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U.S. PTO

UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No.	16820P456
First Inventor	Jiang XiaoPing
Title	TWO-PIN BUTTONS
Express Mail Label No.	EV839871107US

112921 U.S. PTO
11/437517
051806

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents

ADDRESS TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450

1. ☒ **Fee Transmittal Form** (e.g., PTO/SB/17) *(Submit an original and a duplicate for fee processing)*
2. ☐ **Applicant claims small entity status.** See 37 CFR 1.27.
3. ☒ **Specification** *[Total Pages 55]* Both the claims and abstract must start on a new page *(For information on the preferred arrangement, see MPEP 608.01(a))*
4. ☒ **Drawing(s)** *(35 U.S.C. 113)* *[Total Sheets 10]*
5. **Oath or Declaration** (signed) *[Total Pages 3]*
   a. ☒ Newly executed (original or copy)
   b. ☐ Copy from a prior application (37 CFR 1.63(d)) *(for continuation/divisional with Box 18 completed)*
      i. ☐ DELETION OF INVENTOR(S) Signed statement attached deleting inventor(s) named in the prior application, see 37 CFR 1.63(d)(2) and 1.33(b).
6. ☐ **Application Data Sheet.** See 37 CFR 1.76
7. ☐ **CD-ROM or CD-R** in duplicate, large table or Computer Program *(Appendix)*
8. **Nucleotide and/or Amino Acid Sequence Submission** *(if applicable, all necessary)*
   a. ☐ Computer Readable Form (CRF)
   b. Specification Sequence Listing on:
      i. ☐ CD-ROM or CD-R (2 copies); or
      ii. ☐ paper
   c. ☐ Statements verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

9. ☒ **Assignment Papers** (cover sheet & document(s)) Name of Assignee Cypress Semiconductor Corporation
10. ☐ **37 CFR 3.73(b) Statement** *(when there is an assignee)* ☒ **Power of Attorney**
11. ☐ **English Translation Document** *(if applicable)*
12. ☒ **Information Disclosure Statement** (PTO/SB/08 or PTO-1449) ☒ Copies of citations attached
13. ☐ **Preliminary Amendment** ☐ Application Amended to Reflect Claim of Priority
14. ☒ **Return Receipt Postcard** (MPEP 503) *(Should be specifically itemized)*
15. ☐ **Certified Copy of Priority Document(s)** *(if foreign priority is claimed)*
16. ☐ **Nonpublication Request** under 35 U.S.C. 122 (b)(2)(B)(i). Applicant must attach form PTO/SB/35 or its equivalent.
17. ☐ Other: ____________________

18. If a CONTINUING APPLICATION, *check appropriate box, and supply the requisite information below and in the first sentence of the specification following the title, or in an Application Data Sheet under 37 CFR 1.76:*

☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No: __________

Prior application information: Examiner __________ *Group/Art Unit:* __________

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19. CORRESPONDENCE ADDRESS

☒ *Customer Number* **08791** or ☒ *Correspondence address below*

Name	Daniel E. Ovanezian				
	Blakely, Sokoloff, Taylor & Zafman LLP				
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Name (Print/Type)	Daniel E. Ovanezian	Registration No. (Attorney/Agent)	41,236
Signature		Date	5/18/06

Based on PTO/SB/05 (04-05) as modified by Blakely, Sokoloff, Taylor & Zafman (wlr) 11/30/2005.
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EXHIBIT 1011

IPR Petition for U.S. Patent No. 8,004,497

Effective 12/08/2004
Fees pursuant to the Consolidated Appropriations Act, 2005 (H.R. 4818).

FEE TRANSMITTAL for FY 2005

☐ Applicant claims small entity status. See 37 CFR 1.27.

TOTAL AMOUNT OF PAYMENT	($)	1,040.00

Complete if Known	
Application Number	
Filing Date	
First Named Inventor	Jiang XiaoPing
Examiner Name	
Art Unit	
Attorney Docket No.	16820P456

METHOD OF PAYMENT *(check all that apply)*

☒ Check ☐ Credit card ☐ Money Order ☐ None ☐ Other (please identify): ____________

☐ Deposit Account Deposit Account Number: 02-2666 Deposit Account Name: Blakely, Sokoloff, Taylor & Zafman LLP

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FEE CALCULATION

1. BASIC FILING, SEARCH, AND EXAMINATION FEES

	FILING FEES		SEARCH FEES		EXAMINATION FEES		
		Small Entity		Small Entity		Small Entity	
Application Type	Fee($)	Fee($)	Fee($)	Fee($)	Fee($)	Fee($)	Fee(s) Paid ($)
Utility	300	150	500	250	200	100	1,000.00
Design	200	100	100	50	130	65	
Plant	200	100	300	150	160	80	
Reissue			500	250	600	300	
Provisional	200	100	0	0	0	0	

2. EXCESS CLAIM FEES

Fee Description	Fee($)	Small Entity Fee($)
Each claim over 20 (including Reissues)	50	25
Each independent claim over 3 (including Reissues)	200	100
Multiple independent claims	360	180

Total Claims **Extra Claims** **Fee ($)** **Fee Paid**
20 - 20 or HP = 0 X 50.00 = $0.00
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Multiple Dependent Claims
Fee ($) **Fee Paid**
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4. OTHER FEE(S) **Fees Paid ($)**

Non-English Specification, $130 fee (no small entity discount) ____
Other: ____________ ____
Recording of a patent assignment 40.00

5. TOTAL AMOUNT OF PAYMENT ($) 1,040.00

SUBMITTED BY				Complete (if applicable)	
Name (Print/Type)	Daniel E. Ovanezian	Registration No. (Attorney/Agent)	41,236	Telephone	(408) 720-8300
Signature	[signature]			Date	5/18/06

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SUBMITTED BY				Complete (if applicable)	
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Signature	[signature]			Date	5/18/06

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UNITED STATES PATENT APPLICATION

For

TWO-PIN BUTTONS

Inventor:

Jiang XiaoPing

BSTZ Docket No.: 16820P456
Cypress Reference No.: CD06039

Prepared By:
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12400 Wilshire Boulevard, Seventh Floor
Los Angeles, CA 90025-1030
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EV839871107US — May 18, 2006

("Express Mail" mailing label number) (Date of Deposit)

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TWO-PIN BUTTONS

TECHNICAL FIELD

[0001] This invention relates to the field of user interface devices and, in particular, to touch-sensing devices.

BACKGROUND

[0002] Computing devices, such as notebook computers, personal data assistants (PDAs), and mobile handsets, have user interface devices, which are also known as human interface device (HID). One user interface device that is common is a touch-sensor button. A basis touch-sensor button emulates the function of a mechanical button. Touch-sensor buttons may be embedded into different types of operational panels of electronic devices. For example, touch-sensor buttons may be used on operational or control panels of household appliances, consumer electronics, mechanical devices, and the like. Touch-sensor buttons may also be used in conjunction with, or in place of, other user input devices, such as keyboards, mice, trackballs, or the like.

[0003] Figure 1A illustrates a conventional sensing device having three touch-sensor buttons. Conventional sensing device 100 includes button 101, button 102, and button 103. These buttons are conventional touch-sensor buttons. These three buttons may be used for user input using a conductive object, such as a finger.

[0004] Figure 1B illustrates a conventional sensing device of three touch-sensor buttons 101-103 coupled to a processing device 110. Processing device 110 is used to detect whether a conductive object is present on either, or none, of the touch-sensor buttons 101-103. To detect the presence of the conductive object, the processing device 110 may include capacitance sensors 104-106, which are coupled to buttons 101-103, respectively. The capacitance sensors of the processing device are coupled to the touch-sensor buttons in a one-to-one configuration. Accordingly, the processing device 110 scans the touch-sensor buttons 101-103 using the capacitance sensors 104-106, and measures the capacitance on the touch-sensor buttons 101-103.

[0005] Each of the conventional touch-sensor buttons 101-103 may be made of a sensor element of conductive material, such as copper-clad. The conductive material may be form shaped in a circular shape (illustrated in Figure 1A), or even in a rectangular shape (illustrated in Figure 1B). The touch-sensor buttons may be capacitance sensor buttons, which may be used as non-contact switches. These switches, when protected by an insulating layer, offer resistance to severe environments.

[0006] It should be noted that the conventional configuration of Figure 1B includes a one-to-one configuration of touch-sensor buttons to capacitance sensors. There are other conventional configurations that may use less capacitance sensors to measure the capacitance on the three touch-sensor buttons. These conventional configurations, however, still require a one-to-one configuration of pins to touch-sensor buttons. Accordingly, by adding more buttons, the processing device needs to have more pins to correspond to the one-to-one configuration of pins to touch-sensor buttons. Similarly, by increasing the pin count, the scan time to scan the sensor elements increases. In addition, the memory of the processing device, which may be used to store program data and/or temporary data (e.g., raw measurement data, differential counts, baseline measurement data, and the like), increases by increasing the pin count.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] The present invention is illustrated by way of example, and not by way of limitation, in the figures of the accompanying drawings.

[0008] Figure 1A illustrates a conventional sensing device having three touch-sensor buttons.

[0009] Figure 1B illustrates a conventional sensing device of three touch-sensor buttons coupled to a processing device.

[0010] Figure 2 illustrates a block diagram of one embodiment of an electronic system having a processing device for detecting a presence of a conductive object.

[0011] Figure 3A illustrates a varying switch capacitance.

[0012] Figure 3B illustrates one embodiment of a relaxation oscillator.

[0013] Figure 4 illustrates a block diagram of one embodiment of a capacitance sensor including a relaxation oscillator and digital counter.

[0014] Figure 5A illustrates a top-side view of one embodiment of a sensor array having a plurality of sensor elements for detecting a presence of a conductive object on the sensor array of a touch-sensor pad.

[0015] Figure 5B illustrates a top-side view of one embodiment of a sensor array having a plurality of sensor elements for detecting a presence of a conductive object on the sensor array of a touch-sensor slider

[0016] Figure 5C illustrates a top-side view of one embodiment of a two-layer touch-sensor pad.

[0017] Figure 5D illustrates a side view of one embodiment of the two-layer touch-sensor pad of Figure 5C.

[0018] Figure 6A illustrates one embodiment of a sensing device having three touch-sensor buttons.

[0019] Figure 6B illustrates one embodiment of the sensing device of Figure 6A coupled to a processing device.

[0020] Figure 6C illustrates another embodiment of a sensing device having three touch-sensor buttons.

[0021] Figure 6D illustrates another embodiment of a sensing device having three touch-sensor buttons.

[0022] Figure 7A illustrates another embodiment of a sensing device having four touch-sensor buttons.

[0023] Figure 7B illustrates another embodiment of a sensing device having five touch-sensor buttons.

DETAILED DESCRIPTION

[0024] Described herein is an apparatus and method for detecting a presence of a conductive object on a sensing device, and recognizing three or more button operations performed by the conductive object using two sensing areas of the sensing device. The following description sets forth numerous specific details such as examples of specific systems, components, methods, and so forth, in order to provide a good understanding of several embodiments of the present invention. It will be apparent to one skilled in the art, however, that at least some embodiments of the present invention may be practiced without these specific details. In other instances, well-known components or methods are not described in detail or are presented in simple block diagram format in order to avoid unnecessarily obscuring the present invention. Thus, the specific details set forth are merely exemplary. Particular implementations may vary from these exemplary details and still be contemplated to be within the spirit and scope of the present invention.

[0025] Embodiments of a method and apparatus are described to recognize three or more button operations performed by the conductive object on three or more sensor elements that are coupled to two pins of a processing device. In one embodiment, the apparatus may include a sensing device (e.g., touch-sensor button) that has first, second, and third sensor elements. The third sensor element has a first portion coupled to the first sensor element, and a second portion coupled to the second sensor element. These portions of the third sensor element are electrically isolated from one another.

[0026] The embodiments describe herein permit the expansion of additional buttons (e.g., three or more total buttons) to the sensing device, while using only two pins on the processing device. Conversely, since the conventional configuration has implemented a one-to-one configuration of sensor elements to pins of the processing device, each button added requires an additional pin on the processing device. Using only two pins, the scan time does not increase by adding additional buttons to implement three or more buttons on the sensing device. By maintaining two pins for three or more buttons, the scan time to scan the sensor elements is not increased. In other words, more buttons may be implemented without increasing the total scan time of the sensing device. Similarly, the memory of the processing device is not increased to accommodate additional program data and/or temporary data (e.g., raw measurement data, differential counts, baseline measurement data, and the like) for the additional buttons.

[0027] The sensing device may use two capacitive switch relaxation oscillator (CSR) pins of a processing device to realize more than two buttons on the sensing device. For example, the three or more buttons may be realized by using two sensing areas. Each sensing area may include a bar of conductive material and several interconnected sub-bars. The sub-bars of the two sensing areas are interleaved and are electrically isolated. In other words, one set of interconnected sub-bars are connected to one pin, while the other set is coupled to the other pin. The two sensing areas make up three or more sensor elements that are used to form the touch-sensor buttons. The different buttons contain different percentages of surface area of the sensing areas. Alternatively, each sensing area may include two or more bars of conductive material with or without several interconnected sub-bars.

[0028] For example, a three-button scheme using two pins includes one sensor element that has 100% of the first sensing area, the second sensor element has 50% of the first sensing area and 50% of the second sensing area, and the third sensor element has

100% of the second sensing area. Accordingly, by scanning and measuring the capacitance (e.g., capacitance variation of the capacitance minus the baseline, as described below) on the two pins to detect the presence of the conductive object, the processing device can distinguish between the presence of the conductive object on the first, second, and third sensor elements. For example, if the capacitance variation δ_1, measured on the first pin, is greater than zero, and the capacitance variation δ_2, measured on the second pin is equal to approximately zero, then the first button has been pressed. Similarly, if the capacitance variation δ_1, measured on the first pin, is equal to the capacitance variation δ_2, measured on the second pin, then the second button has been pressed. If the capacitance variation δ_1, measured on the first pin, is equal to approximately zero, and the capacitance variation δ_2, measured on the second pin is greater than zero, then the third button has been pressed.

[0029] The embodiments herein may be beneficial to help reduce the pin count of the processing device. This may decrease the complexity of the processing device, or allow the processing device to support additional functionality, such as cursor positioning and selecting functionality, keyboard functionality, slider functionality, or the like. Furthermore, the embodiments may be beneficial to help reduce the scan time of the sensing device. Using two pins of the processing device to measure the capacitance on two sensing areas to realize three or more buttons is faster than measuring the capacitance on three or more touch-sensor buttons of the conventional configuration (e.g., one-to-one configuration). In addition, using two pins reduces the RAM/FLASH space needed in the sensing device, as compared to the conventional configuration.

[0030] The embodiments described herein may be used in different types of operational panels of electronic devices. For example, touch-sensor buttons may be used on operational or control panels of household appliances, consumer electronics, mechanical devices, and the like. Touch-sensor buttons may also be used in conjunction with, or in place of, other user input devices, such as keyboards, mice, trackballs, or the like.

[0031] Figure 2 illustrates a block diagram of one embodiment of an electronic system having a processing device for detecting a presence of a conductive object. Electronic system 200 includes processing device 210, touch-sensor pad 220, touch-sensor slider 230, touch-sensor buttons 240, host processor 250, embedded controller 260, and non-capacitance sensor elements 270. The processing device 210 may include analog and/or digital general purpose input/output ("GPIO") ports 207. GPIO ports 207 may be programmable. GPIO ports 207 may be coupled to a Programmable Interconnect and Logic ("PIL"), which acts as an interconnect between GPIO ports 207 and a digital block array of the processing device 210 (not illustrated). The digital block array may be configured to implement a variety of digital logic circuits (e.g., DAC, digital filters, digital control systems, etc.) using, in one embodiment, configurable user modules ("UMs"). The digital block array may be coupled to a system bus. Processing device 210 may also include memory, such as random access memory (RAM) 205 and program flash 204. RAM 205 may be static RAM (SRAM), and program flash 204 may be a non-volatile storage, which may be used to store firmware (e.g., control algorithms executable by processing core 202 to implement operations described herein). Processing device 210 may also include a memory controller unit (MCU) 203 coupled to memory and the processing core 202.

[0032] The processing device 210 may also include an analog block array (not illustrated). The analog block array is also coupled to the system bus. Analog block array also may be configured to implement a variety of analog circuits (e.g., ADC, analog filters, etc.) using, in one embodiment, configurable UMs. The analog block array may also be coupled to the GPIO 207.

[0033] As illustrated, capacitance sensor 201 may be integrated into processing device 210. Capacitance sensor 201 may include analog I/O for coupling to an external component, such as touch-sensor pad 220, touch-sensor slider 230, touch-sensor buttons 240, and/or other devices. Capacitance sensor 201 and processing device 202 are described in more detail below.

[0034] It should be noted that the embodiments described herein are not limited to touch-sensor pads for notebook implementations, but can be used in other capacitive sensing implementations, for example, the sensing device may be a touch-sensor slider 230, or a touch-sensor button 240 (e.g., capacitance sensing button). Similarly, the operations described herein are not limited to notebook cursor operations, but can include other operations, such as lighting control (dimmer), volume control, graphic equalizer control, speed control, or other control operations requiring gradual adjustments. It should also be noted that these embodiments of capacitive sensing implementations may be used in conjunction with non-capacitive sensing elements, including but not limited to pick buttons, sliders (ex. display brightness and contrast), scroll-wheels, multi-media control (ex. volume, track advance, etc) handwriting recognition and numeric keypad operation.

[0035] In one embodiment, the electronic system 200 includes a touch-sensor pad 220 coupled to the processing device 210 via bus 221. Touch-sensor pad 220 may include a multi-dimension sensor array. The multi-dimension sensor array comprises a plurality of sensor elements, organized as rows and columns. In another embodiment, the electronic system 200 includes a touch-sensor slider 230 coupled to the processing device 210 via bus 231. Touch-sensor slider 230 may include a single-dimension sensor array. The single-dimension sensor array comprises a plurality of sensor elements, organized as rows, or alternatively, as columns. In another embodiment, the electronic system 200 includes a touch-sensor button 240 coupled to the processing device 210 via bus 241. Touch-sensor button 240 may include a single-dimension or multi-dimension sensor array. The single- or multi-dimension sensor array comprises a plurality of sensor elements. For a touch-sensor button, the plurality of sensor elements may be coupled together to detect a presence of a conductive object over the entire surface of the sensing device. Alternatively, the touch-sensor button 240 has a single sensor element to detect the presence of the conductive object. In one embodiment, the touch-sensor button 240 may be a capacitance sensor element. Capacitance sensor elements may be used as non-contact switches. These switches, when protected by an insulating layer, offer resistance to severe environments.

[0036] The electronic system 200 may include any combination of one or more of the touch-sensor pad 220, touch-sensor slider 230, and/or touch-sensor button 240. In another embodiment, the electronic system 200 may also include non-capacitance sensor elements 270 coupled to the processing device 210 via bus 271. The non-capacitance sensor elements 270 may include buttons, light emitting diodes (LEDs), and other user interface devices, such as a mouse, a keyboard, or other functional keys that do not require capacitance sensing. In one embodiment, buses 271, 241, 231, and 221 may be a single bus. Alternatively, these buses may be configured into any combination of one or more separate buses.

[0037] The processing device may also provide value-added functionality such as keyboard control integration, LEDs, battery charger and general purpose I/O, as illustrated as non-capacitance sensor elements 270. Non-capacitance sensor elements 270 are coupled to the GPIO 207.

[0038] Processing device 210 may include internal oscillator/clocks 206 and communication block 208. The oscillator/clocks block 206 provides clock signals to one or more of the components of processing device 210. Communication block 208 may be used to communicate with an external component, such as a host processor 250, via host interface (I/F) line 251. Alternatively, processing block 210 may also be coupled to embedded controller 260 to communicate with the external components, such as host 250. Interfacing to the host 250 can be through various methods. In one exemplary embodiment, interfacing with the host 250 may be done using a standard PS/2 interface to connect to an embedded controller 260, which in turn sends data to the host 250 via low pin count (LPC) interface. In some instances, it may be beneficial for the processing device 210 to do both touch-sensor pad and keyboard control operations, thereby freeing up the embedded controller 260 for other housekeeping functions. In another exemplary embodiment, interfacing may be done using a universal serial bus (USB) interface directly coupled to the host 250 via host interface line 251. Alternatively, the processing device 210 may communicate to external components, such as the host 250 using industry standard interfaces, such as USB, PS/2, inter-integrated circuit (I2C) bus, or system packet interfaces (SPI). The host 250 and/or embedded controller 260 may be coupled to the processing device 210 with a ribbon or flex cable from an assembly, which houses the sensing device and processing device.

[0039] In one embodiment, the processing device 210 is configured to communicate with the embedded controller 260 or the host 250 to send and/or receive data. The data may be a command or alternatively a signal. In an exemplary embodiment, the electronic system 200 may operate in both standard-mouse compatible and enhanced modes. The standard-mouse compatible mode utilizes the HID class drivers already built into the Operating System (OS) software of host 250. These drivers enable the processing device 210 and sensing device to operate as a standard cursor control user interface device, such as a two-button PS/2 mouse. The enhanced mode may enable additional features such as scrolling (reporting absolute position) or disabling the sensing device, such as when a mouse is plugged into the notebook. Alternatively, the processing device 210 may be configured to communicate with the embedded controller 260 or the host 250, using non-OS drivers, such as dedicated touch-sensor pad drivers, or other drivers known by those of ordinary skill in the art.

[0040] In other words, the processing device 210 may operate to communicate data (e.g., commands or signals) using hardware, software, and/or firmware, and the data may be communicated directly to the processing device of the host 250, such as a host processor, or alternatively, may be communicated to the host 250 via drivers of the host

250, such as OS drivers, or other non-OS drivers. It should also be noted that the host 250 may directly communicate with the processing device 210 via host interface 251.

[0041] In one embodiment, the data sent to the host 250 from the processing device 210 includes click, double-click, movement of the cursor, scroll-up, scroll-down, scroll-left, scroll-right, step Back, and step Forward. Alternatively, other user interface device commands may be communicated to the host 250 from the processing device 210. These commands may be based on gestures occurring on the sensing device that are recognized by the processing device, such as tap, push, hop, and zigzag gestures. Alternatively, other commands may be recognized. Similarly, signals may be sent that indicate the recognition of these operations.

[0042] In particular, a tap gesture, for example, may be when the finger (e.g., conductive object) is on the sensing device for less than a threshold time. If the time the finger is placed on the touchpad is greater than the threshold time it may be considered to be a movement of the cursor, in the x- or y-axes. Scroll-up, scroll-down, scroll-left, and scroll-right, step back, and step-forward may be detected when the absolute position of the conductive object is within a pre-defined area, and movement of the conductive object is detected.

[0043] Processing device 210 may reside on a common carrier substrate such as, for example, an integrated circuit (IC) die substrate, a multi-chip module substrate, or the like. Alternatively, the components of processing device 210 may be one or more separate integrated circuits and/or discrete components. In one exemplary embodiment, processing device 210 may be a Programmable System on a Chip (PSoC™) processing device, manufactured by Cypress Semiconductor Corporation, San Jose, California.

Alternatively, processing device 210 may be one or more other processing devices known by those of ordinary skill in the art, such as a microprocessor or central processing unit, a controller, special-purpose processor, digital signal processor (DSP), an application specific integrated circuit (ASIC), a field programmable gate array (FPGA), or the like. In an alternative embodiment, for example, the processing device may be a network processor having multiple processors including a core unit and multiple microengines. Additionally, the processing device may include any combination of general-purpose processing device(s) and special-purpose processing device(s).

[0044] Capacitance sensor 201 may be integrated into the IC of the processing device 210, or alternatively, in a separate IC. Alternatively, descriptions of capacitance sensor 201 may be generated and compiled for incorporation into other integrated circuits. For example, behavioral level code describing capacitance sensor 201, or portions thereof, may be generated using a hardware descriptive language, such as VHDL or Verilog, and stored to a machine-accessible medium (e.g., CD-ROM, hard disk, floppy disk, etc.). Furthermore, the behavioral level code can be compiled into register transfer level ("RTL") code, a netlist, or even a circuit layout and stored to a machine-accessible medium. The behavioral level code, the RTL code, the netlist, and the circuit layout all represent various levels of abstraction to describe capacitance sensor 201.

[0045] It should be noted that the components of electronic system 200 may include all the components described above. Alternatively, electronic system 200 may include only some of the components described above.

[0046] In one embodiment, electronic system 200 may be used in a notebook computer. Alternatively, the electronic device may be used in other applications, such as a mobile handset, a personal data assistant (PDA), a keyboard, a television, a remote control, a monitor, a handheld multi-media device, a handheld video player, a handheld gaming device, or a control panel.

[0047] In one embodiment, capacitance sensor 201 may be a capacitive switch relaxation oscillator (CSR). The CSR may have an array of capacitive touch switches using a current-programmable relaxation oscillator, an analog multiplexer, digital counting functions, and high-level software routines to compensate for environmental and physical switch variations. The switch array may include combinations of independent switches, sliding switches (e.g., touch-sensor slider), and touch-sensor pads implemented as a pair of orthogonal sliding switches. The CSR may include physical, electrical, and software components. The physical component may include the physical switch itself, typically a pattern constructed on a printed circuit board (PCB) with an insulating cover, a flexible membrane, or a transparent overlay. The electrical component may include an oscillator or other means to convert a changed capacitance into a measured signal. The electrical component may also include a counter or timer to measure the oscillator output. The software component may include detection and compensation software algorithms to convert the count value into a switch detection decision. For example, in the case of slide switches or X-Y touch-sensor pads, a calculation for finding position of the conductive object to greater resolution than the physical pitch of the switches may be used.

[0048] It should be noted that there are various known methods for measuring capacitance. Although the embodiments described herein are described using a relaxation oscillator, the present embodiments are not limited to using relaxation oscillators, but may include other methods, such as current versus voltage phase shift measurement, resistor-capacitor charge timing, capacitive bridge divider, charge transfer, or the like.

[0049] The current versus voltage phase shift measurement may include driving the capacitance through a fixed-value resistor to yield voltage and current waveforms that are out of phase by a predictable amount. The drive frequency can be adjusted to keep the phase measurement in a readily measured range. The resistor-capacitor charge timing may include charging the capacitor through a fixed resistor and measuring timing on the voltage ramp. Small capacitor values may require very large resistors for reasonable timing. The capacitive bridge divider may include driving the capacitor under test through a fixed reference capacitor. The reference capacitor and the capacitor under test form a voltage divider. The voltage signal is recovered with a synchronous demodulator, which may be done in the processing device 210. The charge transfer may be conceptually similar to an R-C charging circuit. In this method, C_P is the capacitance being sensed. C_{SUM} is the summing capacitor, into which charge is transferred on successive cycles. At the start of the measurement cycle, the voltage on C_{SUM} is reset. The voltage on C_{SUM} increases exponentially (and only slightly) with each clock cycle. The time for this voltage to reach a specific threshold is measured with a counter. Additional details regarding these alternative embodiments have not been included so as to not obscure the present embodiments, and because these alternative embodiments for measuring capacitance are known by those of ordinary skill in the art.

[0050] Figure 3A illustrates a varying switch capacitance. In its basic form, a capacitive switch 300 is a pair of adjacent plates 301 and 302. There is a small edge-to-edge capacitance Cp, but the intent of switch layout is to minimize the base capacitance

Cp between these plates. When a conductive object 303 (e.g., finger) is placed in proximity to the two plate 301 and 302, there is a capacitance 2*Cf between one electrode 301 and the conductive object 303 and a similar capacitance 2*Cf between the conductive object 303 and the other electrode 302. The capacitance between one electrode 301 and the conductive object 303 and back to the other electrode 302 adds in parallel to the base capacitance Cp between the plates 301 and 302, resulting in a change of capacitance Cf. Capacitive switch 300 may be used in a capacitance switch array. The capacitance switch array is a set of capacitors where one side of each is grounded. Thus, the active capacitor (as represented in Figure 3B as capacitor 351) has only one accessible side. The presence of the conductive object 303 increases the capacitance (Cp + Cf) of the switch 300 to ground. Determining switch activation is then a matter of measuring change in the capacitance (Cf). Switch 300 is also known as a grounded variable capacitor. In one exemplary embodiment, Cf may range from approximately 10-30 picofarads (pF). Alternatively, other ranges may be used.

[0051] The conductive object in this case is a finger, alternatively, this technique may be applied to any conductive object, for example, a conductive door switch, position sensor, or conductive pen in a stylus tracking system.

[0052] Figure 3B illustrates one embodiment of a relaxation oscillator. The relaxation oscillator 350 is formed by the capacitance to be measured on capacitor 351, a charging current source 352, a comparator 353, and a reset switch 354. It should be noted that capacitor 351 is representative of the capacitance measured on a sensor element of a sensor array. The relaxation oscillator is coupled to drive a charging current (Ic) 357 in a single direction onto a device under test ("DUT") capacitor, capacitor 351. As the charging current piles charge onto the capacitor 351, the voltage across the capacitor increases with time as a function of Ic 357 and its capacitance C. Equation (1) describes the relation between current, capacitance, voltage and time for a charging capacitor.

$$CdV = I_C dt \tag{1}$$

[0053] The relaxation oscillator begins by charging the capacitor 351 from a ground potential or zero voltage and continues to pile charge on the capacitor 351 at a fixed charging current Ic 357 until the voltage across the capacitor 351 at node 355 reaches a reference voltage or threshold voltage, V_{TH} 355. At V_{TH} 355, the relaxation oscillator allows the accumulated charge at node 355 to discharge (e.g., the capacitor 351 to "relax" back to the ground potential) and then the process repeats itself. In particular, the output of comparator 353 asserts a clock signal F_{OUT} 356 (e.g., F_{OUT} 356 goes high), which enables the reset switch 354. This resets the voltage on the capacitor at node 355 to ground and the charge cycle starts again. The relaxation oscillator outputs a relaxation oscillator clock signal (F_{OUT} 356) having a frequency (f_{RO}) dependent upon capacitance C of the capacitor 351 and charging current Ic 357.

[0054] The comparator trip time of the comparator 353 and reset switch 354 add a fixed delay. The output of the comparator 353 is synchronized with a reference system clock to guarantee that the comparator reset time is long enough to completely reset the charging voltage on capacitor 355. This sets a practical upper limit to the operating frequency. For example, if capacitance C of the capacitor 351 changes, then f_{RO} will change proportionally according to Equation (1). By comparing f_{RO} of F_{OUT} 356 against the frequency (f_{REF}) of a known reference system clock signal (REF CLK), the change in capacitance ΔC can be measured. Accordingly, equations (2) and (3) below describe that a change in frequency between F_{OUT} 356 and REF CLK is proportional to a change in capacitance of the capacitor 351.

$$\Delta C \propto \Delta f \text{, where} \tag{2}$$

$$\Delta f = f_{RO} - f_{REF}. \tag{3}$$

[0055] In one embodiment, a frequency comparator may be coupled to receive relaxation oscillator clock signal (F_{OUT} 356) and REF CLK, compare their frequencies f_{RO} and f_{REF}, respectively, and output a signal indicative of the difference Δf between these frequencies. By monitoring Δf one can determine whether the capacitance of the capacitor 351 has changed.

[0056] In one exemplary embodiment, the relaxation oscillator 350 may be built using a programmable timer (e.g., 555 timer) to implement the comparator 353 and reset switch 354. Alternatively, the relaxation oscillator 350 may be built using other circuiting. Relaxation oscillators are known in by those of ordinary skill in the art, and accordingly, additional details regarding their operation have not been included so as to not obscure the present embodiments.

[0057] Figure 4 illustrates a block diagram of one embodiment of a capacitance sensor including a relaxation oscillator and digital counter. Capacitance sensor 201 of Figure 4 includes a sensor array 410 (also known as a switch array), relaxation oscillator 350, and a digital counter 420. Sensor array 410 includes a plurality of sensor elements 355(1)-355(N), where N is a positive integer value that represents the number of rows (or alternatively columns) of the sensor array 410. Each sensor element is represented as a capacitor, as previously described with respect to Figure 3B. The sensor array 410 is coupled to relaxation oscillator 350 via an analog bus 401 having a plurality of pins

401(1)-401(N). In one embodiment, the sensor array 410 may be a single-dimension sensor array including the sensor elements 355(1)-355(N), where N is a positive integer value that represents the number of sensor elements of the single-dimension sensor array. The single-dimension sensor array 410 provides output data to the analog bus 401 of the processing device 210 (e.g., via lines 231). Alternatively, the sensor array 410 may be a multi-dimension sensor array including the sensor elements 355(1)-355(N), where N is a positive integer value that represents the number of sensor elements of the multi-dimension sensor array. The multi-dimension sensor array 410 provides output data to the analog bus 401 of the processing device 210 (e.g., via bus 221).

[0058] Relaxation oscillator 350 of Figure 4 includes all the components described with respect to Figure 3B, and a selection circuit 430. The selection circuit 430 is coupled to the plurality of sensor elements 355(1)-355(N), the reset switch 354, the current source 352, and the comparator 353. Selection circuit 430 may be used to allow the relaxation oscillator 350 to measure capacitance on multiple sensor elements (e.g., rows or columns). The selection circuit 430 may be configured to sequentially select a sensor element of the plurality of sensor elements to provide the charge current and to measure the capacitance of each sensor element. In one exemplary embodiment, the selection circuit 430 is a multiplexer array of the relaxation oscillator 350. Alternatively, selection circuit may be other circuitry outside the relaxation oscillator 350, or even outside the capacitance sensor 201 to select the sensor element to be measured. Capacitance sensor 201 may include one relaxation oscillator and digital counter for the plurality of sensor elements of the sensor array. Alternatively, capacitance sensor 201 may include multiple relaxation oscillators and digital counters to measure capacitance on the plurality of sensor elements of the sensor array. The multiplexer array may also be used to ground the sensor elements that are not being measured. This may be done in conjunction with a dedicated pin in the GP10 port 207.

[0059] In another embodiment, the capacitance sensor 201 may be configured to simultaneously scan the sensor elements, as opposed to being configured to sequentially scan the sensor elements as described above. For example, the sensing device may include a sensor array having a plurality of rows and columns. The rows may be scanned simultaneously, and the columns may be scanned simultaneously.

[0060] In one exemplary embodiment, the voltages on all of the rows of the sensor array are simultaneously moved, while the voltages of the columns are held at a constant voltage, with the complete set of sampled points simultaneously giving a profile of the conductive object in a first dimension. Next, the voltages on all of the rows are held at a constant voltage, while the voltages on all the rows are simultaneously moved, to obtain a complete set of sampled points simultaneously giving a profile of the conductive object in the other dimension.

[0061] In another exemplary embodiment, the voltages on all of the rows of the sensor array are simultaneously moved in a positive direction, while the voltages of the columns are moved in a negative direction. Next, the voltages on all of the rows of the sensor array are simultaneously moved in a negative direction, while the voltages of the columns are moved in a positive direction. This technique doubles the effect of any transcapacitance between the two dimensions, or conversely, halves the effect of any parasitic capacitance to the ground. In both methods, the capacitive information from the sensing process provides a profile of the presence of the conductive object to the sensing device in each dimension. Alternatively, other methods for scanning known by those of ordinary skill in the art may be used to scan the sensing device.

[0062] Digital counter 420 is coupled to the output of the relaxation oscillator 350. Digital counter 420 receives the relaxation oscillator output signal 356 (F_{OUT}). Digital counter 420 is configured to count at least one of a frequency or a period of the relaxation oscillator output received from the relaxation oscillator.

[0063] As previously described with respect to the relaxation oscillator 350, when a finger or conductive object is placed on the switch, the capacitance increases from Cp to Cp + Cf so the relaxation oscillator output signal 356 (F_{OUT}) decreases. The relaxation oscillator output signal 356 (F_{OUT}) is fed to the digital counter 420 for measurement. There are two methods for counting the relaxation oscillator output signal 356, frequency measurement and period measurement. In one embodiment, the digital counter 420 may include two multiplexers 423 and 424. Multiplexers 423 and 424 are configured to select the inputs for the PWM 421 and the timer 422 for the two measurement methods, frequency and period measurement methods. Alternatively, other selection circuits may be used to select the inputs for the PWM 421 and the time 422. In another embodiment, multiplexers 423 and 424 are not included in the digital counter, for example, the digital counter 420 may be configured in one, or the other, measurement configuration.

[0064] In the frequency measurement method, the relaxation oscillator output signal 356 is counted for a fixed period of time. The counter 422 is read to obtain the number of counts during the gate time. This method works well at low frequencies where the oscillator reset time is small compared to the oscillator period. A pulse width modulator (PWM) 441 is clocked for a fixed period by a derivative of the system clock, VC3 426 (which is a divider from system clock 425, e.g., 24 MHz). Pulse width modulation is a modulation technique that generates variable-length pulses to represent the amplitude of an analog input signal; in this case VC3 426. The output of PWM 421 enables timer 422 (e.g., 16-bit). The relaxation oscillator output signal 356 clocks the timer 422. The timer 422 is reset at the start of the sequence, and the count value is read out at the end of the gate period.

[0065] In the period measurement method, the relaxation oscillator output signal 356 gates a counter 422, which is clocked by the system clock 425 (e.g., 24 MHz). In order to improve sensitivity and resolution, multiple periods of the oscillator are counted with the PWM 421. The output of PWM 421 is used to gate the timer 422. In this method, the relaxation oscillator output signal 356 drives the clock input of PWM 421. As previously described, pulse width modulation is a modulation technique that generates variable-length pulses to represent the amplitude of an analog input signal; in this case the relaxation oscillator output signal 356. The output of the PWM 421 enables timer 422 (e.g., 16-bit), which is clocked at the system clock frequency 425 (e.g., 24 MHz). When the output of PWM 421 is asserted (e.g., goes high), the count starts by releasing the capture control. When the terminal count of the PWM 421 is reached, the capture signal is asserted (e.g., goes high), stopping the count and setting the PWM's interrupt. The timer value is read in this interrupt. The relaxation oscillator 350 is indexed to the next switch (e.g., capacitor 351(2)) to be measured and the count sequence is started again.

[0066] The two counting methods may have equivalent performance in sensitivity and signal-to-noise ratio (SNR). The period measurement method may have a slightly faster data acquisition rate, but this rate is dependent on software loads and the values of the switch capacitances. The frequency measurement method has a fixed-switch data acquisition rate.

[0067] The length of the counter 422 and the detection time required for the switch are determined by sensitivity requirements. Small changes in the capacitance on capacitor 351 result in small changes in frequency. In order to find these small changes, it may be necessary to count for a considerable time.

[0068] At startup (or boot) the switches (e.g., capacitors 351(1)-(N)) are scanned and the count values for each switch with no actuation are stored as a baseline array (Cp). The presence of a finger on the switch is determined by the difference in counts between a stored value for no switch actuation and the acquired value with switch actuation, referred to here as Δn. The sensitivity of a single switch is approximately:

$$\frac{\Delta \mathrm{n}}{n} = \frac{Cf}{Cp} \qquad (4)$$

[0069] The value of Δn should be large enough for reasonable resolution and clear indication of switch actuation. This drives switch construction decisions.

[0070] Cf should be as large a fraction of Cp as possible. In one exemplary embodiment, the fraction of Cf/Cp ranges between approximately 0.01 to approximately 2.0. Alternatively, other fractions may be used for Cf/Cp. Since Cf is determined by finger area and distance from the finger to the switch's conductive traces (through the over-lying insulator), the baseline capacitance Cp should be minimized. The baseline capacitance Cp includes the capacitance of the switch pad plus any parasitics, including routing and chip pin capacitance.

[0071] In switch array applications, variations in sensitivity should be minimized. If there are large differences in Δn, one switch may actuate at 1.0 cm, while another may not actuate until direct contact. This presents a non-ideal user interface device. There are numerous methods for balancing the sensitivity. These may include precisely matching on-board capacitance with PC trace length modification, adding balance capacitors on each switch's PC board trace, and/or adapting a calibration factor to each switch to be applied each time the switch is tested.

[0072] In one embodiment, the PCB design may be adapted to minimize capacitance, including thicker PCBs where possible. In one exemplary embodiment, a 0.062 inch thick PCB is used. Alternatively, other thicknesses may be used, for example, a 0.015 inch thick PCB.

[0073] It should be noted that the count window should be long enough for Δn to be a “significant number.” In one embodiment, the "significant number" can be as little as 10, or alternatively, as much as several hundred. In one exemplary embodiment, where Cf is 1.0% of Cp (a typical "weak" switch), and where the switch threshold is set at a count value of 20, n is found to be:

$$n = \Delta n \cdot \frac{Cf}{Cp} = 2000 \qquad (5)$$

[0074] Adding some margin to yield 2500 counts, and running the frequency measurement method at 1.0 MHz, the detection time for the switch is approximately 2.5 microseconds. In the frequency measurement method, the frequency difference between a switch with and without actuation (i.e., CP + CF vs. CP) is approximately:

$$\Delta n = \frac{t_{count} \cdot i_c}{V_{TH}} \frac{Cf}{Cp^2} \qquad (6)$$

[0075] This shows that the sensitivity variation between one channel and another is a function of the square of the difference in the two channels' static capacitances. This sensitivity difference can be compensated using routines in the high-level Application Programming Interfaces (APIs).

[0076] In the period measurement method, the count difference between a switch with and without actuation (i.e., CP+CF vs. CP) is approximately:

$$\Delta \mathrm{n} = N_{Periods} \cdot \frac{Cf \cdot V_{TH}}{i_C} \cdot f_{SysClk} \quad (7)$$

[0077] The charge currents are typically lower and the period is longer to increase sensitivity, or the number of periods for which f_{SysClk} is counted can be increased. In either method, by matching the static (parasitic) capacitances Cp of the individual switches, the repeatability of detection increases, making all switches work approximately at the same difference. Compensation for this variation can be done in software at runtime. The compensation algorithms for both the frequency method and period method may be included in the high-level APIs.

[0078] Some implementations of this circuit use a current source programmed by a fixed-resistor value. If the range of capacitance to be measured changes, external components, (i.e., the resistor) should be adjusted.

[0079] Using the multiplexer array 430, multiple sensor elements may be sequentially scanned to provide current to and measure the capacitance from the capacitors (e.g., sensor elements), as previously described. In other words, while one sensor element is being measured, the remaining sensor elements are grounded using the GPIO port 207. This drive and multiplex arrangement bypasses the existing GPIO to connect the selected pin to an internal analog multiplexer (mux) bus. The capacitor charging current (e.g., current source 352) and reset switch 353 are connected to the analog mux bus. This may limit the pin-count requirement to simply the number of switches (e.g., capacitors 351(1)-351(N)) to be addressed. In one exemplary embodiment, no external resistors or capacitors are required inside or outside the processing device 210 to enable operation.

[0080] The capacitor charging current for the relaxation oscillator 350 is generated in a register programmable current output DAC (also known as IDAC). Accordingly, the current source 352 is a current DAC or IDAC. The IDAC output current may be set by an 8-bit value provided by the processing device 210, such as from the processing core 202. The 8-bit value may be stored in a register or in memory.

[0081] Estimating and measuring PCB capacitances may be difficult; the oscillator-reset time may add to the oscillator period (especially at higher frequencies); and there may be some variation to the magnitude of the IDAC output current with operating frequency. Accordingly, the optimum oscillation frequency and operating current for a particular switch array may be determined to some degree by experimentation.

[0082] In many capacitive switch designs the two "plates" (e.g., 301 and 302) of the sensing capacitor are actually adjacent sensor elements that are electrically isolated (e.g., PCB pads or traces), as indicated in Figure 3A. Typically, one of these plates is grounded. Layouts for touch-sensor slider (e.g., linear slide switches) and touch-sensor pad applications have switches that are immediately adjacent. In this case, all of the switches that are not active are grounded through the GPIO 207 of the processing device

210 dedicated to that pin. The actual capacitance between adjacent plates is small (Cp), but the capacitance of the active plate (and its PCB trace back to the processing device 210) to ground, when detecting the presence of the conductive object 303, may be considerably higher (Cp + Cf). The capacitance of two parallel plates is given by the following equation:

$$C = \varepsilon_0 \cdot \varepsilon_R \cdot \frac{A}{d} = \varepsilon_R \cdot 8.85 \cdot \frac{A}{d} pF/m \qquad (8)$$

[0083] The dimensions of equation (8) are in meters. This is a very simple model of the capacitance. The reality is that there are fringing effects that substantially increase the switch-to-ground (and PCB trace-to-ground) capacitance.

[0084] Switch sensitivity (i.e., actuation distance) may be increased by one or more of the following: 1) increasing board thickness to increase the distance between the active switch and any parasitics; 2) minimizing PC trace routing underneath switches; 3) utilizing a grided ground with 50% or less fill if use of a ground plane is absolutely necessary; 4) increasing the spacing between switch pads and any adjacent ground plane; 5) increasing pad area; 6) decreasing thickness of any insulating overlay; or 7) verifying that there is no air-gap between the PC pad surface and the touching finger.

[0085] There is some variation of switch sensitivity as a result of environmental factors. A baseline update routine, which compensates for this variation, may be provided in the high-level APIs.

[0086] Sliding switches are used for control requiring gradual adjustments. Examples include a lighting control (dimmer), volume control, graphic equalizer, and speed control. These switches are mechanically adjacent to one another. Actuation of one switch results in partial actuation of physically adjacent switches. The actual position in the sliding switch is found by computing the centroid location of the set of switches activated.

[0087] In applications for touch-sensor sliders (e.g., sliding switches) and touch-sensor pads it is often necessary to determine finger (or other capacitive object) position to more resolution than the native pitch of the individual switches. The contact area of a finger on a sliding switch or a touch-pad is often larger than any single switch. In one embodiment, in order to calculate the interpolated position using a centroid, the array is first scanned to verify that a given switch location is valid. The requirement is for some number of adjacent switch signals to be above a noise threshold. When the strongest signal is found, this signal and those immediately adjacent are used to compute a centroid:

$$Centroid = \frac{n_{i-1} \cdot (i-1) + n_i i + n_{i+1} \cdot (i+1)}{n_{i-1} + n_i i + n_{i+1}} \qquad (9)$$

[0088] The calculated value will almost certainly be fractional. In order to report the centroid to a specific resolution, for example a range of 0 to 100 for 12 switches, the centroid value may be multiplied by a calculated scalar. It may be more efficient to combine the interpolation and scaling operations into a single calculation and report this result directly in the desired scale. This may be handled in the high-level APIs. Alternatively, other methods may be used to interpolate the position of the conductive object.

[0089] A physical touchpad assembly is a multi-layered module to detect a conductive object. In one embodiment, the multi-layer stack-up of a touchpad assembly includes a PCB, an adhesive layer, and an overlay. The PCB includes the processing device 210 and other components, such as the connector to the host 250, necessary for operations for sensing the capacitance. These components are on the non-sensing side of the PCB. The PCB also includes the sensor array on the opposite side, the sensing side of the PCB. Alternatively, other multi-layer stack-ups may be used in the touchpad assembly.

[0090] The PCB may be made of standard materials, such as FR4 or Kapton™ (e.g., flexible PCB). In either case, the processing device 210 may be attached (e.g., soldered) directly to the sensing PCB (e.g., attached to the non-sensing side of the PCB). The PCB thickness varies depending on multiple variables, including height restrictions and sensitivity requirements. In one embodiment, the PCB thickness is at least approximately 0.3 millimeters (mm). Alternatively, the PCB may have other thicknesses. It should be noted that thicker PCBs may yield better results. The PCB length and width is dependent on individual design requirements for the device on which the sensing device is mounted, such as a notebook or mobile handset.

[0091] The adhesive layer is directly on top of the PCB sensing array and is used to affix the overlay to the overall touchpad assembly. Typical material used for connecting the overlay to the PCB is non-conductive adhesive such as 3M 467 or 468. In one exemplary embodiment, the adhesive thickness is approximately 0.05 mm. Alternatively, other thicknesses may be used.

[0092] The overlay may be non-conductive material used to protect the PCB circuitry to environmental elements and to insulate the user's finger (e.g., conductive object) from the circuitry. Overlay can be ABS plastic, polycarbonate, glass, or Mylar™.

Alternatively, other materials known by those of ordinary skill in the art may be used. In one exemplary embodiment, the overlay has a thickness of approximately 1.0 mm. In another exemplary embodiment, the overlay thickness has a thickness of approximately 2.0 mm. Alternatively, other thicknesses may be used.

[0093] The sensor array may be a grid-like pattern of sensor elements (e.g., capacitive elements) used in conjunction with the processing device 210 to detect a presence of a conductive object, such as finger, to a resolution greater than that which is native. The touch-sensor pad layout pattern maximizes the area covered by conductive material, such as copper, in relation to spaces necessary to define the rows and columns of the sensor array.

[0094] Figure 5A illustrates a top-side view of one embodiment of a sensor array having a plurality of sensor elements for detecting a presence of a conductive object 303 on the sensor array 500 of a touch-sensor pad. Touch-sensor pad 220 includes a sensor array 500. Sensor array 500 includes a plurality of rows 504(1)-504(N) and a plurality of columns 505(1)-505(M), where N is a positive integer value representative of the number of rows and M is a positive integer value representative of the number of columns. Each row includes a plurality of sensor elements 503(1)-503(K), where K is a positive integer value representative of the number of sensor elements in the row. Each column includes a plurality of sensor elements 501(1)-501(L), where L is a positive integer value representative of the number of sensor elements in the column. Accordingly, sensor array is an N x M sensor matrix. The N x M sensor matrix, in conjunction with the processing device 210, is configured to detect a position of a presence of the conductive object 303 in the x-, and y-directions.

[0095] Figure 5B illustrates a top-side view of one embodiment of a sensor array having a plurality of sensor elements for detecting a presence of a conductive object 303 on the sensor array 550 of a touch-sensor slider. Touch-sensor slider 230 includes a sensor array 550. Sensor array 550 includes a plurality of columns 504(1)-504(M), where M is a positive integer value representative of the number of columns. Each column includes a plurality of sensor elements 501(1)-501(L), where L is a positive integer value representative of the number of sensor elements in the column. Accordingly, sensor array is a 1 x M sensor matrix. The 1 x M sensor matrix, in conjunction with the processing device 210, is configured to detect a position of a presence of the conductive object 303 in the x-direction. It should be noted that sensor array 500 may be configured to function as a touch-sensor slider 230.

[0096] Alternating columns in Figure 5A correspond to x- and y-axis elements. The y-axis sensor elements 503(1)-503(K) are illustrated as black diamonds in Figure 5A, and the x-axis sensor elements 501(1)-501(L) are illustrated as white diamonds in Figure 5A and Figure 5B. It should be noted that other shapes may be used for the sensor elements. In another embodiment, the columns and row may include vertical and horizontal bars (e.g., rectangular shaped bars); however, this design may include additional layers in the PCB to allow the vertical and horizontal bars to be positioned on the PCB so that they are not in contact with one another.

[0097] Figure 5C and 5D illustrate top-side and side views of one embodiment of a two-layer touch-sensor pad. Touch-sensor pad, as illustrated in Figure 5C and 5D, include the first two columns 505(1) and 505(2), and the first four rows 504(1)-504(4) of sensor array 500. The sensor elements of the first column 501(1) are connected together in the top conductive layer 575, illustrated as hashed diamond sensor elements and connections. The diamond sensor elements of each column, in effect, form a chain of elements. The sensor elements of the second column 501(2) are similarly connected in the top conductive layer 575. The sensor elements of the first row 504(1) are connected together in the bottom conductive layer 575 using vias 577, illustrated as black diamond sensor elements and connections. The diamond sensor elements of each row, in effect, form a chain of elements. The sensor elements of the second, third, and fourth rows 504(2)-504(4) are similarly connected in the bottom conductive layer 576.

[0098] As illustrated in Figure 5D, the top conductive layer 575 includes the sensor elements for both the columns and the rows of the sensor array, as well as the connections between the senor elements of the columns of the sensor array. The bottom conductive layer 576 includes the conductive paths that connect the sensor elements of the rows that reside in the top conductive layer 575. The conductive paths between the sensor elements of the rows use vias 577 to connect to one another in the bottom conductive layer 576. Vias 577 go from the top conductive layer 575, through the dielectric layer 578, to the bottom conductive layer 576. Coating layers 579 and 589 are applied to the surfaces opposite to the surfaces that are coupled to the dielectric layer 578 on both the top and bottom conductive layers 575 and 576.

[0099] It should be noted that the space between coating layers 579 and 589 and dielectric layer 578, which does not include any conductive material, may be filled with the same material as the coating layers or dielectric layer. Alternatively, it may be filled with other materials.

[00100] It should be noted that the present embodiments are not be limited to connecting the sensor elements of the rows using vias to the bottom conductive layer 576, but may include connecting the sensor elements of the columns using vias to the bottom conductive layer 576. Furthermore, the present embodiments are not limited two-layer configurations, but may include disposing the sensor elements on multiple layers, such as three- or four-layer configurations.

[00101] When pins are not being sensed (only one pin is sensed at a time), they are routed to ground. By surrounding the sensing device (e.g., touch-sensor pad) with a ground plane, the exterior elements have the same fringe capacitance to ground as the interior elements.

[00102] In one embodiment, an IC including the processing device 210 may be directly placed on the non-sensor side of the PCB. This placement does not necessary have to be in the center. The processing device IC is not required to have a specific set of dimensions for a touch-sensor pad, nor a certain number of pins. Alternatively, the IC may be placed somewhere external to the PCB.

[00103] Figure 6A illustrates one embodiment of a sensing device having three touch-sensor buttons. Sensing device 240 of Figure 6A includes buttons 601, 602, and 603. These three buttons may be used for user input using a conductive object, such as a finger.

[00104] Figure 6B illustrates one embodiment of the sensing device of Figure 6A coupled to a processing device 210. Processing device 210 is used to detect whether a conductive object is present on either, or none, of the touch-sensor buttons 601-603. To detect the presence of the conductive object, the processing device 210 may include

capacitance sensors 201(1) and 201(2), which are coupled to buttons 601-603. In particular, button 601 is coupled to capacitance sensor 201(1), button 603 is coupled to capacitance sensor 201(2), and button 602 is coupled to both capacitance sensor 201(1) and 201(2).

[00105] Each of the conventional touch-sensor buttons 601-603 may be made of a sensor element of conductive material, such as copper-clad. The conductive material may be formed in a circular shape (illustrated in Figures 6A-6D), in a rectangular shape, or in a square shape (illustrated in Figures 7A and 7B). The touch-sensor buttons may be capacitance sensor buttons, which may be used as non-contact switches. These switches, when protected by an insulating layer, offer resistance to severe environments.

[00106] The sensing device of Figure 6B includes two sensing areas 613 and 614 of conductive material that are electrically isolated. The sensing areas of conductive area are used to make up the three buttons 601-603. In particular, button 601 includes a sensor element having a surface area of one conductive material (illustrated as white surface area of button 601). Similarly, button 603 includes a sensor element having a surface area of another conductive material (illustrated as hashed surface area of button 603). The conductive materials may be similar or dissimilar materials, but more importantly, are electrically isolated from one another. For example, button 601 is coupled to a first pin 609, and button 603 is coupled to a second pin 610 of processing device 210. Button 602, however, includes a sensor element having a surface area of two conductive materials (illustrated as white and hashed surface areas of button 603) that are electrically isolated. A portion, first portion 604, of the sensor element of button 602 is coupled to the conductive material of button 601, and another portion, second portion 605, is coupled to the conductive material of button 603.

[00107] In one embodiment, first portion 604 is coupled to the sensor element of button 601 using a conductive line 606, and second portion 605 is coupled to the sensor element button 603 using a conductive line 607. The conductive lines 606 and 607 may be conductive traces printed on the surface of the PCB. Alternatively, conductive lines may be conductive paths of conductive material that coupled the conductive material of the sensor elements and to the pins of the processing device 210.

[00108] The processing device 210 scans the touch-sensor buttons 601-603 using the capacitance sensors 201(1) and 201(2), and measures the capacitance on the two sensing areas of conductive material that realize the touch-sensor buttons 601-603. The processing device is operable to recognize a first button operation on the first sensor element, a second button operation on the second sensor element, and third button operation on the first and second portions of the third sensor element. Accordingly, the capacitance sensors of the processing device are not coupled to the touch-sensor buttons in a one-to-one configuration, like that of the conventional sensing device.

[00109] In another embodiment, the processing device 210 may include only one capacitance sensor 201 that is coupled to a selection circuit. The selection circuit operates to select one conductive path to scan and measure. The processing device 210 includes two pins to couple to the two sensing areas of conductive material that make up the three or more buttons. In another embodiment, the processing device 210 may include only one pin and be coupled to a selection circuit that is external to the processing device that selects between the two sensing areas of conductive material.

[00110] In one embodiment, the processing device that is coupled to the sensing device of three or more touch-sensor buttons includes one more capacitance sensors coupled to the first and second sensor elements. The one or more capacitance sensors are operable to measure capacitance on the three or more sensor elements. For example, if the capacitance variation δ_1, measured on the first pin 609, is greater than zero, and the capacitance variation δ_2, measured on the second pin 610 is equal to approximately zero, then the first button 601 has been pressed. Similarly, if the capacitance variation δ_1, measured on the first pin 609, is equal to the capacitance variation δ_2, measured on the second pin 610, then the second button 602 has been pressed. If the capacitance variation δ_1, measured on the first pin 609, is equal to approximately zero, and the capacitance variation δ_2, measured on the second pin 610 is greater than zero, then the third button 603 has been pressed.

[00111] In one embodiment, the one or more capacitance sensors (e.g., 201(1) and 201(2)) may include a relaxation oscillator. The relaxation oscillator may be similar to the relaxation oscillator described above, which includes a current source, a selection circuit, a comparator, and a reset switch. The relaxation oscillator may be coupled to a digital counter that is operable to count at least one of a frequency or a period of a relaxation oscillator output received from the relaxation oscillator.

[00112] In one embodiment, the method may be performed by detecting a presence of a conductive object on a sensing device, and recognizing three or more button operations performed by the conductive object using two sensing areas of the sensing device. In one embodiment, the operation of recognizing the three or more button

operations may include recognizing a first button operation when the presence of the conductive object is detected on a first sensing area 613 of the two sensing areas of the sensing device, recognizing a second button operation when the presence of the conductive object is detected on a second sensing area 614 of the two sensing areas of the sensing device, and recognizing one or more button operations when the presence of the conductive object is detected on the first and second sensing areas 613 and 614.

[00113] The method may include the operation of determining a capacitance on each of the two sensing areas, and determining the three or more button operations based on the determined capacitance. The sensing areas 613 and 614 may be scanned sequentially, or alternatively, may be scanned simultaneously by one or more capacitance sensors of the processing device 210.

[00114] In one embodiment, the two sensing areas may be used to realize three buttons, as illustrated in Figures 6A-6D. Alternatively, the two sensing areas may be used to realize more than three button areas. In one embodiment, the sensor elements of the touch-sensor buttons may be circular shaped, as illustrated in Figures 6A-6D. Alternatively, the sensor elements may have other shapes, such as rectangles, squares, ovals, hexagon, octagons, or the like.

[00115] In one embodiment, portions 613 and 614 are substantially equal in surface area of the sensor element of button 602. Alternatively, portions 613 and 614 are not equal in surface area. In one embodiment, the portions of sensor element of button 602 are semi-circularly shaped. Alternatively, the portions of the sensor element may have other shapes.

[00116] Figure 6C illustrates another embodiment of a sensing device having three touch-sensor buttons. Sensing device 600 includes three touch-sensor buttons that are similar to the touch-sensor buttons 601-603 of Figure 6B, except the portions of the second sensor element of the second button 602 are dissimilarly shaped than the portions of Figure 6B. First portion 604 of Figure 6C has a shape of two pie shapes. Similarly, second portion 605 of Figure 6C has a shape of two pie shapes. The four pie shapes form a substantially circular shape for the sensor element. In one embodiment, the two pie shapes of each portion are coupled together in a single layer, while the other two pie shapes are coupled together in a second conductive layer using vias, as described with respect to Figures 5C & 5D. Alternatively, the conductive material of one portion is coupled together using other methods known by those of ordinary skill in the art.

[00117] In the embodiment of Figure 6C, conductive lines 606 and 607 are conductive traces that couple the first and second portions 604 and 605 to the first and third sensor elements of button 601 and 603, respectively. The conductive lines 607 and 608 may be comprised of similar or dissimilar materials as the conductive material of the sensor elements. It should be noted that first portion 604, sensor element of button 601, and conductive line 606 are electrically isolated from second portion 605, sensor element of button 603, and conductive line 607. Accordingly, the two sensing areas (e.g., 613 and 614) are comprised of these electrically isolated conductive materials.

[00118] In one embodiment, the first and second portions 604 and 605 each have a surface area that is substantially equal. Alternatively, the portions may have surface areas in other proportions.

[00119] Figure 6D illustrates another embodiment of a sensing device having three touch-sensor buttons. Sensing device 650 includes three touch-sensor buttons that are similar to the touch-sensor buttons 601-603 of Figure 6B, except the portions of the second sensor element of the second button 602 are dissimilarly shaped than the portions of Figure 6B. First portion 604 of Figure 6C has multiple arc shapes of conductive material that are electrically isolated from multiple arc shapes of another conductive material of second portion 605. The multiple arc shapes of both the first and second portions 604 and 605 form a substantially circular shape for the sensor element. In one embodiment, the multiple arc shapes of each portion are coupled together in a single layer, while the other two pie shapes are coupled together in a second conductive layer using vias, as described with respect to Figures 5C & 5D. Alternatively, the conductive material of one portion is coupled together using other methods known by those of ordinary skill in the art.

[00120] In the embodiment of Figure 6D, conductive lines 606 and 607 are conductive traces that couple the first and second portions 604 and 605 to the first and third sensor elements of button 601 and 603, respectively. The conductive lines 607 and 608 may be comprised of similar or dissimilar materials as the conductive material of the sensor elements. It should be noted that first portion 604, sensor element of button 601, and conductive line 606 are electrically isolated from second portion 605, sensor element of button 603, and conductive line 607. Accordingly, the two sensing areas (e.g., 613 and 614) are comprised of these electrically isolated conductive materials.

[00121] In one embodiment, the first and second portions 604 and 605 each have a surface area that is substantially equal. Alternatively, the portions may have surface areas in other proportions.

[00122] The shapes of the sensor elements and the portions of the sensor elements are not limited to the shapes illustrated and described herein, but may include other shapes. For example, Figures 7A and 7B include embodiments of rectangular and square shapes for the sensor elements and the portions of the sensor elements. In addition, the number of sensor elements in the sensing device is not limited to three, but may be greater than three. For example, Figures 7A and 7B illustrate embodiments of four and five touch-sensor buttons; however, more sensor elements than five may also be used.

[00123] Figure 7A illustrates another embodiment of a sensing device having four touch-sensor buttons. Sensing device 700 includes four touch-sensor buttons 701-704. Each of the conventional touch-sensor buttons 701-704 may be made of a sensor element of conductive material, such as copper-clad. The sensor elements, in this embodiment are square shaped. The touch-sensor buttons may be capacitance sensor buttons, which may be used as non-contact switches.

[00124] The sensing device 700 of Figure 7A includes two sensing areas of conductive material that are electrically isolated. The sensing areas of conductive area are used to make up the four buttons 701-704. In particular, button 701 includes a sensor element having a surface area of one conductive material (illustrated as white surface area of button 701). Similarly, button 704 includes a sensor element having a surface area of another conductive material (illustrated as hashed surface area of button 704). The conductive materials may be similar or dissimilar materials, but more importantly, are

electrically isolated from one another. For example, button 701 is coupled to a first pin 609, and button 704 is coupled to a second pin 610 of processing device 210. Buttons 702 and 703, however, include a sensor element having a surface area of two conductive materials (illustrated as white and hashed surface areas of buttons 702 and 703) that are electrically isolated. A portion, first portion 710, of the sensor elements of buttons 702 and 703 is coupled to the conductive material of button 701, and another portion, second portion 711, is coupled to the conductive material of button 704.

[00125] In one embodiment, first portion 710 is coupled to the sensor element of button 701 using a conductive line 706, and second portion 711 is coupled to the sensor element button 704 using a conductive line 707. The conductive lines 706 and 707 may be conductive traces printed on the surface of the PCB. Alternatively, conductive lines 706 and 707 may be conductive paths of conductive material that coupled the conductive material of the sensor elements and to the pins of the processing device 210.

[00126] In one embodiment, each sensor element of buttons 702 and 703 comprises two surface areas, one surface area being the first portion 710, and the other surface area being the second portion 711. The surface areas may be one solid shape, or alternatively, the surface areas may be interleaved sub-traces. For example, the first conductive line 706 is a first conductive trace, and the first conductive trace has one or more sub-traces (e.g., 708(1)-708(7)), and the second conductive line 707 is a second conductive trace that has one or more sub-traces (e.g., 709(1)-709(7)). In one embodiment, at least one sub-trace of the first conductive trace 706 is interleaved with at least one sub-trace of the second conductive trace 707. Alternatively, the sub-traces of the first and second conductive traces are not interleaved.

[00127] The sensor elements of buttons 702 and 703 each have a surface area ratio between the surface area of the first portion 710 and the second portion 711. In one embodiment, the surface area ratio of button 702 is approximately 25% of the first portion 710 to approximately 75% of the second portion 711 (25/75). The surface area ratio of button 703 is approximately 75% of the first portion 710 to approximately 25% of the second portion 711 (75/25). Alternatively, the surface area ratios of buttons 702 and 703 may be switched in surface area ratios, e.g., 75/25 for button 702 and 25/75 for button 703. In another embodiment, button 702 and button 703 may have other surface area ratios, ranging from 99/1 to 49/51, and vice versa.

[00128] In the embodiment of Figure 7A, buttons 702 and 703 each include seven sub-traces, sub-traces 708(1)-708(7) and sub-traces 709(1)-709(7). In particular, button 702 includes four sub-traces 708(1)-708(4) of the first portion 710, and three sub-traces 709(1)-709(3) of the second portion 711. Button 703 includes three sub-traces 708(5)-708(7) of the first portion 710, and four sub-traces 709(4)-709(7) of the second portion 711. Accordingly, the surface area ratio of button 702 is 4/7 of the first portion 710 to 3/7 of the second portion 711, and the surface area ratio of button 703 is 3/7 of the first portion 710 to 4/7 of the second portion 711. Alternatively, other total number of sub-traces, and other combinations of sub-traces, may be used to form the different surface area ratios.

[00129] Figure 7B illustrates another embodiment of a sensing device having five touch-sensor buttons. Sensing device 750 includes five touch-sensor buttons 701-705. The touch-sensor buttons of sensing device 750 are similar to those of sensing device

700, expect there is one additional sensor element, and there are eight sub-traces per sensor element for buttons 702-704, which consequently changes the surface area ratios.

[00130] The sensing device 750 of Figure 7B includes two sensing areas (illustrates a white and hashed surface areas) of conductive material that are electrically isolated. The sensing areas of conductive area are used to make up the five buttons 701-705.

[00131] In one embodiment, each sensor element of buttons 702, 703, and 704 comprises two surface areas, one surface area being the first portion 710, and the other surface area being the second portion 711. The surface areas may be one solid shape, or alternatively, the surface areas may be interleaved sub-traces. For example, the first conductive line 706 is a first conductive trace, and the first conductive trace has twelve sub-traces 708(1)-708(12), and the second conductive line 707 is a second conductive trace that has twelve sub-traces 709(1)-709(12). At least two sub-traces of both the first and second conductive traces are interleaved in each sensor element.

[00132] In this embodiment, the surface area ratio of button 702 is approximately 6/8 of the first portion 710 to approximately 2/8 of the second portion 711. The surface area ratio of button 703 is approximately 4/8 (25%) of the first portion 710 to approximately 4/8 (50%) of the second portion 711. The surface area ratio of button 704 is approximately 2/8 of the first portion 710 to approximately 6/8 of the second portion 711.

[00133] In another embodiment, the surface area ratio of button 702 is approximately 25% of the first portion 710 to approximately 75% of the second portion 711. The surface area ratio of button 703 is approximately 50% of the first portion 710 to approximately 50% of the second portion 711. The surface area ratio of button 704 is approximately 75% of the first portion 710 to approximately 25% of the second portion 711.

[00134] In another embodiment, the surface area ratio of button 702 is approximately 33% of the first portion 710 to approximately 67% of the second portion 711. The surface area ratio of button 703 is approximately 50% of the first portion 710 to approximately 50% of the second portion 711. The surface area ratio of button 704 is approximately 67% of the first portion 710 to approximately 33% of the second portion 711.

[00135] Alternatively, other surface area ratios, total number of sub-traces, and other combinations of sub-traces, may be used to form the sensor elements that include the two conductive materials.

[00136] As described with respect to the embodiments above, the processing device 210 can scan the touch-sensor buttons 701-704 of Figure 7A (or the touch-sensor buttons 701-705 of Figure 7B) using one or more capacitance sensors, and measure the capacitance on the two sensing areas of conductive material that realize the touch-sensor buttons 701-704 (or 701-705). Accordingly, the processing device is operable to recognize a first button operation on the first sensor element, a second button operation on the second sensor element, and third and fourth button operations (or third, fourth, and fifth button operations) on the first and second portions of the third and fourth sensor elements (or third, fourth, and fifth sensor elements).

[00137] It should be noted that although the sensor elements that include the two portions are illustrated and described as being inside or in between the two sensor elements that are coupled to the pins, the sensor elements that include the two portions may be disposed in other positions with respect to the other two sensor elements.

[00138] Embodiments of the present invention, described herein, include various operations. These operations may be performed by hardware components, software, firmware, or a combination thereof. As used herein, the term "coupled to" may mean coupled directly or indirectly through one or more intervening components. Any of the signals provided over various buses described herein may be time multiplexed with other signals and provided over one or more common buses. Additionally, the interconnection between circuit components or blocks may be shown as buses or as single signal lines. Each of the buses may alternatively be one or more single signal lines and each of the single signal lines may alternatively be buses.

[00139] Certain embodiments may be implemented as a computer program product that may include instructions stored on a machine-readable medium. These instructions may be used to program a general-purpose or special-purpose processor to perform the described operations. A machine-readable medium includes any mechanism for storing or transmitting information in a form (e.g., software, processing application) readable by a machine (e.g., a computer). The machine-readable medium may include, but is not limited to, magnetic storage medium (e.g., floppy diskette); optical storage medium (e.g., CD-ROM); magneto-optical storage medium; read-only memory (ROM); random-access memory (RAM); erasable programmable memory (e.g., EPROM and EEPROM); flash memory; electrical, optical, acoustical, or other form of propagated signal (e.g., carrier waves, infrared signals, digital signals, etc.); or another type of medium suitable for storing electronic instructions.

[00140] Additionally, some embodiments may be practiced in distributed computing environments where the machine-readable medium is stored on and/or executed by more than one computer system. In addition, the information transferred between computer systems may either be pulled or pushed across the communication medium connecting the computer systems.

[00141] Although the operations of the method(s) herein are shown and described in a particular order, the order of the operations of each method may be altered so that certain operations may be performed in an inverse order or so that certain operation may be performed, at least in part, concurrently with other operations. In another embodiment, instructions or sub-operations of distinct operations may be in an intermittent and/or alternating manner.

[00142] In the foregoing specification, the invention has been described with reference to specific exemplary embodiments thereof. It will, however, be evident that various modifications and changes may be made thereto without departing from the broader spirit and scope of the invention as set forth in the appended claims. The specification and drawings are, accordingly, to be regarded in an illustrative sense rather than a restrictive sense.

CLAIMS

What is claimed is:

1. A method, comprising:

detecting a presence of a conductive object on a sensing device; and

recognizing three or more button operations performed by the conductive object using two sensing areas of the sensing device.

2. The method of claim 1, wherein recognizing three or more button operations comprises:

recognizing a first button operation when the presence of the conductive object is detected on a first sensing area of the two sensing areas of the sensing device;

recognizing a second button operation when the presence of the conductive object is detected on a second sensing area of the two sensing areas of the sensing device; and

recognizing one or more button operations when the presence of the conductive object is detected on the first and second sensing areas.

3. The method of claim 1, further comprising determining a capacitance of the conductive object on the sensing device over time, wherein determining the capacitance further comprises determining a capacitance of the two sensing areas of the sensing device, and wherein recognizing the button operation is based on the capacitance of the two sensing areas.

4. The method of claim 1, further comprising scanning the two sensing areas of the sensing device, and wherein recognizing the three or more button operations comprises:

recognizing a first button operation when a first sensing area of the two sensing areas detects the presence of the conductive object during the scanning of the two sensing areas;

recognizing a second button operation when a second sensing area of the two sensing areas detects the presence of the conductive object during the scanning of the two sensing areas; and

recognizing a third button operation when the first and second sensing areas detect the presence of the conductive object during the scanning of the two sensing areas.

5. An apparatus, comprising:

a sensing device comprising:

a first sensor element;

a second sensor element; and

a third sensor element comprising a first portion coupled to the first sensor element and a second portion coupled to the second sensor element, wherein the first and second portions of the third sensor element are electrically isolated.

6. The apparatus of claim 5, wherein a surface area of the first portion and a surface area of the second portion of the third sensor element are substantially equal.

7. The apparatus of claim 5, further comprising a fourth sensor element comprising a third portion coupled to the first sensor element and a fourth portion coupled to the

second sensor element, wherein the third and fourth portions of the fourth sensor element are electrically isolated.

8. The apparatus of claim 7, wherein a surface area ratio of the third sensor element is approximately 25% of the first portion to approximately 75% of the second portion, and wherein a surface area ratio of the fourth sensor element is approximately 75% of the third portion to approximately 25% of the fourth portion.

9. The apparatus of claim 5, further comprising a fifth sensor element comprising a fifth portion coupled to the first sensor element and a sixth portion coupled to the second sensor element, wherein the fifth and sixth portions of the fifth sensor element are electrically isolated.

10. The apparatus of claim 9, wherein a surface area ratio of the third sensor element is approximately 33% of the first portion to approximately 67% of the second portion, wherein a surface area ratio of the fourth sensor element is approximately 50% of the third portion to approximately 50% of the fourth portion, and wherein a surface area ratio of the fifth sensor element is approximately 67% of the fifth portion to approximately 33% of the sixth portion.

11. The apparatus of claim 5, wherein the first portion comprises a first conductive trace having one or more sub-traces, and the second portion comprises a second conductive trace having one or more sub-traces, and wherein at least one sub-trace of the

first conductive trace is interleaved with at least one sub-trace of the second conductive trace.

12. The apparatus of claim 5, wherein the first, second, and third sensor elements are substantially circular shaped.

13. The apparatus of claim 5, wherein the first, second, and third sensor elements are substantially rectangular shaped.

14. The apparatus of claim 5, further comprising a processing device coupled to the sensing device, wherein the processing device comprises one or more capacitance sensors coupled to the first and second sensor elements, and wherein the one or more capacitance sensors are operable to measure capacitance on the first, second, and third sensor elements.

15. The apparatus of claim 14, wherein the processing device comprises a first pin and a second pin, wherein the first pin is coupled to the first sensor element, and wherein the second pin is coupled to the second sensor element.

16. The apparatus of claim 15, wherein the processing device is operable to recognize a first button operation on the first sensor element, a second button operation on the second sensor element, and a third button operation on the first and second portions of the third sensor element.

17. The apparatus of claim 14, wherein each of the one or more capacitance sensors comprises a relaxation oscillator coupled to one of the first sensor element and the first portion, and the second sensor element and the second portion, wherein the relaxation oscillator comprises:

a current source to provide a charge current to first sensor element and the first portion, and to the second sensor element and the second portion;

a selection circuit coupled to the first sensor element and the first portion, the second sensor element and the second portion, and the current source, wherein the selection circuit is configured to sequentially select a sensor element of the first sensor element and the second sensor elements to provide the charge current and to measure the capacitance of each sensor element of the sensing device;

a comparator coupled to the current source and the selection circuit, wherein the comparator is configured to compare a voltage on the selected sensor element and a threshold voltage; and

a reset switch coupled to the comparator, current source, and selection circuit, wherein the reset switch is configured to reset the charge current on the selected sensor element, and wherein each of the one or more capacitance sensors further comprises a digital counter coupled to the relaxation oscillator, and wherein the digital counter is operable to count at least one of a frequency or a period of a relaxation oscillator output received from the relaxation oscillator.

18. An apparatus, comprising:

a first sensing area to detect a presence of a conductive object on a sensing device;

a second sensing area to detect the presence of the conductive object on the sensing device; and

means for recognizing three or more button operations performed by the conductive object using two sensing areas on the sensing device.

19. The apparatus of claim 18, further comprising means for reducing a pin count of the sensing device.

20. The apparatus of claim 18, further comprising means for reducing scan time of the sensing device.

ABSTRACT

An apparatus and method for detecting a presence of a conductive object on a sensing device, and recognizing three or more button operations performed by the conductive object using two sensing areas of the sensing device. The sensing device may include first, second, and third sensor elements. The third sensor element may include two electrically isolated portions coupled to the first and second sensor elements.

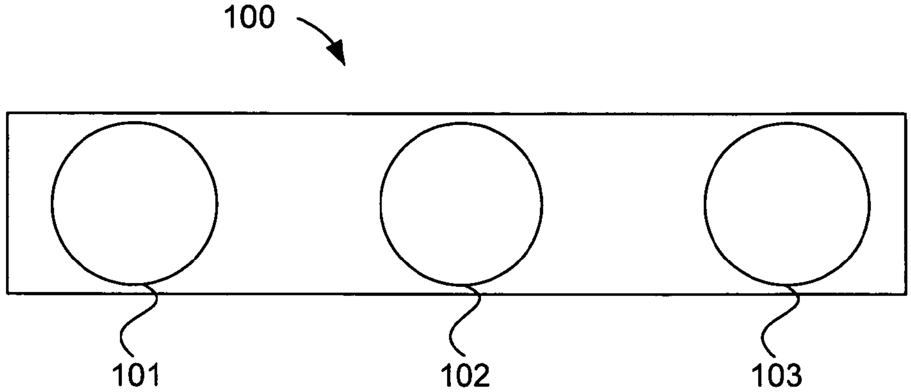
100
101
102
103

FIG. 1A

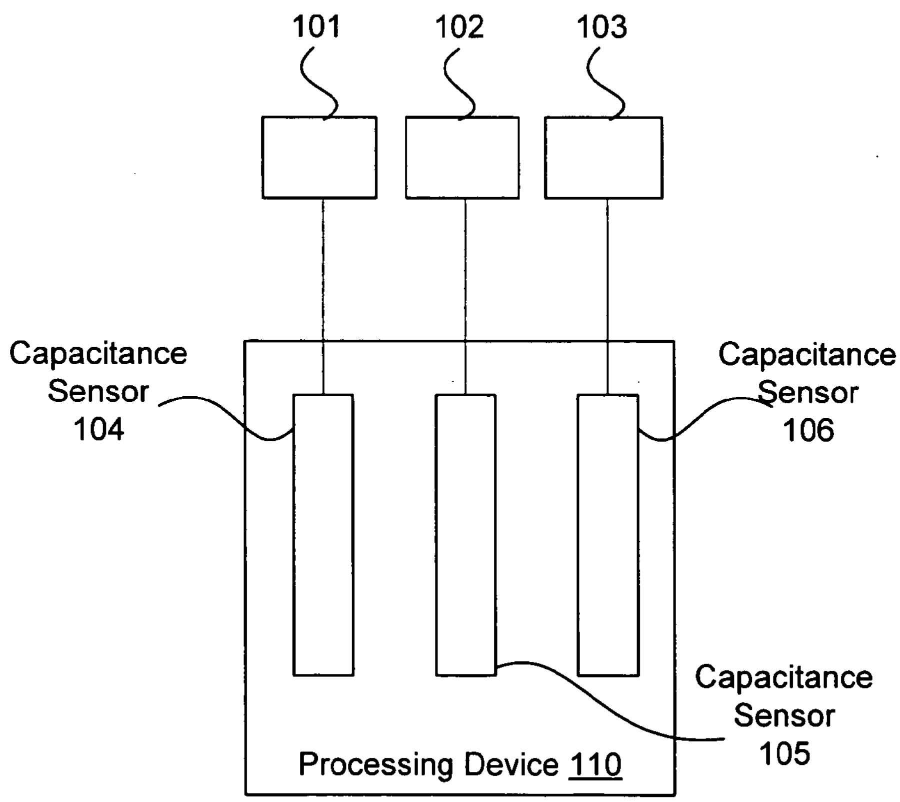
101
102
103
Capacitance Sensor 104
Capacitance Sensor 106
Capacitance Sensor 105
Processing Device 110

FIG. 1B

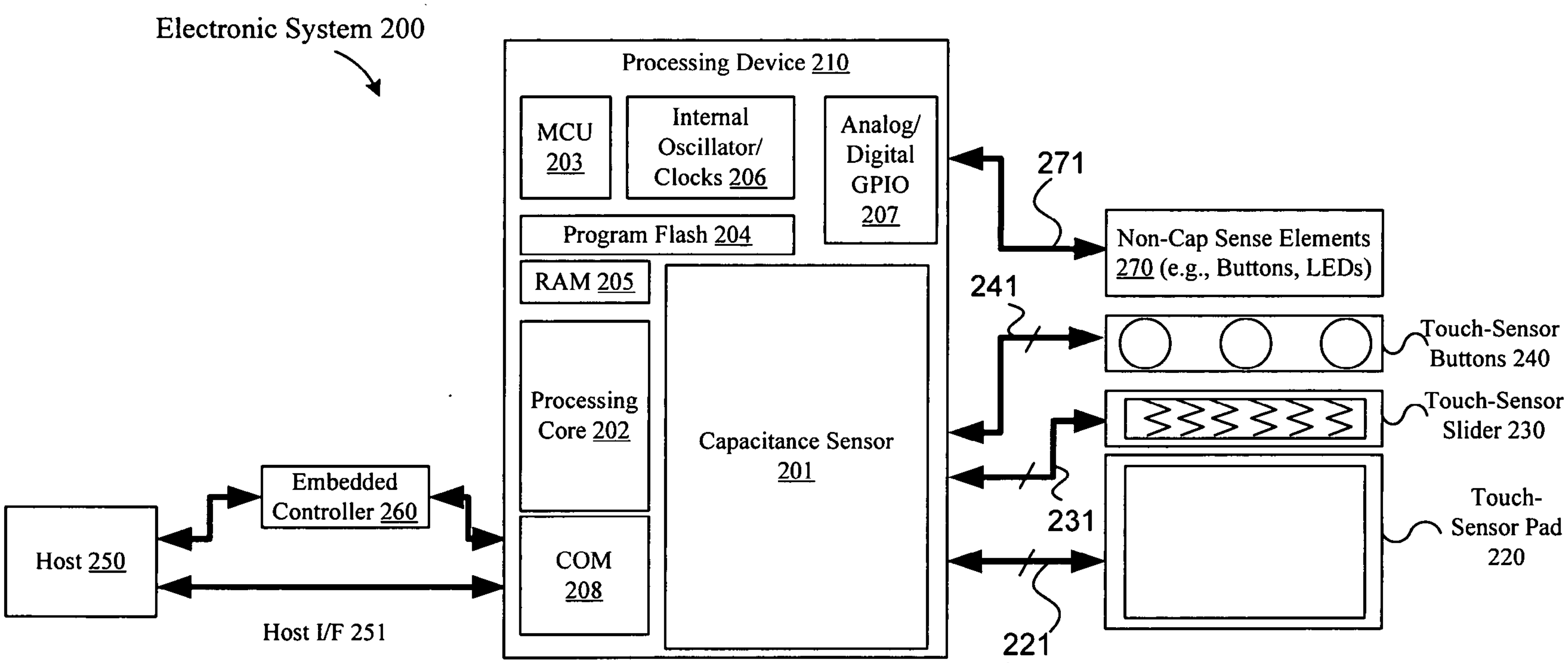
Electronic System 200
Processing Device 210
MCU 203
Internal Oscillator/ Clocks 206
Analog/ Digital GPIO 207
Program Flash 204
RAM 205
Processing Core 202
COM 208
Capacitance Sensor 201
Host 250
Embedded Controller 260
Host I/F 251
271
Non-Cap Sense Elements 270 (e.g., Buttons, LEDs)
241
Touch-Sensor Buttons 240
Touch-Sensor Slider 230
231
Touch-Sensor Pad 220
221

FIG. 2

Varying Switch Capacitance

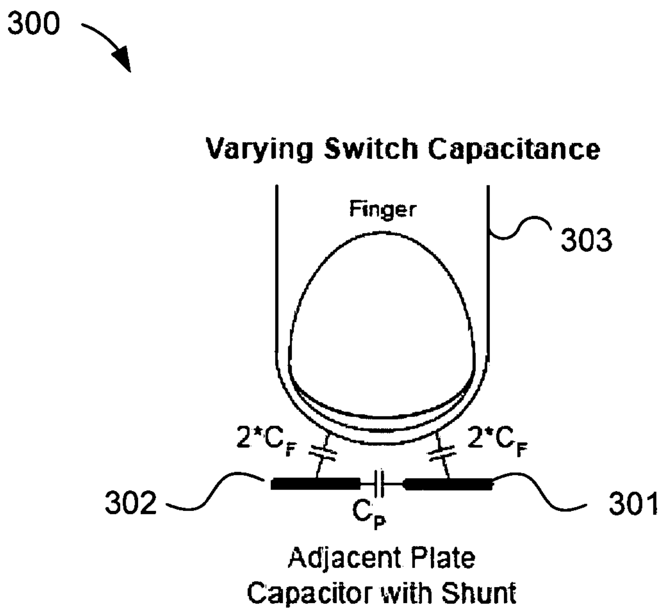

FIG. 3A

Relaxation Oscillator

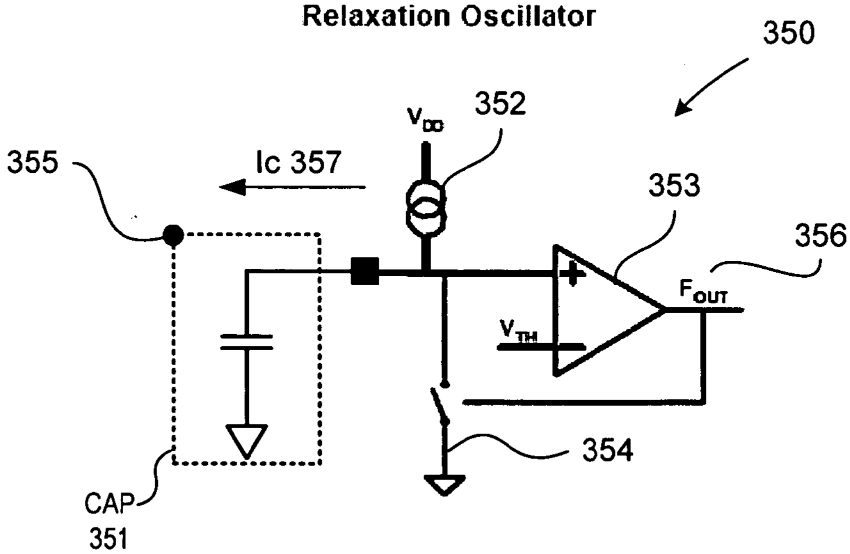

FIG. 3B

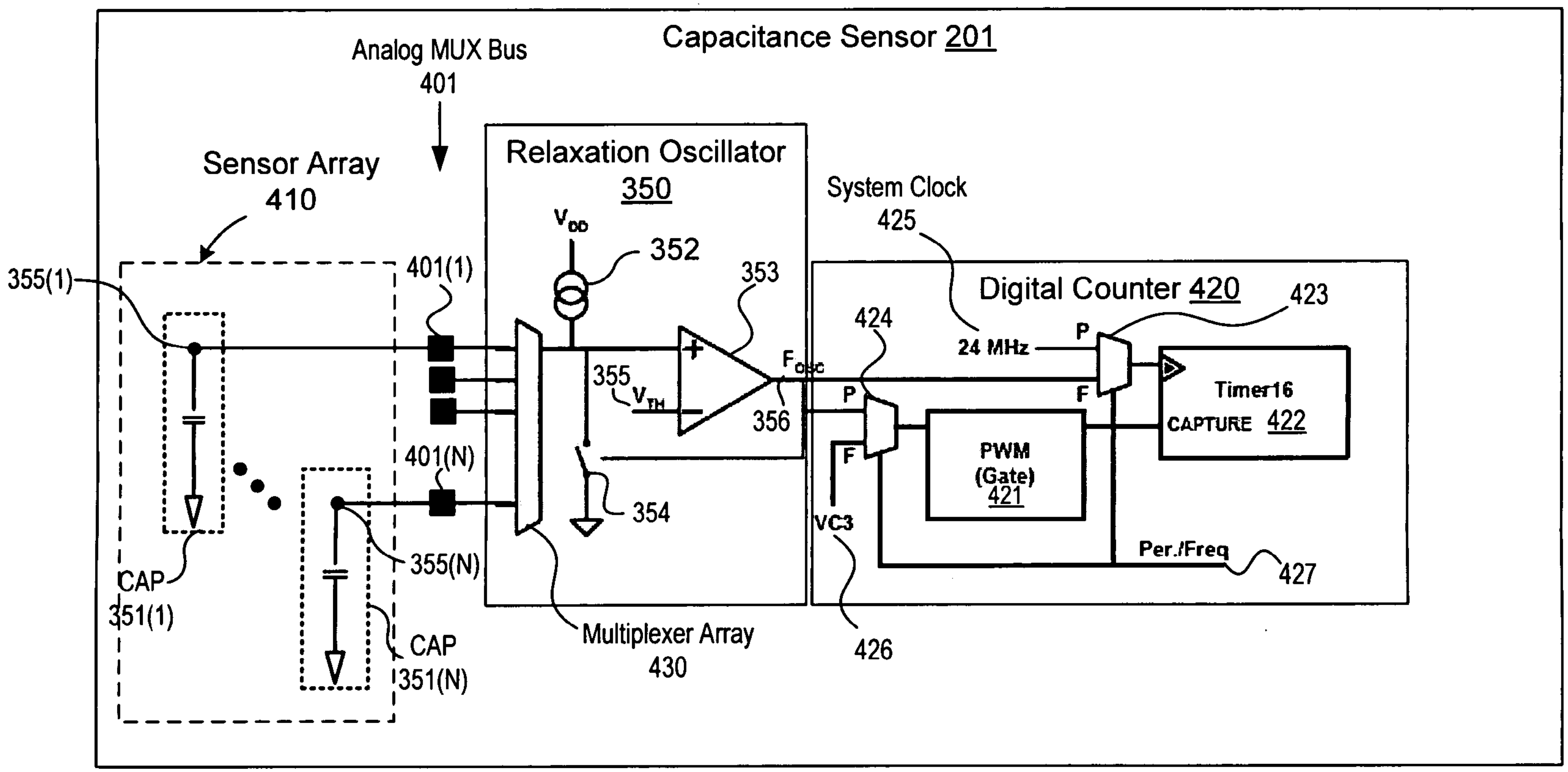

FIG. 4

Blakely, Sokoloff, Taylor & Zafman LLP (408) 720-8300
Title: TWO-PIN BUTTONS
1st Named Inventor: Jiang XiaoPing
Express Mail No.: EV839871107US Docket No.: 16820P456
Sheet: 4/10

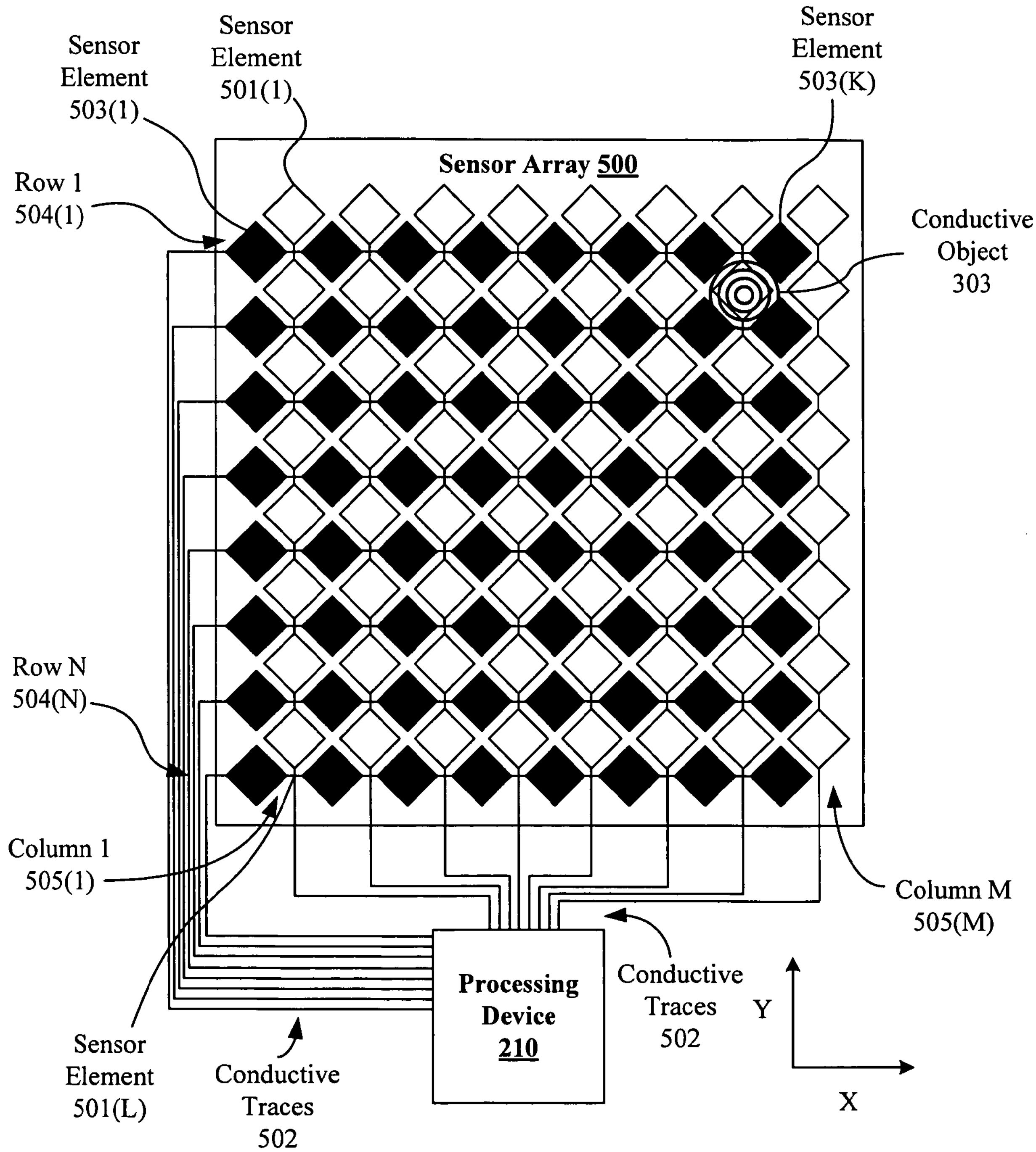
Sensor Element 503(1)
Sensor Element 501(1)
Sensor Element 503(K)
Sensor Array 500
Row 1 504(1)
Conductive Object 303
Row N 504(N)
Column 1 505(1)
Column M 505(M)
Processing Device 210
Conductive Traces 502
Sensor Element 501(L)
Conductive Traces 502
Y
X

FIG. 5A

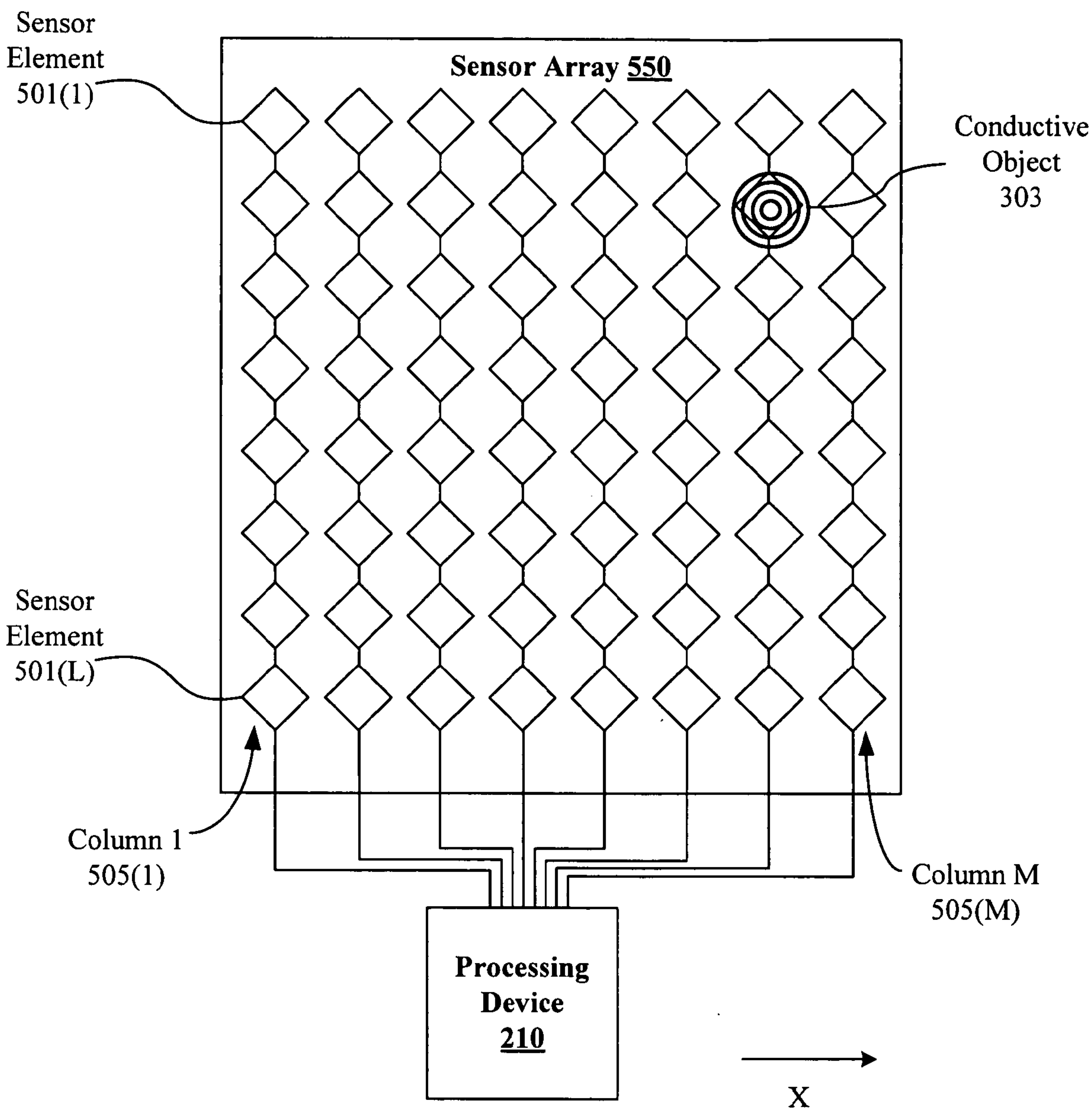
Sensor Array 550
Sensor Element 501(1)
Conductive Object 303
Sensor Element 501(L)
Column 1 505(1)
Column M 505(M)
Processing Device 210
X

FIG. 5B

TOP-VIEW of 2-Layer Touch-Sensor Pad 220

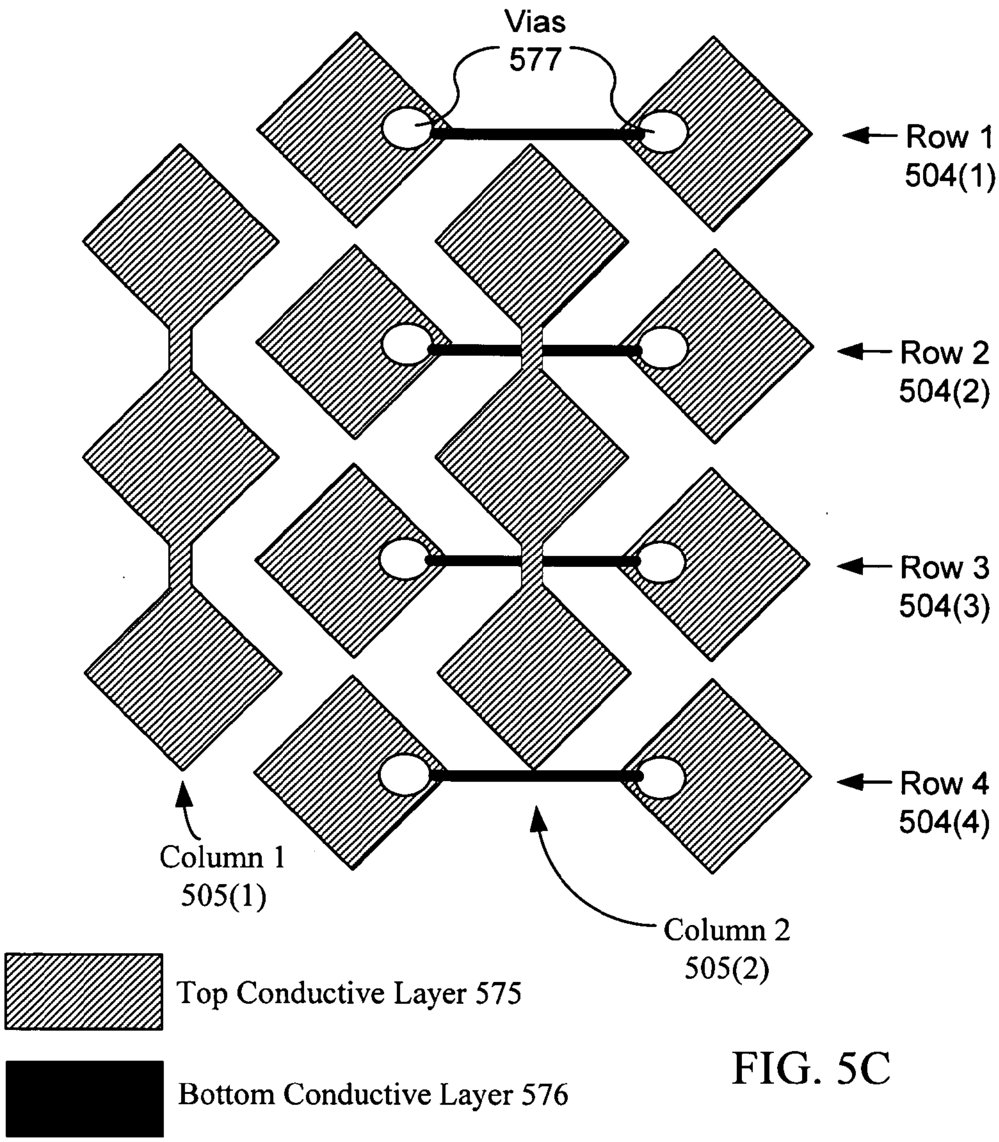

FIG. 5C

CROSS-SECTIONAL VIEW of 2-Layer Touch-Sensor Pad 220

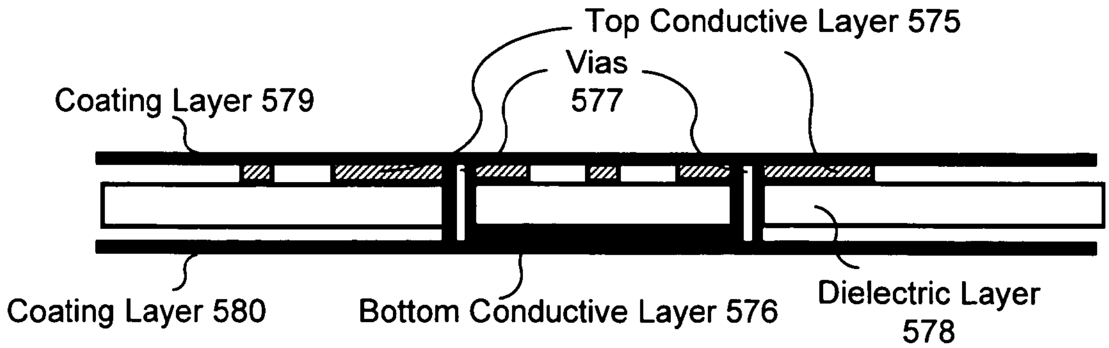

FIG. 5D

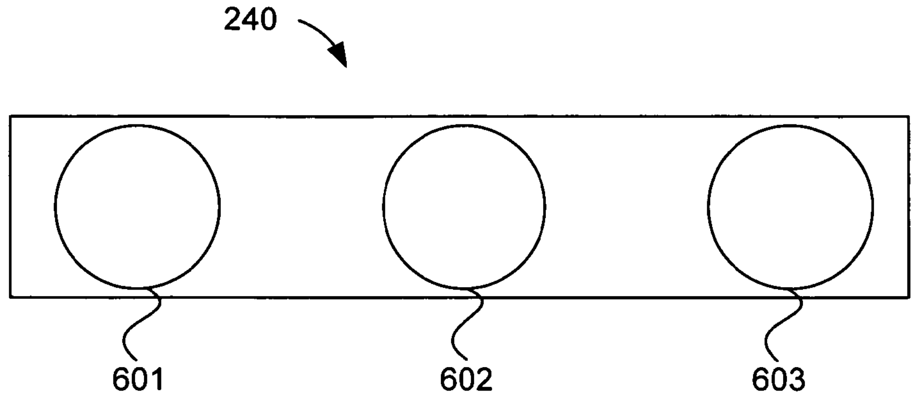
240
601
602
603

FIG. 6A

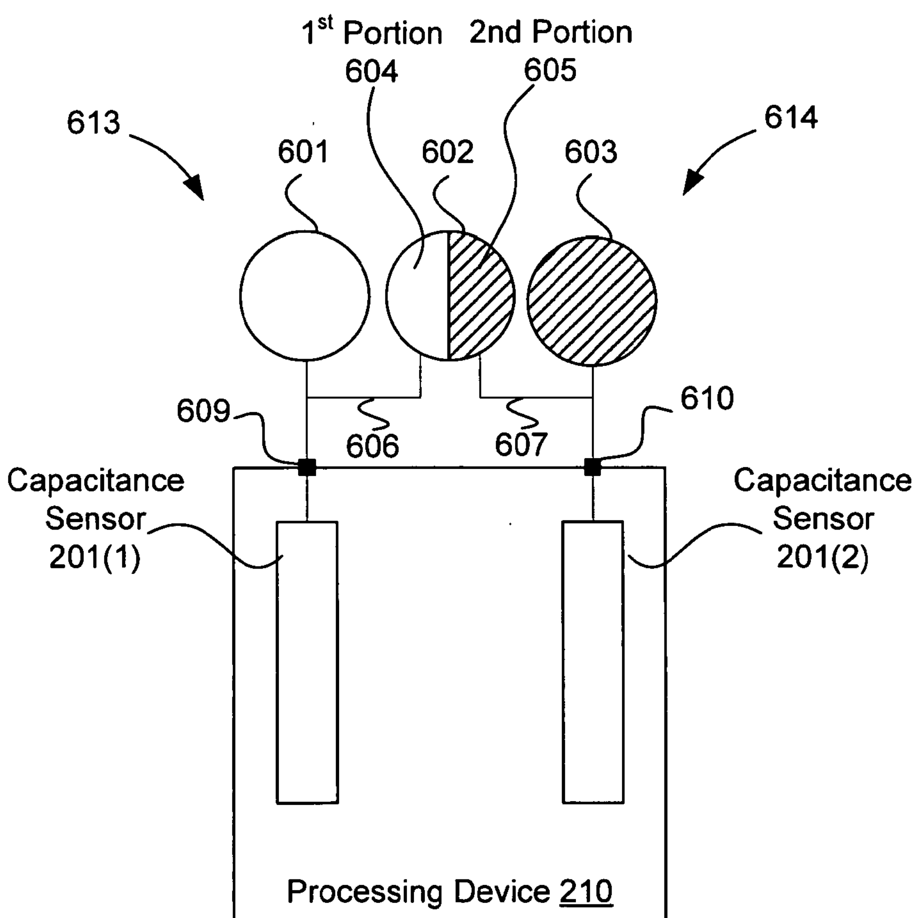
1st Portion
604
2nd Portion
605
613
614
601
602
603
609
610
606
607
Capacitance Sensor 201(1)
Capacitance Sensor 201(2)
Processing Device 210

FIG. 6B

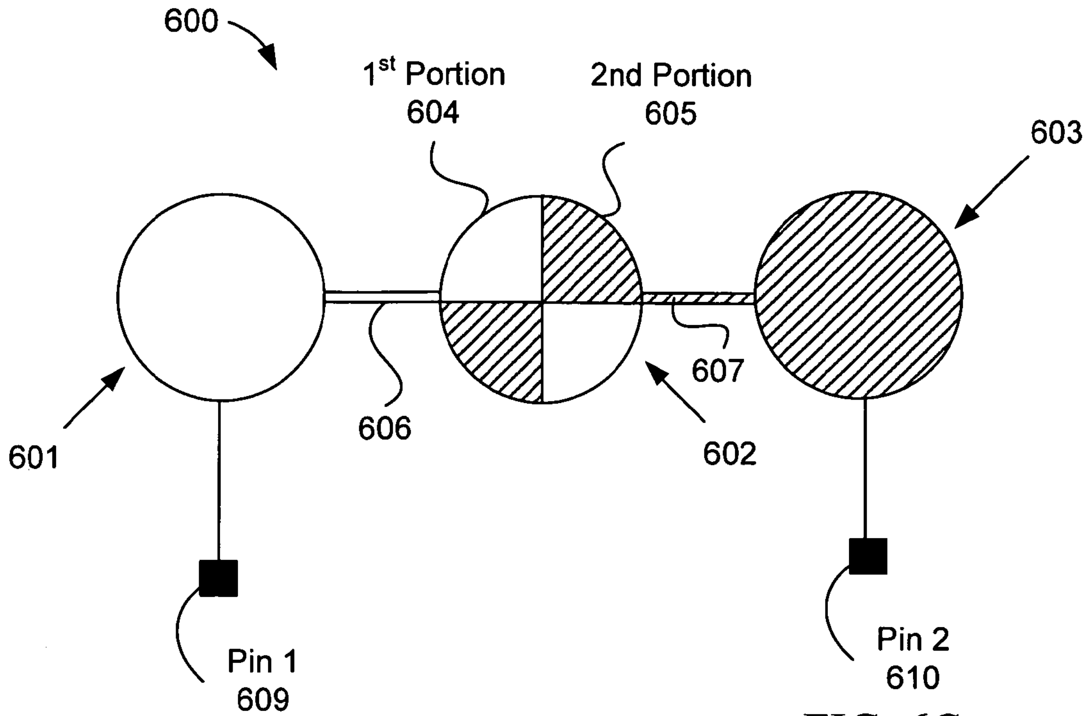
600
1st Portion
604
2nd Portion
605
603
606
607
601
602
Pin 1
609
Pin 2
610

FIG. 6C

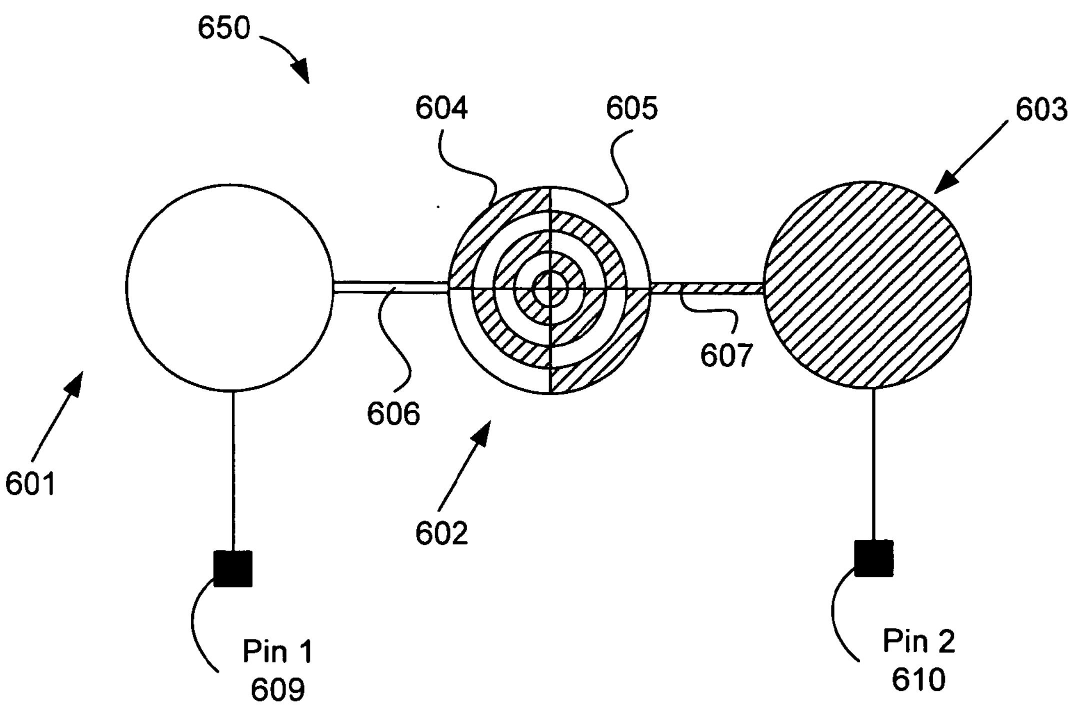
650
604
605
603
606
607
601
602
Pin 1
609
Pin 2
610

FIG. 6D

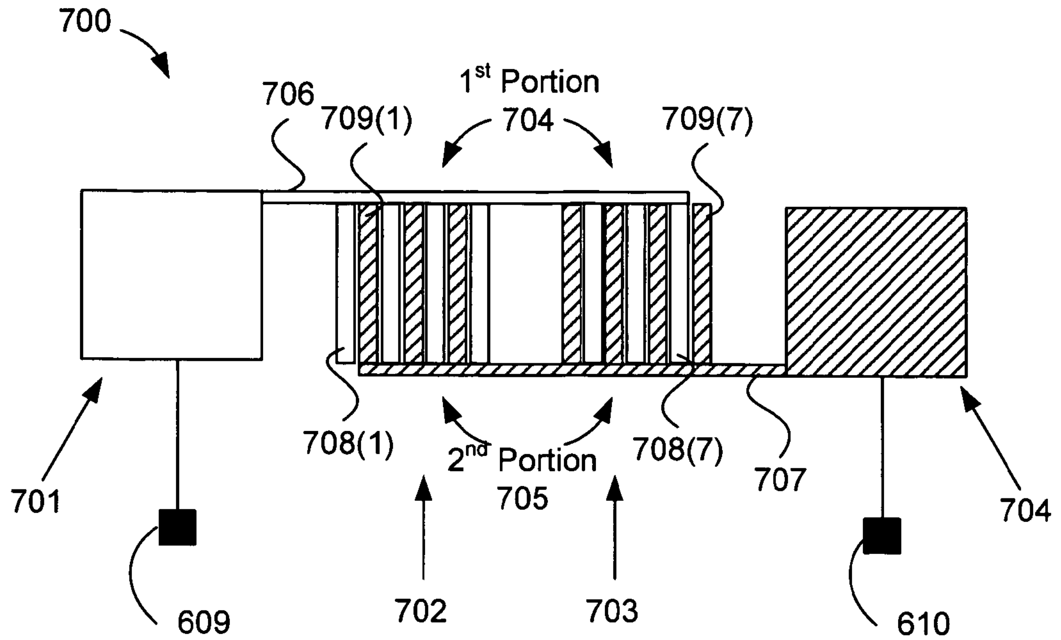
700
1st Portion
704
706
709(1)
709(7)
708(1)
2nd Portion
705
708(7)
707
701
704
609
702
703
610

FIG. 7A

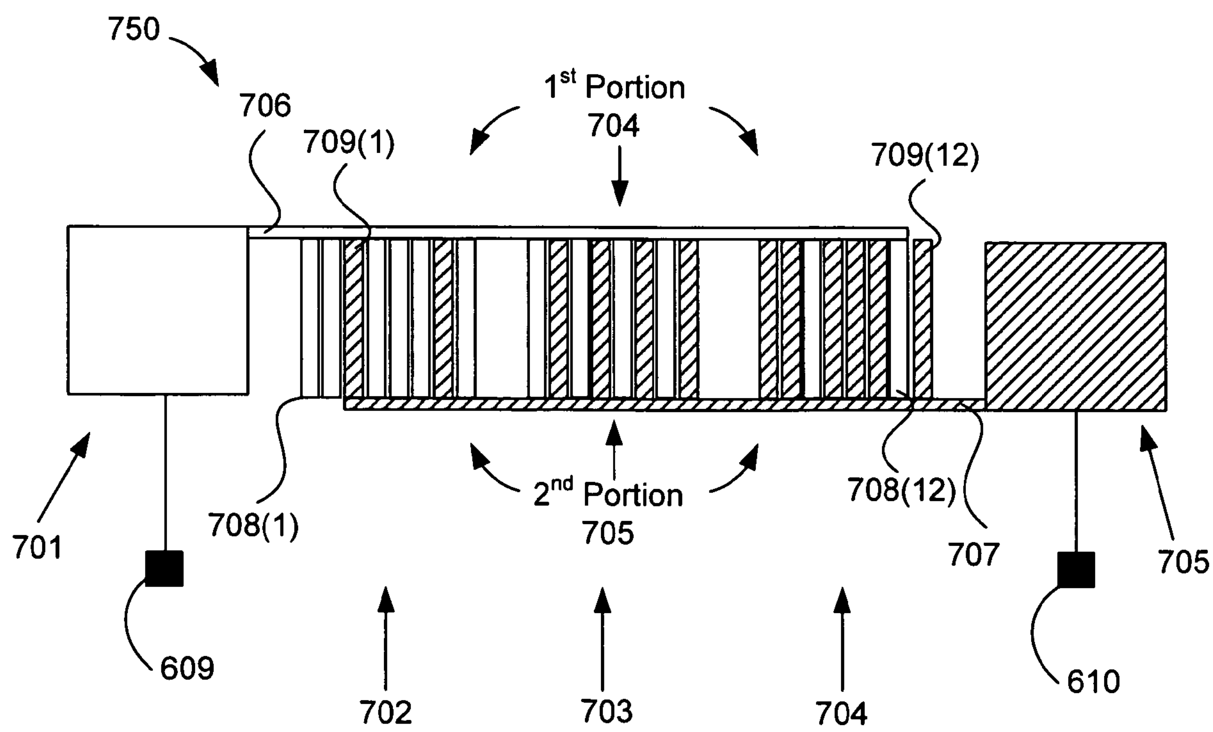
750
1st Portion
704
706
709(1)
709(12)
708(1)
2nd Portion
705
708(12)
707
701
705
609
702
703
704
610

FIG. 7B

Attorney Docket No.: 16820P456 Patent

First Named Inventor: Jiang XiaoPing

Check One:

_X_ Declaration Submitted with Initial Filing OR

___ Declaration Submitted After Initial Filing (Surcharge under 37 C.F.R. § 1.16(e) Required).

Complete If Known:

Application No.: ____________

Filing Date: ____________

Art Unit: ____________

Examiner Name: ____________

DECLARATION AND POWER OF ATTORNEY FOR UTILITY OR DESIGN PATENT APPLICATION

I hereby declare that:

Each inventor's residence, mailing address, and citizenship are as stated below next to their name.

I believe the inventor(s) named below to be the original and first inventor(s) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

TWO-PIN BUTTONS

(Title of the Invention)

the specification of which

_X_ is attached hereto **OR**

___ was filed on ____________

as United States Application Number ____________

or PCT International Application Number ____________

and was amended on (MM/DD/YYYY) ____________.

(if applicable)

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claim(s), as amended by any amendment specifically referred to above.

I do not know and do not believe that the claimed invention was ever known or used in the United States of America before my invention thereof, or patented or described in any printed publication in any country before my invention thereof or more than one year prior to this application. I do not know and do not believe that the claimed invention was in public use or on sale in the United States of America more than one year prior to this application, nor do I know or believe that the invention has been patented or made the subject of an inventor's certificate issued before the date of this application in any country foreign to the United States of America on an application filed by me or my legal representatives or assigns more than twelve months (for a utility patent application) or six months (for a design patent application) prior to this application.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 C.F.R. 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or (f), or 365(b) of any foreign application(s) for patent, inventor's or plant breeder's rights certificate(s), or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent, inventor's or plant breeder's rights certificate(s), or any PCT international application having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)			Priority Claimed?		Certified Copy Attached?	
(Number)	(Country)	(Foreign Filing Date - MM/DD/YYYY)	Yes	No	Yes	No
(Number)	(Country)	(Foreign Filing Date - MM/DD/YYYY)	Yes	No	Yes	No
(Number)	(Country)	(Foreign Filing Date - MM/DD/YYYY)	Yes	No	Yes	No

Appointment of Patent Practitioners:

I hereby appoint the patent practitioners associated with the **Customer Number 08791** as my respective patent attorneys and patent agents, with full power of substitution and revocation, to prosecute this application and to transact all business in the U.S. Patent and Trademark Office connected herewith.

If this patent application is assigned, then the undersigned hereby authorizes the patent attorneys and patent agents named herein to accept and follow instructions from the assignee(s) as to any action to be taken in the United States Patent and Trademark Office regarding this application without direct communication between the patent attorneys and patent agents and the undersigned. In the event of a change in the persons from whom instructions may be taken, at least one patent attorney or patent agent named herein will be so notified by the undersigned.

Direct all correspondence to (check one):

_X_ **Customer Number 08791 OR**

____ **Correspondence Address Below:**

(Name of Attorney or Agent)
BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP
12400 Wilshire Boulevard
Seventh Floor
Los Angeles, California 90025 U.S.A.
Telephone: (408) 720-8300
Fax: (408) 720-8383

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

NAME OF SOLE OR FIRST INVENTOR: ☐ A petition has been filed for this unsigned inventor

Full Name: Jiang XiaoPing
(Given Name (First and Middle [if any]), Family Name (or Surname), and Suffix [if any])

Inventor's Signature Jiang XiaoPing Date May 18, 2006

Residence Shanghai, P.R. China Citizenship China
(City, State, Country) *(Country)*

Mailing Address Room 06-07, 26F, 1 Gateway Plaza, No. 1 Hong Qiao Road
Shanghai, P.R. China 200030

PATENT APPLICATION SERIAL NO. ______________________

U.S. DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE
FEE RECORD SHEET

05/24/2006 EHAILE1 00000032 11437517

01 FC:1011	300.00 OP
02 FC:1111	500.00 OP
03 FC:1311	200.00 OP

PTO-1556
(5/87)

*U.S. Government Printing Office: 2002 — 489-267/69033

PTO/SB/06 (12-04)
Approved for use through 7/31/2006. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875 Effective December 8, 2004

Application or Docket Number: 11437517

APPLICATION AS FILED – PART I

	(Column 1)	(Column 2)	SMALL ENTITY		OR	OTHER THAN SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE ($)	FEE ($)		RATE ($)	FEE ($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	150.00		N/A	300.00
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	$250		N/A	$500
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	$100		N/A	$200
TOTAL CLAIMS (37 CFR 1.16(i))	20 minus 20 =	*	X$ 25 =		OR	X$50 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	*	X100 =			X200 =	
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))			+180=			+360=	
			TOTAL			TOTAL	1006

* If the difference in column 1 is less than zero, enter "0" in column 2.

APPLICATION AS AMENDED – PART II

AMENDMENT A

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE ($)	ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	*	Minus	**	=	X$ 25 =		OR	X$50 =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	X100 =		OR	X200 =	
Application Size Fee (37 CFR 1.16(s))									
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					+180=		OR	+360=	
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

AMENDMENT B

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE ($)	ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	*	Minus	**	=	X$ 25 =		OR	X$50 =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	X100 =		OR	X200 =	
Application Size Fee (37 CFR 1.16(s))									
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					+180=		OR	+360=	
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re the Application of:	
JIANG XIAOPING	Art Group:
Application No.:	Examiner:
Filed:	
For: **TWO-PIN BUTTONS**	

INFORMATION DISCLOSURE STATEMENT UNDER 37 C.F.R. §1.97

Commissioner for Patents
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Alexandria, VA 22313-1450

In accordance with the duty of disclosure, enclosed is a copy of IDS Citation Form PTO/SB/08 or PTO-1449, together with copies of the documents cited on that form, except for copies not required to be submitted (e.g., copies of U.S. patents and U.S. published patent applications need not be enclosed). This IDS and IDS Citation Form are being submitted concurrently with the Utility Application. It is respectfully requested that the cited references be considered and that the enclosed copy of PTO/SB/08 be initialed by the Examiner to indicate such consideration and a copy thereof returned to applicant(s).

The submission of this Information Disclosure Statement is not to be construed as a representation that a search has been made in the subject application and is not to be construed as an admission that the information cited in this statement is material to patentability.

Please charge any fees due to Deposit Account 02-2666. A duplicate copy of the Fee Transmittal (PTO/SB/17) is enclosed for this purpose.

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP

Date: 5/18/06

Daniel E. Ovanezian, Reg. No. 41,236

12400 Wilshire Boulevard, 7th Floor
Los Angeles, CA 90025
Telephone: (408) 720-8300

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Sarah M. Montgomery 5/18/06 *Date*

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT *(use as many sheets as necessary)*			
Sheet	1	**of**	2

Complete If Known	
Application Number	
Filing Date	
First Named Inventor	Jiang XiaoPing
Art Unit	
Examiner Name	
Attorney Docket Number	16820P456

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number: Number - Kind Code[2] *(if known)*	Publication Date or Issue Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US-6,380,931	04-30-2002	Gillespie et al.	
		US-5,305,017	04-19-1994	Gerpheide	
		US-6,188,391	02-13-2001	Seely et al.	
		US-			
		US-			
		US-			
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		US-			
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		US-			
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		US-			
		US-			
		US-			
		US-			

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document: Country Code[3] - Number[4] - Kind Code[5] *(if known)*	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]

Examiner Signature		Date Considered	

*Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication.

[1]Applicant's unique citation designation number (optional). [2]See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3]Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4]For Japanese patent documents, the indication of the year of reign of the Emperor must precede the serial number of the patent document. [5]Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. [6]Applicant is to place a check mark here if English language Translation is attached.

Based on PTO/SB/08A (08-03) as modified by Blakely, Sokoloff, Taylor & Zafman (wlr) 08/11/2003.

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT				Application Number	
				Filing Date	
				First Named Inventor	Jiang XiaoPing
				Art Unit	
				Examiner Name	
Sheet	2	**of**	2	Attorney Docket Number	16820P456

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		Chapweske, Adam, "The PS/2 Mouse Interface", PS/2 Mouse Interfacing, 2001, 10 pages.	
		Mack, Chris, "Semiconductor Lithography - The Basic Process", Gentleman Scientist, 12 pages, downloaded April 20, 2006, http://www.lithoguru.com/scientist/lithobasics.html	
		"Photolithography", Wikipedia, the free encyclopedia, 3 pages, downloaded April 20, 2006, http://en.wikipedia.org/wiki/Photolithography	
		"CY8C21x34 Data Sheet", Cypress Semiconductore Corporation, CSR User Module, CSR v1.0, October 6, 2005, pgs. 1-36	

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[1]Applicant's unique citation designation number. [2]Applicant is to place a check mark here if English language Translation is attached.

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Attorney's Docket No. 16820P456
Confirmation No.: 2623

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Application of:

Jiang XiaoPing

Application No.: 11/437,517

Filed: May 18, 2006

For: TWO-PIN BUTTONS

Examiner: Not yet assigned

Art Unit: 2635

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

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Dianne Neathery
(Typed or printed name of person mailing correspondence)

Dianne Neathery 8-11-06
(Signature of person mailing correspondence)

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Pursuant to 37 C.F.R. § 1.97, this Information Disclosure Statement is being submitted under one of the following (as indicated by an "X" to the left of the appropriate paragraph):

__X__ 37 C.F.R. §1.97(b).

_____ 37 C.F.R. §1.97(c). If so, then enclosed with this Information Disclosure Statement is one of the following:

____ A statement pursuant to 37 C.F.R. §1.97(e) or

____ A check for $180.00 for the fee under 37 C.F.R. § 1.17(p).

_____ 37 C.F.R. §1.97(d). If so, then enclosed with this Information Disclosure Statement are the following:

(1) A statement pursuant to 37 C.F.R. §1.97(e); and

(2) A check for $180.00 for the fee under 37 C.F.R. §1.17(p) for submission of the Information Disclosure Statement.

If there are any additional charges, please charge Deposit Account No. 02-2666.

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP

Dated: August 11, 2006

Daniel E. Ovanezian
Reg. No. 41,236

12400 Wilshire Blvd.
Seventh Floor
Los Angeles, CA 90025
(408) 720-8300

Substitute for Form 1449/PTO				Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT *(use as many sheets as necessary)*				Application Number	11/437,517
				Filing Date	May 18, 2006
				First Named Inventor:	Jiang XiaoPing
				Art Unit	2635
				Examiner Name	Not yet assigned
Sheet	1	**of**	1	Attorney Docket Number	16820P456

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published	T[2]
		RYAN SEGUINE, et al., "Layout Guidelines for PSoC™ CapSense™", Cypress Application Note AN2292, Revision B, October 31, 2005, pages 1-15.	
		DENNIS SEGUINE, "Capacitive Switch Scan", Cypress Application Note AN2233a, Revision B, April 14, 2005, pages 1-6.	

Examiner Signature		Date Considered	

*Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1]Applicant's unique citation designation number (optional). [2]Applicant is to place a check mark here if English Translation is attached.

This collection of information is required by 37 CFR 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SENT FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.

Based on Form PTO/SB/08A (08-03) as modified by BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP on 09/10/03.

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APPLICATION NUMBER	FILING OR 371(c) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
11/437,517	05/18/2006	Jiang XiaoPing	16820P456

CONFIRMATION NO. 2623

8791
BLAKELY SOKOLOFF TAYLOR & ZAFMAN
1279 OAKMEAD PARKWAY
SUNNYVALE, CA94085-4040

Title: Two-pin buttons

Publication No. US-2007-0268265-A1
Publication Date: 11/22/2007

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Office of Public Records. The Office of Public Records can be reached by telephone at (703) 308-9726 or (800) 972-6382, by facsimile at (703) 305-8759, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently http://pair.uspto.gov/. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Pre-Grant Publication Division, 703-605-4283

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APPLICATION NUMBER	PATENT NUMBER	GROUP ART UNIT	FILE WRAPPER LOCATION
11/437,517		2629	

Correspondence Address / Fee Address Change

The following fields have been set to Customer Number 75405 on 03/03/2008

- Maintenance Fee Address

The address of record for Customer Number 75405 is:
CYPRESS/BLAKELY
BLAKELY SOKOLOFF TAYLOR & ZAFMAN
1279 OAKMEAD PARKWAY
SUNNYVALE,CA 94085-4040

UNITED STATES DEPARTMENT OF COMMERCE
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APPLICATION NUMBER	PATENT NUMBER	GROUP ART UNIT	FILE WRAPPER LOCATION
11/437,517		2629	

Correspondence Address / Fee Address Change

The following fields have been set to Customer Number 75405 on 04/07/2008

- Correspondence Address
- Maintenance Fee Address

The address of record for Customer Number 75405 is:
CYPRESS/BLAKELY
BLAKELY SOKOLOFF TAYLOR & ZAFMAN
1279 OAKMEAD PARKWAY
SUNNYVALE,CA 94085-4040

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MAR 2 3 2009

CYPRESS SEMICONDUCTOR CORPORATION

FACSIMILE TRANSMITTAL SHEET

TO: EXAMINER BENYAM KETEMA	FROM: ANDREW J. BATEMAN, REG. NO. 45,573
FAX NUMBER: 571-273-8300	DATE: MARCH 20, 2009
COMPANY: U.S. PATENT AND TRADEMARK OFFICE	TOTAL NO. OF PAGES INCLUDING COVER: 3
PHONE NUMBER: (571)270-7224	SENDER'S REFERENCE NUMBER: CD06039
RE: REVOCATION AND NEW POWER OF ATTORNEY	USPTO APPLICATION NUMBER: 11/437,517

☐ URGENT ☐ FOR REVIEW ☐ PLEASE COMMENT ☐ PLEASE REPLY ☐ PLEASE RECYCLE

NOTES/COMMENTS:

Application No.: 11/437,517
Filing Date: 05/18/2006
First Named Inventor: Jiang XiaoPing
Art Unit: 2629
Confirmation No.: 2623
Examiner Name: Benyam Ketema
Attorney Docket No.: CD06039

Attached are the following documents being submitted in connection with the above-identified patent application:

REVOCATION AND NEW POWER OF ATTORNEY (1 page)
STATEMENT UNDER 37 CFR 3.73(b) (1 page)

If there are any questions regarding this submission, please contact Applicant's attorney, Andrew J. Bateman, by telephone at 408-943-6878.

Respectfully submitted,

Andrew J. Bateman

Andrew J. Bateman
Attorney for Applicant
Reg. No. 45,573
Customer No. 60909

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MAR 2 3 2009

PTO/SB/82 (01-06)
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REVOCATION OF POWER OF ATTORNEY WITH NEW POWER OF ATTORNEY AND CHANGE OF CORRESPONDENCE ADDRESS

Application Number	11/437,517
Filing Date	05/18/2006
First Named Inventor	Jiang XiaoPing
Art Unit	2629
Examiner Name	2623
Attorney Docket Number	CD06039

I hereby revoke all previous powers of attorney given in the above-identified application.

☐ A Power of Attorney is submitted herewith.

OR

☑ I hereby appoint the practitioners associated with the Customer Number: 60909

☑ Please change the correspondence address for the above-identified application to:

☑ The address associated with Customer Number: 60909

OR

☐ Firm or Individual Name					
Address					
City		State		Zip	
Country					
Telephone		Email			

I am the:

☐ Applicant/Inventor.

☑ Assignee of record of the entire interest. See 37 CFR 3.71.
Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96)

SIGNATURE of Applicant or Assignee of Record

Signature	[signature]		
Name	Victoria Tidwell, Vice President of Legal Affairs and Associate General Counsel		
Date	03/20/2009	Telephone	408-943-2979

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below*.

☑ *Total of 1 forms are submitted.

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PTO/SB/96 (01-08)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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STATEMENT UNDER 37 CFR 3.73(b)

Applicant/Patent Owner: Jiang XiaoPing

Application No./Patent No.: 11/437,517 Filed/Issue Date: May 18, 2006

Entitled: TWO-PIN BUTTONS

Cypress Semiconductor Corporation, a Corporation
(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that it is:

1. [✓] the assignee of the entire right, title, and interest; or

2. [ ] an assignee of less than the entire right, title and interest
(The extent (by percentage) of its ownership interest is ______ %)

in the patent application/patent identified above by virtue of either:

A. [✓] An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel 017924, Frame 0470, or for which a copy thereof is attached.

OR

B. [ ] A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: ______ To: ______
The document was recorded in the United States Patent and Trademark Office at
Reel ______, Frame ______, or for which a copy thereof is attached.

2. From: ______ To: ______
The document was recorded in the United States Patent and Trademark Office at
Reel ______, Frame ______, or for which a copy thereof is attached.

3. From: ______ To: ______
The document was recorded in the United States Patent and Trademark Office at
Reel ______, Frame ______, or for which a copy thereof is attached.

[ ] Additional documents in the chain of title are listed on a supplemental sheet.

[✓] As required by 37 CFR 3.73(b)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (*i.e.*, a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

Andrew J. Bateman — March 20, 2009
Signature — Date

Andrew J. Bateman, Reg. No. 45,573 — 408-943-6878
Printed or Typed Name — Telephone Number

Attorney of Record
Title

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
11/437,517	05/18/2006	Jiang XiaoPing	CD06039

CONFIRMATION NO. 2623

POA ACCEPTANCE LETTER

OC000000035246111

60909
CYPRESS SEMICONDUCTOR CORPORATION
198 CHAMPION COURT
SAN JOSE, CA 95134-1709

Date Mailed: 04/01/2009

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 03/23/2009.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

/ttran/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
11/437,517	05/18/2006	Jiang XiaoPing	16820P456

CONFIRMATION NO. 2623

POWER OF ATTORNEY NOTICE

OC000000035246033

75405
CYPRESS/BLAKELY
Blakely Sokoloff Taylor & Zafman LLP
1279 Oakmead Parkway
SUNNYVALE, CA 94085-4040

Date Mailed: 04/01/2009

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 03/23/2009.

- The Power of Attorney to you in this application has been revoked by the assignee who has intervened as provided by 37 CFR 3.71. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

/ttran/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/437,517	05/18/2006	Jiang XiaoPing	CD06039	2623

60909 7590 08/05/2009
CYPRESS SEMICONDUCTOR CORPORATION
198 CHAMPION COURT
SAN JOSE, CA 95134-1709

EXAMINER	
KETEMA, BENYAM	
ART UNIT	**PAPER NUMBER**
2629	

MAIL DATE	DELIVERY MODE
08/05/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)
	11/437,517	XIAOPING, JIANG
	Examiner	Art Unit
	BENYAM KETEMA	2629

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 May 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) *5-17* is/are allowed.

6)☒ Claim(s) *1-4; 18-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *18 May 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *05/18/2006, 08/14/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-20 are presented for examination.

Information Disclosure Statement

2. The information disclosure statement (IDS) submitted on 05/18/2006 and 08/14/2006 has been considered by the examiner.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1, 2, 4 and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Tsujioka et al (US Pat NO 5,518,078)

As in Claim 1, Tsujioka et al discloses *a method* (Column 1 line 5-10)*, comprising:*

- *detecting a presence of a conductive object on a sensing device;* (Column 9 line 65- Column 10 line 4)

- *recognizing three or more button* (Fig 5 item 49, buttons) *operations performed by the conductive object* (Fig 5 item 50 & 51, finger or pen) *using two sensing areas of the sensing device.* (Fig 5 & 6 item 24 & 25, two sensing areas)

As in Claim 2, Tsujioka et al discloses *the method* (Column 1 line 5-10) *of claim 1, wherein recognizing three or more button operations* (Column 9 line 65- Column 10 line 6 and fig 5-8) *comprises: recognizing on a first sensing area of the two sensing areas of the sensing device;* (Fig 5 and Column 9 line 65- Column 10 line 4) *recognizing a second button operation when the presence of the conductive object is detected on a second sensing area of the two sensing areas of the sensing device;* (Fig 5 and Column 9 line 65- Column 10 line 4) *recognizing one or more button operations when the presence of the conductive object is detected on the first and second sensing areas.* (Fig 5)

As in Claim 4, Tsujioka et al discloses *the method* (Column 1 line 5-10) *of claim 1, further comprising scanning the two sensing areas of the sensing device,* (Column 9 line 58 -61) *wherein recognizing the three or more button operations comprises: recognizing a first button operation when a first sensing area of the two sensing areas detects the presence of the conductive object during the scanning of the two sensing areas;* (Fig 5, 7 and 9 and Column 9 line 54- Column 10 line 6) *recognizing a second button operation when a second sensing area of the two sensing areas detects the presence of the conductive object during the scanning of the two sensing areas;* (Fig 5, 7 and 9 and

Column 9 line 54- Column 10 line 6) *recognizing a third button operation when the first and second sensing areas detect the presence of the conductive object during the scanning of the two sensing areas.* (Fig 5, 7 and 9 and Column 9 line 54- Column 10 line 6) discloses scanning the sensing areas (i.e. 24 & 25) and recognizing multiple button (i.e. 36, 39-42) operation for conductive objects (i.e. finger or pen).

As in Claim 18, Tsujioka et al discloses *an apparatus* (Column 1, touch panel)*, comprising:*

- *a first sensing area to detect a presence of a conductive object on a sensing device;* (Fig 9 item 25)
- *a second sensing area to detect the presence of the conductive object on the sensing device;* (Fig 9 item 24)
- *means for recognizing three or more button operations* (Fig 9 item 39-42) *performed by the conductive object* (Fig 5 item 51 or 50, finger or pen) *using two sensing areas on the sensing device.* (Fig 9 item 24 & 25, two sensing areas)

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tsujioka et al (US Pat NO 5,518,078) In view of Collins (PG Pub NO 2004/0239616)

As in Claim 3, Tsujioka et al discloses *the method* (Column 1 line 5-10) *of claim 1,* but fails to disclose *determining a capacitance of the conductive object on the sensing device over time, wherein determining the capacitance further comprises determining a capacitance of the two sensing areas of the sensing device, and wherein recognizing the button operation is based on the capacitance of the two sensing areas.* However Collins discloses *determining a capacitance of the conductive object on the sensing device over time* (Paragraph 24 and Fig 2-3), *wherein determining the capacitance further comprises determining a capacitance of the two sensing areas of the sensing device,* (Fig 3 item 200-1 & 200-3) *and wherein recognizing the button operation is based on the capacitance of the two sensing areas.* (Paragraph 24-28 and Fig 3) discloses operation of buttons is recognized according to a signal produced (i.e. capacitance*)* when the user finger is in contact with sensing area.

Tsujioka et al and Collins are analogous art because they are from the common area of user input device using touch sensor. Tsujioka et al discloses an input device that has multiple sensing areas as well as buttons. But fails to disclose capacitance sensor, However Collins discloses that capacitance sensors are used to determine the presence of conductive object (i.e. finger) on the sensing area in a system similar to that of Tsujioka et al. Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to combine Tsujioka et al's sensing area to include Collins's capacitance sensor, because using capacitance sensor or any other form of sensor in touch panel device would be an alternate design choose.

8. Claims 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsujioka et al (US Pat NO 5,518,078) In view of Gitzinger et al (PG Pub NO 2006/0097992)

As in Claim 19, Tsujioka et al discloses *the apparatus* (Column 1, touch panel), but fails to disclose *means for reducing a pin count of the sensing device.* However Gitzinger et al discloses *means for reducing a pin count of the sensing device.* (Fig 3 and Paragraph 29-32) discloses the reduction of pins by coupling the discrete surfaces (i.e. sensing area, 320, 322, 324) together and connecting them to the controller.

As in Claim 20, Tsujioka et al discloses *the apparatus* (Column 1, touch panel), but fails to disclose *means for reducing scan time of the sensing device.* However Gitzinger et al discloses *means for reducing scan time of the sensing device.* (fig 3) discloses the sensing areas are coupled together and connected to the controller rather than being connected individually; therefore it would be obvious to a skilled person that by reducing the number of connection between the sensing area and controller the scan time would be increased (faster).

Tsujioka et al and Gitzinger et al are analogous art because they are from the common area of user input device using touch sensor. Tsujioka et al discloses an input device that has multiple sensing areas as well as buttons. But fails to disclose reduction of connecter pins as well as the effect of scanning time when the numbers of pins are reduced, However Gitzinger et al discloses in Fig 3 the number of pins have been reduced in a system similar to that of Tsujioka et al. Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to combine Tsujioka et al's sensing area to include Gitzinger et al's arrangement of reduced number of pins in order to reduced coast and material in the manufacturing of said device.

Allowable Subject Matter

9. Claims 5-17 are allowable over the prior art of record.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to BENYAM KETEMA whose telephone number is (571)270-7224. The examiner can normally be reached on Monday- Friday 8:00AM - 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shalwala Bipin H can be reached on (571)-272-7681. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/ B.K. /

Examiner, Art Unit 2629

/Bipin Shalwala/

Supervisory Patent Examiner, Art Unit 2629

Notice of References Cited	Application/Control No. 11/437,517	Applicant(s)/Patent Under Reexamination XIAOPING, JIANG	
	Examiner BENYAM KETEMA	Art Unit 2629	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-5,518,078	05-1996	Tsujioka et al.	178/18.05
*	B	US-2004/0239616	12-2004	Collins, Ryan V.	345/156
*	C	US-2006/0097992	05-2006	Gitzinger et al.	345/173
*	D	US-2006/0227117	10-2006	Proctor, David W.	345/173
*	E	US-7,158,125	01-2007	Sinclair et al.	345/173
*	F	US-2007/0291013	12-2007	WON, Jong Sung	345/173
*	G	US-7,466,307	12-2008	Trent et al.	345/173
*	H	US-7,495,659	02-2009	Marriott et al.	345/173
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
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	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Index of Claims	Application/Control No. 11437517	Applicant(s)/Patent Under Reexamination XIAOPING, JIANG
	Examiner BENYAM KETEMA	**Art Unit** 2629

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE							
Final	Original	07/16/2009							
	1	✓							
	2	✓							
	3	✓							
	4	✓							
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	14	=							
	15	=							
	16	=							
	17	=							
	18	✓							
	19	✓							
	20	✓							

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11437517	XIAOPING, JIANG
	Examiner	**Art Unit**
	BENYAM KETEMA	2629

SEARCHED

Class	Subclass	Date	Examiner
345	173	7/16/2009	bk

SEARCH NOTES

Search Notes	Date	Examiner
Inventer Search	7/16/2009	bk
See Attaches EAST Search	7/16/2009	bk

INTERFERENCE SEARCH

Class	Subclass	Date	Examiner

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BIB DATA SHEET

CONFIRMATION NO. 2623

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
11/437,517	05/18/2006 RULE	341	2629	CD06039

APPLICANTS
Jiang XiaoPing, Shanghai, CHINA;

** **CONTINUING DATA** **************************

** **FOREIGN APPLICATIONS** **************************

** **IF REQUIRED, FOREIGN FILING LICENSE GRANTED** **
06/15/2006

		STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
Foreign Priority claimed ☐ Yes ☑ No 35 USC 119(a-d) conditions met ☐ Yes ☑ No Verified and Acknowledged /BENYAM KETEMA/ Examiner's Signature	☐ Met after Allowance Initials	CHINA	10	20	3

ADDRESS

CYPRESS SEMICONDUCTOR CORPORATION
198 CHAMPION COURT
SAN JOSE, CA 95134-1709
UNITED STATES

TITLE

Two-pin buttons

FILING FEE RECEIVED		
1000	FEES: Authority has been given in Paper No.__________ to charge/credit DEPOSIT ACCOUNT No.__________ for following:	☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other __________ ☐ Credit

Substitute for Form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(use as many sheets as necessary)

Complete if Known	
Application Number	11/437,517
Filing Date	May 18, 2006
First Named Inventor:	Jiang XiaoPing
Art Unit	2635
Examiner Name	Not yet assigned
Attorney Docket Number	16820P456

Sheet 1 **of** 1

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published	T[2]
		RYAN SEGUINE, et al., "Layout Guidelines for PSoC™ CapSense™", Cypress Application Note AN2292, Revision B, October 31, 2005, pages 1-15.	
		DENNIS SEGUINE, "Capacitive Switch Scan", Cypress Application Note AN2233a, Revision B, April 14, 2005, pages 1-6.	

Examiner Signature	/Benyam Ketema/	Date Considered	07/22/2009

*Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1]Applicant's unique citation designation number (optional). [2]Applicant is to place a check mark here if English Translation is attached.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.K./

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	6	("5305017" | "6188391" | "6380931").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 09:51
S2	9	XIAOPING-JIANG.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 10:25
S3	2	"11437517"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 13:10
S6	76	"5543590"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 15:50
S7	4	XIAOPING-JIANG.in. and ((first and second) and (sensing adj areas))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 17:00
S8	3	XIAOPING-JIANG.in. and ((first and second) and (sensing adj areas).clm.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 17:00
S9	2	XIAOPING-JIANG.in. and ((first and sensing adj areas).clm. and (second and sensing adj areas).clm.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 17:03

S10	1202	345/173.ccls. and capacitance	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 17:07
S11	604	345/173.ccls. and capacitance and button	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 17:07
S12	0	345/173.ccls. and capacitance and button and ("multiple sensing areas")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 17:08
S13	48	345/173.ccls. and capacitance and button and (sensing adj areas)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 17:09
S14	31	345/173.ccls. and capacitance and button and (sensing adj areas) and (touch adj pad)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 17:09
S15	77	"5943052"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 13:50
S16	34	2004/0252109	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 15:26
S17	0	2007/0146349	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 15:31

S18	2	"20070146349"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 15:32
S19	173	("20020063688" | "20020191029" | "20030025679" | "20030062889" | "20030063428" | "20030080755" | "20030156098" | "20030160808" | "20030183864" | "20030183884" | "20030184315" | "20040169594" | "20040178989" | "20040178997" | "20040252109" | "20040263864" | "20050021269" | "20050024341" | "20050052425" | "20050073302" | "20050073322" | "20050083110" | "20060032680" | "20060097991" | "20060113974" | "20060164142" | "20060273804" | "4264903" | "4283713" | "4438404" | "4475151" | "4497575" | "4736097" | "4736191" | "4773024" | "4802103" | "4876534" | "4879461" | "4935702" | "4953928" | "4962342" | "5049758" | "5055827" | "5059920" | "5068622" | "5073759" | "5083044" | "5095284" | "5097305" | "5107149" | "5109261" | "5119038" | "5120996" | "5122800" | "5126685" | "5146106" | "5160899" | "5165054" | "5166562"	US-PGPUB; USPAT; USOCR	AND	ON	2009/07/18 15:45

		| "5204549" | "5243554" | "5248873" | "5260592" | "5270963" | "5276407" | "5289023" | "5303329" | "5305017" | "5324958" | "5331215" | "5336936" | "5339213" | "5349303" | "5374787" | "5381515" | "5384467" | "5408194" | "5488204" | "5495077" | "5541878" | "5543588" | "5543590" | "5543591" | "5555907" | "5565658" | "5566702" | "5629891" | "5648642" | "5682032" | "5730165" | "5757368" | "5763909" | "5767457" | "5796183" | "5812698" | "5841078" | "5844265" | "5854625" | "5861583" | "5861875" | "5864242" | "5864392" | "5880411" | "5889236" | "5914465" | "5914708" | "5920310" | "5926566" | "5942733" | "5943052" | "5969513" | "6023422" | "6028271" | "6028959" | "6097432" | "6148104").PN. OR ("6185450" | "6188228" | "6188391" | "6222528" | "6239389" | "6249447" | "6262717" | "6280391" | "6288707" | "6304014" | "6320184" | "6323846" | "6326859" | "6377009" | "6380929" | "6380931" | "6414671" | "6430305" | "6441073" | "6452514" | "6457355" | "6466036" | "6473069" | "6489899"				

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S20	1	2006/0097992	US-PGPUB; USPAT; USOCR	AND	ON	2009/07/18 16:19
S21	1	"20060097992"	US-PGPUB; USPAT; USOCR	AND	ON	2009/07/18 16:20
S22	12	345/173.ccls. and cypress.as.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:28
S23	3731	cypress.as.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:31
S24	0	"cypress.as. and" (Capacitive and sensor)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:33
S25	51	cypress.as. and (Capacitive and sensor)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:33

S26	1	cypress.as. and (Capacitive and sensor) and (touch near button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:34
S27	1167	(Capacitive and sensor) and (sensing near areas)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:47
S28	47	(Capacitive and sensor) and (sensing near areas) same buttons	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:48
S29	26	(touch near screen) and (Capacitive and sensor) and (sensing near areas) same buttons	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:49
S30	3	(touch near screen) and (Capacitive and sensor) and (sensing near areas) same sensing near buttons	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:57
S31	0	(touch near screen near buttons) and (Capacitive and sensor) and (sensing near areas) same sensing near buttons	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:57
S32	4	(touch near screen near buttons) and (Capacitive and sensor) and (sensing near areas)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:58
S33	2	"6947031"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 17:01

S34	89	"4476463"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 17:29
S35	106	"5565658"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 17:45
S36	212	"5730165"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 17:51
S37	162	"4736191"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:02
S38	90	"4680430"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:09
S39	0	345/4.ccls. and ((capacitance near sensor) same (vertual near button) same (pin))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:15
S40	0	345/4.ccls. and (capacitance near sensor)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:15
S41	0	"345"/$.ccls. and ((capacitance near sensor) same (vertual near button) same (pin))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:15

S42	369	"345"/$.ccls. and (capacitance near sensor)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:16
S43	162	"345"/$.ccls. and (capacitance near sensor) and (touch near screen)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:16
S44	32	"345"/$.ccls. and (capacitance near sensor) and (touch near screen) and multi $touch	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:17
S45	20	three near sensing near area	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:28
S46	8710	capacitance near sensor	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:29
S47	158	(electrically adj isolated) same (sensor near element)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:34
S48	0	S45 and S46 and S47	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:35
S49	24	S46 and S47	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:35

S50	307	(touch near sensor near button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:50
S51	60	S50 and S46	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:51
S52	0	(Multiple near sens$4 near area) and (button near operation) and (touch near screen)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 07:57
S53	2	(Multiple near sens$4 near area) and (touch near screen)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 07:58
S54	0	(Multiple near sens$4 near button$2) and (touch near screen) and (capacitance$2)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 08:04
S55	4	(Multiple near sens$4 near button$2) and (capacitance)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 08:05
S56	3	"20050133262"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 08:13
S57	2	"20080278453"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 08:22

S58	2	"20080246735"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 08:23
S59	4	"61000784"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 08:25
S60	1202	345/173.ccls. and capacitance	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 08:29
S61	613	345/174-179.ccls. and capacitance	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 11:09
S63	29	(touch near screen) and (Capacit$6 and sens$3) and (sensing near areas) same buttons	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 12:11
S64	2784	178/18.01-18.11.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 15:47
S65	439	178/18.01-18.11.ccls. and (touch near panel)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 15:48
S66	900	178/18.01-18.11.ccls. and (capacit$6 and sens$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 16:35

S67	30	178/18.01-18.11.ccls. and capacit$6 same sens$3 near (second or third)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 16:37
S68	33	(Capacit$6 and sens $3) and (sensing near areas) and (input near button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 17:23
S69	24064	(touch near screen or pad) and (capacit$6 and sens$3) and (button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 17:31
S70	90998	(touch near screen or pad) and (capacit$6 and sens$3) and (first or second and button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 17:32
S71	73385	(touch near screen or pad) and (capacit$6 and sens$3) and (first or second and button) and (sens$3 and area)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 17:33
S72	20303	(touch near screen or pad) and (capacit$6 and sens$3) and (button) and (sens$3 and area)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 17:33
S73	20303	(touch near screen or pad) and (capacit$6 and sens$3 and button) and (sens$3 and area)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 17:34
S74	2438	(touch near screen or pad) and (capacit$6 and sens$3 and button) and (sens$3 and area) and "345"/$.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 17:35

S76	1334	(touch near screen or pad) and (capacit$6 and sens$3 and button) and (sens$3 and area) and "345"/$. ccls. and portable	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 17:36
S77	61	345/173.ccls. and capacit$6 same sens$3 near (second or third)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/21 13:51

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Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(use as many sheets as necessary)

Sheet	1	of	2

Complete If Known	
Application Number	
Filing Date	
First Named Inventor	Jiang XiaoPing
Art Unit	
Examiner Name	
Attorney Docket Number	16820P456

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number: Number - Kind Code[2] *(if known)*	Publication Date or Issue Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US-6,380,931	04-30-2002	Gillespie et al.	
		US-5,305,017	04-19-1994	Gerpheide	
		US-6,188,391	02-13-2001	Seely et al.	
		US-			
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FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document: Country Code[3] - Number[4] - Kind Code[5] *(if known)*	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]

Examiner Signature	/Benyam Ketema/	Date Considered	07/22/2009

*Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication.

[1]Applicant's unique citation designation number (optional). [2]See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3]Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4]For Japanese patent documents, the indication of the year of reign of the Emperor must precede the serial number of the patent document. [5]Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. [6]Applicant is to place a check mark here if English language Translation is attached.

Based on PTO/SB/08A (08-03) as modified by Blakely, Sokoloff, Taylor & Zafman (wlr) 08/11/2003.

Send To: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.K./

Substitute for form 1449A/PTO				Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				Application Number	
				Filing Date	
				First Named Inventor	Jiang XiaoPing
				Art Unit	
				Examiner Name	
Sheet	2	**of**	2	Attorney Docket Number	16820P456

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
		Chapweske, Adam, "The PS/2 Mouse Interface", PS/2 Mouse Interfacing, 2001, 10 pages.	
		Mack, Chris, "Semiconductor Lithography - The Basic Process", Gentleman Scientist, 12 pages, downloaded April 20, 2006, http://www.lithoguru.com/scientist/lithobasics.html	
		"Photolithography", Wikipedia, the free encyclopedia, 3 pages, downloaded April 20, 2006, http://en.wikipedia.org/wiki/Photolithography	
		"CY8C21x34 Data Sheet", Cypress Semiconductore Corporation, CSR User Module, CSR v1.0, October 6, 2005, pgs. 1-36	

Examiner Signature		Date Considered	

*Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication.

[1]Applicant's unique citation designation number. [2]Applicant is to place a check mark here if English language Translation is attached.

Based on PTO/SB/08B (08-03) as modified by Blakely, Sokoloff, Taylor & Zafman (wlr) 08/11/2003.
Send To: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.K./

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Jiang XiaoPing	Examiner: Benyan Ketema
Serial No.: 11/437,517	Group Art Unit: 2629
Filed: May 18, 2006	Docket No.: CD06039
Title: Two-Pin Buttons	Confirmation No.: 2623
Assignee: Cypress Semiconductor	

<u>RESPONSE TO OFFICE ACTION DATED AUGUST 5, 2009</u>

To: Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Amendments to the present application and/or associated remarks are detailed below.

CLAIMS

Claims pending

- At time of the Action: 1-20.
- After this Response: 1-20.

Currently Amended claims: None.

Currently Cancelled claims: None.

Currently Withdrawn claims: None.

New claims: None.

1. (Original) A method, comprising:

detecting a presence of a conductive object on a sensing device; and

recognizing three or more button operations performed by the conductive object using two sensing areas of the sensing device.

2. (Original) The method of claim 1, wherein recognizing three or more button operations comprises:

recognizing a first button operation when the presence of the conductive object is detected on a first sensing area of the two sensing areas of the sensing device;

recognizing a second button operation when the presence of the conductive object is detected on a second sensing area of the two sensing areas of the sensing device; and

recognizing one or more button operations when the presence of the conductive object is detected on the first and second sensing areas.

3. (Original) The method of claim 1, further comprising determining a capacitance of the conductive object on the sensing device over time, wherein determining the capacitance further comprises determining a capacitance of the two sensing areas of the sensing device, and wherein recognizing the button operation is based on the capacitance of the two sensing areas.

4. (Original) The method of claim 1, further comprising scanning the two sensing areas of the sensing device, and wherein recognizing the three or more button operations comprises:

recognizing a first button operation when a first sensing area of the two sensing areas detects the presence of the conductive object during the scanning of the two sensing areas;

recognizing a second button operation when a second sensing area of the two sensing areas detects the presence of the conductive object during the scanning of the two sensing areas; and

recognizing a third button operation when the first and second sensing areas detect the presence of the conductive object during the scanning of the two sensing areas.

5. (Original) An apparatus, comprising:

a sensing device comprising:

a first sensor element;

a second sensor element; and

a third sensor element comprising a first portion coupled to the first sensor element and a second portion coupled to the second sensor element, wherein the first and second portions of the third sensor element are electrically isolated.

6. (Original) The apparatus of claim 5, wherein a surface area of the first portion and a surface area of the second portion of the third sensor element are substantially equal.

7. (Original) The apparatus of claim 5, further comprising a fourth sensor element comprising a third portion coupled to the first sensor element and a fourth portion coupled to the second sensor element, wherein the third and fourth portions of the fourth sensor element are electrically isolated.

8. (Original) The apparatus of claim 7, wherein a surface area ratio of the third sensor element is approximately 25% of the first portion to approximately 75% of the second portion, and wherein a surface area ratio of the fourth sensor element is approximately 75% of the third portion to approximately 25% of the fourth portion.

9. (Original) The apparatus of claim 5, further comprising a fifth sensor element comprising a fifth portion coupled to the first sensor element and a sixth portion coupled to the second sensor element, wherein the fifth and sixth portions of the fifth sensor element are electrically isolated.

10. (Original) The apparatus of claim 9, wherein a surface area ratio of the third sensor element is approximately 33% of the first portion to approximately 67% of the second portion, wherein a surface area ratio of the fourth sensor element is approximately 50% of the third portion to approximately 50% of the fourth portion, and wherein a surface

area ratio of the fifth sensor element is approximately 67% of the fifth portion to approximately 33% of the sixth portion.

11. (Original) The apparatus of claim 5, wherein the first portion comprises a first conductive trace having one or more sub-traces, and the second portion comprises a second conductive trace having one or more sub-traces, and wherein at least one sub-trace of the first conductive trace is interleaved with at least one sub-trace of the second conductive trace.

12. (Original) The apparatus of claim 5, wherein the first, second, and third sensor elements are substantially circular shaped.

13. (Original) The apparatus of claim 5, wherein the first, second, and third sensor elements are substantially rectangular shaped.

14. (Original) The apparatus of claim 5, further comprising a processing device coupled to the sensing device, wherein the processing device comprises one or more capacitance sensors coupled to the first and second sensor elements, and wherein the one or more capacitance sensors are operable to measure capacitance on the first, second, and third sensor elements.

15. (Original) The apparatus of claim 14, wherein the processing device comprises a first pin and a second pin, wherein the first pin is coupled to the first sensor element, and wherein the second pin is coupled to the second sensor element.

16. (Original) The apparatus of claim 15, wherein the processing device is operable to recognize a first button operation on the first sensor element, a second button operation on the second sensor element, and a third button operation on the first and second portions of the third sensor element.

17. (Original) The apparatus of claim 14, wherein each of the one or more capacitance sensors comprises a relaxation oscillator coupled to one of the first sensor element and the first portion, and the second sensor element and the second portion, wherein the relaxation oscillator comprises:

a current source to provide a charge current to first sensor element and the first portion, and to the second sensor element and the second portion;

a selection circuit coupled to the first sensor element and the first portion, the second sensor element and the second portion, and the current source, wherein the selection circuit is configured to sequentially select a sensor element of the first sensor element and the second sensor elements to provide the charge current and to measure the capacitance of each sensor element of the sensing device;

a comparator coupled to the current source and the selection circuit, wherein the comparator is configured to compare a voltage on the selected sensor element and a threshold voltage; and

a reset switch coupled to the comparator, current source, and selection circuit, wherein the reset switch is configured to reset the charge current on the selected sensor element, and wherein each of the one or more capacitance sensors further comprises a digital counter coupled to the relaxation oscillator, and wherein the digital counter is operable to count at least one of a frequency or a period of a relaxation oscillator output received from the relaxation oscillator.

18. (Original) An apparatus, comprising:

a first sensing area to detect a presence of a conductive object on a sensing device;

a second sensing area to detect the presence of the conductive object on the sensing device; and

means for recognizing three or more button operations performed by the conductive object using two sensing areas on the sensing device.

19. (Original) The apparatus of claim 18, further comprising means for reducing a pin count of the sensing device.

20. (Original) The apparatus of claim 18, further comprising means for reducing scan time of the sensing device.

REMARKS

This communication is responsive to the Final Office Action mailed on August 5, 2009. Claims 1-20 are currently pending. No claims have been amended. No claims have been added. No claims have been cancelled or withdrawn. Applicant respectfully requests reconsideration of the present objections and rejections. Applicant believes this communication to be fully responsive to all issues raised in the Action.

§*102 Rejections*

Claims 1, 2, 4 and 18 were rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by Tsujioka et al. (U.S. Patent Number 5,518,078, hereinafter "Tsujioka").

Regarding independent claim 1, Examiner stated:

> "Tsujioka et al discloses *a method (*Column 1 line 5-10), *comprising:*
> *detecting a presence of a conductive object on a sensing device;* (Column 9 line 25- Column 10 line 4)
> *recognizing three or more button* (Fig. 5 item 49, buttons) *operations performed by the conductive object* (Fig 5 item 50 & 51, finger or pen) *using two sensing areas of the sensing device* (Fig 5 & 6 item 24 & 25, two sensing areas)."

Applicant submits that Tsujioka is directed to an analog-resistive touch screen.

> (Figures 14, 16-20; Column 1, Lines 5-10) "The present invention relates to a coordinates input device generally known as a touch panel, and more particularly to coordinates input device for reading by converting a pressing position signal into an electric signal when the **surface having a planar resistive thin film thereon is pressed**."

Tsujioka does not disclose "detecting a present of a **conductive object** on a sensing device" as recited in claim 1.

For at least the reason stated above, Tsujioka does not recite the claimed features of claim 1. Applicant respectfully submits that claim 1 is in condition for allowance and requests notification of same.

Claims 2 and 4 depend from independent claim 1 and incorporate all of the features therein. Claim 2 an 4 are also asserted to be allowable for the reasons presented above, and Applicant respectfully requests notification of same. Applicant considers additional elements of claims 2 and 4 to further distinguish over Tsujioka and Applicant reserves the right to present arguments to this effect at a later date.

Regarding independent claim 18, Examiner stated:

> "Tsujioka et al discloses *an apparatus (*Column 1, touch panel), *comprising:*
> *a first sensing area to detect a presence of a conductive object on a sensing device;* (Fig 9 item 25)
> *a second senign area to detect thr presence of the conductive object on the sensing device;* (Fig 9 item 24)
> *means for recognizing three or more button operations* (Fig 9 item 39-42) *performed by the conductive object* (Fig 5 item 51 and 50, finger or pen) *using two sensing areas on the sensing device* (Fig 9 item 24 & 25, two sensing areas)."

For at least the reason stated for independent claim 1 above, Tsujioka does not recite the claimed features of claim 18. In particular, Tsujioka does not disclose a first or second sensing area "to detect the **presence of a conductive object**…" as claimed. Applicant respectfully submits that claim 1 is in condition for allowance and requests notification of same.

§103 Rejections

Claim 3 was rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Tsujioka in view of Collins (U.S. Published Application 2004/0239616, hereinafter "Collins").

Claim 3 depends from independent claim 1 and incorporates all of the features therein. Claim 3 is also asserted to be allowable for the reasons presented above, and Applicant respectfully requests notification of same. Applicant considers additional elements of claim 3 to further distinguish over Tsujioka in view of Collins and Applicant reserves the right to present arguments to this effect at a later date.

Claims 19 and 20 was rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Tsujioka in view of Gritzinger et al. (U.S. Published Application 2006/0097992, hereinafter "Gritzinger").

Claims 19 and 20 depend from independent claim 18 and incorporate all of the features therein. Claims 19 and 20 are also asserted to be allowable for the reasons presented above, and Applicant respectfully requests notification of same. Applicant considers additional elements of claims 19 and 20 to further distinguish over Tsujioka in view of Gritzinger and Applicant reserves the right to present arguments to this effect at a later date.

Allowed Claims

Claims 5-17 have been allowed by the Patent Office. Applicant thanks the Examiner.

Reservation of Rights

In the interest of clarity and brevity, Applicant may not have addressed every assertion made in the Office Action. Applicant's silence regarding any such assertion does not constitute any admission or acquiescence. Applicant reserves all rights not exercised in connection with this response, such as the right to challenge or rebut any tacit or explicit characterization of any reference or of any of the present claims, the right to challenge or rebut any asserted factual or legal basis of any of the rejections, the right to swear behind any cited reference such as provided under 37 C.F.R. § 1.131 or otherwise, or the right to assert co-ownership of any cited reference. Applicant does not admit that any of the cited references or any other references of record is relevant to the present claims, or that they constitute prior art. To the extent that any rejection or assertion is based upon the Examiner's personal knowledge, rather than any objective evidence of record as manifested by a cited prior art reference, Applicant timely objects to such reliance on Official Notice, and reserves all rights to request that the Examiner provide a reference or affidavit in support of such assertion, as required by MPEP § 2144.03. Applicant reserves all rights to pursue any cancelled claims in a subsequent patent application claiming the benefit of priority of the present patent application, and to request rejoinder of any withdrawn claim, as required by MPEP § 821.04.

Conclusion

Applicants respectfully submit that the claims are in condition for allowance and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's attorney, Lucinda Price, at (408) 545-7194.

Please charge any additional fees under 37 CFR §§ 1.16, 1.17, 1.18, 1.20 and 1.21 that may be required to maintain pendency of the present application, or apply any credits to our PTO deposit account number: 50-3781.

Respectfully submitted,
Jiang XiaoPing

By their Representative,
Agent for Applicant

Date November 5, 2009

By: /Ryan Seguine/
Ryan D. Seguine
Reg. No. 64,577

Cypress Semiconductor Corporation
198 Champion Court
San Jose, CA 95134
Facsimile: (408) 545-6911

Electronic Acknowledgement Receipt

EFS ID:	6402612
Application Number:	11437517
International Application Number:	
Confirmation Number:	2623
Title of Invention:	Two-pin buttons
First Named Inventor/Applicant Name:	Jiang XiaoPing
Customer Number:	60909
Filer:	Andrew J. Bateman/Ryan Seguine
Filer Authorized By:	Andrew J. Bateman
Attorney Docket Number:	CD06039
Receipt Date:	05-NOV-2009
Filing Date:	18-MAY-2006
Time Stamp:	18:08:03
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Amendment/Req. Reconsideration-After Non-Final Reject	CD06039AmendmentAfterNonFinal.pdf	85350 28326b2548efa737c078f8c1a57d54d67ea3601b	no	12

Warnings:

Information:

Total Files Size (in bytes):	85350

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 11/437,517	Filing Date 05/18/2006	☐ To be Mailed

APPLICATION AS FILED – PART I

FOR	NUMBER FILED (Column 1)	NUMBER EXTRA (Column 2)	SMALL ENTITY ☐ RATE ($)	SMALL ENTITY FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =		OR	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =			X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT	11/05/2009	CLAIMS REMAINING AFTER AMENDMENT (Column 1)		HIGHEST NUMBER PREVIOUSLY PAID FOR (Column 2)	PRESENT EXTRA (Column 3)	SMALL ENTITY RATE ($)	SMALL ENTITY ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 20	Minus	** 20	= 0	X $ =		OR	X $52=	0
	Independent (37 CFR 1.16(h))	* 3	Minus	***3	= 0	X $ =		OR	X $220=	0
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	**0**

AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT (Column 1)		HIGHEST NUMBER PREVIOUSLY PAID FOR (Column 2)	PRESENT EXTRA (Column 3)	SMALL ENTITY RATE ($)	SMALL ENTITY ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =		OR	X $ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =		OR	X $ =	
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

Legal Instrument Examiner:
/ANTHONY WILLIAMS/

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/437,517	05/18/2006	Jiang XiaoPing	CD06039	2623

60909 7590 01/26/2010
CYPRESS SEMICONDUCTOR CORPORATION
198 CHAMPION COURT
SAN JOSE, CA 95134-1709

EXAMINER	
KETEMA, BENYAM	

ART UNIT	PAPER NUMBER
2629	

MAIL DATE	DELIVERY MODE
01/26/2010	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	11/437,517	XIAOPING, JIANG	
	Examiner	**Art Unit**	
	BENYAM KETEMA	2629	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 November 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *5-17* is/are allowed.

6)☒ Claim(s) *1-4 and 18-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *05/18/2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. In an amendment dated, November 5, 2009, claims 1-20 are presented for examination.

2. Applicant's arguments with respect to claims 1-4 and 18- 20 have been considered but is not persuasive.

On page 8 and 9 of the Remarks, the Applicants argue that Tsujioka et al fails to teach the claimed feature of "*…detecting a presence of a* ***conductive object*** *on a sensing device …"* as recited in independent Claims 1 and 18. The Examiner must respectfully disagree. Tsujioka et al discloses that as the user (i.e. operator) presses any one of the input region using his/her finger the corresponding signal that is associated with anyone of the input region is converted into digital signal and fed into the control device so that the appropriate action (command) would be initiated. This process would show that the device had to detect operator's finger (i.e. *conductive object*) in order to process inputted information. Further more applicants' discloses that "***conductive object"*** *as* being user finger (Paragraph 50 & 51). Therefor one can see Tsujioka's device detects users finger (***conductive object***) as it is used to input information or command on any one of the pressing regions (Fig 5).

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1, 2, 4 and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Tsujioka et al (US Pat NO 5,518,078)

As in Claim 1, Tsujioka et al discloses *a method* (Column 1 line 5-10), *comprising:*

- *detecting a presence of a conductive object on a sensing device;* (Column 9 line 65- Column 10 line 4)
- *recognizing three or more button* (Fig 5 item 49, buttons) *operations performed by the conductive object* (Fig 5 item 50 & 51, finger or pen) *using two sensing areas of the sensing device.* (Fig 5 & 6 item 24 & 25, two sensing areas)

As in Claim 2, Tsujioka et al discloses *the method* (Column 1 line 5-10) *of claim 1, wherein recognizing three or more button operations* (Column 9 line 65- Column 10 line 6 and fig 5-8) *comprises: recognizing on a first sensing area of* *the two sensing areas of the sensing device;* (Fig 5 and Column 9 line 65- Column 10 line 4) *recognizing a second button operation when the presence of the conductive object is detected on a second sensing area of the two sensing areas of the sensing device;* (Fig 5 and Column 9 line 65- Column 10 line 4) *recognizing one or more button operations when the presence of the conductive object is detected on the first and second sensing areas.* (Fig 5)

As in Claim 4, Tsujioka et al discloses *the method* (Column 1 line 5-10) *of claim 1, further comprising scanning the two sensing areas of the sensing device,* (Column 9 line 58 -61) *wherein recognizing the three or more button operations comprises: recognizing a first button operation when a first sensing area of the two sensing areas detects the presence of the conductive object during the scanning of the two sensing areas;* (Fig 5, 7 and 9 and Column 9 line 54- Column 10 line 6) *recognizing a second button operation when a second sensing area of the two sensing areas detects the presence of the conductive object during the scanning of the two sensing areas;* (Fig 5, 7 and 9 and Column 9 line 54- Column 10 line 6) *recognizing a third button operation when the first and second sensing areas detect the presence of the conductive object during the scanning of the two sensing areas.* (Fig 5, 7 and 9 and Column 9 line 54- Column 10 line 6) discloses scanning the sensing areas (i.e. 24 & 25) and recognizing multiple button (i.e. 36, 39-42) operation for conductive objects (i.e. finger or pen).

As in Claim 18, Tsujioka et al discloses *an apparatus* (Column 1, touch panel), *comprising:*

- *a first sensing area to detect a presence of a conductive object on a sensing device;* (Fig 9 item 25)
- *a second sensing area to detect the presence of the conductive object on the sensing device;* (Fig 9 item 24)
- *means for recognizing three or more button operations* (Fig 9 item 39-42) *performed by the conductive object* (Fig 5 item 51 or 50, finger or pen) *using two sensing areas on the sensing device.* (Fig 9 item 24 & 25, two sensing areas)

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tsujioka et al (US Pat NO 5,518,078) In view of Collins (PG Pub NO 2004/0239616)

As in Claim 3, Tsujioka et al discloses *the method* (Column 1 line 5-10) *of claim 1,* but fails to disclose *determining a capacitance of the conductive object on the sensing device over time, wherein determining the capacitance further comprises determining a capacitance of the two sensing areas of the sensing device, and wherein recognizing the button operation is based on the capacitance of the two sensing areas.* However Collins discloses *determining a capacitance of the conductive object on the sensing device over time* (Paragraph 24 and Fig 2-3), *wherein determining the capacitance further comprises determining a capacitance of the two sensing areas of the sensing device,* (Fig 3 item 200-1 & 200-3) *and wherein recognizing the button operation is based on the capacitance of the two sensing areas.* (Paragraph 24-28 and Fig 3) discloses operation of buttons is recognized according to a signal produced (i.e. capacitance*)* when the user finger is in contact with sensing area.

Tsujioka et al and Collins are analogous art because they are from the common area of user input device using touch sensor. Tsujioka et al discloses an input device that has multiple sensing areas as well as buttons. But fails to disclose capacitance sensor, However Collins discloses that capacitance sensors are used to determine the presence of conductive object (i.e. finger) on the sensing area in a system similar to that of Tsujioka et al. Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to combine Tsujioka et al's sensing area to include Collins's capacitance sensor, because using capacitance sensor or any other form of sensor in touch panel device would be an alternate design choose.

8. Claims 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsujioka et al (US Pat NO 5,518,078) In view of Gitzinger et al (PG Pub NO 2006/0097992)

As in Claim 19, Tsujioka et al discloses *the apparatus* (Column 1, touch panel), but fails to disclose *means for reducing a pin count of the sensing device.* However Gitzinger et al discloses *means for reducing a pin count of the sensing device.* (Fig 3 and Paragraph 29-32) discloses the reduction of pins by coupling the discrete surfaces (i.e. sensing area, 320, 322, 324) together and connecting them to the controller.

Tsujioka et al and Gitzinger et al are analogous art because they are from the common area of user input device using touch sensor. Tsujioka et al discloses an input device that has multiple sensing areas as well as buttons. But fails to disclose reduction of connecter pins as well as the effect of scanning time when the numbers of pins are reduced, However Gitzinger et al discloses in Fig 3 the number of pins have been reduced in a system similar to that of Tsujioka et al. Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to combine Tsujioka et al's sensing area to include Gitzinger et al's arrangement of reduced number of pins in order to reduced coast and material in the manufacturing of said device.

As in Claim 20, Tsujioka et al discloses *the apparatus* (Column 1, touch panel), but fails to disclose *means for reducing scan time of the sensing device.* However Gitzinger et al discloses *means for reducing scan time of the sensing device.* (fig 3) discloses the sensing areas are coupled together and connected to the controller rather than being connected individually; therefore it would be obvious to a skilled person that by reducing the number of connection between the sensing area and controller the scan time would be increased (faster).

Allowable Subject Matter

9. Claims 5-17 are allowable over the prior art of record.

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to BENYAM KETEMA whose telephone number is (571)270-7224. The examiner can normally be reached on Monday-Friday 8:00AM - 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shalwala Bipin H can be reached on (571)-272-7681. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO

Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/ B.K. /

Examiner, Art Unit 2629

/Bipin Shalwala/

Supervisory Patent Examiner, Art Unit 2629

Notice of References Cited	Application/Control No. 11/437,517	Applicant(s)/Patent Under Reexamination XIAOPING, JIANG	
	Examiner BENYAM KETEMA	Art Unit 2629	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-5,518,078	05-1996	Tsujioka et al.	178/18.05
*	B	US-2004/0239616	12-2004	Collins, Ryan V.	345/156
*	C	US-2006/0097992	05-2006	Gitzinger et al.	345/173
*	D	US-2006/0227117	10-2006	Proctor, David W.	345/173
*	E	US-7,158,125	01-2007	Sinclair et al.	345/173
*	F	US-2007/0291013	12-2007	WON, Jong Sung	345/173
*	G	US-7,466,307	12-2008	Trent et al.	345/173
*	H	US-7,495,659	02-2009	Marriott et al.	345/173
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L3	560	345/173.ccls. and capacit$6 same sens$3 same (second or third)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/01/19 16:58
L4	396	(touch near screen or pad) same (capacit$6 and sens$3 and button) and (sens$3 and area) and "345"/$. ccls. and portable	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2010/01/19 16:58
L5	35	(touch near screen or pad) same (capacit$6 and sens$3 and button) same(sens$3 and area) and "345"/$. ccls. and portable	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2010/01/19 16:59
L6	567	(touch near (screen or pad)) same (capacit$6 and sens$3) same (button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/01/19 17:10
L7	504	(touch (screen or pad)) same (capacit$6 same sens$3) same (button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/01/19 17:11
L8	311	(touch (screen or pad)) same (capacit$6 sens$3) same (button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/01/19 17:11
L9	85	"345"/$.ccls. and (touch (screen or pad)) same (capacit$6 sens$3) same (button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/01/19 17:12

S1	6	("5305017" | "6188391" | "6380931").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 09:51
S2	9	XIAOPING-JIANG.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 10:25
S3	2	"11437517"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 13:10
S6	76	"5543590"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 15:50
S7	4	XIAOPING-JIANG.in. and ((first and second) and (sensing adj areas))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 17:00
S8	3	XIAOPING-JIANG.in. and ((first and second) and (sensing adj areas).clm.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 17:00
S9	2	XIAOPING-JIANG.in. and ((first and sensing adj areas).clm. and (second and sensing adj areas).clm.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 17:03
S10	1202	345/173.ccls. and capacitance	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 17:07

S11	604	345/173.ccls. and capacitance and button	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 17:07
S12	0	345/173.ccls. and capacitance and button and ("multiple sensing areas")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 17:08
S13	48	345/173.ccls. and capacitance and button and (sensing adj areas)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 17:09
S14	31	345/173.ccls. and capacitance and button and (sensing adj areas) and (touch adj pad)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 17:09
S15	77	"5943052"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 13:50
S16	34	2004/0252109	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 15:26
S17	0	2007/0146349	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 15:31
S18	2	"20070146349"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 15:32

S19	173	("20020063688" | "20020191029" | "20030025679" | "20030062889" | "20030063428" | "20030080755" | "20030156098" | "20030160808" | "20030183864" | "20030183884" | "20030184315" | "20040169594" | "20040178989" | "20040178997" | "20040252109" | "20040263864" | "20050021269" | "20050024341" | "20050052425" | "20050073302" | "20050073322" | "20050083110" | "20060032680" | "20060097991" | "20060113974" | "20060164142" | "20060273804" | "4264903" | "4283713" | "4438404" | "4475151" | "4497575" | "4736097" | "4736191" | "4773024" | "4802103" | "4876534" | "4879461" | "4935702" | "4953928" | "4962342" | "5049758" | "5055827" | "5059920" | "5068622" | "5073759" | "5083044" | "5095284" | "5097305" | "5107149" | "5109261" | "5119038" | "5120996" | "5122800" | "5126685" | "5146106" | "5160899" | "5165054" | "5166562" | "5204549" | "5243554" | "5248873" | "5260592" | "5270963" | "5276407" | "5289023" | "5303329" | "5305017" | "5324958" |	US-PGPUB; USPAT; USOCR	AND	ON	2009/07/18 15:45

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		"5331215" | "5336936" | "5339213" | "5349303" | "5374787" | "5381515" | "5384467" | "5408194" | "5488204" | "5495077" | "5541878" | "5543588" | "5543590" | "5543591" | "5555907" | "5565658" | "5566702" | "5629891" | "5648642" | "5682032" | "5730165" | "5757368" | "5763909" | "5767457" | "5796183" | "5812698" | "5841078" | "5844265" | "5854625" | "5861583" | "5861875" | "5864242" | "5864392" | "5880411" | "5889236" | "5914465" | "5914708" | "5920310" | "5926566" | "5942733" | "5943052" | "5969513" | "6023422" | "6028271" | "6028959" | "6097432" | "6148104").PN. OR ("6185450" | "6188228" | "6188391" | "6222528" | "6239389" | "6249447" | "6262717" | "6280391" | "6288707" | "6304014" | "6320184" | "6323846" | "6326859" | "6377009" | "6380929" | "6380931" | "6414671" | "6430305" | "6441073" | "6452514" | "6457355" | "6466036" | "6473069" | "6489899" | "6498720" | "6499359" | "6522128" | "6523416" | "6534970" | "6535200" | "6570557" | "6587093" | "6610936" | "6624640" |				

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S20	1	2006/0097992	US-PGPUB; USPAT; USOCR	AND	ON	2009/07/18 16:19
S21	1	"20060097992"	US-PGPUB; USPAT; USOCR	AND	ON	2009/07/18 16:20
S22	12	345/173.ccls. and cypress.as.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:28
S23	3731	cypress.as.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:31
S24	0	"cypress.as. and" (Capacitive and sensor)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:33
S25	51	cypress.as. and (Capacitive and sensor)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:33
S26	1	cypress.as. and (Capacitive and sensor) and (touch near button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:34

S27	1167	(Capacitive and sensor) and (sensing near areas)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:47
S28	47	(Capacitive and sensor) and (sensing near areas) same buttons	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:48
S29	26	(touch near screen) and (Capacitive and sensor) and (sensing near areas) same buttons	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:49
S30	3	(touch near screen) and (Capacitive and sensor) and (sensing near areas) same sensing near buttons	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:57
S31	0	(touch near screen near buttons) and (Capacitive and sensor) and (sensing near areas) same sensing near buttons	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:57
S32	4	(touch near screen near buttons) and (Capacitive and sensor) and (sensing near areas)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:58
S33	2	"6947031"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 17:01
S34	89	"4476463"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 17:29

S35	106	"5565658"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 17:45
S36	212	"5730165"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 17:51
S37	162	"4736191"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:02
S38	90	"4680430"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:09
S39	0	345/4.ccls. and ((capacitance near sensor) same (vertual near button) same (pin))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:15
S40	0	345/4.ccls. and (capacitance near sensor)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:15
S41	0	"345"/$.ccls. and ((capacitance near sensor) same (vertual near button) same (pin))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:15
S42	369	"345"/$.ccls. and (capacitance near sensor)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:16

S43	162	"345"/$.ccls. and (capacitance near sensor) and (touch near screen)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:16
S44	32	"345"/$.ccls. and (capacitance near sensor) and (touch near screen) and multi $touch	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:17
S45	20	three near sensing near area	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:28
S46	8710	capacitance near sensor	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:29
S47	158	(electrically adj isolated) same (sensor near element)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:34
S48	0	S45 and S46 and S47	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:35
S49	24	S46 and S47	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:35
S50	307	(touch near sensor near button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:50

S51	60	S50 and S46	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:51
S52	0	(Multiple near sens$4 near area) and (button near operation) and (touch near screen)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 07:57
S53	2	(Multiple near sens$4 near area) and (touch near screen)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 07:58
S54	0	(Multiple near sens$4 near button$2) and (touch near screen) and (capacitance$2)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 08:04
S55	4	(Multiple near sens$4 near button$2) and (capacitance)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 08:05
S56	3	"20050133262"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 08:13
S57	2	"20080278453"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 08:22
S58	2	"20080246735"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 08:23

S59	4	"61000784"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 08:25
S60	1202	345/173.ccls. and capacitance	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 08:29
S61	613	345/174-179.ccls. and capacitance	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 11:09
S63	29	(touch near screen) and (Capacit$6 and sens$3) and (sensing near areas) same buttons	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 12:11
S64	2784	178/18.01-18.11.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 15:47
S65	439	178/18.01-18.11.ccls. and (touch near panel)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 15:48
S66	900	178/18.01-18.11.ccls. and (capacit$6 and sens$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 16:35
S67	30	178/18.01-18.11.ccls. and capacit$6 same sens$3 near (second or third)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 16:37

S68	33	(Capacit$6 and sens $3) and (sensing near areas) and (input near button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 17:23
S69	24064	(touch near screen or pad) and (capacit$6 and sens$3) and (button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 17:31
S70	90998	(touch near screen or pad) and (capacit$6 and sens$3) and (first or second and button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 17:32
S71	73385	(touch near screen or pad) and (capacit$6 and sens$3) and (first or second and button) and (sens$3 and area)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 17:33
S72	20303	(touch near screen or pad) and (capacit$6 and sens$3) and (button) and (sens$3 and area)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 17:33
S73	20303	(touch near screen or pad) and (capacit$6 and sens$3 and button) and (sens$3 and area)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 17:34
S74	2438	(touch near screen or pad) and (capacit$6 and sens$3 and button) and (sens$3 and area) and "345"/$. ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 17:35
S76	1334	(touch near screen or pad) and (capacit$6 and sens$3 and button) and (sens$3 and area) and "345"/$. ccls. and portable	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 17:36

S77	61	345/173.ccls. and capacit$6 same sens$3 near (second or third)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/21 13:51

1/ 19/ 2010 5:19:34 PM
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Index of Claims	Application/Control No. 11437517	Applicant(s)/Patent Under Reexamination XIAOPING, JIANG
	Examiner BENYAM KETEMA	Art Unit 2629

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	07/16/2009	01/19/2010							
	1	✓	✓							
	2	✓	✓							
	3	✓	✓							
	4	✓	✓							
	5	=	=							
	6	=	=							
	7	=	=							
	8	=	=							
	9	=	=							
	10	=	=							
	11	=	=							
	12	=	=							
	13	=	=							
	14	=	=							
	15	=	=							
	16	=	=							
	17	=	=							
	18	✓	✓							
	19	✓	✓							
	20	✓	✓							

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11437517	XIAOPING, JIANG
	Examiner	**Art Unit**
	BENYAM KETEMA	2629

SEARCHED

Class	Subclass	Date	Examiner
345	173	7/16/2009	bk

SEARCH NOTES

Search Notes	Date	Examiner
Inventer Search	7/16/2009	bk
See Attaches EAST Search	7/16/2009	bk
Above EAST Search have been updated	1/19/2010	b.k

INTERFERENCE SEARCH

Class	Subclass	Date	Examiner

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Jiang XiaoPing
Serial No.: 11/437,517
Filed: May 18, 2006
Title: Two-Pin Buttons
Assignee: Cypress Semiconductor

Examiner: Benyan Ketema
Group Art Unit: 2629
Docket No.: CD06039
Confirmation No.: 2623

RESPONSE TO FINAL OFFICE ACTION DATED JANURAY 26, 2009

To: Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Amendments to the present application and/or associated remarks are detailed below.

REMARKS

This communication is responsive to the Final Office Action mailed on December 26, 2009. Claims 1-20 are currently pending. No claims have been amended. No claims have been added. No claims have been cancelled or withdrawn. Applicant respectfully requests reconsideration of the present objections and rejections. Applicant believes this communication to be fully responsive to all issues raised in the Action.

§*102 Rejections*

Claims 1, 2, 4 and 18 were rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by Tsujioka et al. (U.S. Patent Number 5,518,078, hereinafter "Tsujioka").

Without conceding Applicant's previous argument, Applicant respectfully submits that Tsujioka does not disclose "**recognizing three or more button operations** performed by the conductive object **using two areas of the sensing device**" as recited in the present claims. Tsujioka (Col. 10, lines 4-9) teaches:

> The control device 28 detects the pressing position as the operating position of the transparent electrodes 39 to 42; 32, 33, that is, the input coordinates as the coordinates (x, y), (x=1 to 4, y=1) of the pressing region 49 of two lines and four rows as an example of matrix arrangement.

Figure 5 of Tsujioka shows a 2x4 matrix of buttons (49) and a touchscreen area (first input area 24). Tsujioka does not disclose that the 2x4 matrix of buttons (49) recognizes "**three or more button operations...using two areas of the sensing device.**"

Therefore, applicant submits that Tsujioka does not disclose each and every element of the claimed subject matter of claim 1 and is thus allowable over the cited art.

Claims 2 and 4 depend from independent claim 1 and incorporate all of the features therein. Claim 2 and 4 are also asserted to be allowable for the reasons presented above, and Applicant respectfully requests notification of same. Applicant considers additional elements of claims 2 and 4 to further distinguish over Tsujioka and Applicant reserves the right to present arguments to this effect at a later date.

Claim 18 includes substantially similar limitations to claim 1 discussed above. Therefore, for at least the reasons stated for independent claim 1, Tsujioka does not disclose the claimed features of claim 18. In particular, Tsujioka does not disclose "a means for **recognizing three or more button operations** performed by the conductive object **using two sensing areas on the sensing device**" as claimed. Applicant respectfully submits that claim 18 is in condition for allowance and requests notification of same.

§103 Rejections

Claim 3 was rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Tsujioka in view of Collins (U.S. Published Application 2004/0239616, hereinafter "Collins").

Claim 3 depends from independent claim 1 and incorporates all of the features therein. Claim 3 is also asserted to be allowable for the reasons presented above, and Applicant respectfully requests notification of same. Applicant believes additional elements of claim 3 further distinguish the claims over Tsujioka in view of Collins, however in the interest of brevity in the present response Applicant reserves the right to present arguments to this effect at a later date, if needed.

Claims 19 and 20 was rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Tsujioka in view of Gritzinger et al. (U.S. Published Application 2006/0097992, hereinafter "Gritzinger").

Claims 19 and 20 depend from independent claim 18 and incorporate all of the features therein. Claims 19 and 20 are also asserted to be allowable for the reasons presented above, and Applicant respectfully requests notification of same. Applicant believes additional elements of claims 19 and 20 further distinguish the claims over Tsujioka in view of Gritzinger, however in the interest of brevity in the present response Applicant reserves the right to present arguments to this effect at a later date, if needed.

Allowed Claims

Claims 5-17 have been allowed by the Patent Office. Applicant thanks the Examiner.

Reservation of Rights

In the interest of clarity and brevity, Applicant may not have addressed every assertion made in the Office Action. Applicant's silence regarding any such assertion does not constitute any admission or acquiescence. Applicant reserves all rights not exercised in connection with this response, such as the right to challenge or rebut any tacit or explicit characterization of any reference or of any of the present claims, the right to challenge or rebut any asserted factual or legal basis of any of the rejections, the right to swear behind any cited reference such as provided under 37 C.F.R. § 1.131 or otherwise, or the right to assert co-ownership of any cited reference. Applicant does not admit that any of the cited references or any other references of record is relevant to the present claims, or that they constitute prior art. To the extent that any rejection or assertion is based upon the Examiner's personal knowledge, rather than any objective evidence of record as manifested by a cited prior art reference, Applicant timely objects to such reliance on Official Notice, and reserves all rights to request that the Examiner provide a reference or affidavit in support of such assertion, as required by MPEP § 2144.03. Applicant reserves all rights to pursue any cancelled claims in a subsequent patent application claiming the benefit of priority of the present patent application, and to request rejoinder of any withdrawn claim, as required by MPEP § 821.04.

Conclusion

Applicants respectfully submit that the claims are in condition for allowance and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's attorney, Lucinda Price, at (408) 545-7194.

Please charge any additional fees under 37 CFR §§ 1.16, 1.17, 1.18, 1.20 and 1.21 that may be required to maintain pendency of the present application, or apply any credits to our PTO deposit account number: 50-3781.

Respectfully submitted,
Jiang XiaoPing

By their Representative,
Agent for Applicant

Date March 26, 2010

By: /Ryan Seguine/
Ryan D. Seguine
Reg. No. 64,577

Cypress Semiconductor Corporation
198 Champion Court
San Jose, CA 95134
Facsimile: (408) 545-6911

Electronic Acknowledgement Receipt

EFS ID:	7299121
Application Number:	11437517
International Application Number:	
Confirmation Number:	2623
Title of Invention:	Two-pin buttons
First Named Inventor/Applicant Name:	Jiang XiaoPing
Customer Number:	60909
Filer:	Andrew J. Bateman/Penny Jackson
Filer Authorized By:	Andrew J. Bateman
Attorney Docket Number:	CD06039
Receipt Date:	26-MAR-2010
Filing Date:	18-MAY-2006
Time Stamp:	19:15:56
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Amendment After Final	CD06039AmendmentAfterFinal 03262010.pdf	2401251 e1e12c6be03244524568661a80943c4ec23 4f92d	no	12

Warnings:

Information:

Total Files Size (in bytes):	2401251

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

<u>New Applications Under 35 U.S.C. 111</u>
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

<u>National Stage of an International Application under 35 U.S.C. 371</u>
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

<u>New International Application Filed with the USPTO as a Receiving Office</u>
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/06 (07-06)
Approved for use through 1/31/2007. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

PATENT APPLICATION FEE DETERMINATION RECORD
Substitute for Form PTO-875

Application or Docket Number: 11/437,517
Filing Date: 05/18/2006
☒ To be Mailed

APPLICATION AS FILED – PART I

FOR	NUMBER FILED (Column 1)	NUMBER EXTRA (Column 2)	SMALL ENTITY ☐ RATE ($)	SMALL ENTITY FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =		OR	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =			X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT	03/26/2010	CLAIMS REMAINING AFTER AMENDMENT (Column 1)		HIGHEST NUMBER PREVIOUSLY PAID FOR (Column 2)	PRESENT EXTRA (Column 3)	SMALL ENTITY RATE ($)	SMALL ENTITY ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 20	Minus	** 20	= 0	X $ =		OR	X $52=	0
	Independent (37 CFR 1.16(h))	* 3	Minus	***3	= 0	X $ =		OR	X $220=	0
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	0

AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT (Column 1)		HIGHEST NUMBER PREVIOUSLY PAID FOR (Column 2)	PRESENT EXTRA (Column 3)	RATE ($)	ADDITIONAL FEE ($)		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =		OR	X $ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =		OR	X $ =	
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

Legal Instrument Examiner:
/NICHELE PETERSON/

CLAIMS

Claims pending

- At time of the Action: 1-20.
- After this Response: 1-20.

Currently Amended claims: None.

Currently Cancelled claims: None.

Currently Withdrawn claims: None.

New claims: None.

1. (Original) A method, comprising:

detecting a presence of a conductive object on a sensing device; and

recognizing three or more button operations performed by the conductive object using two sensing areas of the sensing device.

2. (Original) The method of claim 1, wherein recognizing three or more button operations comprises:

recognizing a first button operation when the presence of the conductive object is detected on a first sensing area of the two sensing areas of the sensing device;

recognizing a second button operation when the presence of the conductive object is detected on a second sensing area of the two sensing areas of the sensing device; and

recognizing one or more button operations when the presence of the conductive object is detected on the first and second sensing areas.

3. (Original) The method of claim 1, further comprising determining a capacitance of the conductive object on the sensing device over time, wherein determining the capacitance further comprises determining a capacitance of the two sensing areas of the sensing device, and wherein recognizing the button operation is based on the capacitance of the two sensing areas.

4. (Original) The method of claim 1, further comprising scanning the two sensing areas of the sensing device, and wherein recognizing the three or more button operations comprises:

recognizing a first button operation when a first sensing area of the two sensing areas detects the presence of the conductive object during the scanning of the two sensing areas;

recognizing a second button operation when a second sensing area of the two sensing areas detects the presence of the conductive object during the scanning of the two sensing areas; and

recognizing a third button operation when the first and second sensing areas detect the presence of the conductive object during the scanning of the two sensing areas.

5. (Original) An apparatus, comprising:

a sensing device comprising:

a first sensor element;

a second sensor element; and

a third sensor element comprising a first portion coupled to the first sensor element and a second portion coupled to the second sensor element, wherein the first and second portions of the third sensor element are electrically isolated.

6. (Original) The apparatus of claim 5, wherein a surface area of the first portion and a surface area of the second portion of the third sensor element are substantially equal.

7. (Original) The apparatus of claim 5, further comprising a fourth sensor element comprising a third portion coupled to the first sensor element and a fourth portion coupled to the second sensor element, wherein the third and fourth portions of the fourth sensor element are electrically isolated.

8. (Original) The apparatus of claim 7, wherein a surface area ratio of the third sensor element is approximately 25% of the first portion to approximately 75% of the second portion, and wherein a surface area ratio of the fourth sensor element is approximately 75% of the third portion to approximately 25% of the fourth portion.

9. (Original) The apparatus of claim 5, further comprising a fifth sensor element comprising a fifth portion coupled to the first sensor element and a sixth portion coupled to the second sensor element, wherein the fifth and sixth portions of the fifth sensor element are electrically isolated.

10. (Original) The apparatus of claim 9, wherein a surface area ratio of the third sensor element is approximately 33% of the first portion to approximately 67% of the second portion, wherein a surface area ratio of the fourth sensor element is approximately 50% of the third portion to approximately 50% of the fourth portion, and wherein a surface area ratio of the fifth sensor element is approximately 67% of the fifth portion to approximately 33% of the sixth portion.

11. (Original) The apparatus of claim 5, wherein the first portion comprises a first conductive trace having one or more sub-traces, and the second portion comprises a second conductive trace having one or more sub-traces, and wherein at least one sub-trace of the first conductive trace is interleaved with at least one sub-trace of the second conductive trace.

12. (Original) The apparatus of claim 5, wherein the first, second, and third sensor elements are substantially circular shaped.

13. (Original) The apparatus of claim 5, wherein the first, second, and third sensor elements are substantially rectangular shaped.

14. (Original) The apparatus of claim 5, further comprising a processing device coupled to the sensing device, wherein the processing device comprises one or more capacitance sensors coupled to the first and second sensor elements, and wherein the one or more capacitance sensors are operable to measure capacitance on the first, second, and third sensor elements.

15. (Original) The apparatus of claim 14, wherein the processing device comprises a first pin and a second pin, wherein the first pin is coupled to the first sensor element, and wherein the second pin is coupled to the second sensor element.

16. (Original) The apparatus of claim 15, wherein the processing device is operable to recognize a first button operation on the first sensor element, a second button operation on the second sensor element, and a third button operation on the first and second portions of the third sensor element.

17. (Original) The apparatus of claim 14, wherein each of the one or more capacitance sensors comprises a relaxation oscillator coupled to one of the first sensor element and the first portion, and the second sensor element and the second portion, wherein the relaxation oscillator comprises:

a current source to provide a charge current to first sensor element and the first portion, and to the second sensor element and the second portion;

a selection circuit coupled to the first sensor element and the first portion, the second sensor element and the second portion, and the current source, wherein the selection circuit is configured to sequentially select a sensor element of the first sensor element and the second sensor elements to provide the charge current and to measure the capacitance of each sensor element of the sensing device;

a comparator coupled to the current source and the selection circuit, wherein the comparator is configured to compare a voltage on the selected sensor element and a threshold voltage; and a reset switch coupled to the comparator, current source, and selection circuit, wherein the reset switch is configured to reset the charge current on the selected sensor element, and wherein each of the one or more capacitance sensors further comprises a digital counter coupled to the relaxation oscillator, and wherein the digital counter is operable to count at least one of a frequency or a period of a relaxation oscillator output received from the relaxation oscillator.

18. (Original) An apparatus, comprising:

a first sensing area to detect a presence of a conductive object on a sensing device;

a second sensing area to detect the presence of the conductive object on the sensing device; and

means for recognizing three or more button operations performed by the conductive object using two sensing areas on the sensing device.

19. (Original) The apparatus of claim 18, further comprising means for reducing a pin count of the sensing device.

20. (Original) The apparatus of claim 18, further comprising means for reducing scan time of the sensing device.

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/437,517	05/18/2006	Jiang XiaoPing	CD06039	2623

60909 7590 04/07/2010
CYPRESS SEMICONDUCTOR CORPORATION
198 CHAMPION COURT
SAN JOSE, CA 95134-1709

EXAMINER	
KETEMA, BENYAM	
ART UNIT	PAPER NUMBER
2629	
MAIL DATE	DELIVERY MODE
04/07/2010	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Advisory Action Before the Filing of an Appeal Brief	Application No.	Applicant(s)
	11/437,517	XIAOPING, JIANG
	Examiner	**Art Unit**
	BENYAM KETEMA	2629

--The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

THE REPLY FILED 26 March 2010 FAILS TO PLACE THIS APPLICATION IN CONDITION FOR ALLOWANCE.

1. ☒ The reply was filed after a final rejection, but prior to or on the same day as filing a Notice of Appeal. To avoid abandonment of this application, applicant must timely file one of the following replies: (1) an amendment, affidavit, or other evidence, which places the application in condition for allowance; (2) a Notice of Appeal (with appeal fee) in compliance with 37 CFR 41.31; or (3) a Request for Continued Examination (RCE) in compliance with 37 CFR 1.114. The reply must be filed within one of the following time periods:
   a) ☐ The period for reply expires ______months from the mailing date of the final rejection.
   b) ☒ The period for reply expires on: (1) the mailing date of this Advisory Action, or (2) the date set forth in the final rejection, whichever is later. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of the final rejection.
   Examiner Note: If box 1 is checked, check either box (a) or (b). ONLY CHECK BOX (b) WHEN THE FIRST REPLY WAS FILED WITHIN TWO MONTHS OF THE FINAL REJECTION. See MPEP 706.07(f).

Extensions of time may be obtained under 37 CFR 1.136(a). The date on which the petition under 37 CFR 1.136(a) and the appropriate extension fee have been filed is the date for purposes of determining the period of extension and the corresponding amount of the fee. The appropriate extension fee under 37 CFR 1.17(a) is calculated from: (1) the expiration date of the shortened statutory period for reply originally set in the final Office action; or (2) as set forth in (b) above, if checked. Any reply received by the Office later than three months after the mailing date of the final rejection, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

NOTICE OF APPEAL

2. ☐ The Notice of Appeal was filed on _____. A brief in compliance with 37 CFR 41.37 must be filed within two months of the date of filing the Notice of Appeal (37 CFR 41.37(a)), or any extension thereof (37 CFR 41.37(e)), to avoid dismissal of the appeal. Since a Notice of Appeal has been filed, any reply must be filed within the time period set forth in 37 CFR 41.37(a).

AMENDMENTS

3. ☐ The proposed amendment(s) filed after a final rejection, but prior to the date of filing a brief, will not be entered because
   (a) ☐ They raise new issues that would require further consideration and/or search (see NOTE below);
   (b) ☐ They raise the issue of new matter (see NOTE below);
   (c) ☐ They are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal; and/or
   (d) ☐ They present additional claims without canceling a corresponding number of finally rejected claims.
   NOTE: _____. (See 37 CFR 1.116 and 41.33(a)).
4. ☐ The amendments are not in compliance with 37 CFR 1.121. See attached Notice of Non-Compliant Amendment (PTOL-324).
5. ☐ Applicant's reply has overcome the following rejection(s): _____.
6. ☐ Newly proposed or amended claim(s) _____ would be allowable if submitted in a separate, timely filed amendment canceling the non-allowable claim(s).
7. ☒ For purposes of appeal, the proposed amendment(s): a) ☐ will not be entered, or b) ☒ will be entered and an explanation of how the new or amended claims would be rejected is provided below or appended.
   The status of the claim(s) is (or will be) as follows:
   Claim(s) allowed: _____.
   Claim(s) objected to: *5-17*.
   Claim(s) rejected: *1-4 and 18-20*.
   Claim(s) withdrawn from consideration: _____.

AFFIDAVIT OR OTHER EVIDENCE

8. ☐ The affidavit or other evidence filed after a final action, but before or on the date of filing a Notice of Appeal will not be entered because applicant failed to provide a showing of good and sufficient reasons why the affidavit or other evidence is necessary and was not earlier presented. See 37 CFR 1.116(e).
9. ☐ The affidavit or other evidence filed after the date of filing a Notice of Appeal, but prior to the date of filing a brief, will not be entered because the affidavit or other evidence failed to overcome all rejections under appeal and/or appellant fails to provide a showing a good and sufficient reasons why it is necessary and was not earlier presented. See 37 CFR 41.33(d)(1).
10. ☐ The affidavit or other evidence is entered. An explanation of the status of the claims after entry is below or attached.

REQUEST FOR RECONSIDERATION/OTHER

11. ☒ The request for reconsideration has been considered but does NOT place the application in condition for allowance because: Examiner disagrees with the assertion of Tsujioka not disclosing " three or more button operations …using two areas of the sensing device" as it is recited in claim 1. Tsujioka (fig 5) discloses two sensing area (24 and 25), further more (Fig 5) discloses three or more button operations (49 and input 50). Therefore one can see that multiple input operations (i.e. button operations) are done using two areas (24 and 25) of the sensing device (i.e. input device 21). .
12. ☐ Note the attached Information *Disclosure Statement*(s). (PTO/SB/08) Paper No(s). _____
13. ☐ Other: _____.

/Bipin Shalwala/
Supervisory Patent Examiner, Art Unit 2629

PTO/SB/30EFS (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL
(Submitted Only via EFS-Web)

Application Number	11/437,517	Filing Date	2006-05-18	Docket Number (if applicable)	CD06039	Art Unit	2629
First Named Inventor	Jiang XiaoPing			Examiner Name	Benyam Ketema		

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV

SUBMISSION REQUIRED UNDER 37 CFR 1.114

Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

☒ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

- ☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on ____
- ☐ Other ____

☐ Enclosed

- ☐ Amendment/Reply
- ☐ Information Disclosure Statement (IDS)
- ☐ Affidavit(s)/ Declaration(s)
- ☐ Other ____

MISCELLANEOUS

☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months ____
(Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

☐ Other ____

FEES

☒ **The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.**
The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No 503781

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature
☐ Applicant Signature

Signature of Registered U.S. Patent Practitioner			
Signature	/Larry Johnson/	Date (YYYY-MM-DD)	2010-04-26
Name	Larry Johnson	Registration Number	56861

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Patent Application Fee Transmittal

Application Number:	11437517
Filing Date:	18-May-2006
Title of Invention:	Two-pin buttons
First Named Inventor/Applicant Name:	Jiang XiaoPing
Filer:	Andrew J. Bateman/Hilary Link
Attorney Docket Number:	CD06039

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
Request for continued examination	1801	1	810	810
		Total in USD ($)		**810**

CY00000875

Electronic Acknowledgement Receipt

EFS ID:	7491804
Application Number:	11437517
International Application Number:	
Confirmation Number:	2623
Title of Invention:	Two-pin buttons
First Named Inventor/Applicant Name:	Jiang XiaoPing
Customer Number:	60909
Filer:	Andrew J. Bateman/Hilary Link
Filer Authorized By:	Andrew J. Bateman
Attorney Docket Number:	CD06039
Receipt Date:	26-APR-2010
Filing Date:	18-MAY-2006
Time Stamp:	19:13:15
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$810
RAM confirmation Number	19895
Deposit Account	503781
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.20 (Post Issuance fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Request for Continued Examination (RCE)	CD06039RCEpdf.pdf	550555 39c13805ec86f106fc2c1dbb6f510c8b3cf29bcf	no	3

Warnings:

This is not a USPTO supplied RCE SB30 form.

Information:

2	Fee Worksheet (PTO-875)	fee-info.pdf	30440 1dc7f23be52fb092091654518119bbe49cd22060	no	2

Warnings:

Information:

Total Files Size (in bytes):	580995

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

<u>New Applications Under 35 U.S.C. 111</u>
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

<u>National Stage of an International Application under 35 U.S.C. 371</u>
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

<u>New International Application Filed with the USPTO as a Receiving Office</u>
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/06 (07-06)
Approved for use through 1/31/2007. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 11/437,517	Filing Date 05/18/2006	☐ To be Mailed

APPLICATION AS FILED – PART I

FOR	NUMBER FILED (Column 1)	NUMBER EXTRA (Column 2)	SMALL ENTITY ☐ RATE ($)	FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =		OR	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =			X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT	04/26/2010	CLAIMS REMAINING AFTER AMENDMENT (Column 1)		HIGHEST NUMBER PREVIOUSLY PAID FOR (Column 2)	PRESENT EXTRA (Column 3)	SMALL ENTITY RATE ($)	ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 20	Minus	** 20	= 0	X $ =		OR	X $52=	0
	Independent (37 CFR 1.16(h))	* 3	Minus	***3	= 0	X $ =		OR	X $220=	0
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	0

AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT (Column 1)		HIGHEST NUMBER PREVIOUSLY PAID FOR (Column 2)	PRESENT EXTRA (Column 3)	RATE ($)	ADDITIONAL FEE ($)		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =		OR	X $ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =		OR	X $ =	
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

Legal Instrument Examiner:
/C. DESSAU/

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/437,517	05/18/2006	Jiang XiaoPing	CD06039	2623

60909 7590 08/03/2010
CYPRESS SEMICONDUCTOR CORPORATION
198 CHAMPION COURT
SAN JOSE, CA 95134-1709

EXAMINER	
KETEMA, BENYAM	

ART UNIT	PAPER NUMBER
2629	

MAIL DATE	DELIVERY MODE
08/03/2010	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	11/437,517	XIAOPING, JIANG	
	Examiner	Art Unit	
	BENYAM KETEMA	2629	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 April 2010*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *5-17* is/are allowed.

6)☒ Claim(s) *1-4 and 18-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *18 May 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. In an amendment dated, April 26, 2010, claims 1-20 are presented for examination.

2. Applicant's arguments with respect to claims 1-4 and 18- 20 have been considered but is not persuasive.

On page 8 and 9 of the Remarks, the Applicants argue that Tsujioka et al fails to teach the claimed feature of "…***recognizing three or more button operations performed*** *by the conductive object using* ***two sensing areas of the sensing device*** *…"* as recited in independent Claims 1 and 18. The Examiner must respectfully disagree. Tsujioka et al (Fig. 5) discloses multiple input operation being performed onto the two sensing areas. Applicant claims "…***recognizing three or more button operations performed…"*** Tsujioka et al (Fig. 5) discloses that a user can perform multiple input operation using his/her finger or pen as it is clearly shown in fig 5 in order to perform an input operation. Further more Applicant claims this input operation is done using "***two sensing areas of the sensing device".*** Tsujioka et al (Fig. 5) discloses that the device has two sensing area (i.e. 24 and 25). Therefore, Tsujioka et al (Fig. 5) discloses that multiple button input operation being performed by the user when the user (i.e. operator) presses any one of the input areas (49 and 50) which are located in two sensing area (24 and 25) of the input device. Therefore one can see that multiple input operations ('i.e. button operations) are done using two sensing areas (24 and 25) of the sensing device ('i.e. input device 21) as it is claimed in claim 1 and 18.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1, 2, 4 and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Tsujioka et al (US Pat NO 5,518,078)

As in Claim 1, Tsujioka et al discloses *a method* (Column 1 line 5-10)*, comprising:*

- *detecting a presence of a conductive object on a sensing device;* (Column 9 line 65- Column 10 line 4)
- *recognizing three or more button operations performed* (Fig 5 item 49 and 50a) *by the conductive object* (Fig 5 item 50 & 51, finger or pen) *using two sensing areas of the sensing device.* (Fig 5 & 6 item 24 & 25, two sensing areas)

As in Claim 2, Tsujioka et al discloses *the method* (Column 1 line 5-10) *of claim 1, wherein recognizing three or more button operations* (Column 9 line 65- Column 10 line 6 and fig 5-8) *comprises: recognizing on a first sensing area of the two sensing areas of the sensing device;* (Fig 5 and Column 9 line 65- Column 10 line 4) *recognizing a second button operation when the presence of the conductive object is detected on a second sensing area of the two sensing areas of the sensing device;* (Fig 5 and Column 9 line 65- Column 10 line 4) *recognizing one or more button operations when the presence of the conductive object is detected on the first and second sensing areas.* (Fig 5)

As in Claim 4, Tsujioka et al discloses *the method* (Column 1 line 5-10) *of claim 1, further comprising scanning the two sensing areas of the sensing device,* (Column 9 line 58 -61) *wherein recognizing the three or more button operations comprises: recognizing a first button operation when a first sensing area of the two sensing areas detects the presence of the conductive object during the scanning of the two sensing areas;* (Fig 5, 7 and 9 and Column 9 line 54- Column 10 line 6) *recognizing a second button operation when a second sensing area of the two sensing areas detects the presence of the conductive object during the scanning of the two sensing areas;* (Fig 5, 7 and 9 and Column 9 line 54- Column 10 line 6) *recognizing a third button operation when the first and second sensing areas detect the presence of the conductive object during the scanning of the two sensing areas.* (Fig 5, 7 and 9 and Column 9 line 54- Column 10 line 6) discloses scanning the sensing areas (i.e. 24 & 25) and recognizing multiple button (i.e. 36, 39-42) operation for conductive objects (i.e. finger or pen).

As in Claim 18, Tsujioka et al discloses *an apparatus* (Column 1, touch panel), *comprising:*

- *a first sensing area to detect a presence of a conductive object on a sensing device;* (Fig 5 item 25)
- *a second sensing area to detect the presence of the conductive object on the sensing device;* (Fig 5 item 24)
- *means for recognizing three or more button operations* (Fig 5 item 49 and 50a) *performed by the conductive object* (Fig 5 item 51 or 50, finger or pen) *using two sensing areas on the sensing device.* (Fig 5 item 24 & 25, two sensing areas)

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tsujioka et al (US Pat NO 5,518,078) In view of Collins (PG Pub NO 2004/0239616)

As in Claim 3, Tsujioka et al discloses *the method* (Column 1 line 5-10) *of claim 1,* but fails to disclose *determining a capacitance of the conductive object on the sensing device over time, wherein determining the capacitance further comprises determining a capacitance of the two sensing areas of the sensing device, and wherein recognizing the button operation is based on the capacitance of the two sensing areas.* However Collins discloses *determining a capacitance of the conductive object on the sensing device over time* (Paragraph 24 and Fig 2-3), *wherein determining the capacitance further comprises determining a capacitance of the two sensing areas of the sensing device,* (Fig 3 item 200-1 & 200-3) *and wherein recognizing the button operation is based on the capacitance of the two sensing areas.* (Paragraph 24-28 and Fig 3) discloses operation of buttons is recognized according to a signal produced (i.e. capacitance) when the user finger is in contact with sensing area.

Tsujioka et al and Collins are analogous art because they are from the common area of user input device using touch sensor. Tsujioka et al discloses an input device that has multiple sensing areas as well as buttons. But fails to disclose capacitance sensor, However Collins discloses that capacitance sensors are used to determine the presence of conductive object (i.e. finger) on the sensing area in a system similar to that of Tsujioka et al. Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to combine Tsujioka et al's sensing area to include Collins's capacitance sensor, because using capacitance sensor or any other form of sensor in touch panel device would be an alternate design choose.

8. Claims 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsujioka et al (US Pat NO 5,518,078) In view of Gitzinger et al (PG Pub NO 2006/0097992)

As in Claim 19, Tsujioka et al discloses *the apparatus* (Column 1, touch panel), but fails to disclose *means for reducing a pin count of the sensing device.* However Gitzinger et al discloses *means for reducing a pin count of the sensing device.* (Fig 3 and Paragraph 29-32) discloses the reduction of pins by coupling the discrete surfaces (i.e. sensing area, 320, 322, 324) together and connecting them to the controller.

Tsujioka et al and Gitzinger et al are analogous art because they are from the common area of user input device using touch sensor. Tsujioka et al discloses an input device that has multiple sensing areas as well as buttons. But fails to disclose reduction of connecter pins as well as the effect of scanning time when the numbers of pins are reduced, However Gitzinger et al discloses in Fig 3 the number of pins have been reduced in a system similar to that of Tsujioka et al. Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to combine Tsujioka et al's sensing area to include Gitzinger et al's arrangement of reduced number of pins in order to reduced coast and material in the manufacturing of said device.

As in Claim 20, Tsujioka et al discloses *the apparatus* (Column 1, touch panel), but fails to disclose *means for reducing scan time of the sensing device.* However Gitzinger et al discloses *means for reducing scan time of the sensing device.* (fig 3) discloses the sensing areas are coupled together and connected to the controller rather than being connected individually; therefore it would be obvious to a skilled person that by reducing the number of connection between the sensing area and controller the scan time would be increased (faster).

Allowable Subject Matter

9. Claims 5-17 are allowable over the prior art of record.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to BENYAM KETEMA whose telephone number is (571)270-7224. The examiner can normally be reached on Monday- Friday 8:00AM - 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shalwala Bipin H can be reached on (571)-272-7681. The fax phone number for the organization where this application or proceeding is assigned is 571-

273-8300.Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/ B.K. /

Examiner, Art Unit 2629

/Bipin Shalwala/

Supervisory Patent Examiner, Art Unit 2629

Notice of References Cited	Application/Control No. 11/437,517	Applicant(s)/Patent Under Reexamination XIAOPING, JIANG	
	Examiner BENYAM KETEMA	Art Unit 2629	Page 1 of 1

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*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-5,518,078	05-1996	Tsujioka et al.	178/18.05
*	B	US-2004/0239616	12-2004	Collins, Ryan V.	345/156
*	C	US-2006/0097992	05-2006	Gitzinger et al.	345/173
*	D	US-2006/0227117	10-2006	Proctor, David W.	345/173
*	E	US-7,158,125	01-2007	Sinclair et al.	345/173
*	F	US-2007/0291013	12-2007	WON, Jong Sung	345/173
*	G	US-7,466,307	12-2008	Trent et al.	345/173
*	H	US-7,495,659	02-2009	Marriott et al.	345/173
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Index of Claims	Application/Control No. 11437517	Applicant(s)/Patent Under Reexamination XIAOPING, JIANG
	Examiner BENYAM KETEMA	Art Unit 2629

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	07/16/2009	01/19/2010	07/30/2010						
	1	✓	✓	✓						
	2	✓	✓	✓						
	3	✓	✓	✓						
	4	✓	✓	✓						
	5	=	=	=						
	6	=	=	=						
	7	=	=	=						
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	14	=	=	=						
	15	=	=	=						
	16	=	=	=						
	17	=	=	=						
	18	✓	✓	✓						
	19	✓	✓	✓						
	20	✓	✓	✓						

Search Notes	Application/Control No. 11437517	Applicant(s)/Patent Under Reexamination XIAOPING, JIANG
	Examiner BENYAM KETEMA	Art Unit 2629

SEARCHED

Class	Subclass	Date	Examiner
345	173	7/16/2009	bk

SEARCH NOTES

Search Notes	Date	Examiner
Inventer Search	7/16/2009	bk
See Attaches EAST Search	7/16/2009	bk
Above EAST Search have been updated	1/19/2010	b.k
Above East search have been updated	7/30/2010	BK

INTERFERENCE SEARCH

Class	Subclass	Date	Examiner

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	42	"345"/173.ccls. and (touch (screen or pad)) same (capacit$6 sens$3) same (button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/07/30 12:03
L2	0	(Multiple near sens$4 near button$2) and (touch near screen) and (capacit$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2010/07/30 12:06
S1	6	("5305017" | "6188391" | "6380931").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 09:51
S2	9	XIAOPING-JIANG.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 10:25
S3	2	"11437517"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 13:10
S6	76	"5543590"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 15:50
S7	4	XIAOPING-JIANG.in. and ((first and second) and (sensing adj areas))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 17:00

S8	3	XIAOPING-JIANG.in. and ((first and second) and (sensing adj areas).clm.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 17:00
S9	2	XIAOPING-JIANG.in. and ((first and sensing adj areas).clm. and (second and sensing adj areas).clm.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 17:03
S10	1202	345/173.ccls. and capacitance	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 17:07
S11	604	345/173.ccls. and capacitance and button	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 17:07
S12	0	345/173.ccls. and capacitance and button and ("multiple sensing areas")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 17:08
S13	48	345/173.ccls. and capacitance and button and (sensing adj areas)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 17:09
S14	31	345/173.ccls. and capacitance and button and (sensing adj areas) and (touch adj pad)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 17:09
S15	77	"5943052"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 13:50

S16	34	2004/0252109	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 15:26
S17	0	2007/0146349	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 15:31
S18	2	"20070146349"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 15:32
S19	173	("20020063688" | "20020191029" | "20030025679" | "20030062889" | "20030063428" | "20030080755" | "20030156098" | "20030160808" | "20030183864" | "20030183884" | "20030184315" | "20040169594" | "20040178989" | "20040178997" | "20040252109" | "20040263864" | "20050021269" | "20050024341" | "20050052425" | "20050073302" | "20050073322" | "20050083110" | "20060032680" | "20060097991" | "20060113974" | "20060164142" | "20060273804" | "4264903" | "4283713" | "4438404" | "4475151" | "4497575" | "4736097" | "4736191" | "4773024" | "4802103" | "4876534" | "4879461" | "4935702" | "4953928" | "4962342"	US-PGPUB; USPAT; USOCR	AND	ON	2009/07/18 15:45

		| "5049758" | "5055827" | "5059920" | "5068622" | "5073759" | "5083044" | "5095284" | "5097305" | "5107149" | "5109261" | "5119038" | "5120996" | "5122800" | "5126685" | "5146106" | "5160899" | "5165054" | "5166562" | "5204549" | "5243554" | "5248873" | "5260592" | "5270963" | "5276407" | "5289023" | "5303329" | "5305017" | "5324958" | "5331215" | "5336936" | "5339213" | "5349303" | "5374787" | "5381515" | "5384467" | "5408194" | "5488204" | "5495077" | "5541878" | "5543588" | "5543590" | "5543591" | "5555907" | "5565658" | "5566702" | "5629891" | "5648642" | "5682032" | "5730165" | "5757368" | "5763909" | "5767457" | "5796183" | "5812698" | "5841078" | "5844265" | "5854625" | "5861583" | "5861875" | "5864242" | "5864392" | "5880411" | "5889236" | "5914465" | "5914708" | "5920310" | "5926566" | "5942733" | "5943052" | "5969513" | "6023422" | "6028271" | "6028959" | "6097432" | "6148104").PN. OR ("6185450" | "6188228" | "6188391" | "6222528" | "6239389" | "6249447"					

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S20	1	2006/0097992	US-PGPUB; USPAT; USOCR	AND	ON	2009/07/18 16:19
S21	1	"20060097992"	US-PGPUB; USPAT; USOCR	AND	ON	2009/07/18 16:20
S22	12	345/173.ccls. and cypress.as.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:28
S23	3731	cypress.as.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:31

S24	0	"cypress.as. and" (Capacitive and sensor)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:33
S25	51	cypress.as. and (Capacitive and sensor)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:33
S26	1	cypress.as. and (Capacitive and sensor) and (touch near button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:34
S27	1167	(Capacitive and sensor) and (sensing near areas)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:47
S28	47	(Capacitive and sensor) and (sensing near areas) same buttons	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:48
S29	26	(touch near screen) and (Capacitive and sensor) and (sensing near areas) same buttons	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:49
S30	3	(touch near screen) and (Capacitive and sensor) and (sensing near areas) same sensing near buttons	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:57
S31	0	(touch near screen near buttons) and (Capacitive and sensor) and (sensing near areas) same sensing near buttons	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:57

S32	4	(touch near screen near buttons) and (Capacitive and sensor) and (sensing near areas)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:58
S33	2	"6947031"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 17:01
S34	89	"4476463"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 17:29
S35	106	"5565658"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 17:45
S36	212	"5730165"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 17:51
S37	162	"4736191"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:02
S38	90	"4680430"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:09
S39	0	345/4.ccls. and ((capacitance near sensor) same (vertual near button) same (pin))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:15

S40	0	345/4.ccls. and (capacitance near sensor)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:15
S41	0	"345"/$.ccls. and ((capacitance near sensor) same (vertual near button) same (pin))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:15
S42	369	"345"/$.ccls. and (capacitance near sensor)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:16
S43	162	"345"/$.ccls. and (capacitance near sensor) and (touch near screen)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:16
S44	32	"345"/$.ccls. and (capacitance near sensor) and (touch near screen) and multi $touch	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:17
S45	20	three near sensing near area	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:28
S46	8710	capacitance near sensor	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:29
S47	158	(electrically adj isolated) same (sensor near element)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:34

S48	0	S45 and S46 and S47	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:35
S49	24	S46 and S47	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:35
S50	307	(touch near sensor near button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:50
S51	60	S50 and S46	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:51
S52	0	(Multiple near sens$4 near area) and (button near operation) and (touch near screen)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 07:57
S53	2	(Multiple near sens$4 near area) and (touch near screen)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 07:58
S54	0	(Multiple near sens$4 near button$2) and (touch near screen) and (capacitance$2)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 08:04
S55	4	(Multiple near sens$4 near button$2) and (capacitance)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 08:05

S56	3	"20050133262"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 08:13
S57	2	"20080278453"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 08:22
S58	2	"20080246735"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 08:23
S59	4	"61000784"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 08:25
S60	1202	345/173.ccls. and capacitance	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 08:29
S61	613	345/174-179.ccls. and capacitance	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 11:09
S63	29	(touch near screen) and (Capacit$6 and sens$3) and (sensing near areas) same buttons	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 12:11
S64	2784	178/18.01-18.11.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 15:47

S65	439	178/18.01-18.11.ccls. and (touch near panel)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 15:48
S66	900	178/18.01-18.11.ccls. and (capacit$6 and sens$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 16:35
S67	30	178/18.01-18.11.ccls. and capacit$6 same sens$3 near (second or third)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 16:37
S68	33	(Capacit$6 and sens $3) and (sensing near areas) and (input near button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 17:23
S69	24064	(touch near screen or pad) and (capacit$6 and sens$3) and (button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 17:31
S70	90998	(touch near screen or pad) and (capacit$6 and sens$3) and (first or second and button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 17:32
S71	73385	(touch near screen or pad) and (capacit$6 and sens$3) and (first or second and button) and (sens$3 and area)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 17:33
S72	20303	(touch near screen or pad) and (capacit$6 and sens$3) and (button) and (sens$3 and area)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 17:33

S73	20303	(touch near screen or pad) and (capacit$6 and sens$3 and button) and (sens$3 and area)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 17:34
S74	2438	(touch near screen or pad) and (capacit$6 and sens$3 and button) and (sens$3 and area) and "345"/$.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 17:35
S76	1334	(touch near screen or pad) and (capacit$6 and sens$3 and button) and (sens$3 and area) and "345"/$.ccls. and portable	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 17:36
S77	61	345/173.ccls. and capacit$6 same sens$3 near (second or third)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/21 13:51
S78	560	345/173.ccls. and capacit$6 same sens$3 same (second or third)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/01/19 16:58
S79	396	(touch near screen or pad) same (capacit$6 and sens$3 and button) and (sens$3 and area) and "345"/$.ccls. and portable	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2010/01/19 16:58
S80	35	(touch near screen or pad) same (capacit$6 and sens$3 and button) same(sens$3 and area) and "345"/$.ccls. and portable	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2010/01/19 16:59
S81	567	(touch near (screen or pad)) same (capacit$6 and sens$3) same (button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/01/19 17:10

S82	504	(touch (screen or pad)) same (capacit$6 same sens$3) same (button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/01/19 17:11
S83	311	(touch (screen or pad)) same (capacit$6 sens$3) same (button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/01/19 17:11
S84	85	"345"/$.ccls. and (touch (screen or pad)) same (capacit$6 sens$3) same (button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/01/19 17:12

7/30/2010 12:08:02 PM
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BIB DATA SHEET

CONFIRMATION NO. 2623

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
11/437,517	05/18/2006 RULE	341	2629	CD06039

APPLICANTS
Jiang XiaoPing, Shanghai, CHINA;

** **CONTINUING DATA** *************************

** **FOREIGN APPLICATIONS** *************************

** **IF REQUIRED, FOREIGN FILING LICENSE GRANTED** **
06/15/2006

		STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
Foreign Priority claimed ☐ Yes ☑ No 35 USC 119(a-d) conditions met ☐ Yes ☑ No Verified and Acknowledged /BENYAM KETEMA/ Examiner's Signature	☐ Met after Allowance Initials	CHINA	10	20	3

ADDRESS

CYPRESS SEMICONDUCTOR CORPORATION
198 CHAMPION COURT
SAN JOSE, CA 95134-1709
UNITED STATES

TITLE

Two-pin buttons

FILING FEE RECEIVED		
1000	FEES: Authority has been given in Paper No.____________ to charge/credit DEPOSIT ACCOUNT No.____________ for following:	☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other ________________ ☐ Credit

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Jiang XiaoPing

Serial No.: 11/437,517

Filed: May 18, 2006

Title: Two-Pin Buttons

Assignee: Cypress Semiconductor

Examiner: Benyan Ketema

Group Art Unit: 2629

Docket No.: CD06039

Confirmation No.: 2623

RESPONSE TO NON-FINAL OFFICE ACTION DATED AUGUST 3, 2010

To: Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Amendments to the present application and/or associated remarks are detailed below.

REMARKS

This communication is responsive to the Non-Final Office Action mailed on August 3, 2010. Claims 1-20 are currently pending. Claims 1-4 and 18 are amended. No claims have been cancelled or withdrawn. Applicant respectfully requests reconsideration of the present objections and rejections. Applicant believes this communication to be fully responsive to all issues raised in the Action.

Examiner Interview

Applicant thanks the Examiner for the courtesy of the telephone interview conducted on October 25, 2010, in which it was agreed that the Applicant would amend the claims to more accurately claim the subject matter of the specification, which overcomes the references cited.

Amendments

The amendments to the claims are fully supported by the specification as originally filed, and no new matter will be added by entry of the amendment. The amendments to the claims are made to satisfy Applicants' preferences, not necessarily to satisfy any legal requirement(s) of the patent laws. The amendments clarify the claims and are not intended to limit the scope of equivalents to which any claim element may be entitled. Applicants respectfully request reconsideration of the above-identified application in view of the amendments above and the remarks that follow.

§102 Rejections

Claims 1, 2, 4 and 18 were rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by Tsujioka et al. (U.S. Patent Number 5,518,078, hereinafter "Tsujioka").

Regarding independent claim 1, Examiner stated:

> "Tsujioka et al discloses *a method* (Column 1 line 5-10), *comprising:*
>
> *detecting a presence of a conductive object on a sensing device;* (Column 9 line 25- Column 10 line 4)

recognizing three or more button (Fig. 5 item 49, buttons) *operations performed by the conductive object* (Fig 5 item 50 & 51, finger or pen) *using two sensing areas of the sensing device* (Fig 5 & 6 item 24 & 25, two sensing areas)."

Merely in the interest of advancing prosecution and without conceding the propriety of the rejection, Applicant submits that claim 1 has been amended to recite:

A method, comprising:
detecting a presence of a conductive object on a capacitance sensing device, the sensing device comprising at least two sensing areas each coupled to a capacitance measurement input; and
recognizing a plurality of button activations performed by the detected presence of the conductive object, wherein the number of the plurality of button activations is equal to at least the number or sensing areas plus one and wherein a combination of the at least two sensing areas is used to recognize at least one of the plurality of button operations.

Applicant respectfully submits that Tsujioka does not disclose "**recognizing a plurality of button activations** performed by the detected presence of the conductive object, **wherein the number of the plurality of button activations is equal to at least the number or sensing areas plus one** and wherein a combinat**ion of the at least two sensing areas is used to recognize at least one of the plurality of button operations**" as recited in the present application. Tsujioka (Col. 10, lines 4-9) teaches:

"The control device 28 detects the pressing position as the operating position of the transparent electrodes 39 to 42; 32, 33, that is, the input coordinates as the coordinates (x, y), (x=1 to 4, y=1) of the pressing region 49 of two lines and four rows as an example of matrix arrangement."

Figure 5 of Tsujioka shows a 2x4 matrix of buttons (49) and a touchscreen area (first input area 24). Tsujioka does not disclose that the 2x4 matrix of buttons (49) recognizes "**three or more button operations**...**using two areas of the sensing device**."

Therefore, applicant submits that Tsujioka does not teach or suggest the claimed material of claim 1.

Claims 2 and 4 depend from independent claim 1 and incorporate all of the features therein. Claim 2 and 4 are also asserted to be allowable for the reasons presented above, and Applicant respectfully requests notification of same. Applicant considers additional elements of claims 2 and 4 to further distinguish over Tsujioka and Applicant reserves the right to present arguments to this effect at a later date.

Regarding independent claim 18, Examiner stated:

> "Tsujioka et al discloses *an apparatus* (Column 1, touch panel), *comprising:*
> *a first sensing area to detect a presence of a conductive object on a sensing device;* (Fig 9 item 25)
> *a second senign area to detect thr presence of the conductive object on the sensing device;* (Fig 9 item 24)
> *means for recognizing three or more button operations* (Fig 9 item 39-42) *performed by the conductive object* (Fig 5 item 51 and 50, finger or pen) *using two sensing areas on the sensing device* (Fig 9 item 24 & 25, two sensing areas)."

Merely in the interest of advancing prosecution and without conceding the propriety of the rejection, Applicant submits that claim 1 has been amended to recite:

> An apparatus, comprising:
>
> a first sensing area configured to detect a presence of a conductive object on a sensing device;
> a second sensing area configured to detect the presence of the conductive object on the sensing device; and
> means for recognizing three or more button activations performed by the conductive object using the first and second sensing areas on the sensing device.

For at least the reasons stated for independent claim 1 above, Tsujioka does not recite the claimed features of claim 18. In particular, Tsujioka does not disclose "**recognizing three or more button activations** performed by the conductive object **using the first and second sensing areas** on the sensing device" as claimed. Applicant respectfully submits that claim 18 is in condition for allowance and requests notification of same.

§*103 Rejections*

Claim 3 was rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Tsujioka in view of Collins (U.S. Published Application 2004/0239616, hereinafter "Collins").

Claim 3 depends from independent claim 1 and incorporates all of the features therein. Claim 3 is also asserted to be allowable for the reasons presented above, and Applicant respectfully requests notification of same.

Claims 19 and 20 was rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Tsujioka in view of Gritzinger et al. (U.S. Published Application 2006/0097992, hereinafter "Gritzinger").

Claims 19 and 20 depend from independent claim 18 and incorporate all of the features therein. Claims 19 and 20 are also asserted to be allowable for the reasons presented above, and Applicant respectfully requests notification of same.

Allowed Claims

Claims 5-17 have been allowed by the Patent Office. Applicant thanks the Examiner.

Reservation of Rights

Applicant believes every assertion by the Office Action has been addressed, however in the interest of clarity and brevity, Applicant may not have asserted every available argument for each assertion made in the Office Action. Applicant's silence regarding any such assertion does not constitute any admission or acquiescence. Applicant reserves all rights not exercised in connection with this response, such as the right to challenge or rebut any tacit or explicit characterization of any reference or of any of the present claims, the right to challenge or rebut any asserted factual or legal basis of any of the rejections, the right to swear behind any cited reference such as provided under 37 C.F.R. § 1.131 or otherwise, or the right to assert co-ownership of any cited reference. Applicant does not admit that any of the cited references or any other references of record is relevant to the present claims, or that they constitute prior art. To the extent that any rejection or assertion is based upon the Examiner's personal knowledge, rather than any objective evidence of record as manifested by a cited prior art reference, Applicant timely objects to such reliance on Official Notice, and reserves all rights to request that the Examiner provide a reference or affidavit in support of such assertion, as required by MPEP § 2144.03. Applicant reserves all rights to pursue any cancelled claims in a subsequent patent application claiming the benefit of priority of the present patent application, and to request rejoinder of any withdrawn claim, as required by MPEP § 821.04.

Conclusion

Applicant respectfully submit that the claims are in condition for allowance and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's agent, Ryan Seguine, at (425) 753-4459.

Please charge any additional fees under 37 CFR §§ 1.16, 1.17, 1.18, 1.20 and 1.21 that may be required to maintain pendency of the present application, or apply any credits to our PTO deposit account number: 50-3781.

Respectfully submitted,
Jiang XiaoPing

By their Representative,
Agent for Applicant

Date October 25, 2010

By: /Ryan Seguine/
Ryan D. Seguine
Reg. No. 64,577

Cypress Semiconductor Corporation
198 Champion Court
San Jose, CA 95134
Facsimile: (408) 545-6911

Electronic Acknowledgement Receipt

EFS ID:	8765756
Application Number:	11437517
International Application Number:	
Confirmation Number:	2623
Title of Invention:	Two-pin buttons
First Named Inventor/Applicant Name:	Jiang XiaoPing
Customer Number:	60909
Filer:	Larry Joel Johnson/Penny Jackson
Filer Authorized By:	Larry Joel Johnson
Attorney Docket Number:	CD06039
Receipt Date:	03-NOV-2010
Filing Date:	18-MAY-2006
Time Stamp:	23:44:55
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Amendment/Req. Reconsideration-After Non-Final Reject	CD06039AmendmentAfterNonFinal11032010.pdf	3575179 a4c9499945ed376c51891dac6ec7233af7bda1cd	no	14

Warnings:

Information:

Total Files Size (in bytes):	3575179

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

<u>New Applications Under 35 U.S.C. 111</u>
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

<u>National Stage of an International Application under 35 U.S.C. 371</u>
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

<u>New International Application Filed with the USPTO as a Receiving Office</u>
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

CLAIMS

Claims pending

- At time of the Action: 1-20.
- After this Response: 1-20.

Currently Amended claims: 1-4 and 18.
Currently Cancelled claims: None.
Currently Withdrawn claims: None.
New claims: None.

1. (Currently Amended) A method, comprising:

detecting a presence of a conductive object on a <u>capacitance</u> sensing device<u>, the sensing device comprising at least two sensing areas each coupled to a capacitance measurement input</u>; and

recognizing ~~three or more~~ <u>a plurality of</u> button ~~operations~~ <u>activations</u> performed by the <u>detected presence of the</u> conductive object<u>, wherein the number of the plurality of button activations is equal to at least the number of sensing areas plus one and wherein a combination of the at least two sensing areas is used to recognize at least one of the plurality of button operations</u> ~~using two sensing areas of the sensing device~~.

2. (Currently Amended) The method of claim 1, wherein recognizing <u>the plurality of</u> ~~three or more~~ button ~~operations~~ <u>activations</u> comprises:

recognizing a first button ~~operation~~ activation when the presence of the conductive object is detected on a first sensing area of the at least two sensing areas of the sensing device;

recognizing a second button ~~operation~~ activation when the presence of the conductive object is detected on a second sensing area of the at least two sensing areas of the sensing device; and

recognizing ~~one or more~~ a third button ~~operations~~ activation when the presence of the conductive object is detected on the first and second sensing areas.

3. (Currently Amended) The method of claim 1, further comprising ~~determining~~ measuring a capacitance of the conductive object on the sensing device over time, wherein ~~determining~~ measuring the capacitance further comprises ~~determining~~ measuring a capacitance of the at least two sensing areas of the sensing device, and wherein recognizing the button ~~operation~~ activation is based on the measured capacitance of the at least two sensing areas.

4. (Currently Amended) The method of claim 1, further comprising scanning the at least two sensing areas of the sensing device, and wherein recognizing the ~~three or more~~ a plurality of button ~~operations~~ activations comprises:

recognizing a first button ~~operation~~ activation when a first sensing area of the at least two sensing areas detects the presence of the conductive object during the scanning of the at least two sensing areas;

recognizing a second button ~~operation~~ activation when a second sensing area of the two sensing areas detects the presence of the conductive object during the scanning of the at least two sensing areas; and

recognizing a third button ~~operation~~ activation when the first and second sensing areas detect the presence of the conductive object during the scanning of the at least two sensing areas.

5. (Original) An apparatus, comprising:

a sensing device comprising:

a first sensor element;

a second sensor element; and

a third sensor element comprising a first portion coupled to the first sensor element and a second portion coupled to the second sensor element, wherein the first and second portions of the third sensor element are electrically isolated.

6. (Original) The apparatus of claim 5, wherein a surface area of the first portion and a surface area of the second portion of the third sensor element are substantially equal.

7. (Original) The apparatus of claim 5, further comprising a fourth sensor element comprising a third portion coupled to the first sensor element and a fourth portion coupled to the second sensor element, wherein the third and fourth portions of the fourth sensor element are electrically isolated.

8. (Original) The apparatus of claim 7, wherein a surface area ratio of the third sensor element is approximately 25% of the first portion to approximately 75% of the second portion, and wherein a surface area ratio of the fourth sensor element is approximately 75% of the third portion to approximately 25% of the fourth portion.

9. (Original) The apparatus of claim 5, further comprising a fifth sensor element comprising a fifth portion coupled to the first sensor element and a sixth portion coupled to the second sensor element, wherein the fifth and sixth portions of the fifth sensor element are electrically isolated.

10. (Original) The apparatus of claim 9, wherein a surface area ratio of the third sensor element is approximately 33% of the first portion to approximately 67% of the second portion, wherein a surface area ratio of the fourth sensor element is approximately 50% of the third portion to approximately 50% of the fourth portion, and wherein a surface area ratio of the fifth sensor element is approximately 67% of the fifth portion to approximately 33% of the sixth portion.

11. (Original) The apparatus of claim 5, wherein the first portion comprises a first conductive trace having one or more sub-traces, and the second portion comprises a second conductive trace having one or more sub-traces, and wherein at least one sub-trace of the first conductive trace is interleaved with at least one sub-trace of the second conductive trace.

12. (Original) The apparatus of claim 5, wherein the first, second, and third sensor elements are substantially circular shaped.

13. (Original) The apparatus of claim 5, wherein the first, second, and third sensor elements are substantially rectangular shaped.

14. (Original) The apparatus of claim 5, further comprising a processing device coupled to the sensing device, wherein the processing device comprises one or more capacitance sensors coupled to the first and second sensor elements, and wherein the one or more capacitance sensors are operable to measure capacitance on the first, second, and third sensor elements.

15. (Original) The apparatus of claim 14, wherein the processing device comprises a first pin and a second pin, wherein the first pin is coupled to the first sensor element, and wherein the second pin is coupled to the second sensor element.

16. (Original) The apparatus of claim 15, wherein the processing device is operable to recognize a first button operation on the first sensor element, a second button operation on the second sensor element, and a third button operation on the first and second portions of the third sensor element.

17. (Original) The apparatus of claim 14, wherein each of the one or more capacitance sensors comprises a relaxation oscillator coupled to one of the first sensor element and

the first portion, and the second sensor element and the second portion, wherein the relaxation oscillator comprises:

a current source to provide a charge current to first sensor element and the first portion, and to the second sensor element and the second portion;

a selection circuit coupled to the first sensor element and the first portion, the second sensor element and the second portion, and the current source, wherein the selection circuit is configured to sequentially select a sensor element of the first sensor element and the second sensor elements to provide the charge current and to measure the capacitance of each sensor element of the sensing device;

a comparator coupled to the current source and the selection circuit, wherein the comparator is configured to compare a voltage on the selected sensor element and a threshold voltage; and

a reset switch coupled to the comparator, current source, and selection circuit, wherein the reset switch is configured to reset the charge current on the selected sensor element, and wherein each of the one or more capacitance sensors further comprises a digital counter coupled to the relaxation oscillator, and wherein the digital counter is operable to count at least one of a frequency or a period of a relaxation oscillator output received from the relaxation oscillator.

18. (Currently Amended) An apparatus, comprising:

a first sensing area configured to detect a presence of a conductive object on a sensing device;

a second sensing area configured to detect the presence of the conductive object on the sensing device; and

means for recognizing three or more button ~~operations~~ activations performed by the conductive object using ~~two~~ the first and second sensing areas on the sensing device.

19. (Original) The apparatus of claim 18, further comprising means for reducing a pin count of the sensing device.

20. (Original) The apparatus of claim 18, further comprising means for reducing scan time of the sensing device.

PTO/SB/06 (07-06)
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 11/437,517	Filing Date 05/18/2006	☐ To be Mailed

APPLICATION AS FILED – PART I

FOR	NUMBER FILED (Column 1)	NUMBER EXTRA (Column 2)	SMALL ENTITY ☐ RATE ($)	SMALL ENTITY FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =		OR	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =			X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							
			TOTAL			TOTAL	

* If the difference in column 1 is less than zero, enter "0" in column 2.

APPLICATION AS AMENDED – PART II

AMENDMENT	11/03/2010	CLAIMS REMAINING AFTER AMENDMENT (Column 1)		HIGHEST NUMBER PREVIOUSLY PAID FOR (Column 2)	PRESENT EXTRA (Column 3)	SMALL ENTITY RATE ($)	SMALL ENTITY ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 20	Minus	** 20	= 0	X $ =		OR	X $52=	0
	Independent (37 CFR 1.16(h))	* 3	Minus	***3	= 0	X $ =		OR	X $220=	0
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	**0**

AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT (Column 1)		HIGHEST NUMBER PREVIOUSLY PAID FOR (Column 2)	PRESENT EXTRA (Column 3)	RATE ($)	ADDITIONAL FEE ($)	OR	RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =		OR	X $ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =		OR	X $ =	
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

Legal Instrument Examiner:
/Halley D. Massey/

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Jiang XiaoPing
Serial No.: 11/437,517
Filed: May 18, 2006
Title: Two-Pin Buttons
Assignee: Cypress Semiconductor

Examiner: Benyan Ketema
Group Art Unit: 2629
Docket No.: CD06039
Confirmation No.: 2623

SUPPLEMENTAL RESPONSE TO OCTOBER 25, 2010 RESPONSE TO NON-FINAL OFFICE ACTION DATED AUGUST 3, 2010

To: Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Amendments to the present application and/or associated remarks are detailed below.

CLAIMS

Claims pending

- At time of the Action: 1-20.
- After this Response: 1-20.

Currently Amended claims: 1-4 and 18.
Currently Cancelled claims: None.
Currently Withdrawn claims: None.
New claims: None.

1. (Currently Amended) A method, comprising:

detecting a presence of a conductive object on a capacitance sensing device, the sensing device comprising at least two sensing areas each coupled to a capacitance measurement input; and

recognizing activation of at least three ~~a plurality of~~ buttons ~~activations~~ performed by the detected presence of the conductive object, wherein the ~~plurality~~ number of ~~button~~ buttons ~~activations~~ is equal to at least the number or sensing areas plus one and wherein a combination of the at least two sensing areas is used to recognize at least one of the ~~plurality of~~ activated ~~button~~ buttons ~~operations~~.

2. (Currently Amended) The method of claim 1, wherein recognizing the plurality of button activations comprises:

recognizing a first activated button ~~activation~~ when the presence of the conductive object is detected on a first sensing area of the at least two sensing areas of the sensing device;

recognizing a second activated button ~~activation~~ when the presence of the conductive object is detected on a second sensing area of the at least two sensing areas of the sensing device; and

recognizing a third activated button ~~activation~~ when the presence of the conductive object is detected on the first and second sensing areas.

3. (Currently Amended) The method of claim 1, further comprising measuring a capacitance of the conductive object on the sensing device over time, wherein measuring the capacitance further comprises measuring a capacitance of the at least two sensing areas of the sensing device, and wherein recognizing the activated ~~button~~ buttons ~~activation~~ is based on the measured capacitance of the at least two sensing areas.

4. (Currently Amended) The method of claim 1, further comprising scanning the at least two sensing areas of the sensing device, and wherein recognizing the a plurality of activated ~~button~~ buttons ~~activations~~ comprises:

recognizing a first activated button ~~activation~~ when a first sensing area of the at least two sensing areas detects the presence of the conductive object during the scanning of the at least two sensing areas;

recognizing a second activated button ~~activation~~ when a second sensing area of the two sensing areas detects the presence of the conductive object during the scanning of the at least two sensing areas; and recognizing a third activated button ~~activation~~ when the first and second sensing areas detect the presence of the conductive object during the scanning of the at least two sensing areas.

5. (Original) An apparatus, comprising:

a sensing device comprising:

a first sensor element;

a second sensor element; and

a third sensor element comprising a first portion coupled to the first sensor element and a second portion coupled to the second sensor element, wherein the first and second portions of the third sensor element are electrically isolated.

6. (Original) The apparatus of claim 5, wherein a surface area of the first portion and a surface area of the second portion of the third sensor element are substantially equal.

7. (Original) The apparatus of claim 5, further comprising a fourth sensor element comprising a third portion coupled to the first sensor element and a fourth portion coupled to the second sensor element, wherein the third and fourth portions of the fourth sensor element are electrically isolated.

8. (Original) The apparatus of claim 7, wherein a surface area ratio of the third sensor element is approximately 25% of the first portion to approximately 75% of the second

portion, and wherein a surface area ratio of the fourth sensor element is approximately 75% of the third portion to approximately 25% of the fourth portion.

9. (Original) The apparatus of claim 5, further comprising a fifth sensor element comprising a fifth portion coupled to the first sensor element and a sixth portion coupled to the second sensor element, wherein the fifth and sixth portions of the fifth sensor element are electrically isolated.

10. (Original) The apparatus of claim 9, wherein a surface area ratio of the third sensor element is approximately 33% of the first portion to approximately 67% of the second portion, wherein a surface area ratio of the fourth sensor element is approximately 50% of the third portion to approximately 50% of the fourth portion, and wherein a surface area ratio of the fifth sensor element is approximately 67% of the fifth portion to approximately 33% of the sixth portion.

11. (Original) The apparatus of claim 5, wherein the first portion comprises a first conductive trace having one or more sub-traces, and the second portion comprises a second conductive trace having one or more sub-traces, and wherein at least one sub-trace of the first conductive trace is interleaved with at least one sub-trace of the second conductive trace.

12. (Original) The apparatus of claim 5, wherein the first, second, and third sensor elements are substantially circular shaped.

13. (Original) The apparatus of claim 5, wherein the first, second, and third sensor elements are substantially rectangular shaped.

14. (Original) The apparatus of claim 5, further comprising a processing device coupled to the sensing device, wherein the processing device comprises one or more capacitance sensors coupled to the first and second sensor elements, and wherein the one or more capacitance sensors are operable to measure capacitance on the first, second, and third sensor elements.

15. (Original) The apparatus of claim 14, wherein the processing device comprises a first pin and a second pin, wherein the first pin is coupled to the first sensor element, and wherein the second pin is coupled to the second sensor element.

16. (Original) The apparatus of claim 15, wherein the processing device is operable to recognize a first button operation on the first sensor element, a second button operation on the second sensor element, and a third button operation on the first and second portions of the third sensor element.

17. (Original) The apparatus of claim 14, wherein each of the one or more capacitance sensors comprises a relaxation oscillator coupled to one of the first sensor element and the first portion, and the second sensor element and the second portion, wherein the relaxation oscillator comprises:

a current source to provide a charge current to first sensor element and the first portion, and to the second sensor element and the second portion;

a selection circuit coupled to the first sensor element and the first portion, the second sensor element and the second portion, and the current source, wherein the selection circuit is configured to sequentially select a sensor element of the first sensor element and the second sensor elements to provide the charge current and to measure the capacitance of each sensor element of the sensing device;

a comparator coupled to the current source and the selection circuit, wherein the comparator is configured to compare a voltage on the selected sensor element and a threshold voltage; and

a reset switch coupled to the comparator, current source, and selection circuit, wherein the reset switch is configured to reset the charge current on the selected sensor element, and wherein each of the one or more capacitance sensors further comprises a digital counter coupled to the relaxation oscillator, and wherein the digital counter is operable to count at least one of a frequency or a period of a relaxation oscillator output received from the relaxation oscillator.

18. (Currently Amended) An apparatus, comprising:

a first sensing area configured to detect a presence of a conductive object on a sensing device;

a second sensing area configured to detect the presence of the conductive object on the sensing device; and means for recognizing three or more activated ~~button~~ buttons ~~activation~~ performed by the conductive object using ~~two~~ the first and second sensing areas on the sensing device.

19. (Original) The apparatus of claim 18, further comprising means for reducing a pin count of the sensing device.

20. (Original) The apparatus of claim 18, further comprising means for reducing scan time of the sensing device.

RECEIVED
CENTRAL FAX CENTER
JAN 26 2011

Jennifer Geoffrion

From: Ryan Seguine [rxi@cypress.com]
Sent: Wednesday, January 26, 2011 1:37 PM
To: Jennifer Geoffrion
Subject: Can you please Fax this for me?

Attachments: CD06039 11 437 517 January 27 2010 CLAIMS.pdf

CD06039 11 437
517 January 27 ...

Jennifer,

Can you please fax the attached document to the US Patent and Trademark Office for me?

The number is: 571.273.8300
Contact Name: Examiner Benyam Ketema
Phone number: 571.270.7224
Regarding: Application 11/437,517
From: Ryan Seguine (64,577)
Phone number: 425.753.4459.

Thanks.

Ryan.

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

60909 7590 02/03/2011

CYPRESS SEMICONDUCTOR CORPORATION
198 CHAMPION COURT
SAN JOSE, CA 95134-1709

EXAMINER	
KETEMA, BENYAM	
ART UNIT	PAPER NUMBER
2629	

DATE MAILED: 02/03/2011

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/437,517	05/18/2006	Jiang XiaoPing	CD06039	2623

TITLE OF INVENTION: TWO-PIN BUTTONS

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1510	$300	$0	$1810	05/03/2011

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PTOL-85 (Rev. 08/07) Approved for use through 08/31/2010.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

60909 7590 02/03/2011

CYPRESS SEMICONDUCTOR CORPORATION
198 CHAMPION COURT
SAN JOSE, CA 95134-1709

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)

(Signature)

(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/437,517	05/18/2006	Jiang XiaoPing	CD06039	2623

TITLE OF INVENTION: TWO-PIN BUTTONS

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1510	$300	$0	$1810	05/03/2011

EXAMINER	ART UNIT	CLASS-SUBCLASS
KETEMA, BENYAM	2629	345-173000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

(1) the names of up to 3 registered patent attorneys or agents OR, alternatively,

(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 ____________________
2 ____________________
3 ____________________

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. The following fee(s) are submitted:

❑ Issue Fee
❑ Publication Fee (No small entity discount permitted)
❑ Advance Order - # of Copies ____________

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**

❑ A check is enclosed.
❑ Payment by credit card. Form PTO-2038 is attached.
❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number ________ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)

❑ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27.
❑ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature ____________________ Date ________________

Typed or printed name ____________________ Registration No. ________________

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/437,517	05/18/2006	Jiang XiaoPing	CD06039	2623

60909 7590 02/03/2011

CYPRESS SEMICONDUCTOR CORPORATION
198 CHAMPION COURT
SAN JOSE, CA 95134-1709

EXAMINER	
KETEMA, BENYAM	
ART UNIT	PAPER NUMBER
2629	

DATE MAILED: 02/03/2011

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)

(application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 749 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 749 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

Notice of Allowability	Application No. 11/437,517	Applicant(s) XIAOPING, JIANG	
	Examiner BENYAM KETEMA	Art Unit 2629	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *11/03/2010*.

2. ☒ The allowed claim(s) is/are *1-20*.

3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☐ All b) ☐ Some* c) ☐ None of the:
   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. ______ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: ______.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
   1) ☐ hereto or 2) ☐ to Paper No./Mail Date ______.
   (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date ______.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date ______
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☒ Interview Summary (PTO-413), Paper No./Mail Date ______ .
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other ______.

Interview Summary	**Application No.** 11/437,517	**Applicant(s)** XIAOPING, JIANG	
	Examiner BENYAM KETEMA	**Art Unit** 2629	

All participants (applicant, applicant's representative, PTO personnel):

(1) BENYAM KETEMA. (3)_____.

(2) Ryan Seguine. (4)_____.

Date of Interview: 25 January 2011.

Type: a)☒ Telephonic b)☐ Video Conference
c)☐ Personal [copy given to: 1)☐ applicant 2)☐ applicant's representative]

Exhibit shown or demonstration conducted: d)☐ Yes e)☒ No.
If Yes, brief description: _____.

Claim(s) discussed: 1 and 18.

Identification of prior art discussed: N/A.

Agreement with respect to the claims f)☒ was reached. g)☐ was not reached. h)☐ N/A.

Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: *Examiner discussed a proposed amendment to claims 1 and 18 with Applicant representative Mr. Ryan Seguine on January 25, 2011 and with applicant representative permission examiner faxed the proposed amendment to the applicant representative on January 25, 2011. Applicant's representative agreed with examiners suggestion and informs the examiner that he would need to further review the proposed amendment and will respond to the proposal the next day (January 26, 2011).*.

(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims allowable, if available, must be attached. Also, where no copy of the amendments that would render the claims allowable is available, a summary thereof must be attached.)

THE FORMAL WRITTEN REPLY TO THE LAST OFFICE ACTION MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW. (See MPEP Section 713.04). If a reply to the last Office action has already been filed, APPLICANT IS GIVEN A NON-EXTENDABLE PERIOD OF THE LONGER OF ONE MONTH OR THIRTY DAYS FROM THIS INTERVIEW DATE, OR THE MAILING DATE OF THIS INTERVIEW SUMMARY FORM, WHICHEVER IS LATER, TO FILE A STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. See Summary of Record of Interview requirements on reverse side or on attached sheet.

Summary of Record of Interview Requirements

Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record
A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews
Paragraph (b)

In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

37 CFR §1.2 Business to be transacted in writing.
All business with the Patent or Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

The action of the Patent and Trademark Office cannot be based exclusively on the written record in the Office if that record is itself incomplete through the failure to record the substance of interviews.

It is the responsibility of the applicant or the attorney or agent to make the substance of an interview of record in the application file, unless the examiner indicates he or she will do so. It is the examiner's responsibility to see that such a record is made and to correct material inaccuracies which bear directly on the question of patentability.

Examiners must complete an Interview Summary Form for each interview held where a matter of substance has been discussed during the interview by checking the appropriate boxes and filling in the blanks. Discussions regarding only procedural matters, directed solely to restriction requirements for which interview recordation is otherwise provided for in Section 812.01 of the Manual of Patent Examining Procedure, or pointing out typographical errors or unreadable script in Office actions or the like, are excluded from the interview recordation procedures below. Where the substance of an interview is completely recorded in an Examiners Amendment, no separate Interview Summary Record is required.

The Interview Summary Form shall be given an appropriate Paper No., placed in the right hand portion of the file, and listed on the "Contents" section of the file wrapper. In a personal interview, a duplicate of the Form is given to the applicant (or attorney or agent) at the conclusion of the interview. In the case of a telephone or video-conference interview, the copy is mailed to the applicant's correspondence address either with or prior to the next official communication. If additional correspondence from the examiner is not likely before an allowance or if other circumstances dictate, the Form should be mailed promptly after the interview rather than with the next official communication.

The Form provides for recordation of the following information:

- Application Number (Series Code and Serial Number)
- Name of applicant
- Name of examiner
- Date of interview
- Type of interview (telephonic, video-conference, or personal)
- Name of participant(s) (applicant, attorney or agent, examiner, other PTO personnel, etc.)
- An indication whether or not an exhibit was shown or a demonstration conducted
- An identification of the specific prior art discussed
- An indication whether an agreement was reached and if so, a description of the general nature of the agreement (may be by attachment of a copy of amendments or claims agreed as being allowable). Note: Agreement as to allowability is tentative and does not restrict further action by the examiner to the contrary.
- The signature of the examiner who conducted the interview (if Form is not an attachment to a signed Office action)

It is desirable that the examiner orally remind the applicant of his or her obligation to record the substance of the interview of each case. It should be noted, however, that the Interview Summary Form will not normally be considered a complete and proper recordation of the interview unless it includes, or is supplemented by the applicant or the examiner to include, all of the applicable items required below concerning the substance of the interview.

A complete and proper recordation of the substance of any interview should include at least the following applicable items:

1) A brief description of the nature of any exhibit shown or any demonstration conducted,
2) an identification of the claims discussed,
3) an identification of the specific prior art discussed,
4) an identification of the principal proposed amendments of a substantive nature discussed, unless these are already described on the Interview Summary Form completed by the Examiner,
5) a brief identification of the general thrust of the principal arguments presented to the examiner,
   (The identification of arguments need not be lengthy or elaborate. A verbatim or highly detailed description of the arguments is not required. The identification of the arguments is sufficient if the general nature or thrust of the principal arguments made to the examiner can be understood in the context of the application file. Of course, the applicant may desire to emphasize and fully describe those arguments which he or she feels were or might be persuasive to the examiner.)
6) a general indication of any other pertinent matters discussed, and
7) if appropriate, the general results or outcome of the interview unless already described in the Interview Summary Form completed by the examiner.

Examiners are expected to carefully review the applicant's record of the substance of an interview. If the record is not complete and accurate, the examiner will give the applicant an extendable one month time period to correct the record.

Examiner to Check for Accuracy

If the claims are allowable for other reasons of record, the examiner should send a letter setting forth the examiner's version of the statement attributed to him or her. If the record is complete and accurate, the examiner should place the indication, "Interview Record OK" on the paper recording the substance of the interview along with the date and the examiner's initials.

DETAILED ACTION

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Ryan Seguine on January 25, 2011.

In the claims:

Please amend claims 1- 4 and 18 as follows:

Claim 1:

A method, comprising:

detecting a presence of a conductive object on a capacitance sensing device, the sensing device comprising at least two sensing areas each coupled to a capacitance measurement input; and

recognizing activation of at least three ~~a plurality of~~ button ~~activations~~ performed by the detected presence of the conductive object, wherein the ~~plurality~~ number of ~~button~~ buttons ~~activations~~ is equal to at least the number of sensing areas plus one and wherein a combination of the at least two sensing areas is used to recognize at least one of the ~~plurality of~~ activated ~~button~~ buttons ~~operations.~~

Claim 2:

The method of claim 1, wherein recognizing the plurality of button activations comprises:

recognizing a first activated button ~~activation~~ when the presence of the conductive object is detected on a first sensing area of the at least two sensing areas of the sensing device;

recognizing a second activated button ~~activation~~ when the presence of the conductive object is detected on a second sensing area of the at least two sensing areas of the sensing device; and

recognizing a third activated button ~~activation~~ when the presence of the conductive object is detected on the first and second sensing areas.

Claim 3:

The method of claim 1, further comprising measuring a capacitance of the conductive object on the sensing device over time, wherein measuring the capacitance further comprises measuring a capacitance of the at least two sensing areas of the sensing device, and wherein recognizing the activated ~~button~~ buttons ~~activation~~ is based on the measured capacitance of the at least two sensing areas.

Claim 4:

The method of claim 1, further comprising scanning the at least two sensing areas of the sensing device, and wherein recognizing the a plurality of activated ~~button~~ buttons ~~activations~~ comprises:

recognizing a first activated button ~~activation~~ when a first sensing area of the at least two sensing areas detects the presence of the conductive object during the scanning of the at least two sensing areas;

recognizing a second activated button ~~activation~~ when a second sensing area of the two sensing areas detects the presence of the conductive object during the scanning of the at least two sensing areas; and

recognizing a third activated button ~~activation~~ when the first and second sensing areas detect the presence of the conductive object during the scanning of the at least two sensing areas.

Claim 18:

An apparatus, comprising:

a first sensing area configured to detect a presence of a conductive object on a sensing device;

a second sensing area configured to detect the presence of the conductive object on the sensing device; and

means for recognizing three or more activated ~~button~~ buttons ~~activation~~ performed by the conductive object using the first and second sensing areas on the sensing device.

Examiner's Statement of Reasons for Allowance

2. The following is an examiner's statement of reasons for allowance: The prior art of record fails to disclose the claimed invention. **The features of independent claim 1** directed towards allowable subject matter is "*detecting a presence of a conductive object on a capacitance sensing device, the sensing device comprising at least two sensing areas each coupled to a capacitance measurement input; and recognizing activation of at least three button performed by the detected presence of the conductive object, <u>wherein the number of buttons is equal to at least the number of sensing areas plus one</u> and wherein a combination of the at least two sensing areas is used to recognize at least one of the activated buttons".* **Tsujioka et al (US Pat NO 5,518,078)** discloses that the presence of users finger (i.e. conductive object) is detected by sensing device (col. 9- 10), the sensing device comprising at least two sensing areas each coupled to a capacitance measurement input (fig 5 & 6) wherein the user can perform multiple input operation using his/her finger or pen as it is clearly shown in fig 5 in order to perform an input operation. But Tsujioka et al fails to disclose <u>**the number of buttons** is **equal** to at least **the number of sensing areas plus one**</u> and wherein a <u>combination of the at least two sensing areas is used to recognize at least one of the activated buttons.</u> These features in combination with the remaining language of claim 1, are not taught by the prior art of record.

The prior art of record fails to disclose the claimed invention. **The features of independent claim 5** directed towards allowable subject matter is " *a first sensor* *element; a second sensor elements; and a third sensor element comprising a first portion coupled to the first sensor element and second portion coupled to the second sensor element, wherein the first and second portions of the third sensor element are electrically isolated.* **Tsujioka et al (US Pat NO 5,518,078)** discloses a device having multiple sensor elements, but fails to disclose a third sensor element comprising a first portion coupled to the first sensor element and second portion coupled to the second sensor element. These features in combination with the remaining language of claims 1, 5, are not taught by the prior art of record. Therefore claims 1- 9 are found to be allowable over the prior art of record.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled “Comments on Statement of Reasons for Allowance.”

Conclusion

3. Any inquiry concerning this communication or earlier communications from the examiner should be directed to BENYAM KETEMA whose telephone number is (571)270-7224. The examiner can normally be reached on Monday- Friday 8:00AM - 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner’s supervisor, Shalwala Bipin H can be reached on 571-272-7681. The fax phone number for the organization where this application or proceeding is assigned is 571-273-

8300.Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/ B.K. /

Examiner, Art Unit 2629

/Bipin Shalwala/

Supervisory Patent Examiner, Art Unit 2629

Notice of References Cited	Application/Control No. 11/437,517	Applicant(s)/Patent Under Reexamination XIAOPING, JIANG	
	Examiner BENYAM KETEMA	Art Unit 2629	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-5,518,078	05-1996	Tsujioka et al.	178/18.05
*	B	US-2004/0239616	12-2004	Collins, Ryan V.	345/156
*	C	US-2006/0097992	05-2006	Gitzinger et al.	345/173
*	D	US-2006/0227117	10-2006	Proctor, David W.	345/173
*	E	US-7,158,125	01-2007	Sinclair et al.	345/173
*	F	US-2007/0291013	12-2007	WON, Jong Sung	345/173
*	G	US-7,466,307	12-2008	Trent et al.	345/173
*	H	US-7,495,659	02-2009	Marriott et al.	345/173
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11437517	XIAOPING, JIANG
	Examiner	**Art Unit**
	BENYAM KETEMA	2629

ORIGINAL		INTERNATIONAL CLASSIFICATION									
CLASS	SUBCLASS	CLAIMED					NON-CLAIMED				
345	173	G	0	6	F	3 / 041 (2006.0)					
		G	0	6	F	3 / 045 (2006.0)					
		G	0	6	F	3 / 033 (2006.0)					

CROSS REFERENCE(S)

CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)				
345	174	179			
178	18.01	18.06			

☒ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
	1		17												
	2		18												
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/BENYAM KETEMA/ Examiner.Art Unit 2629 (Assistant Examiner)	(Date)	**Total Claims Allowed:** 20	
/BIPIN SHALWALA/ Supervisory Patent Examiner.Art Unit 2629 (Primary Examiner)	01/31/2011 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 6B

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11437517	XIAOPING, JIANG
	Examiner	**Art Unit**
	BENYAM KETEMA	2629

SEARCHED

Class	Subclass	Date	Examiner
345	173	7/16/2009	bk

SEARCH NOTES

Search Notes	Date	Examiner
Inventer Search	7/16/2009	bk
See Attaches EAST Search	7/16/2009	bk
Above EAST Search have been updated	1/19/2010	b.k
Above East search have been updated	7/30/2010	BK
above search have been updated	1/20/2011	BK

INTERFERENCE SEARCH

Class	Subclass	Date	Examiner
	Searched all of the above	1/28/2011	B.K

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	6	("5305017" | "6188391" | "6380931").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 09:51
S2	9	XIAOPING-JIANG.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 10:25
S3	2	"11437517"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 13:10
S6	76	"5543590"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 15:50
S7	4	XIAOPING-JIANG.in. and ((first and second) and (sensing adj areas))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 17:00
S8	3	XIAOPING-JIANG.in. and ((first and second) and (sensing adj areas).clm.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 17:00
S9	2	XIAOPING-JIANG.in. and ((first and sensing adj areas).clm. and(second and sensing adj areas). clm.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 17:03

S10	1202	345/173.ccls. and capacitance	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 17:07
S11	604	345/173.ccls. and capacitance and button	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 17:07
S12	0	345/173.ccls. and capacitance and button and ("multiple sensing areas")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 17:08
S13	48	345/173.ccls. and capacitance and button and (sensing adj areas)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 17:09
S14	31	345/173.ccls. and capacitance and button and (sensing adj areas) and (touch adj pad)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 17:09
S15	77	"5943052"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 13:50
S16	34	2004/0252109	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 15:26
S17	0	2007/0146349	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 15:31

S18	2	"20070146349"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 15:32
S19	173	("20020063688" | "20020191029" | "20030025679" | "20030062889" | "20030063428" | "20030080755" | "20030156098" | "20030160808" | "20030183864" | "20030183884" | "20030184315" | "20040169594" | "20040178989" | "20040178997" | "20040252109" | "20040263864" | "20050021269" | "20050024341" | "20050052425" | "20050073302" | "20050073322" | "20050083110" | "20060032680" | "20060097991" | "20060113974" | "20060164142" | "20060273804" | "4264903" | "4283713" | "4438404" | "4475151" | "4497575" | "4736097" | "4736191" | "4773024" | "4802103" | "4876534" | "4879461" | "4935702" | "4953928" | "4962342" | "5049758" | "5055827" | "5059920" | "5068622" | "5073759" | "5083044" | "5095284" | "5097305" | "5107149" | "5109261" | "5119038" | "5120996" | "5122800" | "5126685" | "5146106" | "5160899" | "5165054" | "5166562" | "5204549" | "5243554" | "5248873" | "5260592" | "5270963" | "5276407" | "5289023" | "5303329" | "5305017" | "5324958" | "5331215" | "5336936" | "5339213" | "5349303" |	US-PGPUB; USPAT; USOCR	AND	ON	2009/07/18 15:45

		"5374787" | "5381515" | "5384467" | "5408194" | "5488204" | "5495077" | "5541878" | "5543588" | "5543590" | "5543591" | "5555907" | "5565658" | "5566702" | "5629891" | "5648642" | "5682032" | "5730165" | "5757368" | "5763909" | "5767457" | "5796183" | "5812698" | "5841078" | "5844265" | "5854625" | "5861583" | "5861875" | "5864242" | "5864392" | "5880411" | "5889236" | "5914465" | "5914708" | "5920310" | "5926566" | "5942733" | "5943052" | "5969513" | "6023422" | "6028271" | "6028959" | "6097432" | "6148104").PN. OR ("6185450" | "6188228" | "6188391" | "6222528" | "6239389" | "6249447" | "6262717" | "6280391" | "6288707" | "6304014" | "6320184" | "6323846" | "6326859" | "6377009" | "6380929" | "6380931" | "6414671" | "6430305" | "6441073" | "6452514" | "6457355" | "6466036" | "6473069" | "6489899" | "6498720" | "6499359" | "6522128" | "6523416" | "6534970" | "6535200" | "6570557" | "6587093" | "6610936" | "6624640" | "6639586" | "6642857" | "6649924" | "6667740" | "6673308" | "6677932" | "6680731" | "6683462" | "6705511" | "6714817" | "6730863" | "6750852" | "6788221" | "6798218" | "6809275" | "6856433" | "6873203" | "6888538" | "6893724" | "6969978" | "6975123" | "7046230" | "7119550").PN.				
S20	1	2006/0097992	US-PGPUB; USPAT; USOCR	AND	ON	2009/07/18 16:19
S21	1	"20060097992"	US-PGPUB; USPAT; USOCR	AND	ON	2009/07/18 16:20

S22	12	345/173.ccls. and cypress. as.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:28
S23	3731	cypress.as.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:31
S24	0	"cypress.as. and" (Capacitive and sensor)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:33
S25	51	cypress.as. and (Capacitive and sensor)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:33
S26	1	cypress.as. and (Capacitive and sensor) and (touch near button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:34
S27	1167	(Capacitive and sensor) and (sensing near areas)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:47
S28	47	(Capacitive and sensor) and (sensing near areas) same buttons	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:48
S29	26	(touch near screen) and (Capacitive and sensor) and (sensing near areas) same buttons	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:49

S30	3	(touch near screen) and (Capacitive and sensor) and (sensing near areas) same sensing near buttons	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:57
S31	0	(touch near screen near buttons) and (Capacitive and sensor) and (sensing near areas) same sensing near buttons	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:57
S32	4	(touch near screen near buttons) and (Capacitive and sensor) and (sensing near areas)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:58
S33	2	"6947031"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 17:01
S34	89	"4476463"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 17:29
S35	106	"5565658"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 17:45
S36	212	"5730165"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 17:51
S37	162	"4736191"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:02

S38	90	"4680430"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:09
S39	0	345/4.ccls. and ((capacitance near sensor) same (vertual near button) same (pin))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:15
S40	0	345/4.ccls. and (capacitance near sensor)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:15
S41	0	"345"/$.ccls. and ((capacitance near sensor) same (vertual near button) same (pin))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:15
S42	369	"345"/$.ccls. and (capacitance near sensor)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:16
S43	162	"345"/$.ccls. and (capacitance near sensor) and (touch near screen)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:16
S44	32	"345"/$.ccls. and (capacitance near sensor) and (touch near screen) and multi$touch	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:17
S45	20	three near sensing near area	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:28

S46	8710	capacitance near sensor	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:29
S47	158	(electrically adj isolated) same (sensor near element)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:34
S48	0	S45 and S46 and S47	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:35
S49	24	S46 and S47	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:35
S50	307	(touch near sensor near button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:50
S51	60	S50 and S46	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:51
S52	0	(Multiple near sens$4 near area) and (button near operation) and (touch near screen)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 07:57
S53	2	(Multiple near sens$4 near area) and (touch near screen)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 07:58

S54	0	(Multiple near sens$4 near button$2) and (touch near screen) and (capacitance $2)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 08:04
S55	4	(Multiple near sens$4 near button$2) and (capacitance)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 08:05
S56	3	"20050133262"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 08:13
S57	2	"20080278453"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 08:22
S58	2	"20080246735"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 08:23
S59	4	"61000784"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 08:25
S60	1202	345/173.ccls. and capacitance	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 08:29
S61	613	345/174-179.ccls. and capacitance	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 11:09

S63	29	(touch near screen) and (Capacit$6 and sens$3) and (sensing near areas) same buttons	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 12:11
S64	2784	178/18.01-18.11.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 15:47
S65	439	178/18.01-18.11.ccls. and (touch near panel)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 15:48
S66	900	178/18.01-18.11.ccls. and (capacit$6 and sens$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 16:35
S67	30	178/18.01-18.11.ccls. and capacit$6 same sens$3 near (second or third)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 16:37
S68	33	(Capacit$6 and sens$3) and (sensing near areas) and (input near button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 17:23
S69	24064	(touch near screen or pad) and (capacit$6 and sens$3) and (button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 17:31
S70	90998	(touch near screen or pad) and (capacit$6 and sens$3) and (first or second and button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 17:32

S71	73385	(touch near screen or pad) and (capacit$6 and sens$3) and (first or second and button) and (sens$3 and area)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 17:33
S72	20303	(touch near screen or pad) and (capacit$6 and sens$3) and (button) and (sens$3 and area)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 17:33
S73	20303	(touch near screen or pad) and (capacit$6 and sens$3 and button) and (sens$3 and area)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 17:34
S74	2438	(touch near screen or pad) and (capacit$6 and sens$3 and button) and (sens$3 and area) and "345"/$.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 17:35
S76	1334	(touch near screen or pad) and (capacit$6 and sens$3 and button) and (sens$3 and area) and "345"/$.ccls. and portable	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 17:36
S77	61	345/173.ccls. and capacit $6 same sens$3 near (second or third)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/21 13:51
S78	560	345/173.ccls. and capacit $6 same sens$3 same (second or third)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/01/19 16:58
S79	396	(touch near screen or pad) same (capacit$6 and sens$3 and button) and (sens$3 and area) and "345"/$.ccls. and portable	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2010/01/19 16:58

S80	35	(touch near screen or pad) same (capacit$6 and sens$3 and button) same (sens$3 and area) and "345"/$.ccls. and portable	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2010/01/19 16:59
S81	567	(touch near (screen or pad)) same (capacit$6 and sens$3) same (button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/01/19 17:10
S82	504	(touch (screen or pad)) same (capacit$6 same sens$3) same (button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/01/19 17:11
S83	311	(touch (screen or pad)) same (capacit$6 sens$3) same (button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/01/19 17:11
S84	85	"345"/$.ccls. and (touch (screen or pad)) same (capacit$6 sens$3) same (button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/01/19 17:12
S85	42	"345"/173.ccls. and (touch (screen or pad)) same (capacit$6 sens$3) same (button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/07/30 12:03
S86	0	(Multiple near sens$4 near button$2) and (touch near screen) and (capacit$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2010/07/30 12:06
S87	2	"20080252608"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2011/01/10 10:30

S88	19	"7030860"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2011/01/11 09:34
S89	2	"20060097992"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2011/01/24 09:55
S90	0	("2008/0074398").URPN.	USPAT	ADJ	ON	2011/01/24 11:18
S93	339	(sens$4 near button$2) and (touch near screen) and (capacit$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2011/01/24 18:42
S94	93	(sens$4 near button$2) same (touch near screen) and (capacit$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2011/01/24 18:43
S95	38	(sens$4 near button$2) same (touch near screen) same (capacit$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2011/01/24 18:43

1/ 29/ 2011 8:04:24 PM
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PTO/SB/30EFS (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL
(Submitted Only via EFS-Web)

Application Number	11/437,517	Filing Date	2006-05-18	Docket Number (if applicable)	CD06039	Art Unit	2629
First Named Inventor	Jiang XiaoPing			Examiner Name	KETEMA, BENYAM		

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV

SUBMISSION REQUIRED UNDER 37 CFR 1.114

Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

☐ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on ____________

☐ Other ____________

☒ Enclosed

☐ Amendment/Reply

☒ Information Disclosure Statement (IDS)

☐ Affidavit(s)/ Declaration(s)

☐ Other ____________

MISCELLANEOUS

☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months ____________
(Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

☐ Other ____________

FEES

☒ **The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.**
The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No 503781

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature

☐ Applicant Signature

PTO/SB/30EFS (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Signature of Registered U.S. Patent Practitioner			
Signature	/Larry Johnson/	Date (YYYY-MM-DD)	2011-05-03
Name	Larry Johnson	Registration Number	56861

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

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6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	Examiner: KETEMA, BENYAM
Jiang XiaoPing	Group Art Unit: 2629
Application No.: 11/437,517	Confirmation No.: 2623
Filed: May 18, 2006	
For: **TWO-PIN BUTTONS**	

REQUEST FOR CONTINUED EXAMINATION AND INFORMATION DISCLOSURE STATEMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Applicant hereby submits the Request for Continued Examination to be considered with the IDS for the above referenced application. In compliance with the duty of disclosure under 37 CFR § 1.56 and in accordance with the practice under 37 CFR §§ 1.97 and 1.98, the Examiner's attention is directed to the documents listed on the enclosed PTO-1449.

In accordance with 37 CFR § 1.97(h), this Information Disclosure Statement is not to be construed as an admission that the information cited is or is considered to be material to patentability as defined in 37 CFR § 1.56(b), nor as an admission that the information constitutes prior art within the meaning of 35 USC §§ 102 and/or 103.

It is respectfully requested that the information listed on the PTO-1449 be considered by the Examiner, and that an initialed copy of the PTO-1449 be returned indicating that such information was considered.

Customer No.: 60909

The Commissioner is hereby authorized to charge any appropriate fees under 37 C.F.R. §§ 1.16, 1.17, 1.18, 1.20 and 1.21 that may be required to maintain pendency of the present application, and to credit any overpayments, to Deposit Account No. 50-3781.

Should the Patent Office have any questions regarding this submission or the application in general, the Patent Office is urged to contact the Applicant's attorney, Larry Johnson, by telephone at (408) 545-7194. All correspondence should continue to be directed to the address given below.

/

/

Respectfully submitted,

Date: 05/03/2011

By: /Larry Johnson/

Larry Johnson
Attorney for Applicant
Registration No. 56,861

Cypress Semiconductor Corporation
198 Champion Court
San Jose, CA 95134
Facsimile: (408) 545-6911
Customer No.: 60909

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	11437517
	Filing Date	2006-05-18
	First Named Inventor	Jiang XiaoPing
	Art Unit	2629
	Examiner Name	KETEMA, BENYAM
	Attorney Docket Number	CD06039

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	5237879	B1	1993-08-24	Speeter, Thomas H.	Entire Document

If you wish to add additional U.S. Patent citation information please click the Add button. Add

U.S.PATENT APPLICATION PUBLICATIONS Remove

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20070076897	A1	2007-04-05	Philipp, Harald	Entire Document

If you wish to add additional U.S. Published Application citation information please click the Add button. Add

FOREIGN PATENT DOCUMENTS Remove

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1							☐

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NON-PATENT LITERATURE DOCUMENTS Remove

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	11437517
	Filing Date	2006-05-18
	First Named Inventor	Jiang XiaoPing
	Art Unit	2629
	Examiner Name	KETEMA, BENYAM
	Attorney Docket Number	CD06039

	1	USPTO Final Rejection for Application Number 11/600,896 (CD06101) dated 09/30/10; 19 pages	☐
	2	USPTO Notice of Allowance for Application Number 11/484,085 (CD06043) dated 06/10/10; 4 pages	☐
	3	USPTO Final Rejection for Application Number 11/477,179 (CD06065) dated 11/24/10; 10 pages	☐
	4	USPTO Non-Final Rejection for Application Number 11/477,179 (CD06065) dated 07/20/10; 10 pages	☐
	5	USPTO Non-Final Rejection for Application Number 11/493,350 (CD06097) dated 11/09/10; 9 pages	☐
	6	USPTO Non-Final Rejection for Application Number 11/600,896 (CD06101) dated 05/14/10; 15 pages	☐

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EXAMINER SIGNATURE

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	11437517
	Filing Date	2006-05-18
	First Named Inventor	Jiang XiaoPing
	Art Unit	2629
	Examiner Name	KETEMA, BENYAM
	Attorney Docket Number	CD06039

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ None

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Larry Johnson/	Date (YYYY-MM-DD)	2011-05-03
Name/Print	Larry Johnson	Registration Number	56861

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	11437517
	Filing Date	2006-05-18
	First Named Inventor	Jiang XiaoPing
	Art Unit	2629
	Examiner Name	KETEMA, BENYAM
	Attorney Docket Number	CD06039

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code1	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	5541580	B1	1996-07-30	Gerston et al.	Entire Document
	2	4266144	B1	1981-05-05	Bristol, Robert G.	Entire Document
	3	4305135	B1	1981-12-08	Dahl et al.	Entire Document
	4	7078916	B1	2006-07-18	Denison, Timothy J.	Entire Document
	5	7359816	B1	2008-04-15	Kumar et al.	Entire Document
	6	7479788	B1	2009-01-20	Bolender et al.	Entire Document
	7	7098675	B1	2006-08-29	Inaba et al.	Entire Document
	8	4831325	B1	1989-05-16	Watson Jr., Charles W.	Entire Document

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	Examiner Name	KETEMA, BENYAM
	Attorney Docket Number	CD06039

	9	6583632	B1	2003-06-24	Von Basse et al.	Entire Document
	10	6946853	B1	2005-09-20	Gifford et al.	Entire Document
	11	7006078	B1	2006-02-28	Kim, Wonchan	Entire Document
	12	6184871	B1	2001-02-06	Teres et al.	Entire Document
	13	4113378	B1	1978-09-12	Wirtz, John Stanley	Entire Document
	14	6825673	B1	2004-11-30	Yamaoka, Shuji	Entire Document
	15	7598822	B1	2009-10-06	Rajagopal et al.	Entire Document
	16	6781577	B1	2004-08-24	Shigetaka, Hiroshi	Entire Document
	17	6145850	B1	2000-11-14	Rehm, Fritz	Entire Document
	18	6891531	B1	2005-05-10	Lin, Jaoching	Entire Document
	19	5373245	B1	1994-12-13	Vranish et al.	Entire Document

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	11437517
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	Art Unit	2629
	Examiner Name	KETEMA, BENYAM
	Attorney Docket Number	CD06039

	20	5214388	B1	1993-05-25	Vranish et al.	Entire Document
	21	7075316	B1	2006-07-11	Umeda et al.	Entire Document
	22	7068039	B1	2006-06-27	Parker, Kenneth P.	Entire Document
	23	6448911	B1	2002-09-10	Somajayula, Shyam S.	Entire Document
	24	5942733	B1	1999-08-24	Allen et al.	Entire Document

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	1	20060197750	A1	2006-09-07	Kerr et al.	Entire Document
	2	20030091220	A1	2003-05-15	Sato et al.	Entire Document
	3	20050031175	A1	2005-02-10	Hara et al.	Entire Document

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	1							☐

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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	USPTO Notice of Allowance for Application Number 11/395,417 (CD05044) dated 11/06/2008; 7 pages	☐
	2	USPTO Non-Final Rejection for Application Number 11/395,417 (CD05044) dated 04/25/2008; 7 pages	☐
	3	USPTO Non-Final Rejection for Application Number 11/395,417 (CD05044) dated 11/01/2007; 8 pages	☐
	4	USPTO Advisory Action for Application Number 11/395,417 (CD05044) dated 07/06/2007; 3 pages	☐
	5	USPTO Final Rejection for Application Number 11/395,417 (CD05044) dated 04/24/2007; 9 pages	☐
	6	USPTO Non-Final Rejection for Application Number 11/395,417 (CD05044) dated 10/26/2006; 13 pages	☐
	7	USPTO Non-Final Rejection for Application Number 12/367,279 (CD05044D) dated 10/29/2009; 8 pages	☐

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	11437517
	Filing Date	2006-05-18
	First Named Inventor	Jiang XiaoPing
	Art Unit	2629
	Examiner Name	KETEMA, BENYAM
	Attorney Docket Number	CD06039

	8	The Authoritative Dictionary of IEEE Standards Terms, 2000, IEEE Press Publications, 7th Edition, pp. 1133-1134; 4 pages	☐
	9	Mark Lee, " CapSense Best Practices," Cypress Semiconductor Application Note, 10/19/2006; 10 pages	☐

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EXAMINER SIGNATURE

Examiner Signature		Date Considered	

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[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

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	First Named Inventor	Jiang XiaoPing
	Art Unit	2629
	Examiner Name	KETEMA, BENYAM
	Attorney Docket Number	CD06039

CERTIFICATION STATEMENT

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OR

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☐ See attached certification statement.

☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ None

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Larry Johnson/	Date (YYYY-MM-DD)	2011-05-03
Name/Print	Larry Johnson	Registration Number	56861

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	11437517
	Filing Date	2006-05-18
	First Named Inventor	Jiang XiaoPing
	Art Unit	2629
	Examiner Name	KETEMA, BENYAM
	Attorney Docket Number	CD06039

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Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	6297811	B1	2001-10-02	Joel Kent	Entire Document
	2	6353200	B1	2002-03-05	Gerhard Schwankhart	Entire Document
	3	7382139	B1	2008-06-03	Bob Lee Mackey	Entire Document
	4	7548073	B1	2009-06-16	Bob Lee Mackey	Entire Document

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	1	20070247443	A1	2007-10-25	Harald Philipp	Entire Document
	2	20070257894	A1	2007-11-08	Harald Philipp	Entire Document

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[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

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CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

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☐ See attached certification statement.

☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ None

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Larry Johnson/	Date (YYYY-MM-DD)	2011-05-03
Name/Print	Larry Johnson	Registration Number	56861

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	First Named Inventor	Jiang XiaoPing
	Art Unit	2831
	Examiner Name	KETEMA, BENYAM
	Attorney Docket Number	CD06039

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Examiner Initial*	Cite No	Patent Number	Kind Code1	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	6377129	B1	2002-04-23	Rhee et al.	Entire Document
	2	6700392	B1	2004-03-02	Hasse, Wayne C.	Entire Document
	3	5323158	B1	1994-06-21	Paul F. Ferguson, Jr.	Entire Document

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	1	20080111714	A1	2008-05-15	Kremin, Viktor	Entire Document

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	1	USPTO Non-Final Rejection for Application Number 11/600,896 (CD06101) dated 01/26/2011; 12 pages	☐
	2	USPTO Notice of Allowance for Application Number 11/600,255 (CD06138) dated 07/27/2010; 6 pages	☐
	3	USPTO Non-Final Rejection for Application Number 11/600,255 (CD06138) dated 03/29/2010; 10 pages	☐

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Signature	/Larry Johnson/	Date (YYYY-MM-DD)	2011-05-03
Name/Print	Larry Johnson	Registration Number	56861

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	Filing Date	2006-05-18
	First Named Inventor	Jiang XiaoPing
	Art Unit	2629
	Examiner Name	KETEMA, BENYAM
	Attorney Docket Number	CD06039

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Examiner Initial*	Cite No	Patent Number	Kind Code1	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	7307485	B1	2007-12-11	Snyder et al.	Entire Document
	2	5670915	B1	1997-09-23	Cooper et al.	Entire Document
	3	6970126	B1	2005-11-29	O'Dowd et al.	Entire Document
	4	4825147	B1	1989-04-25	Cook et al.	Entire Document
	5	6366099	B1	2002-04-02	Reddi, M. Mahadeva	Entire Document
	6	4193063	B1	1980-03-11	Hitt et al.	Entire Document
	7	6577140	B1	2003-06-10	Wenman, Richard A.	Entire Document
	8	4586260	B1	1986-05-06	Baxter et al.	Entire Document

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	9	7253643	B1	2007-08-07	Seguine, Ryan D.	Entire Document
	10	7375535	B1	2008-05-20	Kutz et al.	Entire Document
	11	7381031	B1	2008-06-03	Kawaguchi et al.	Entire Document
	12	5386219	B1	1995-01-31	Greanias et al.	Entire Document
	13	4831325	B1	1989-05-16	Watson Jr.	Entire Document
	14	6583632	B1	2003-06-24	Von Basse et al.	Entire Document
	15	7006078	B1	2006-02-28	Kim, Wonchan	Entire Document
	16	7068039	B1	2006-06-27	Parker, Kenneth P.	Entire Document
	17	7075316	B1	2006-07-11	Umeda et al.	Entire Document
	18	6448911	B1	2002-09-10	Somayajula, Shyam S.	Entire Document
	19	7046230	B1	2006-05-16	Zadesky et al.	Entire Document

INFORMATION DISCLOSURE STATEMENT BY APPLICANT **(Not for submission under 37 CFR 1.99)**	Application Number: 11437517 Filing Date: 2006-05-18 First Named Inventor: Jiang XiaoPing Art Unit: 2629 Examiner Name: KETEMA, BENYAM Attorney Docket Number: CD06039

	20	4736191	B1	1988-04-05	Matzke et al.	Entire Document
	21	4264903	B1	1991-04-28	Bigelow, John E.	Entire Document
	22	7499040	B1	2009-03-03	Zadesky et al.	Entire Document
	23	6535200	B1	2003-03-18	Philipp, Harald	Entire Document
	24	6940291	B1	2005-09-06	Ozick, Daniel N.	Entire Document
	25	6806693	B1	2004-10-19	Bron, Ernest Armand	Entire Document
	26	6191723	B1	2001-02-20	Lewis, Jason D.	Entire Document
	27	6037929	B1	2000-03-14	Ogura et al.	Entire Document
	28	6838887	B1	2005-01-04	Denen et al.	Entire Document
	29	3979745	B1	1976-09-07	Bishop, Allen J.	Entire Document
	30	4238711	B1	1980-12-09	Wallot, George P.	Entire Document

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Attorney Docket Number	CD06039

	31	6882338	B1	2005-04-19	Flowers, Mark	Entire Document
	32	6490203	B1	2002-12-03	Tang, Yuan	Entire Document

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	1	20080036473	A1	2008-02-14	Jansson, Hakan	Entire Document
	2	20080179112	A1	2008-07-31	Qin et al.	Entire Document
	3	20070296709	A1	2007-12-27	GuangHai, Li	Entire Document
	4	20070268265	A1	2007-11-22	XiaoPing, Jiang	Entire Document
	5	20080024455	A1	2008-01-31	Lee et al.	Entire Document
	6	20040217945	A1	2004-11-04	Miyamoto et al.	Entire Document
	7	20080007534	A1	2008-01-10	Peng et al.	Entire Document

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	8	20060262101	A1	2006-11-23	Layton et al.	Entire Document
	9	20060232559	A1	2006-10-19	Chien et al.	Entire Document
	10	20040178989	A1	2004-09-16	Shahoian et al.	Entire Document
	11	20050159126	A1	2005-07-21	Wang, Chung-Hsiung	Entire Document

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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	GB05/000604	GB	B2	2005-02-18	Pelikon	Entire Document	☐
	2	EP0574213	EP	A2	1993-12-15	Miller et al. (Synaptics, Inc.)	Entire Document	☐

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	1	USPTO Notice of Allowance for Application Number 11/273,708 (CD05141) dated 08/09/2007; 4 pages	☐

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	Attorney Docket Number	CD06039

	2	USPTO Final Rejection for Application Number 11/273,708 (CD05141) dated 07/05/2007; 8 pages	☐
	3	USPTO Non-Final Rejection for Application Number 11/273,708 (CD05141) dated 03/19/2007; 16 pages	☐
	4	USPTO Final Rejection for Application Number 11/502,267 (CD06038) dated 02/03/2009; 10 pages	☐
	5	USPTO Non-Final Rejection for Application Number 11/502,267 (CD06038) dated 08/11/2008; 10 pages	☐
	6	USPTO Non-Final Rejection for Application Number 11/600,896 (CD06101) dated 12/16/2009; 13 pages	☐
	7	USPTO Notice of Allowance for Application Number 11/230,719 (CD05060) dated 01/16/2008; 4 pages	☐
	8	USPTO Advisory Action for Application Number 11/230,719 (CD05060) dated 11/30/2007; 3 pages	☐
	9	USPTO Final Rejection for Application Number 11/230,719 (CD05060) dated 09/07/2007; 9 pages	☐
	10	USPTO Non-Final Rejection for Application Number 11/230,719 (CD05060) dated 05/25/2007; 6 pages	☐
	11	USPTO Non-Final Rejection for Application Number 11/230,719 (CD05060) dated 01/16/2007; 8 pages	☐
	12	USPTO Non-Final Rejection for Application Number 11/230,719 (CD05060) dated 08/28/2006; 7 pages	☐

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	13	USPTO Non-Final Rejection for Application Number 11/230,719 (CD05060) dated 05/11/2006; 5 pages	☐
	14	USPTO Non-Final Rejection for Application Number 11/484,085 (CD06043) dated 09/17/2009; 8 pages	☐
	15	USPTO Final Rejection for Application Number 11/484,085 (CD06043) dated 03/16/2010; 7 pages	☐
	16	USPTO Final Rejection for Application Number 11/477,179 (CD06065) dated 04/01/2010; 10 pages	☐
	17	USPTO Non-Final Rejection for Application Number 11/477,179 (CD06065) dated 11/18/2009; 10 pages	☐
	18	USPTO Non-Final Rejection for Application Number 11/477,179 (CD06065) dated 06/09/2009; 13 pages	☐
	19	Application Number 11/493,350 (CD06097): "Technique for Increasing the Sensitivity of Capacitive Sensor Arrays," Lee et al., filed on 07/25/2006; 48 pages	☐
	20	USPTO Notice of Allowance for Application Number 11/489,944 (CD06099) dated 04/09/2007; 7 pages	☐
	21	USPTO Non-Final Rejection for Application Number 11/700,314 (CD06163) dated 03/26/2010; 7 pages	☐
	22	"The Virtual Keyboard: I-Tech Bluetooth/Serial Virtual Laser Keyboard Available Now!" The Virtual Laser Keyboard (VKB) Online Worldwide Shop, <http://www.virtual-laser-keyboard.com> downloaded 4/13/2006; 4 pages	☐
	23	Wikipedia, The Free Encyclopedia, "IBM PC Keyboard," <http://en.wikipedia.org/wiki/PC_keyboard> accessed 5/19/2006; 3 pages	☐

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		11437517
	Filing Date		2006-05-18
	First Named Inventor	Jiang XiaoPing	
	Art Unit		2629
	Examiner Name	KETEMA, BENYAM	
	Attorney Docket Number		CD06039

	24	USPTO Non-Final Rejection for Application Number 11/600,896 (CD06101) dated 05/14/2010; 15 pages	☐

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☐ See attached certification statement.

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SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Larry Johnson/	Date (YYYY-MM-DD)	2011-05-03
Name/Print	Larry Johnson	Registration Number	56861

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	Attorney Docket Number	CD06039

U.S.PATENTS

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	6888536	B1	2005-05-03	Westerman et al.	Entire Document
	2	6914547	B1	2005-07-05	Swaroop et al.	Entire Document
	3	6933873	B1	2005-08-23	Horsley et al.	Entire Document
	4	6958594	B1	2005-10-25	Redl et al.	Entire Document
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	1	USPTO Notice of Allowance for Application Number 11/489,944 (CD06099) dated 05/24/2007; 2 pages	☐
	2	USPTO Notice of Allowance for Application Number 11/489,944 (CD06099) dated 04/09/2007; 7 pages	☐

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International application number: PCT/GB05/000604

International filing date: 18 February 2005 (18.02.2005)

Document type: Certified copy of priority document

Document details: Country/Office: GB
Number: 0403853.5
Filing date: 20 February 2004 (20.02.2004)

Date of receipt at the International Bureau: 01 April 2005 (01.04.2005)

Remark: Priority document submitted or transmitted to the International Bureau in compliance with Rule 17.1(a) or (b)

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1/77

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(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)

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20 FEB 2004

The Patent Office
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23FEB04 E875085-1 000027
P01/7700 0.00-0403853.5 NONE
20 FEB 2004

1.	Your reference	31232/83613
2.	Patent application number *(The Patent Office will fill in this part)*	0403853.5
3.	Full name, address and postcode of the or of each applicant *(underline all surnames)*	Pelikon Limited Trecenydd Business Park Caerphilly Wales CF83 2RZ 8337792002
	Patents ADP number *(if you know it)*	
	If the applicant is a corporate body, give country/state of its incorporation	United Kingdom
4.	Title of the invention	Improved Displays
5.	Name of your agent *(if you have one)*	Frank B. Dehn & Co.
	"Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)*	179 Queen Victoria Street London EC4V 4EL
	Patents ADP number *(if you know it)*	166001 ✓
6.	Priority: Complete this section if you are declaring priority from one or more earlier patent applications, filed in the last 12 months	Country / Priority application number *(if you know it)* / Date of filing *(day / month / year)*
7.	Divisionals, etc: Complete this section only if this application is a divisional application or resulted from an entitlement dispute *(see note f)*	Number of earlier UK application / Date of filing *(day / month / year)*
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Continuation sheets of this form	
Description	10
Claim(*s*)	
Abstract	
Drawing(*s*)	2

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11. I/We request the grant of a patent on the basis of this application.

Signature Date 20 February 2004

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83613.902

Improved displays

This invention is concerned with improved displays, and relates in particular to devices with displays that are activated by the mere presence of a User of the device. More specifically still, the invention is concerned with displays, such as electroluminescent displays, that are most preferably switched off, to conserve power, when not in use, and employ capacitance sensing means to detect a nearby User and so enable activation ready for use.

Certain materials are electroluminescent - that is, they emit light, and so glow, when an electric field is generated across them. The first known electroluminescent materials were inorganic particulate substances such as zinc sulphide, while more recently-found electroluminescent materials include a number of small-molecule organic emitters known as organic LEDs (OLEDs) and some plastics - synthetic organic polymeric substances - known as light-emitting polymers (LEPs). Inorganic particulates, in a doped and encapsulated form, are still in use, particularly when mixed into a binder and applied to a substrate surface as a relatively thick layer; LEPs can be used both as particulate materials in a binder matrix or, with some advantages, on their own as a relatively thin continuous film.

This electroluminescent effect has been used in the construction of displays. In some types of these a large area of an electroluminescent material - generally referred to in this context as a phosphor - is provided to form a backlight which can be seen through a mask that defines whatever characters the display is to show. In other types there are instead individual small areas of EL material. These displays have many applications; examples are a simple digital time and date display (to be used in a watch or clock), a mobile phone display, the control panel of a household device (such as a dishwasher or washing machine), and a hand-holdable remote controller (for a television, video or DVD player, a digibox, or a stereo or music centre).

A problem with electroluminescent displays is that they are rather profligate with power; another is that they have a relatively short life - possibly as little as 1000 hours. Accordingly, when they are used the device of which they are a part is normally arranged to turn the display off when it is not required. This means, of course, that when their use *is* required they must first be activated, or turned on, and while it is perfectly possible for the User him- or herself manually to achieve this it would be advantageous were the display to be turned on automatically. It is this, the automatic activation of the display, that the present invention seeks to facilitate. And in order to attain this end the invention proposes that the display - or, rather, the controlling circuitry with which the display is associated - be able to use capacitance effects to determine the near presence of the User, and specifically of the User's hand as the device is picked up, and to utilise this to effect activation of the display.

In one aspect, therefore, this invention provides a display of the type having both an activated, "on", state and an inactivated, "off", state, and being switchable between the two, which display incorporates a capacitance sensor, able to detect the near presence of a User, together with means able to utilise the output of this sensor to effect activation of the display accordingly.

The display can be of any sort, and used with any variety of device. It could, for instance, be a light-emitting diode (LED) display, or it could be a backlit liquid crystal display (an LCD) or even a thin film transistor (TFT) display as used in computer screens. However, the invention is of particular value when applied to displays using electroluminescent materials to provide the light output, which displays need to be switched off when not in use in order to conserve power and extend their useful working life. A typical such electroluminescent display is that employed in a remote (hand-held) controller for, say, a television.

In the invention the display - by which term is here meant the combination of the actual display together with its controlling circuitry - incorporates a capacitance sensor, able to detect the near presence of a User. In this context a capacitance sensor is, in effect, little more than a pair of spaced electrodes plus suitable electronics able to measure the capacitance of the pair and to output some sort of signal in dependence thereon. The pair's capacitance is determined by the size of the electrodes, by the distance between them, and by the electrical nature of the medium between them; a near body, particularly such a body at earth/ground potential (such as the User's hand), will strongly affect the latter, and the resulting change in capacitance, and relevant output signal, can be sufficient to allow its use for switching the display, as required.

Where the capacitance sensor does indeed utilise a pair of electrodes, then these can be positioned anywhere suitable relative to the display. Where the display of the device in question is an electroluminescent display, and such a display has, as is usual, a front electrode for activating the display's light-emitting areas, then one electrode of the pair is most conveniently that front electrode, the other being either the case of the device or one of the power terminals of the circuit driving and controlling the device and its display. The ground (earth) terminal is a preferred choice, particularly if the case is grounded, as - in a hand-held device such as a remote controller, for example - this will couple to the User holding the device better than other parts of the system. The use of the front electrode of the display removes the need to add extra electrodes to the system specifically for the purpose of capacitance sensing; however, if preferred an extra electrode can be added specifically for the purpose of making the capacitance measurement.

For displays which operate with the front electrode at a high voltage, some protection - a suitable diode, for instance - can be added to safeguard the sensor electronics therefrom when the display is operating.

The invention employs a capacitance sensor able to detect the near presence of a User. More specifically, the sensor detects a change in the capacitance of a pair of spaced electrodes that is effected when a User either picks up the device of which the display is a part and/or touches the display panel. The capacitance may either increase or decrease, depending on the design of the device in question, and the electrodes between which the capacitance is measured. In an example discussed in more detail hereinafter, the capacitance increases.

The display of the invention incorporates a capacitance sensor together with means able to utilise the output of this sensor to effect activation of the display accordingly. In general, the manner in which the sensor's output is used to effect display activation may be any that is convenient. However, one particular method involves measuring the time taken to charge the capacitance to a specific value (a threshold value; this threshold level could be the threshold level of an input into a microcontroller, a comparator or any other suitable device). Clearly, the bigger the capacitance the longer it takes, and by frequently discharging and then charging the capacitance, and comparing the charging times, so there can quite simply be determined when - as by picking up the device - a User has come near to the display.

To explain this in more detail the invention is now described as the measurement of a test capacitance between the front electrode of a display device and the ground point of the device. As noted, the system for measuring the test capacitance involves charging the test capacitance under the control of a microprocessor, and making a measurement of the time taken for the voltage on the test capacitance to reach a threshold level.

For battery powered applications it is preferable to minimise the power consumption of the capacitance measurement system in order to maximise battery life. As the test capacitance will be very small, it will not require a large amount of charge to reach the threshold voltage, so this is not an important consideration in reducing power consumption (indeed, the power consumption of the microcontroller device used to control the capacitance measurement in the period over which the measurement is made will usually be greater than the power consumed in charging the capacitance!). The critical issue is to make the measurement as quickly as possible, and therefore reduce power consumption, while also making an accurate measurement which can distinguish small changes in the test capacitance. In order to achieve this, a system of two or more charge rates may be used. By way of example, a system using two charge rates - the dual ramp system - is described here.

The test capacitance is first charged at a high rate for a fixed period of time chosen so as rapidly to charge the capacitance to a voltage close to the threshold voltage in a very short time (within, for example, 1 to 50 microseconds). The capacitance is then charged at a significantly lower rate until the required threshold voltage is reached (the rate of the slow ramp determines the variation in capacitance which can be distinguished by timing of the slow ramp). The time taken for the slow ramp charge period thus to charge the capacitance gives a measurement of the size of the capacitance.

The microcontroller filters the time taken for the slow ramp to charge the capacitance to the threshold voltage, taking the average of a number of measurements in order to reduce noise. A large change in the slow ramp time, i.e. a change that is larger than the usual level of random noise in the capacitance measurement, will indicate a change in the test capacitance due to the presence of a User's hand or the like, and cause the microcontroller to activate the device. If the test capacitance increases, then the time for the slow ramp will increase, and if the test capacitance decreases then the slow ramp time will decrease.

In order to minimise the time for the test, and therefore to minimise power consumption, the time period for the fast ramp is adjusted by feedback from the slow ramp time. If the slow ramp time takes longer than a predetermined time, then the fast ramp time is increased by one time quantisation. This reduces the time the microprocessor is running for, and therefore reduces power consumption.

If the voltage threshold is reached on the test capacitance before the fast ramp has finished then the time period for the fast ramp needs to be decreased in order to bring the trigger point into the slow ramp period.

In summary, then, the invention relates to devices incorporating displays, particularly electroluminescent displays, which are able to sense when they have been picked up or touched by a User, this functionality enabling the display panel of the device only to be active when the device is required by the User. Application of the invention preferably involves apparatus for making a measurement of the capacitance between two electrodes, particularly in a way such that power consumption is minimised (for battery-powered devices, in particular). The two electrodes used can be, for example, the front electrode of the display and either the case of the device or one of the power terminals of the device circuitry (the ground (earth) terminal is preferred for this, as this will couple to the User holding the device better than will other parts of the system). The electrode capacitance will be affected when a User either picks up the device and/or touches its display panel (the capacitance may either increase or decrease, depending on the design of the device in question, and the electrodes between which the capacitance is measured). If possible, the use of the front electrode of the display removes the need to add extra electrodes to the system specifically for the purpose of capacitance sensing, though of course an extra electrode can be added if desirable.

An embodiment of the invention is now described, though by way of illustration only, with reference to the accompanying diagrammatic Drawings in which:

<u>Figure 1</u> shows, mostly in block form, a circuit diagram of a display system using a capacitance sensing system according to the invention;

Figure 2 shows a graph representing the voltage in the sensing system of Figure 1 on the test capacitance against time; and

Figure 3 shows a flow chart showing the flow of system operation for the sensing circuit of Figure 1.

Figure 1 shows a circuit diagram of a display system using a capacitance sensing system according to the invention. The diagram indicates the test capacitance (TC) to be measured, two resistors (R_1, R_2) for charging the test capacitance, a protection diode (D_1), a transistor (Q_1) for discharging the test capacitance (with a resistor [R_3] for controlling the discharge current), the input (I) for testing for the threshold voltage, a microcontroller (CPU) for processing measurements, and the display (D) to be activated when a User is detected. The front electrode (FE) of the display is labelled for the case when it is used as one of the electrodes.

Figure 2 shows a graph representing the voltage in the sensing system of Figure 1 on the test capacitance against time, while Figure 3 is a flow chart showing the flow of system operation for the sensing circuit. The operation of the sensing system is now explained.

The test capacitance TC - here the capacitance between the display's front electrode FE and Ground/earth - is first charged through a resistance R_1 (typically 100 kOhms) for a fixed period of time. This time period (T_{fast}) is chosen so as to charge the test capacitance TC to a voltage close to the threshold voltage $V_{threshold}$ within a short period of time (typically between 1 and 50 micro seconds). The test capacitance TC is then charged at a slower rate through a larger resistance R_2 (typically 5 MOhms), until the required threshold voltage is reached.

The time (T_{slow}) taken for the slow ramp charge period to charge the test capacitance to the threshold voltage as measured at input I gives a measurement of the capacitance of the test capacitance. The rate of the slow ramp determines the variation in capacitance which can be distinguished by timing of the slow ramp.

The microcontroller CPU filters the time T_{slow} taken for the slow ramp to charge the test capacitance to the threshold voltage. This is done by taking the average of a number of measurements in order to reduce noise. A large change in the slow ramp time - i.e. a change that is larger than the usual level of random noise in the capacitance measurement - indicates a change in the test capacitance TC due to the presence of a human hand or the like (not shown), and causes the microcontroller to activate the device (the display D of which the sensing system forms a part). If the test capacitance TC increases, then the time T_{slow} for the slow ramp will increase, and if the test capacitance decreases then the slow ramp time will decrease.

In order to minimise the time for the test, and therefore also to minimise power consumption, the time period T_{fast} for the fast ramp is adjusted by feedback from the slow ramp time T_{slow}. If the slow ramp time takes longer than a predetermined time, then the fast ramp time is increased by one time quantisation in order to reduce the time the microprocessor is running for, and therefore to reduce power consumption.

If the voltage threshold $V_{threshold}$ is reached on the test capacitance before the fast ramp has finished, then the time period T_{fast} for the fast ramp needs to be decreased in order to bring the trigger point into the slow ramp period.

After a measurement has been made, a transistor (Q_1) is used to pull all of the charge out of the test capacitance in order to ensure it is fully discharged before the next measurement is made. Resistor R_3 controls the current used in this discharge. Diode D_1 is included to protect the microcontroller from the high voltages present on the front electrode FE when the display D is in operation.

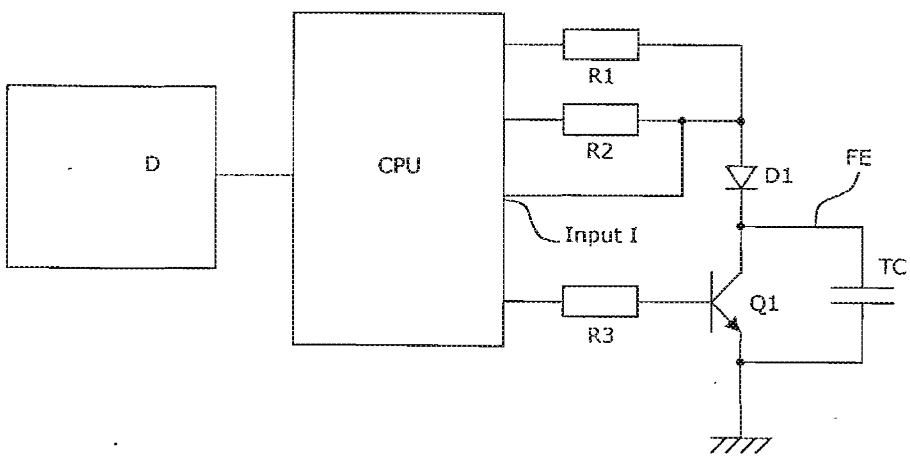

Fig 1

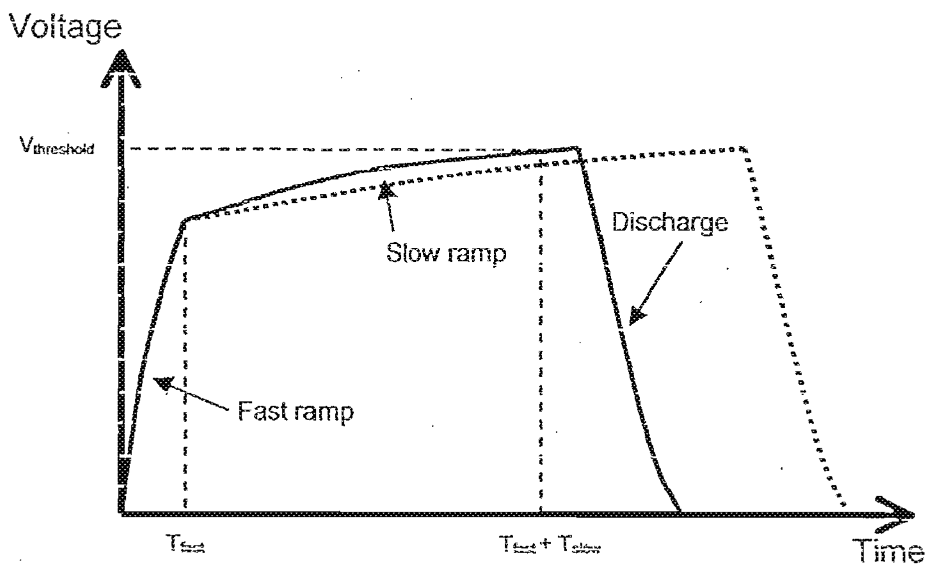
Voltage
Vthreshold
Slow ramp
Discharge
Fast ramp
Time

Fig 2

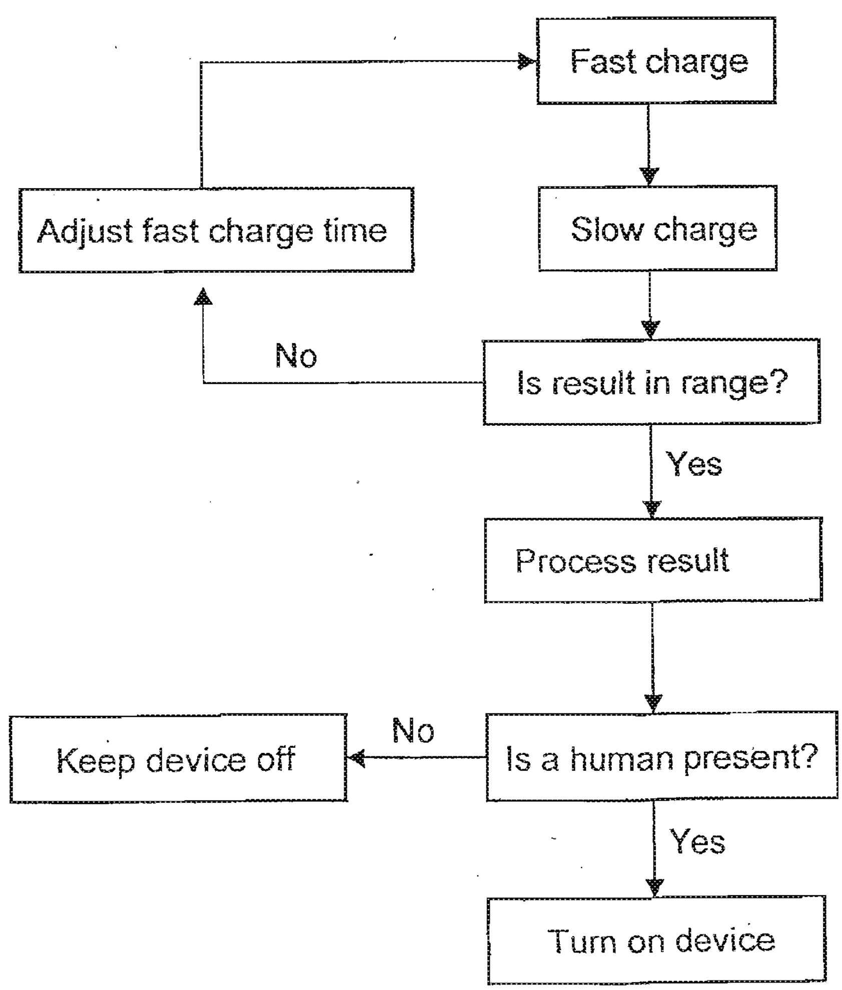
Fast charge
Adjust fast charge time
Slow charge
No
Is result in range?
Yes
Process result
Keep device off
No
Is a human present?
Yes
Turn on device

Fig 3

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(54) **Object position detector.**

(57) A proximity sensor system includes a sensor matrix array having a characteristic capacitance between horizontal and vertical conductors connected to sensor pads. The capacitance changes as a function of the proximity of an object or objects to the sensor matrix. The change in capacitance of each node in both the X and Y directions of the matrix due to the approach of an object is converted to a set of voltages in the X and Y directions. These voltages are processed by analog circuitry to develop electrical signals representative of the centroid of the profile of the object, i.e., its position in the X and Y dimensions. The profile of position may also be integrated to provide Z-axis (pressure) information.

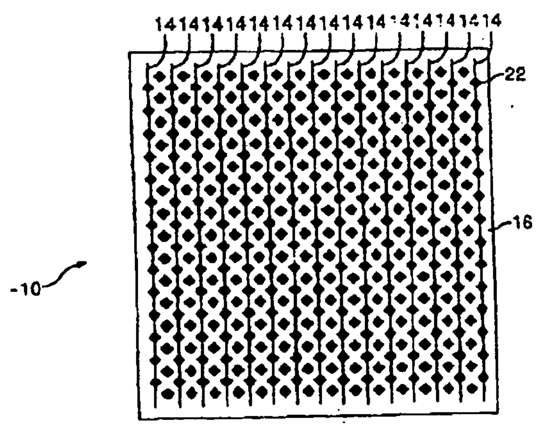

FIG. 1a

EP 0 574 213 A1

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BACKGROUND OF THE INVENTION

1. Field Of The Invention

The present invention relates to object position sensing transducers and systems. More particularly, the present invention relates to object position sensors useful in applications such as cursor movement for computing devices and other applications.

2. The Prior Art

Numerous devices are available or have been proposed for use as object position detectors for use in computer systems and other applications. The most familiar of such devices is the computer "mouse". While extremely popular as a position indicating device, a mouse has mechanical parts and requires a surface upon which to roll its position ball. Furthermore, a mouse usually needs to be moved over long distances for reasonable resolution. Finally, a mouse requires the user to lift a hand from the keyboard to make the cursor movement, thereby upsetting the prime purpose, which is usually typing on the computer.

Trackball devices are similar to mouse devices. A major difference, however is that, unlike a mouse device, a trackball device does not require a surface across which it must be rolled. Trackball devices are still expensive, have moving parts, and require a relatively heavy touch as do the mouse devices. They are also large in size and doe not fit well in a volume sensitive application like a laptop computer.

There are several available touch-sense technologies which may be employed for use as a position indicator. Resistive-membrane position sensors are known and used in several applications. However, they generally suffer from poor resolution, the sensor surface is exposed to the user and is thus subject to wear. In addition, resistive-membrane touch sensors are relatively expensive. A one-surface approach requires a user to be grounded to the sensor for reliable operation. This cannot be guaranteed in portable computers. An example of a one-surface approach is the UnMouse product by MicroTouch, of Wilmington, MAAtwo-surface approach has poorer resolution and potentially will wear out very quickly in time.

Surface Acoustic Wave (SAW) devices have potential use as position indicators. However, this sensor technology is expensive and is not sensitive to light touch. In addition, SAW devices are sensitive to residue buildup on the touch surfaces and generally have poor resolution.

Strain gauge or pressure plate approaches are an interesting position sensing technology, but suffer from several drawbacks. This approach may employ piezo-electric transducers. One drawback is that the piezo phenomena is an AC phenomena and may be sensitive to the user's rate of movement. In addition, strain gauge or pressure plate approaches are a somewhat expensive because special sensors are required.

Optical approaches are also possible but are somewhat limited for several reasons. All would require light generation which will require external components and increase cost and power drain. For example, a "finger-breaking" infra-red matrix position detector consumes high power and suffers from relatively poor resolution.

BRIEF DESCRIPTION OF THE INVENTION

The present invention comprises a position-sensing technology particularly useful for applications where finger position information is needed, such as in computer "mouse" or trackball environments. However the position-sensing technology of the present invention has much more general application than a computer mouse, because its sensor can detect and report if one or more points are being touched. In addition, the detector can sensa the pressure of the touch.

There are at least two distinct embodiments of the present invention. Both embodiments of the present invention include a sensor comprising a plurality of spaced apart generally parallel conductive lines disposed on a first surface.

According to a first embodiment of the present invention, referred to herein as a "finger pointer" embodiment, a position sensing system includes a position sensing transducer comprising a touch-sensitive surface disposed on a substrate, such as a printed circuit board, including a matrix of conductive lines. A first set of conductive lines runs in a first direction and is insulated from a second set of conductive lines running in a second direction generally perpendicular to the first direction. An insulating layer is disposed over the first and second sets of conductive lines. The insulating layer is thin enough to promote significant capacitive coupling between a finger placed on its surface and the first and second sets of conductive lines.

Sensing electronics respond to the proximity of a finger to translate the capacitance changes between the conductors caused by finger proximity into position and touch pressure information. Its output is a simple X, Y and pressure value of the one object on its surface. The matrix of conductive lines are successively scanned, one at a time, with the capacitive information from that scan indicating how close a finger is to that node. That information provides a profile of the proximity of the finger to the sensor in each dimension. The centroid of the profile is computed with that value being the position of the finger in that dimension. The profile of position is also integrated with that result providing the Z (pressure) information. The position sensor of the first embodiment of the invention can only detect the position of one object on its sensor surface. If more than one object is present, the position sensor of this embodiment tries to compute the centroid position of the combined set of objects.

According to a second embodiment of the present invention, a position sensing system includes a position sensing transducer as described herein. Sensing electronics respond to the.proximity of a finger to translate the capacitance changes between the conductors running in one direction and those running in the other direction caused by finger proximity into position and touch pressure information. The sensing electronics of the second embodiment of the invention saves information for every node in its sensor matrix and can thereby give the full X/Y dimension picture of what it is sensing. It thus has much broader application for richer multi-dimensional sensing than does the first "finger pointer' embodiment. In this embodiment, referred to herein as the "position matrix" approach, the x,y coordinate information can be used as input to a on-chip neural network processor. This allows an operator to use multiple fingers, coordinated gestures, etc. for even more complex interactions.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1a is a top view of an object position sensor transducer according to a presently preferred embodiment of the invention showing the object position sensor surface layer including a top conductive trace layer and conductive pads connected to a bottom trace layer.

FIG. 1b is a bottom view of the object position sensor transducer of FIG. 1a showing the bottom conductive trace layer.

FIG. 1c is a composite view of the object position sensor transducer of FIGS. 1a and 1b showing both the top and bottom conductive trace layers.

FIG. 1d is a cross-sectional view of the object position sensor transducer of FIGS. 1a-1c.

FIG. 2 is a block diagram of sensor decoding electronics which may be used with the sensor transducer in accordance with a first embodiment of the present invention.

FIGS. 3a and 3b are graphs of output voltage versus matrix conductor position which illustrate the effect of the minimum detector.

FIG. 4 is a simplified schematic diagram of an integrating charge amplifier circuit suitable for use in the present invention.

FIG. 5 is a timing diagram showing the relative timing of control signals used to operate the object position sensor system of the present invention with an integrating charge amplifier as shown in FIG. 4.

FIG. 6a is a schematic diagram of a first alternate embodiment of an integrating charge amplifier circuit suitable for use in the present invention including additional components to bring the circuit to equilibrium prior to integration measurement.

FIG. 6b is a timing diagram showing the control and timing signals used to drive the integrating charge amplifier of FIG. 6a and the response of various nodes in the amplifier to those signals.

FIG. 7a is a schematic diagram of a second alternate embodiment of an integrating charge amplifier circuit suitable for use in the present invention including additional components to bring the circuit to equilibrium prior to integration measurement.

FIG. 7b is a timing diagram showing the control and timing signals used to drive the integrating charge amplifier of FIG. 7a and the response of various nodes in the amplifier to those signals.

FIG. 8 is a schematic diagram of a minimum detector circuit according to a presently preferred embodiment of the invention.

FIG. 9 is a schematic diagram of a maximum detector circuit according to a presently preferred embodiment of the invention.

FIG. 10 is a schematic diagram of a linear voltage-to-current converter circuit according to a presently preferred embodiment of the invention.

FIG. 11 is a schematic diagram of a position encoder centroid computing circuit according to a presently preferred embodiment of the invention.

FIG. 12 is a schematic diagram of a Z Sum circuit according to a presently preferred embodiment of the invention.

FIG. 13 is a schematic diagram of a multiplier circuit according to a presently preferred embodiment of the invention.

FIG. 14 is a schematic diagram of a combination driving-point impedance circuit and receiving-point impedance circuit according to a presently preferred position matrix embodiment of the invention.

FIG. 15 is a block diagram of a the structure of a portion of a sample/hold array suitable for use in the present invention.

FIG. 16a is a block diagram of a simple version of a position matrix embodiment of the present invention in which the matrix of voltage information is sent to a computer which processes the data.

FIG. 16b is a block diagram of a second version of a position matrix embodiment of the present invention employing a sample/hold array such as that depicted in FIG. 15.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

Those of ordinary skill in the art will realize that the following description of the present invention is illustrative only and not in any way limiting. Other embodiments of the invention will readily suggest themselves to such skilled persons.

The present invention brings together in combination a number of unique features which allow for new applications not before possible. Because the object position sensor of the present invention has very low power requirements, it is beneficial for use in battery operated or low power applications such as lap top or portable computers. It is also a very low cost solution, has no moving parts (and is therefore virtually maintenance free), and uses the existing printed circuit board traces for sensors. The sensing technology of the present invention can be integrated into a computer motherboard to even further lower its cost in computer applications. Similarly, in other applications the sensor can be part of an already existent circuit board.

Because of its small size and low profile, the sensor technology of the present invention is useful in lap top or portable applications where volume is important consideration. The sensor technology of the present invention requires circuit board space for only a single sensor interface chip that can interface directly to a microprocessor, plus the area needed on the printed circuit board for sensing.

The sensor material can be anything that allows creation of a conductive X/Y matrix of pads. This includes not only standard PC board, but also flexible PC board, conductive elastomer materials, and piezoelectric Kynar plastic materials. This renders it useful as well in any portable equipment application or in human interface where the sensor needs to be molded to fit within the hand.

The sensor can be conformed to any three dimensional surface. Copper can be plated in two layers on most any surface contour producing the sensor. This will allow the sensor to be adapted to the best ergonomic form needed for a application. This coupled with the "light-touch" feature will make it effortless to use in many applications. The sensor can also be used in an indirect manner, i.e it can have a conductive foam over the surface and be used to detect any object (not just conductive) that presses against it's surface.

Small sensor areas are practical, i.e., a presently conceived embodiment takes about 1.5"x 1.5" of area, however those of ordinary skill in the art will recognize that the area is scalable for different applications. The matrix area is scaleable by either varying the matrix trace spacing or by varying the number of traces. Large sensor areas are practical where more information is needed.

Besides simple X and Y position information, the sensor technology of the present invention also provides finger pressure information. This additional dimension of information may be used by programs to control special features such as "brush-width" modes in Paint programs, special menu accesses, etc., allowing provision of a more natural sensory input to computers.

The user will not even have to touch the surface to generate the minimum reaction. This feature can greatly minimize user strain and allow for more flexible use.

The sense system of the present invention depends on a transducer device capable of providing position and pressure information regarding the object contacting the transducer. Referring first to FIGS. 1a-1d, top, bottom, composite, and cross-sectional views, respectively, are shown of a presently-preferred touch sensor array for use in the present invention. Since capacitance is exploited by this embodiment of the present invention, the sensor surface is designed to maximize the capacitive coupling between top (X) trace pads to the bottom (Y) trace pads in a way that can be maximally perturbed and coupled to a finger or other object placed above the surface.

A presently preferred sensor array 10 according to the present invention comprises a substrate 12 including a set of first conductive traces 14 disposed on a top surface 16 thereof and run in a first direction to comprise rows of the array. A second set of conductive traces 18 are disposed on a bottom surface 20 thereof and run in a second direction preferably orthogonal to the first direction to form the columns of the array. The top and bottom conductive traces 14 and 18 are alternately in contact with periodic sense pads 22 comprising enlarged areas, shown as diamonds in FIGS. 1a-1c. While sense pads 22 are shown as diamonds in FIGS. 1a-1c, any shape, such as circles, which allows close packing of the sense pads, is equivalent for purposes of this invention.

The number and spacing of these sense pads 22 depends upon the resolution desired. For example, in an actual embodiment constructed according to the principles of the present invention, a 0.10 inch center-to-center diamond-shaped pattern of conductive pads disposed along a matrix of 15 rows and 15 columns of conductors is employed. Every other sense pad 22 in each direction in the pad pattern is connected to conductive traces on the top and bottom surfaces 16 and 20, respectively of substrate 12.

Substrate 12 may be a printed circuit board, a flexible circuit board or any of a number of available circuit interconnect technology structures. Its thickness is unimportant as long as contact may be made therethrough from the bottom conductive traces 18 to their sense pads 22 on the top surface 16. The printed circuit board comprising substrate 12 can be constructed using standard industry techniques. Board thickness is not important. Pad-to-pad spacing should preferably be minimized to something in the range of about 15 mils or less. Connections from the conductive pads 22 to the bottom traces 18 may be made employing standard plated-through hole techniques well known in the printed circuit board art.

An insulating layer 24 is disposed over the sense pads 22 on top surface 16 to insulate a human finger or other object therefrom. Insulating layer 24 is preferably a thin layer (i.e., approximately 5 mils) to keep capacitive coupling large and may comprise a material, such as mylar, chosen for its protective and ergonomic characteristics.

There are two different capacitive effects taking place when a finger approaches the sensor array 10. The first capacitive effect is trans-capacitance, or coupling between sense pads 22, and the second capacitive effect is self-capacitance (ground capacitance), or coupling to earth-ground. Sensing circuitry is coupled to the sensor array 10 of the present invention and responds to changes in either or both of these capacitances, This is important because the relative sizes of the two capacitances change greatly depending on the user environment. The ability of the present invention to detect changes in both self capacitance and trans-capacitance results in a very versatile system having a wide range of applications.

According to a first embodiment of the invention, a position sensor system including sensor array 10 and associated touch detector circuitry will detect a finger position on a matrix of printed circuit board traces via the capacitive effect of finger proximity to the sensor array 10. The position sensor system will report the X, Y position of a finger placed near the sensor array 10 to much finer resolution than the spacing between the row and column traces 14 and 18. The position sensor according to this embodiment of the invention will also report a Z value proportional to the outline of that finger and hence indicative of the pressure with which the finger contacts the surface of insulating layer 22 over the sensing array 10.

According to a presently preferred embodiment of the invention, a very sensitive, light-touch detector circuit may be provided using adaptive analog VLSI techniques. The circuit of the present invention is very robust and calibrates out process and systematic errors. The detector circuit of the present invention will process the capacitive input information and provide digital information to a microprocessor.

According to this embodiment of the invention, sensing circuitry is contained on a single sensor processor integrated circuit chip. The sensor processor chip can have any number of X and Y "matrix" inputs. The number of X and Y inputs does not have to be equal. The integrated circuit has a digital bus as output. In the illustrative example disclosed in FIGS. 1a-1d herein, the sensor array has 15 traces in both the Y and Y directions. The sensor processor chip thus has 15 X inputs and 15 Y inputs.

The X and Y matrix nodes are successively scanned, one at a time, with the capacitive information from that scan indicating how close a finger is to that node. The scanned information provides a profile of the finger proximity in each dimension. According to this aspect of the present invention, the profile centroid is derived in both the X and Y directions and is the position in that dimension. The profile curve of proximity is also integrated to provide the Z information.

Referring now to FIG. 2, a block diagram of presently preferred sensing circuitry 30 for use according to the present invention is shown. The sensing circuitry of this embodiment employs a driving-point impedance measurement for each X and Y line in the sensing matrix 10. The block diagram of FIG. 2 illustrates the portion of the sensing circuitry for developing signals from one direction (shown as X in the matrix). The circuitry for developing signals from the other direction in the matrix is identical and its interconnection to the circuitry shown in FIG. 2 will be disclosed herein. The circuitry of FIG. 2 illustratively discloses an embodiment in which information from six X matrix lines X1 . . . X6 are processed. Those of ordinary skill in the art will recognize that this embodiment is illustrative only, and that actual embodiments fabricated according to the present invention may employ an arbitrarily sized matrix, limited only by technology constraints.

The driving-point capacitance measurement for each of X lines X1 ... X6 is derived from an integrating charge amplifier circuit. These circuits are shown in block form at reference numerals 32-1 through 32-6. The function of each of integrating charge amplifier circuits 32-1 through 32-6 is to develop an output voltage proportional to the capacitance sensed on its corresponding X matrix line.

The driving-point capacitance measurement is made for all X (row) conductors 14 and all Y (column) conductors 18 in the sensor matrix array 10. A profile of the finger proximity mapped into the X and Y dimension is generated from the driving-point capacitance measurement data. This profile is then used to determine a centroid in both dimensions, thereby determining the X and Y position of the finger.

The output voltages of integrating charge amplifier circuits 32-1 through 32-6 are utilized by several other circuit elements and are shown for convenience in FIG. 2 as distributed by bus 34. Bus 34 is a six conductor bus, and those of ordinary skill in the art will recognize that each of its conductors comprises the output of one of integrating charge amplifiers 32-1 through 32-6.

The first of circuit elements driven by the outputs of integrating charge amplifier circuits 32-1 through 32-6 is linear voltage-to-current converter 36. The function of linear voltage-to-current converter 36 is to convert the output voltages of integrating charge amplifiers 32-1 through 32-6 to currents for subsequent processing.

The current outputs from linear voltage-to-current converter 36 are presented as inputs to X position encode circuit 38. The function of X position encode circuit 38 is to convert the input information into a signal representing object proximity in the X dimension of the sensor array matrix. According to a presently preferred embodiment of the invention, this circuit will provide a scaled weighted mean (centroid) of the set of input currents. The result is a circuit which is a linear position encoder,having an output voltage which varies between the power supply rails. Because it is a weighted mean, it averages all current inputs and can in turn generate an output voltage which represents an X position with a finer resolution than the spacing of the X matrix grid spacing.

The output voltage of X position encode circuit 38 is presented to sample/hold circuit 40, the output of which, as is well known in the art, either follows the input or holds a value present at the input depending on the state of its control input 42. The structure and operation of sample/hold circuits are well known in the art.

The output of sample/hold circuit 40 drives the input of analog-to-digital (A/D) converter 44. The output of A/D converter 44 is a digital value proportional to the position of the object in the X dimension of the sensor array matrix 10.

While the portion of the circuit described so far is useful for providing a digital signal indicating object position in one dimension, the addition of further circuit elements yields a more useful device which is more immune to noise, detects and subtracts the no-object-proximate signal from the outputs of the sensors, and provides threshold detection of an approaching object.

The first of these additional circuit elements is minimum detector circuit 46. The function of minimum detector circuit 46 is to determine the level of signal representing ambient no-object-proximate to the sensor array matrix 10 and to provide a signal which may be fed back to integrating charge amplifiers 32-1 through 32-6 to control their output voltages to effectively zero out the outputs of the amplifiers under the ambient condition. The output of minimum detector 46 circuit is a voltage. This voltage is compared in operational amplifier 48 with an adjustable voltage representing a minimum threshold value V_{Thmin}. Through feedback to the integrating charge amplifiers 32-1 through 32-6, amplifier 48 adjusts its output to balance the output voltage of Minimum detector circuit 46 with the voltage VThmin. Feedback is controlled by P-channel MOS transistor 50, which allows the feedback to operate only when the PROCESS signal is active.

FIGS. 3a and 3b are graphs of output voltage versus matrix conductor position which illustrate the effect of the minimum detector circuit 46. In order to better illustrate the effect of offset cancellation, FIGS. 3a and 3b show the outputs of integrating charge amplifiers from a fifteen row matrix, rather than from a six row matrix as is implied by FIG. 2. FIG. 3a shows the offset component of the voltage outputs of integrating charge amplifiers without the operation of minimum detector 46, and FIG, 3b shows the voltage outputs with the offset having been zeroed out by the feedback loop comprising minimum detector circuit 46, P-channel MOS transistor 50, and feedback conductor 52.

Another additional circuit component is maximum detector circuit 54. The function of maximum detector circuit 54, working in co-operation with amplifier 56, OR gate 58, and AND gate 60 is to provide a MAX INTERRUPT signal. The MAX INTERRUPT signal alerts the microprocessor controlling the object sensor system of the present invention that an object is approaching the sensor array matrix 10. The amplifier 56 acts as a comparator which trips if the output voltage from maximum detector circuit 54 exceeds the threshold set by the voltage V_{Thmax}. When the output voltage from maximum detector circuit 54 exceeds the threshold, or the output voltage from the corresponding Y maximum detector (not shown) exceeds the threshold set for its corresponding amplifier, the output of OR gate 58 becomes true. That and a true SAMPLE signal at the second input of AND gate 60 causes a true MAX INTERRUPT signal at its output.

The Z Sum circuit 62 produces an output which is proportional to the pressure with which a finger is pressing on the sensor. This is done in both the X and Y dimensions by effectively integrating the areas under the curves of FIG. 3b. Referring again to FIG. 3b for illustration purposes, it can be seen that the width of the contact area in the X dimension of the sensor array 10 is from about X_2 to X_{10}.

According to a presently preferred embodiment of the invention, Z Sum circuit 62 is configured to produce an output voltage V_O. Output voltage V_O is a scaled function of all the input voltages.

Since the outputs of the Z Sum circuits 62 in both the X and Y directions are proportional to the width of the pointing finger or other flexible object in the two dimensions of the sensor array matrix 10, the area of the finger or other flexible object is a reliable measure of the pressure with which the finger is contacting the surface of the sensor array matrix 20. The area may be calculated by multiplier circuit 64, having the output of the Z Sum circuit in the X dimension as one of its inputs and the output of the Z Sum circuit in the Y dimension as the other one of its inputs.

A presently preferred embodiment of multiplier circuit takes two analog voltage inputs and performs an analog computation on those voltages to create a voltage output which is proportional to the product of the two input voltages. As shown in FIG. 2, a first input term is the output voltage of the X dimension Z Sum circuit 62 and a second input term is the output of the Y dimension Z Sum circuit (not shown). Those of ordinary skill in the art will recognize that since multiplication is commutative process and since the multiplier inputs are symmetrical, it does not matter which of the X and Y Z sum circuits contributes the first input term and which contributes the second input term.

The output of multiplier circuit 64 is a voltage and drives a sample/hold circuit 66. Sample/hold circuit 66 may be identical to sample/hold circuit 40 and may be driven by the same SAMPLE signal which drives sample/hold circuit 40.

The output of sample/hold circuit 66 drives the input of analog-to-digital (A/D) converter 68. A/D converter 68 may be identical to A/D converter 44. The output of A/D converter 68 is a digital value proportional to the pressure with which the finger (or other flexible object) is contacting the surface of sensor array matrix 10.

The object position sensor system of the present invention may be operated under the control of a microprocessor which provides the timing and other control signals necessary to operate the system. For example, the MAX INTERRUPT signal from the output of AND gate 60 may be used to interrupt the microprocessor and invoke an object sensing routine. The particular timing and control signals employed by any system constructed according to the present invention will vary according to the individual design. The following is therefore an illustrative disclosure providing circuit details of illustrative circuit components of a presently preferred system according to the present invention and including disclosure of typical timing and control signals for operating these circuits.

Referring now to FIG. 4, a simplified schematic diagram of an integrating charge amplifier circuit 70 operating in a driving-point capacitance measuring mode suitable for use in the present invention is shown. Integrating charge amplifier circuit 70 is derived from the common integrating amplifier seen in the literature, for example in Gregorian and Temes, Analog MOS Integrated Circuits, John Wiley & Sons (1986) pp. 270-271; Haskard and May, Analog VLSI Design, Prentice Hall (1988), pp. 105-106, and is built around amplifying element 72, which may comprise a common transconductance amplifier as described in Mead, Analog VLSI and Neural Systems, Addison-Wesley (1989) pp. 70-71. The inverting input of amplifying element is connected to an input node 74 through a switch 76 controlled by a SELECT(n) node 78. The input node is connected to one of the lines in the sensor array matrix of FIG. 1. While the disclosure herein illustrates the use of an integrating charge amplifier connected to a row line of the matrix, those of ordinary skill in the art will recognize that the operation of the integrating charge amplifiers connected to the column lines of the array is identical.

The non-inverting input of amplifying element 72 is connected to a Voltage step input node 80. A capacitor 82 is connected as an integrating feedback element between the output and inverting input of amplifying element 72. According to a presently preferred embodiment of the invention, capacitor 82 may have a capacitance of about 10 pF.

The output of amplifying element 72 is connected to an output node 84 through a switch 86. Switch 86 is controlled by the SELECT(n) node 78 which also controls switch 76. A capacitor 88, which may have a capacitance of about 3 pF, is connected between output node 84 and an offset adjust node 90. Those of ordinary skill in the art will recognize that switches 76 and 86 may comprise common CMOS pass gates, each including an N-channel and a P-channel MOS transistor connected in parallel with their gates driven by complimentary signals. Those of ordinary skill in the art will recognize that the combination of switch 86 and capacitor 88 form a simple sample/hold circuit the offset of which may be adjusted when the switch is in its off position via the voltage on node 90.

Amplifying element 72 also includes a BIAS input node 92, which may be connected to an on-chip current bias reference which may be used for all of the integrating charge amplifiers on the chip.

A driving-point capacitance measurement is made by closing switches 76 and 86 and stepping, by an amount Vstep, the input voltage on Voltage step input node 80 at the non-inverting input of amplifying element 72. Because of the negative feedback arrangement, the output of amplifying element 72 will then move to force the voltage at its inverting input to match the voltage at its non-inverting input. The result is that the voltage at the output node 84 changes to a value that injects enough charge into capacitor 82 to match the charge that is injected into the capacitance on the sensor array matrix line connected to input node 74. This change may be expressed as:

$$V_{out} = Vstep \bullet (1 + C_{matrix}/C_{82})$$

where V_{out} is the output voltage, C_{matrix} is the capacitance on the row or column line of the sensor array matrix to which input node 74 is connected and C_{82} is capacitor 82..

When a finger approaches the sensor array matrix 10, C_{matrix} will increase in magnitude. The result is that Vout will also increase in a driving-point capacitance measurement made as the finger approaches. V_{out} is proportional to the proximity of a finger (conductive object) to the sensor array matrix line connected to input node 74. As described above, the driving-point capacitance measurement gives an output voltage change that is directly proportional to the sensor capacitance that is to be measured.

Subtracting the V_{out} value with no object present from the V_{out} value where there is an object present results in a V_{out} difference that is proportional to the change in capacitance at the row line of the sensor array matrix to which input node 74 is connected. Thus:

$$V_{out(final)} = V_{out\ (with\ finger)} - V_{out\ (no\ object)}$$

$$V_{out\ (with\ finger)} = V_{STEP} \bullet (1 + ((C_{no\ object} + C_{finger})/C_{82}))$$

$$V_{out\ (no\ object)} = V_{STEP} \bullet (1 + (C_{no\ object}/C_{82}))$$

$$V_{out\ (final)} = V_{STEP}\ (C_{finger}/C_{82})$$

According to a presently preferred embodiment of the invention, this subtraction operation may be performed by applying an the offset adjust voltage to capacitor 88 at offset adjust node 90. This voltage may be presented to the amplifier circuit via line 52 (FIG. 2) and is controlled by the Minimum Detect circuit 46 when the PROCESS control line is active. The Offset Adjust subtracts the "no object voltage" from the output node 84 and leaves an output voltage directly proportional to the change of the capacitance at the row line of the sensor array matrix to which input node 74 is connected caused by the approaching object.

To operate the object position sensing system of the present invention, the integrating charge amplifiers 70 are selected one at a time using their select nodes 78. This closes both switch 76 and 86 to start the integrator and to start sampling the results of this operation. The voltage at the Voltage step input node 80 is stepped, and the circuit is allowed to settle. After sufficient settling time the select signal is disabled, switches 76 and 86 are opened and the sampled result is left stored at the output node 84 on capacitor 88.

After all of the row and column lines of the sensor array matrix 10 have been scanned, a PROCESS cycle takes place, and the minimum Detect circuits 46 in both the X and Y dimensions adjust the output voltages on capacitors 88 in all integrating charge amplifiers 70 via the common input line 52 to all amplifiers.

Referring now to FIG. 5 a timing diagram shows the relationship between the timing and control signals used to operate the object position sensor system of the present invention utilizing the integrating charge amplifier of FIG. 4. In the embodiment illustrated in FIG. 5, first all X and Y integrating charge amplifiers are sequentially selected, followed by a PROCESS signal and then a SAMPLE signal.

Additional components may be added to integrating charge amplifiers 70, largely to bring the circuits to equilibrium before the integration takes place. Referring now to FIG. 6a, In an alternate embodiment of an integrating charge amplifier 100, all components of the embodiment of FIG. 4 are present. In the embodiment of FIG. 6a, the portion of the cycle in which a global RESET node is true is used to equibrilate the circuit by discharging the integrating feedback capacitor to zero volts. The voltage V_{STEP} is then provided to the non-inverting input of the amplifying element 72 in a manner which allows easily controlled stepping between the two designated voltages, V_{LOW} and V_{HIGH}.

The additional components in integrating charge amplifier 100 include a switch 102 connected across capacitor 82 connected to a RESET node 104 connected to all of the integrating charge amplifiers in the system. When the RESET signal is true at the beginning of each scanning cycle, switch 102 turns on and discharges the capacitor 82 to zero volts.

A switch 106 is connected between the input node 74 and ground has a control element connected to a RESET1(n) node 108. The RESET1(n) node 108 is active for all integrating charge amplifiers except for the one selected by its SELECT(n) node to perform the driving-point impedance measurement. Its function is to discharge any voltage present on those nodes due to the capacitive coupling to the other nodes which have been driven by the scanning process and thereby eliminate or minimize the error which such voltages would introduce into the measurement process.

Finally, the V_{STEP} voltage may be provided to the non-inverting input of amplifying element 72 by employing switches 110 and 112. Switch 110 is connected between a V_{HIGH} voltage node 114 and the non-inverting input of amplifying element 72, and is controlled by a STEP node 116. Switch 112 is connected between a V_{LOW} voltage node 118 and the non-inverting input of amplifying element 72, and is controlled by a STEP\ node 120. Switches 102, 106,110, and 112 may comprise common CMOS pass gates.

Referring now to FIG. 6b, a timing diagram shows the relationships between the various control signals and the voltages present on selected nodes of the Integrating charge amplifier circuit 100 of FIG. 6a during scan cycles (n-1), (n), and (n+1). As can be seen from FIG. 6b, the global RESET signal at node 104 discharges the capacitors 82 of all integrating charge amplifiers 100 in the system at the beginning of each scanning cycle. The RESET1(n) signal at node 108 is coincident with the RESET signal during scanning cycles (n-1) and (n+1) but does not appear at the node 108 of the integrating charge amplifier 100 which is making the driving-point impedance measurement during scanning cycle (n). As those of ordinary skill in the art will readily appreciate from the description herein, the RESET1(n) signal for any integrating charge amplifier 100n may be generated by simple logic circuitry to implement the logic function RESET1(n) = RESET · SELECT(n)\.

FIG. 6b also shows the STEP and STEP\ signals drive the non-inverting input of amplifying element 72 first to V_{LOW} and then to V_{HIGH} during each scanning cycle. The signals N1, N2, and N3 represent the voltages present at the inverting input, the non-inverting input, and the output, respectively, of amplifying element 72. As can be seen from FIG. 6b, the voltage V_{meas}, the voltage of interest, remains at the output node of integrating charge amplifier 100 even after the end of scan cycle (n) in which it was developed.

Referring now to FIG. 7a, an embodiment of an integrating charge amplifier 130 according to the present invention is an approach that provides a larger operating range for the integration. The embodiment of FIG. 7a is nearly identical in its structure and operation to the embodiment of FIG. 6a, except that instead of switch 102 acting to discharge capacitor 82 to zero volts when the RESET input 104 is true, switch 132, which may comprise a common CMOS pass gate, is used to force the output of amplifying element 72 to ground (zero volts) instead of to V_{LOW} as in the embodiment of FIG. 6a. A switch 134, also controlled by RESET input 104, is used to short together the inverting and non-inverting inputs of amplifier 72, forcing them both to an equilibrium voltage of V_{LOW}. In low power supply-voltage applications, such as found in notebook computers, this circuit increases the signal sensitivity by a factor of two.

FIG. 7b is a timing diagram which shows the relationships between the various control signals and the voltages present on selected nodes of the integrating charge amplifier circuit 130 of FIG. 7a during scan cycles (n-1), (n), and (n+1). As can be seen from FIG. 7b, the global RESET signal at node 104 forces the outputs of all integrating charge amplifiers 100 in the system to zero volts at the beginning of each scanning cycle. As in the embodiment of FIG. 7a, the RESET1(n) signal at node 108 is coincident with the RESET signal during scanning cycles (n-1) and (n+1) but does not appear at the node 108 of the integrating charge amplifier 130 which is making the driving-point impedance measurement during scanning cycle (n).

Like the embodiment of FIG. 6a, in the embodiment of FIG. 7a the STEP and STEP\ signals drive the non-inverting input of amplifying element 72 first to V_{LOW} and then to V_{HIGH} during each scanning cycle. The signals N1, N2, and N3 represent the voltages present at the inverting input, the non-inverting input, and the output, respectively, of amplifying element 72. As can be seen from FIG. 7b, the voltage V_{meas}, the voltage of interest, remains at the output node of integrating charge amplifier 130 even after the end of scan cycle (n) in which it was developed.

Referring now to FIG. 8, a schematic diagram is presented of a minimum detector circuit 46 of FIG. 2. While the X dimension minimum detector circuit 46 is illustratively disclosed herein, those of ordinary skill in the art will understand that the Y dimension minimum detector circuit functions in the same manner.

According to a presently preferred embodiment of the invention, minimum detector circuit 46 includes a P-channel bias transistor 142 having its source connected to a voltage source V_{DD} and its gate connected to a bias voltage V_{BIAS}. The inputs of the minimum detector circuit are connected to the output nodes 84 of the respective integrating charge amplifiers. In the minimum detector circuit illustrated in FIG. 8, there are (n) inputs. Each input section comprises a series pair of MOS transistors connected between the drain of P-channel bias transistor 142 and ground.

Thus, the input section for In_1 comprises P-channel MOS input transistor 144 having its source connected to the drain of P-channel MOS bias transistor 142 and N-channel MOS current-limiting transistor 146 having its drain connected to the drain of P-channel MOS input transistor 144 and its source connected to ground. The gate of P-channel MOS input transistor 144 is connected to In_1 input node 148 and the gate of N-channel MOS current-limiting transistor 146 is connected to a source of limiting bias voltage VL_{BIAS} at node 150.

Similarly, the input section for In_2 comprises P-channel MOS input transistor 152 having its source connected to the drain of P-channel MOS bias transistor 142 and N-channel MOS current-limiting transistor 154 having its drain connected to the drain of N-channel MOS input transistor 152 and its source connected to ground. The gate of P-channel MOS input transistor 152 is connected to In_2 input node 156 and the gate of N-channel MOS current-limiting transistor 154 is connected to node 150.

The input section for In_3 comprises P-channel MOS input transistor 158 having its source connected to the drain of P-channel MOS bias transistor 142 and N-channel MOS current-limiting transistor 160 having its drain connected to the drain of P-channel MOS input transistor 158 and its source connected to ground. The gate of P-channel MOS input transistor 158 is connected to In_3 input node 162 and the gate of N-channel MOS current-limiting transistor 160 is connected to node 150.

The input section for $In_{(n)}$ comprises P-channel MOS input transistor 164 having its source connected to the drain of P-channel MOS bias transistor 142 and N-channel MOS current-limiting transistor 166 having its drain connected to the drain of P-channel MOS input transistor 164 and its source connected to ground. The gate of P-channel MOS input transistor 164 is connected to $In_{(n)}$ input node 168 and the gate of N-channel MOS current-limiting transistor 146 is connected to node 150. The output of minimum detector circuit 46 is node 170.

Without averaging control, V_{BIAS} and V_{LBIAS} would be set so that the saturation currents in any one of transistors 146, 154, 160 .. 166 is much larger than the saturation current in transistor 142. In this mode, assume that In1 is the smallest voltage of all n inputs. In this case transistor 144 is turned on strongly with transistor 146 taking all the current from transistor 142. As a result, output node 170 moves down until transistor 144 is on just enough to sink all the current from transistor 142. In this case all other transistor pairs (152/154, 158/160, ...164/166) turn off because their p-channel devices have an input voltage drive of less than that of transistor 144. The result is that the output is directly related to the minimum input voltage and is offset therefrom by a gate bias voltage.

Operating the minimum detector circuit 46 of FIG. 8 in an averaging mode provides substantial noise rejection in the system. If for some reason one input was noisy and gave a much smaller value than all other

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values it could cause the generation of an erroneous output voltage. According to the present invention, the goal is to detect the "background level" of an input with no input stimulus. This would be the true minimum value. Since there are typically more than one input in this state, several inputs can be averaged to form the minimum signal. This is done via the averaging mode, which is enabled by setting the VL_{BIAS} current of each transistor 146, 154, 160, ... 166 to be some fraction of the current from transistor 142.

For this invention the current set by V_{LBIAS} is approximately one-third of the current from transistor 142. Therefore, in order to sink all of the current from transistor 142, at least three input pairs (144/146, ...164/166) must be turned on. For that to happen the output node 170 must then be sitting at a voltage equal to a p-channel bias voltage above the third lowest input. It has thus, in effect, filtered out and ignored the two lower values.

The present embodiment of the minimum detect circuit of FIG. 8 has been described in terms of separately deriving an X minimum signal and a Y minimum signal and separately computing their weighted minima. Those of ordinary skill in the art will recognize that, pursuant to an equivalent embodiment, the weighted minima of the combined X and Y signals could be computed utilizing the principles disclosed herein.

Referring again to FIG. 2, the output of amplifier 48 (a transconductance amplifier operating as a comparator) and the bottom of capacitor 88 in the integrating charge amplifiers 70, 100, and 130 of FIGS. 4, 6a, and 7a has been held high by MOS transistor 50 during the scan operation or non-PROCESS cycles when the global PROCESS signal (FIG, 5) is low. When the PROCESS cycle starts, the PROCESS line goes high and MOS transistor 50 is turned off, thus enabling the action of minimum detector circuit 46. If the output of minimum detector circuit 46 is greater than the V_{Thmin} at the input of amplifier 48, the output of amplifier 48 is driven low. This is a feedback loop because when the bottom of capacitor 88 in the integrating charge amplifiers drives low it pulls the outputs of all integrating charge amplifiers (32-1 through 32-6) low also. This in turn pulls the output of minimum detector circuit 46 low. This feedback-settling process continues until the minimum detector circuit 46 output equals the V_{Thmin} (FIG. 3b).

The V_{Thmin} voltage is chosen so that when the integrating charge amplifiers (32-1 through 32-6) outputs are shifted down, the minimum charge amplifier output will generate no current in the voltage-to-current converter circuits 36.

Referring now to FIG. 9, the maximum detector circuit 54 will be disclosed. According to a presently preferred embodiment of the invention, maximum detector circuit 54 includes an N-channel bias transistor 182 having its source connected to ground and its gate connected to a bias voltage V_{BIAS} at node 184. The inputs of the maximum detector circuit are connected to the output nodes 84 of the respective integrating charge amplifiers in the maximum detector circuit illustrated in FIG. 9, there are (n) inputs. Each input section comprises a series pair of MOS transistors connected between the drain of N-channel bias transistor 182 and a voltage source V_{DD}.

Thus, the input section for In_1 comprises P-channel MOS current-limiting transistor 186 having its source connected to V_{DD} and its drain connected to the drain of N-channel MOS input transistor 188. The gate of N-channel MOS input transistor 188 is connected to In_1 input node 190 and the gate of P-channel MOS current-limiting transistor 186 is connected to a source of bias voltage VL_{BIAS} at node 192. Similarly, the input section for In_2 comprises P-channel MOS current-limiting transistor 194 having its source connected to V_{DD} and its drain connected to the drain of N-channel MOS input transistor 196. The gate of N-channel MOS input transistor 196 is connected to In_2 input node 198 and the gate of P-channel MOS current-limiting transistor 194 is connected to node 192. The input section for In_3 comprises P-channel MOS current-limiting transistor 200 having its source connected to VDD and its drain connected to the drain of N-channel MOS input transistor 202. The gate of N-channel MOS input transistor 202 is connected to In_3 input node 204 and the gate of R-channel MOS current-limiting transistor 200 is connected to node 192. The input section for $In_{(n)}$ comprises P-channel MOS current-limiting transistor 206 having its source connected to VDD and its drain connected to the drain of N-channel MOS input transistor 208. The gate of N-channel MOS input transistor 208 is connected to $In_{(n)}$ input node 210 and the gate of N-channel MOS current-limiting transistor 206 is connected to node 192. The sources of N-channel MOS input transistors 188, 196, 202, and 208 are connected together to the drain of N-channel MOS bias transistor 182. The output of maximum detector circuit 54 is node 212 at the common connection of the drain of N-channel bias transistor 182 and the sources of the N-channel input transistors.

The maximum detector circuit 54 acts analogously to the minimum detector circuit 46. The difference is that an N-channel bias transistor is used instead of a P-channel bias transistor and an N-channel transconductance amplifier is used in place of a P-channel transconductance amplifier. The result is the output will now track approximately an N-channel bias drop below the largest input (in non-averaging mode), since that much difference is needed to guarantee at least one input pair is on (186/188, 194/196, ... 206/208).

However for this circuit the output is not used for feedback, but is instead used to drive a comparator 56 (FIG. 2) which is set to trip if the input is greater than the voltage V_{Thmax}. If tripped, a MAX INTERRUPT signal is generated. The MAX INTERRUPT is used to "wake-up" a microprocessor and tell it that there is an object detected at the sensor. The signal is prevented from appearing on the MAX INTERRUPT line by gate AND gate 60 and the SAMPLE signal. The SAMPLE signal only allows the interrupt signal to pass after the circuit has settled completely. As shown in FIG. 2 by OR gate 58, either the X or the Y dimension maximum detector circuit may be used to enable the MAX INTERRUPT signal.

Referring now to FIG. 10, a presently preferred embodiment of linear voltage-to-current circuit 36 is shown in schematic form. In the presently preferred embodiment of the invention, block 36 in FIG. 2 actually contains one voltage to current converter circuit of FIG. 10 for each output of an integrating charge amplifier.

In the circuit of FIG. 10, a current mirror comprises diode-connected P-channel MOS transistor 222 having its source connected to voltage source V_{DD}, and P-channel MOS transistor 224 having its source connected to voltage source V_{DD} and its gate connected to the gate and drain of transistor 222. An N-channel MOS input transistor 226 has its drain connected to the drain of P-channel transistor 222, its gate connected to a voltage input node 228, and its source connected to the drain of N-channel bias transistor 230. The source of N-channel bias transistor 230 is connected to ground and its gate is connected to bias input 232. The drain of P-channel MOS transistor 224 is connected to the gate and drain of diode connected N-channel MOS transistor 234. The source of diode connected N-channel MOS transistor 234 is connected to ground. The common gate and drain connection of diode- connected N-channel MOS transistor 234 is an N Bias current output node 236 and the common connection of the gate of P-channel MOS transistor 224 and the drain of P-channel MOS transistor 222 is a P Bias current output node 236 of the voltage-to-current-converter.

To generate a linear transformation N-channel MOS bias transistor 230 is biased in it's linear region by setting V_{BIAS} to be a value which is much greater than the largest value expected on the voltage input node 228. This will guarantee it is always operating in its linear region. For this invention the voltage to be expected at the voltage input 228 of the voltage-to-current converter circuit is typically less than half of the power supply, so it will operate linearly if V_{BIAS} is set to the power supply or greater.

The transconductance of N-channel input transistor 226 is designed to be as large as reasonable. The result is that N-channel input transistor 226 will operate like a follower with a resistor in it's source, and hence will give a linear change of output current versus a linear change in input voltage.

The current is sourced by diode-connected P-channel MOS transistor 222 which acts as half of a CMOS P-channel current mirror and provides a reference for P Bias Output node 236 for the position encoder circuit. The current is mirrored thru P-channel MOS transistor 224 and diode connected MOS transistor 232 generating a reference at N Bias Output node 238 for the position encoder circuit.

For the purposes of this embodiment, a linear transfer function between voltage and current has been selected. Those of ordinary skill in the art will recognize that, under certain circumstances, a non-linear transfer function will be desired.

The linear voltage-to-current converter of FIG. 10 is disclosed in U.S. Patent No. 5,096,284 operating in the weak inversion region.. This circuit is used in the strong inversion region in the present invention, however, for certain applications, the weak inversion mode may be preferred.

Referring now to FIG. 11, a presently preferred embodiment of a position encoder circuit 38 of FIG. 2 is shown in schematic diagram form. The circuits in the X and Y dimensions are identical. The position encoder circuit 38 is shown having six inputs, but those of ordinary skill in the art will recognize that, due to its symmetry, it may be arbitrarily expanded.

As presently preferred, position encoder circuit 38 includes a plurality of transconductance amplifiers 242-1 through 242-6 connected as followers. The outputs of all amplifiers 242-1 through 242-6 are connected together to a common node 244, which comprises the output node of the circuit.

The non-inverting inputs of amplifiers 242-1 through 242-6 are connected to a resistive voltage divider network comprising resistors 246, 248, 250, 252, 254, 256, and 258, shown connected between V_{DD} and ground.

Amplifiers 242-1 through 242-3 have P-channel bias transistors and differential pair inputs due to the input operating range between zero volts and $V_{DD}/2$, and amplifiers 242-4 through 242-6 have N-channel bias transistors and differential pair inputs due to the input operating range between $V_{DD}/2$ and V_{DD}. Those of ordinary skill in the art will readily recognize that amplifiers 242-4 through 242-6 will be configured exactly like amplifiers 242-1 through 242-3, except that all transistor and supply voltage polarities are reversed. The input nodes I_{in1} through I_{in6} (reference numerals 260, 262, 264, 266, 268, and 270) of the circuit are connected to the gates of the bias transistors of the transconductance amplifiers 242-1 through 242-6, respectively. The inputs I_{in1} through I_{in3} are driven by the P Bias output nodes 236 of their respective linear voltage-to-current converters and the inputs I_{in4} through I_{in6} are driven by the N Bias output nodes 238 of their respective linear voltage-to-current converters.

The position encoder circuit of FIG. 11 will provide a weighted mean (centroid) of the input currents weighted by the voltages on the resistor divider circuit to which the inputs of the amplifiers are connected. If the resistors 246, 248, 250, 252, 254, 256, and 258 are all equal then the result is a circuit which is a linear position encoder, with its output voltage varying between the power supply rails. Because it is a weighted mean, it averages all current inputs which in turn generates an interpolated output. This arrangement affords finer resolution than the voltage spacing of voltage nodes "n" at the input. This is key to making a dense circuit function. This circuit is an improvement of a circuit described in DeWeerth, Stephen P., Analog VLSI Circuits For Sensorimotor Feedback, Ph.D Thesis, California Institute of Technology, 1991.

Referring now to FIG. 12, a presently preferred embodiment of a Z Sum circuit 62 of FIG. 2 is shown. For purposes of illustration, Z Sum circuit 62 is shown to include four inputs. Those of ordinary skill in the art will readily understand how to provide additional inputs.

The four input sections for the Z Sum circuit illustrated in FIG. 12 each comprise two N-channel MOS transistors connected in series. Thus a first input section comprises N-channel MOS input transistor 290, having its drain connected to the drain of P-channel MOS bias transistor 282 and its source connected top the drain of N-channel MOS transistor 292. The gate of N-channel MOS input transistor 290 is connected to input node In_1 at reference numeral 294. The gate of N-channel MOS bias transistor 292 is connected to bias input node 296.

A second input section comprises N-channel MOS input transistor 298, having its drain connected to the drain of P-channel MOS bias transistor 282 and its source connected top the drain of N-channel MOS transistor 300. The gate of N-channel MOS input transistor 298 is connected to input node In_2 at reference numeral 302. The gate of N-channel MOS bias transistor 300 is connected to bias input node 296.

A third input section comprises N-channel MOS input transistor 304, having its drain connected to the drain of P-channel MOS bias transistor 282 and its source connected top the drain of N-channel MOS transistor 306. The gate of N-channel MOS input transistor 304 is connected to input node In_3 at reference numeral 308. The gate of N-channel MOS bias transistor 306 is connected to bias input node 296.

A fourth input section comprises N-channel MOS input transistor 310, having its drain connected to the drain of P-channel MOS bias transistor 282 and its source connected top the drain of N-channel MOS transistor 312. The gate of N-channel MOS input transistor 310 is connected to input node In_4 at reference numeral 314. The gate of N-channel MOS bias transistor 312 is connected to bias input node 296. The common drain connections of N-channel MOS input transistors 290, 298, 304, and 310 are connected to the gate of P-channel MOS transistor 316.

The Z sum circuit FIG. 12 is analogous to the Linear voltage-to-current converter circuit 36 of FIG. 10. However in this case there are multiple circuit sections which have their currents all summed together (transistors 290/292, 298/300, 304/306, ... 310/312) into the P-channel MOS transistor 282.

P-channel MOS transistors 282 and 316 form a current mirror. Their sources are connected to voltage source V_{DD} and their gates are connected together to the drain P-channel MOS of transistor 282. The drain of P-channel MOS transistor 316 is connected to the drain of N-channel MOS transistor 318, which has its source connected to ground. The common connection of the drains of MOS transistors 316 and 318 forms a voltage output node 288 for the circuit.

MOS transistor 316 drives MOS transistor 318 which is operating in its linear region. The result is a voltage which is proportional to the current from transistor 316. Therefore the voltage at voltage output node 320 is a scaled sum of all the input voltages, and is utilized by the multiplier circuit.

Referring now to FIG. 13, a presently preferred embodiment of the multiplier circuit 64 of FIG. 2 is presented in schematic form. P-channel MOS transistors 332 and 334 form a current mirror. N-channel MOS transistor 336 has its drain connected to the drain of P-channel MOS transistor 332, its gate connected to first voltage input node 338, and its source connected to the drain of N-channel MOS transistor 340. The gate of N-channel MOS transistor 340 is connected to second voltage input node 342 and its source is connected to ground. N-channel MOS transistor 344 has its drain connected to the gate and drain of P-channel MOS transistor 332. The gate of N-channel MOS transistor 344 is connected to second voltage input node 342 and its source is connected to the drain of N-channel MOS transistor 346. The gate of N-channel MOS transistor 346 is connected to first voltage input node 338 and its source is connected to ground. The sources of P-channel MOS transistors 332 and 334 are connected to voltage source V_{DD}. The drain of P-channel MOS transistor 334 is connected to output node 348 and to the drain of N-channel MOS transistor 350. The gate of N-channel MOS transistor 350 is connected to input bias node 352.

The multiplier circuit of FIG. 13 is a symmetrized extension of the multiplier described in U.S. Patent 5,095,284 and is a wide input range, voltage-input, voltage-output multiplier circuit. Because of the symmetrical input stage, the multiplier can be operated both above and below the threshold voltages of transistors 340 and 346.

The currents from the two transistor pairs 336/340 and 344/346 are summed into the current mirror of transistors 332 and 334 and appear at the drain of transistor 334. Transistor 350 is biased to be in its linear region by bias input 352. Therefore, the output voltage at output node 348 will be proportional to the conductance of device 350 multiplied by the current driven by device 334. The bias voltage at input 352 is adjusted to scale the range of Vout values at node 348 and, once set, is left constant. Thereafter, the output voltage is proportional to the current injected from device 334, and hence is proportional to the product of the two input voltages at input nodes 338 and 342.

According to another aspect of the present invention, a position matrix sensing system is disclosed herein. The position matrix embodiment of the present invention is a straightforward extension of the finger position invention and uses much the same circuitry and basic signal flow. The main differences are in the measurement technique and the amount of information stored. The goal is to provide a matrix of voltages, V(x,y), that represent the proximity of the object to every node (x,y) on the sensor matrix. Instead of using this sel of voltages to drive position encoders in the X and Y dimensions separately, as in the finger position embodiment, the information is instead sent to the input of a neural network circuit, which uses this multi-dimensional information to help it make decisions about what the input means.

In the finger position embodiment, the driving-point capacitance information is used for position detection. However, because the driving-point capacitance looks at the total capacitive effect on the node being measured, it is incapable of resolving what is happening at each X and Y location on the sensor.

The position matrix embodiment of the present invention has the capability of resolving the capacitive effect at each X and Y location of the sensor. In this embodiment the driving-point capacitance circuit is only used to inject charge into the X matrix node. The trans-capacitance (i.e., the capacitance between a selected X node and a selected Y node in the sensor matrix) causes some of that charge to in turn be injected into a Y node. This injected charge is measured by the charge-sensitive amplifier connected to the Y node, thus forming a receiving-point capacitance circuit.

Referring now to FIG. 14, a presently preferred combination driving-point capacitance circuit and receiving-point capacitance circuit is shown in schematic diagram form. A representative X node $X_{(n)}$ at reference numeral 14 and a selected Y node $Y_{(n)}$ at reference numeral 18, are shown each having a self capacitance C_X and C_Y, respectively. Transcapacitance between nodes $X_{(n)}$ $Y_{(n)}$ is represented by capacitor C_{XY}.

A driving-point capacitance measurement is made of row line $X_{(n)}$ by a circuit which, as shown, may be one of the integrating charge amplifier circuits of either FIG. 6a or FIG. 7a, equipped with switches to zero out the matrix prior to injecting charge onto the matrix. The output of this circuit need not be used for anything. After the driving-point measurement has been made for a particular X line, charge is injected into all of the Y receiving-point impedance measuring circuits (the integrating charge amplifier). If all Y outputs are monitored simultaneously then for one X node, a profile of all the trans-capacitive effects at all the Y nodes that cross it will be created as a set of voltages V(x,1), V(x,2), ... V(x,m) that are a profile of the object (or objects) proximity on that X node. This sequence is done for every X node in the matrix resulting in a complete matrix of voltages whose values are proportional to the proximity of nearby objects.

As shown in FIG. 14, the receiving-point circuit can be an integrating charge amplifier identical to that used in the driving-point circuit. However, there are three differences in the way that the Y receiving circuit is used. First, the V_{STEP} node is left at a constant voltage, V_{LOW}, by disabling the STEP input such that switch 112 (FIGS. 6a and 7a) is always on and switch 110 is always off. Second, the Y receiving circuits are not individually selected, but instead are all selected simultaneously. Hence, there is only one Y select line for all Y inputs. Third, the RESET1 line is not used in the receiving-point circuit, and switch 106 (FIGS. 6a and 7a) is always off. These circuits will give an output voltage which is proportional to the amount of charge injected onto the Y node. Since the trans-capacitance varies with the proximity of an object, the voltage is proportional to the proximity of an object.

The position matrix embodiment requires storage of all of the output signals from the receiving-point impedance circuits in both the X and Y directions. This may be a accomplished by providing a sample/hold circuit matrix or a charge-coupled device (CCD) array as is known in the art. The structure of an illustrative sample/hold matrix is disclosed in FIG. 15, which shows a portion of a sample/hold array 350 suitable for use in the present invention. The array 350 is arranged as a plurality of rows and columns of individual sample/hold circuits. The number of rows is equal to the number of Y positions in the sensor matrix and the number of columns is equal to the number of X positions in the sensor matrix. For example, a 15x15 sensor matrix requires 15 rows and 15 columns. All of the voltage data inputs in a row are wired together and the sample/hold control inputs of all the sample/hold circuits in a column are connected to one of the select signals (FIG. 5) such that the select inputs from the X direction drive the sample/hold circuits in the matrix storing the Y data. Those of ordinary skill in the art will note that the roles of X and Y may be reversed.

Referring now to FIGS. 16a and 16b two possible embodiments of the position matrix system of the present invention are illustrated. In the simplest embodiment, the matrix of voltage information is sent to a computer which processes the data. This simple embodiment is shown in FIG. 16a. The approach of FIG. 16a is feasible if the input profile shapes change no faster than about every millisecond.

In the embodiment of position matrix system (reference numeral 360) illustrated in FIG. 16a, the X dimension integrating charge amplifiers (reference numerals 362-1 through 362-n) are used to perform the driving-point capacitance measurements disclosed herein for all X lines in the matrix. For each X line driven, the Y dimension integrating charge amplifiers (reference numerals 364-1 through 364-n) are used to perform the receiving-point capacitance measurements disclosed herein. The sample/hold matrix of FIG. 15 is not required. Instead, one sample/hold amplifier (366-1 through 366-n) is required per Y output to sample the output voltages from the Y dimension integrating charge amplifiers 364-1 through 364-n at the end of each X select period.

These outputs are digitized by A/D converters 368-1 through 368-n respectively. In the illustrative embodiment of FIG. 16a, the digital resolution will be of the order of 8 bits. The 8-bit data words from each A/D converter 368-1 through 368-n are multiplexed down to a bus width that is more easily handled by a computer by multiplexer 370. Multiplexer 370 is a conventional multiplexer device known to those of ordinary skill in the art. The output of multiplexer 370 is presented to a computer which may then process the data in an appropriate manner.

A second illustrative embodiment of position matrix system (reference numeral 380) is shown in FIG. 16b. As in the embodiment of FIG. 16a, the X dimension integrating charge amplifiers (reference numerals 362-1 through 362-n) are used to perform the driving-point capacitance measurements disclosed herein for all X lines in the matrix. For each X line driven, the Y dimension integrating charge amplifiers (reference numerals 364-1 through 364-n) are used to perform the receiving-point capacitance measurements disclosed herein.

The sample/hold array 350 of FIG. 15 is employed and describes the extraction of derivation of the n by m array of voltages applications (V(1,1) to V(n,m)). These voltages are then sent to the input of a single or multiple level neural network 382. Each input neuron will have to have n•m input nodes to support the full size of the sensor array voltage matrix V(n,m).

An example of a single level neural network array circuitry 382, including the pre-processing and sample/hold circuitry 350 required, is disclosed in U.S. Patent No. 5,083,044. This circuit could be used as is or could be replicated and built into two or three layers giving more power and functionality. These variations and many others are well described in the literature, such as Hertz, Krogh, and Palmer, A Lecture Notes Volume in the Santa Fe Institute Studies in the Sciences of Complexity, Allen M. Wilde, Publ. (1991).

The typical application of this embodiment would require a neural network or computer program that at the primitive level can discern objects (finger touch points). This is the basic symbol, the presence of a finger, that is manipulated. From that point there may be predetermined gestures that the system looks for which indicate action. Motion may also need to be detected. A possible solution for this may be found in Mead, Analog VLSI and Neural Systems, Addison-Wesley (1989), Chapter 14, Optical Motion Sensor.

Because of the unique physical features of the present invention, there are several ergonomically interesting applications that were not previously possible. Presently a Mouse or Trackball is not physically convenient to use on portable computers. The present invention provides a very convenient and easy-to-use cursor position solution that replaces those devices.

In mouse-type applications, the sensor of the present invention may be placed in a convenient location, e.g., below the "space bar" key in a portable computer. When placed in this location, the thumb of the user may be ysed as the position pointer on the sensor to control the cursor position on the computer screen. The cursor may then be moved without the need for the user's fingers to leave the keyboard. Ergonomically, this is similar to the concept of the Macintosh Power Book with it's trackball, however the present invention provides a significant advantage in size over the track ball. Extensions of this basic idea are possible in that two sensors could be placed below the "space bar" key for even more feature control.

The computer display with it's cursor feedback is one small example of a very general area of application where a display could be a field of lights or LED's, a LCD display, or a CRT. Examples include touch controls on laboratory equipment where present equipment uses a knob/button/touch screen combination. Because of the articulating ability of this interface, one or more of those inputs could be combined into one of our inputs.

Consumer Electronic Equipment (stereos, graphic equalizers, mixers) applications often utilize significant front panel surface area for slide potentiometers because variable control is needed. The present invention can provide such control in one small touch pad location. As Electronic Home Systems become more common, denser and more powerful human interface is needed. The sensor technology of the present invention permits a very dense control panel. Hand Held TV/VCR/Stereo controls could be ergonomically formed and allow.for more powerful features if this sensor technology is used.

The sensor of the present invention can be conformed to any surface and can be made to detect multiple touching points, making possible a more powerful joystick. The unique pressure detection ability of the sensor technology of the present invention is also key to this application. Computer games, "remote" controls (hobby electronics, planes) , and machine tool controls are a few examples of applications which would benefit from the sensor technology of the present invention.

Musical keyboards (synthesizers, electric pianos) require velocity sensitive keys which can be provided by the pressure sensing ability of this sensor. There are also pitch bending controls, and other slide switches that could be replaced with this technology. An even more unique application comprises a musical instrument that creates notes as a function of the position and pressure of the hands and fingers in a very articulate 3-d interface.

The sensor technology of the present invention can best detect any conducting material pressing against it. By adding a conductive foam material on top of the sensor the sensor of the present invention may also indirectly detect pressure from any object being handled, regardless of its electrical conductivity.

Because of the amount of information available from this sensor it will serve very well as an input device to virtual reality machines. It is easy to envision a construction that allows position-monitoring in three dimensions and some degree of response (pressure) to actions.

While embodiments and applications of this invention have been shown and described, it would be apparent to those skilled in the art that many more modifications than mentioned above are possible without departing from the inventive concepts herein. The invention, therefore, is not to be restricted except in the spirit of the appended claims.

Claims

1. An object proximity sensor, including:

   a plurality of spaced-apart conductive sensor pads disposed in a matrix of rows and columns on a first face of a substrate;

   a plurality of row conductive lines disposed on said substrate and generally aligned with said rows, each of said row conductive lines electrically contacting certain ones of said sensor pads in one of said rows;

   a plurality of column conductive lines disposed on said substrate, insulated from said row conductors and generally aligned with said columns, each of said column conductive lines electrically contacting the ones of said sensor pads in one of said columns which are not contacted by said row conductive lines;

   capacitance-sensing means for sensing the capacitance of each of said row conductive lines and the capacitance of each of said column conductive lines in the presence of an object to be sensed and for producing a set of object-sensed electrical signals related thereto.

2. The object proximity sensor of claim 1 wherein said row conductive lines are disposed on said first face of said substrate and said column conductive lines are disposed on a second face of said substrate opposite said first face.

3. The object proximity sensor of claim 1, wherein said capacitance-sensing means comprises means for injecting a step voltage onto each of said row conductive lines and said column conductive lines, and means for sensing the charge required to inject said step voltage onto each of said row conductive lines and said column conductive lines.

4. The object proximity sensor of claim 3, further including:

   means for sensing a no-object-present capacitance of each of said row conductive lines and sensing a no-object-present capacitance of each of said column conductive lines, for producing a set of no-object-present electrical signals related thereto; and

   means for subtracting said set of no-object-present electrical signals from said set of object-sensed electrical signals.

5. The object proximity sensor of claim 4 wherein said means for producing a set of no-object-present electrical signals related to said no-object-present capacitance of each of said row conductive lines and said no-object-present capacitance of each of said column conductive lines comprises means for computing weighted minima of said object-sensed electrical signals thereof.

6. An object proximity sensor, including:

   a plurality of spaced-apart conductive sensor pads disposed in a matrix of rows and columns on a first side of a substrate;

   a plurality of row conductive lines disposed on said substrate and generally aligned with said rows, each of said row conductive lines electrically contacting certain ones of said sensor pads in one of said rows;

   a plurality of column conductive lines disposed on said substrate, insulated from said row conductive lines and generally aligned with said columns, each of said column conductive lines electrically contacting the ones of said sensor pads in one of said columns which are not contacted by said row conductive lines;

   capacitance-sensing means for sensing the capacitance between each of said row conductive lines and each of said column conductive lines in the presence of an object to be sensed and for producing set of object-sensed electrical signals related thereto.

7. The object proximity sensor of claim 6 wherein said row conductive lines are disposed on said first face of said substrate and said column conductive lines are disposed on a second face of said substrate opposite said first face.

8. The object proximity sensor of claim 6, wherein said capacitance-sensing means comprises means for injecting a step voltage onto each of said row conductive lines, and means for sensing the charge injected onto each of said column conductive lines by said step voltage.

9. The object proximity sensor of claim 6, further including:

means for sensing a no-object-present capacitance of each intersection of one of said row conductive lines and one of said column conductive lines, for producing a set of no-object-present electrical signals related thereto; and

means for subtracting said set of no-object-present electrical signals from said set of object-sensed electrical signals.

10. The object proximity sensor of claim 9 wherein said means for producing a set of no-object-present electrical signals related to said no-object-present capacitance of each of said row conductive lines and said no-object-present capacitance of each of said column conductive lines comprises means for computing weighted minima of said object-sensed electrical signals thereof.

11. An object proximity sensor, including:

a plurality of spaced-apart conductive sensor pads disposed in a plurality of rows on a first side of a substrate, the ones of said sensor pads in odd numbered ones of said rows disposed along a first set of column positions and the ones of said sensor pads in even numbered ones of said rows disposed at a second set of column positions offset from said first set of column positions such that said sensor pads form a repetitive diamond pattern;

a plurality of row conductive lines disposed on said substrate and generally aligned with said rows, each of said row conductive lines electrically contacting every one of said sensor pads in one of said odd-numbered rows;

a plurality of column conductive lines disposed on said substrate, insulated from said row conductive lines and generally aligned with said offset column positions, each of said column conductive lines electrically contacting through said substrate the ones of said sensor pads in one of said offset column positions;

capacitance-sensing means for sensing the capacitance of each of said row conductive lines and the capacitance of each of said column conductive lines in the presence of an object to be sensed and for producing a set of object-sensed electrical signals related thereto.

12. The object proximity sensor of claim 11 wherein said row conductive lines are disposed on said first face of said substrate and said column conductive lines are disposed on a second face of said substrate opposite said first face.

13. The object proximity sensor of claim 11, wherein said capacitance-sensing means comprises means for injecting a step voltage onto each of said row conductive lines and said column conductive lines, and means for sensing the charge required to inject said step voltage onto each of said row conductive lines and said column conductive lines.

14. The object proximity sensor of claim 11, further including:

means for sensing a no-object-present capacitance of each of said row conductive lines and sensing a no-object-present capacitance of each of said column conductive lines, for producing a set of no-object-present electrical signals related thereto; and

means for subtracting said set of no-object-present electrical signals from said set of object-sensed electrical signals.

15. The object proximity sensor of claim 14 wherein said means for producing a set of no-object-present electrical signals related to said no-object-present capacitance of each of said row conductive lines and said no-object-present capacitance of each of said column conductive lines comprises means for computing weighted minimums of said object-sensed electrical signals thereof.

16. An object proximity sensor, including:

a plurality of spaced-apart conductive sensor pads disposed in a plurality of rows on a first side of a substrate, the ones of said sensor pads in odd numbered ones of said rows disposed along a first set of column positions and the ones of said sensor pads in even numbered ones of said rows disposed at a second set of column positions offset from said first set of column positions and said rows spaced apart such that said sensor pads form a closely packed repetitive pattern wherein each pad is not in contact with adjoining pads;

a plurality of row conductive lines disposed on said substrate and generally aligned with said rows, each of said row conductive lines electrically contacting every one of said sensor pads in one of said odd-numbered rows;

a plurality of column conductive lines disposed on said substrate, insulated from said row conductive lines and generally aligned with said offset column positions, each of said column conductive lines electrically contacting the ones of said sensor pads in one of said offset column positions;

capacitance-sensing means for sensing the capacitance between each of said row conductive lines and each of said column conductive lines in the presence of an object to be sensed and for producing set of object-sensed electrical signals related thereto.

17. The object proximity sensor of claim 16 wherein said row conductive lines are disposed on said first face of said substrate and said column conductive lines are disposed on a second face of said substrate opposite said first face.

18. The object proximity sensor of claim 16, wherein said capacitance-sensing means comprises means for injecting a step voltage onto each of said row conductive lines, and means for sensing on each of said column conductive lines the charge injected thereinto by said step voltage onto each of said row conductive lines.

19. The object proximity sensor of claim 16, further including:

means for sensing a no-object-present capacitance of each intersection of one of said row conductive lines and one of said column conductive lines, for producing a set of no-object-present electrical signals related thereto; and

means for subtracting said set of no-object-present electrical signals from said set of object-sensed electrical signals.

20. The object proximity sensor of claim 19 wherein said means for producing a set of no-object-present electrical signals related to said no-object-present capacitance of each of said row conductive lines and said no-object-present capacitance of each of said column conductive lines comprises means for computing weighted minimums of said object-sensed electrical signals thereof.

21. A method for providing an electrical signal representative of the position of an object in a two dimensional plane, including the steps of:

providing a sensing plane including a matrix of conductors arranged as a plurality of rows and columns of spaced apart conductors, said sensing plane characterized by an inherent capacitance between the various ones of said row and column conductors, said capacitance varying with the proximity of an object to said row and column conductors;

developing for each conductor in both the row and column dimensions a first electrical signal proportional to the value of said capacitance when no object is located proximate to said sensing plane;

developing for each conductor in both the row and column dimensions a second electrical signal proportional to the value of said capacitance when an object is located proximate to said sensing plane; and

encoding said set of row electrical signals and said set of column electrical signals into electrical signals indicating the position of said object in said row dimension and said column dimension.

22. The method of claim 21, further including the step of subtracting said first electrical signal from said second electrical signal for each conductor to form a set of row and a set of column electrical signals defining a profile of the proximity of said object in both said row and column dimensions.

23. The method of claim 21 further including the step of processing said set of row electrical signals and said set of column electrical signals to create an area electrical signal proportional to the area of proximity of said object to said processing plane.

24. The method of claim 21 wherein the step of encoding said set of row electrical signals and said set of column electrical signals into electrical signals indicating the position of said object in said row dimension and said column dimension comprises separately encoding said set of row electrical signals into a first digital signal and encoding said set of column electrical signals into a second digital signal.

25. The method of claim 24 wherein the step of encoding said set of row electrical signals and said set of column electrical signals into electrical signals indicating the position of said object in said row dimension and said column dimension comprises separately encoding said set of row electrical signals into a first digital signal and encoding said set of column electrical signals into a second digital signal, and further including the step of encoding said area electrical signal into a third digital signal.

26. The method of claim 21 further including the step of providing a signal when said first electrical signal for any of said row or column conductors exceeds a predetermined threshold.

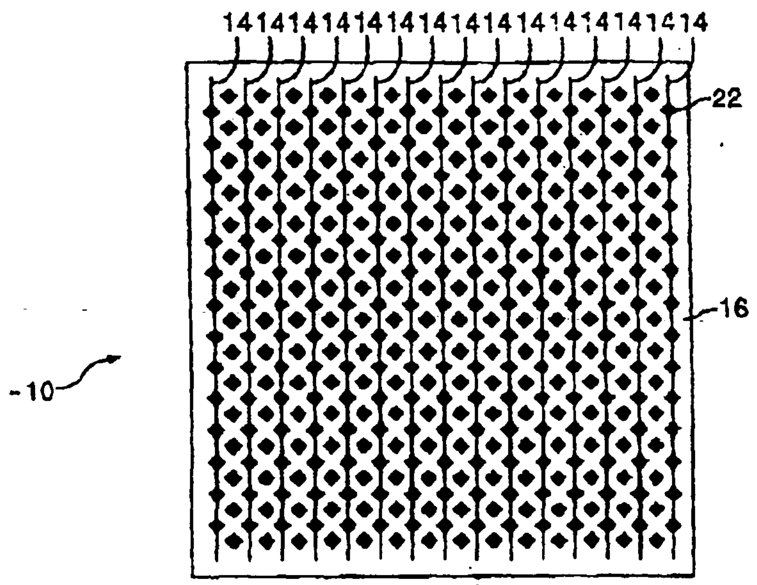


FIG. 1a

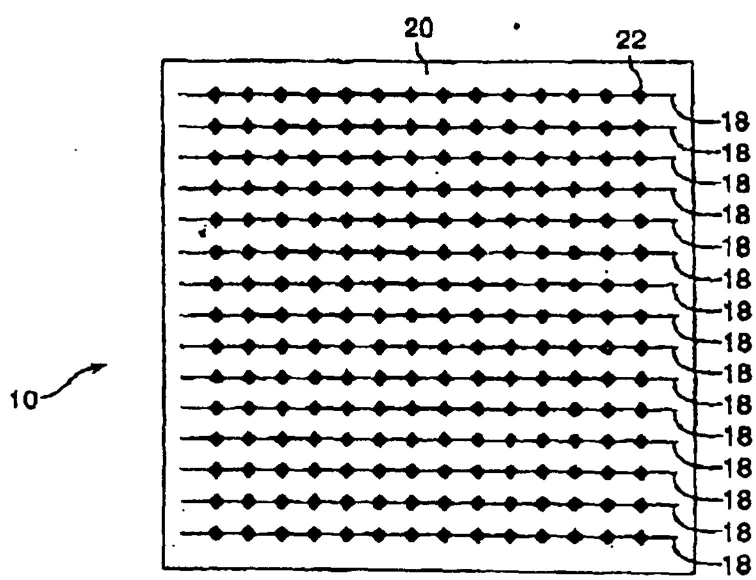


FIG. 1b

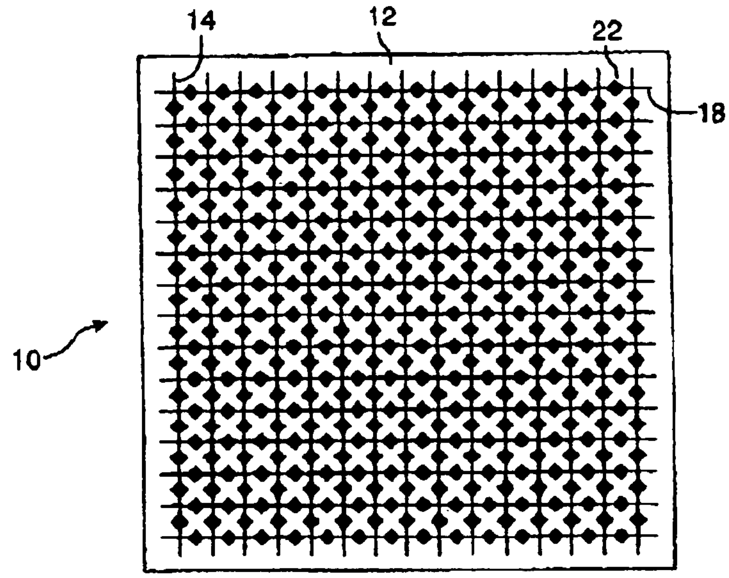


FIG. 1c

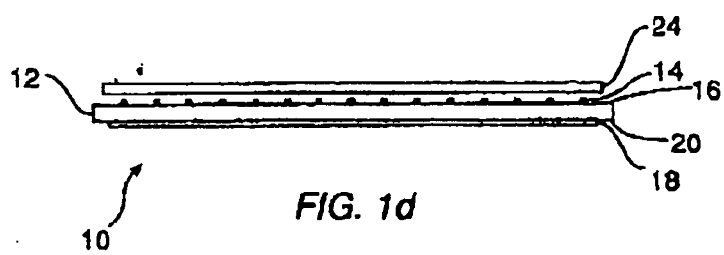


FIG. 1d

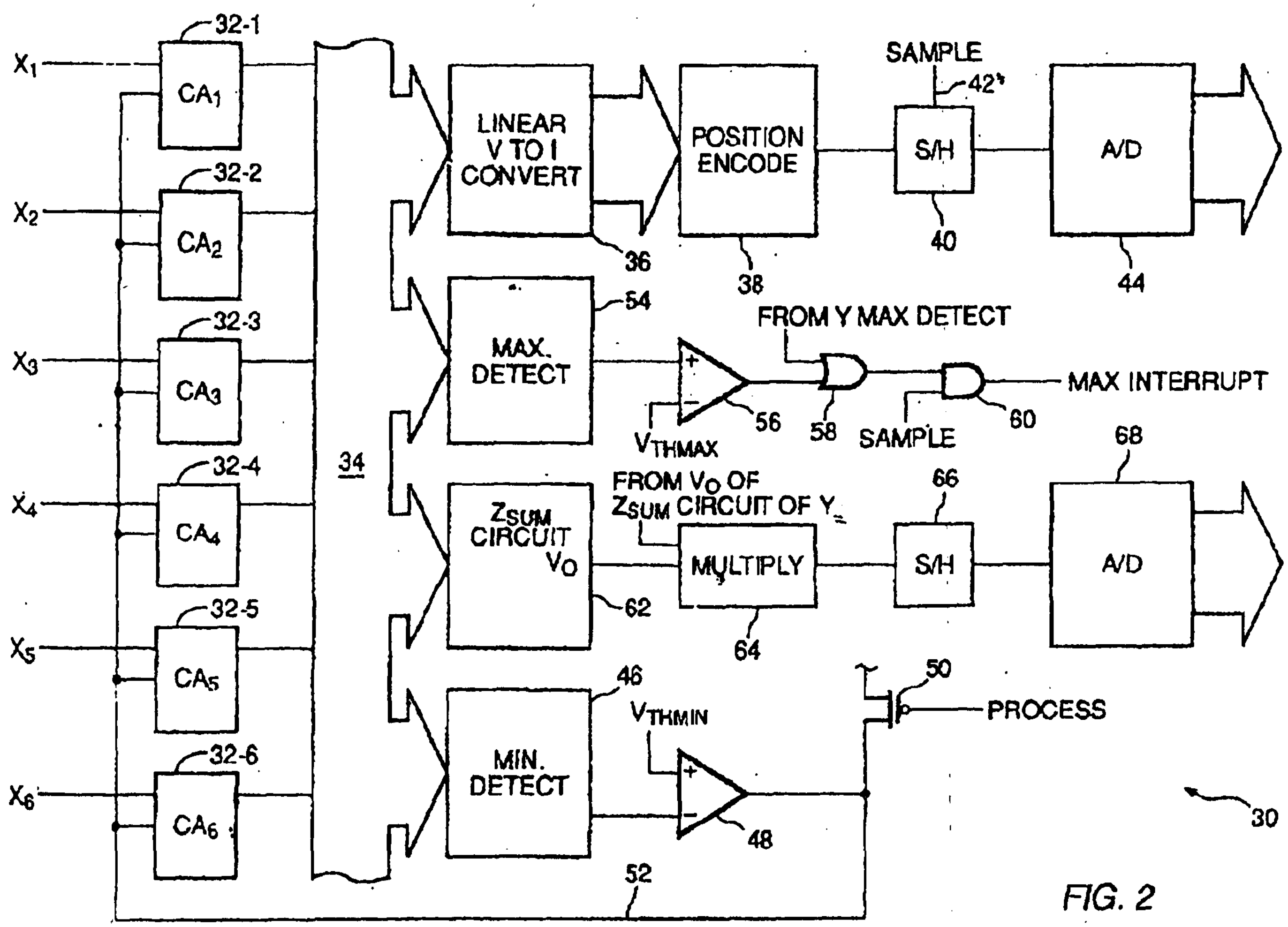

X1
X2
X3
X4
X5
X6
32-1
32-2
32-3
32-4
32-5
32-6
CA1
CA2
CA3
CA4
CA5
CA6
34
LINEAR V TO I CONVERT
36
POSITION ENCODE
38
SAMPLE
42
S/H
40
A/D
44
MAX. DETECT
54
FROM Y MAX DETECT
56
VTHMAX
58
SAMPLE
60
MAX INTERRUPT
68
FROM VO OF ZSUM CIRCUIT OF Y
66
ZSUM CIRCUIT VO
62
MULTIPLY
64
S/H
A/D
46
VTHMIN
50
PROCESS
MIN. DETECT
48
52
30

FIG. 2

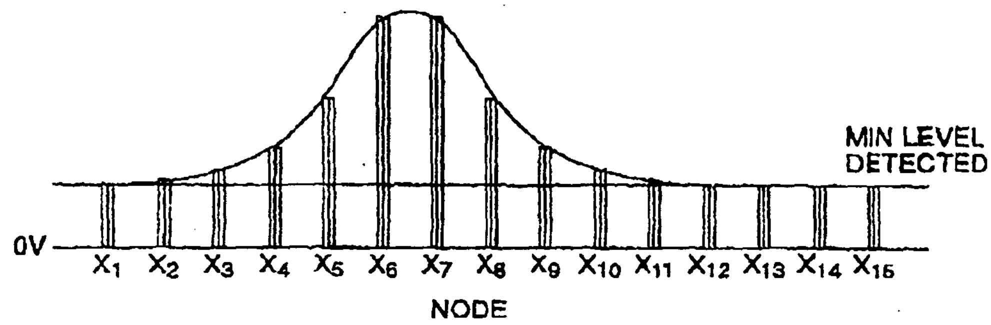


FIG. 3a

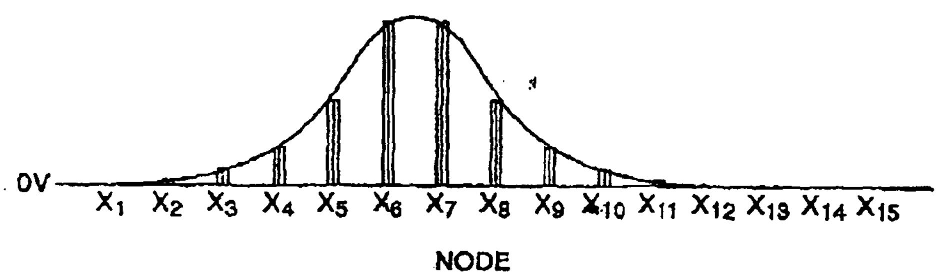


FIG. 3b

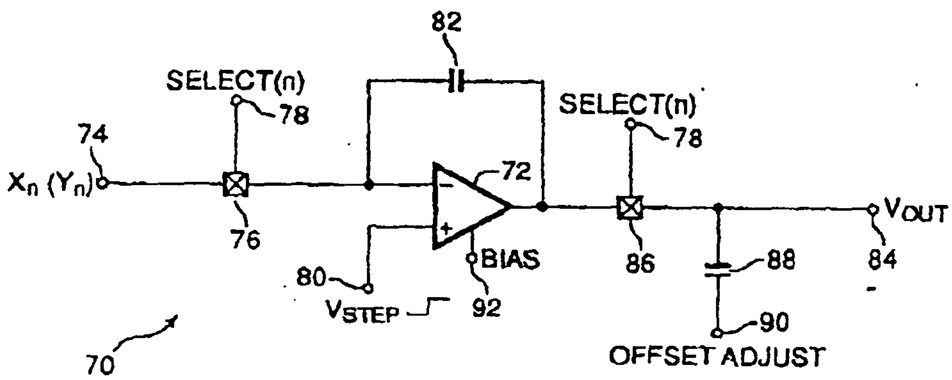


FIG. 4

CY00001033

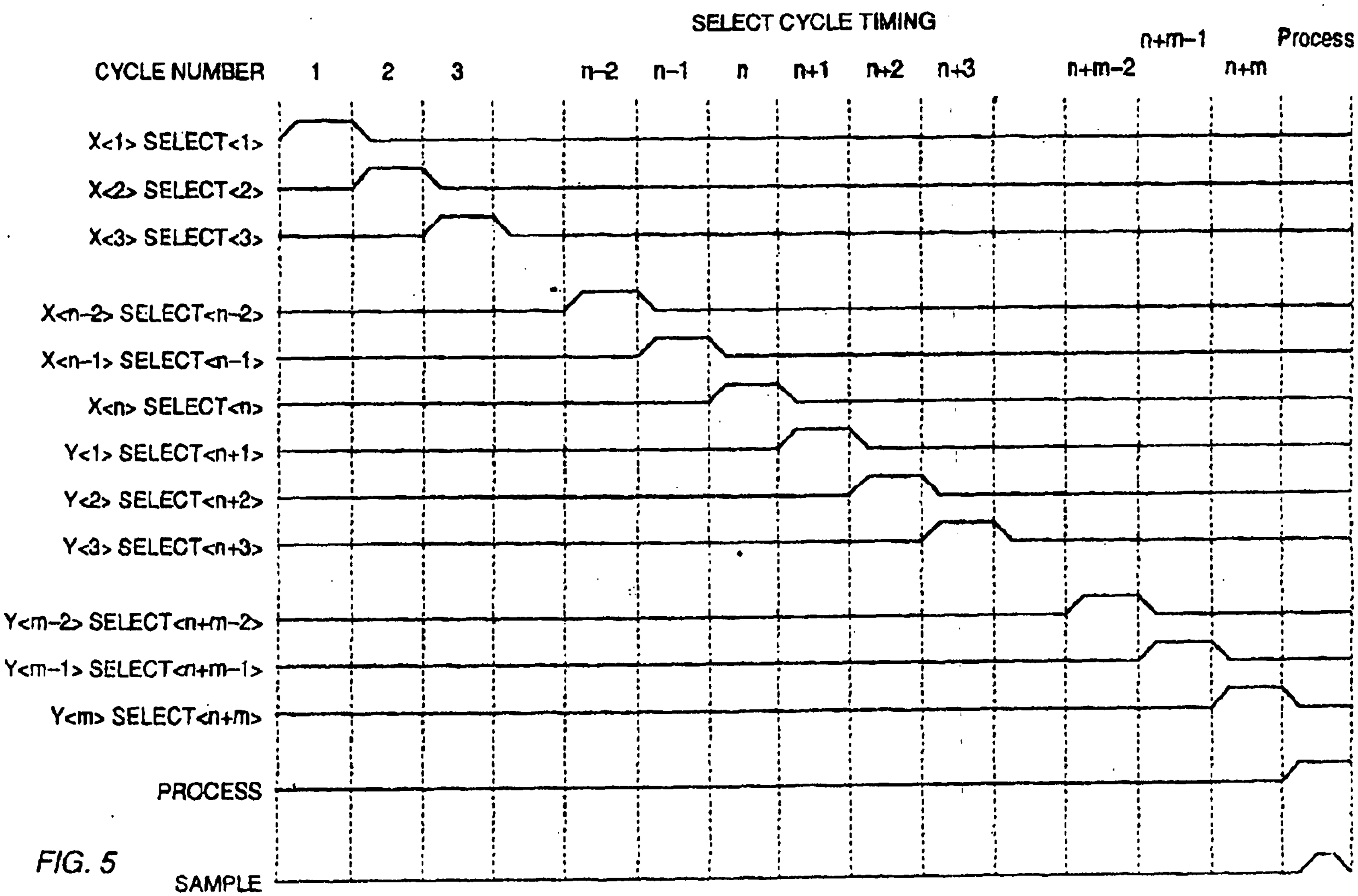

SELECT CYCLE TIMING
CYCLE NUMBER
1
2
3
n-2
n-1
n
n+1
n+2
n+3
n+m-2
n+m-1
n+m
Process
X<1> SELECT<1>
X<2> SELECT<2>
X<3> SELECT<3>
X<n-2> SELECT<n-2>
X<n-1> SELECT<n-1>
X<n> SELECT<n>
Y<1> SELECT<n+1>
Y<2> SELECT<n+2>
Y<3> SELECT<n+3>
Y<m-2> SELECT<n+m-2>
Y<m-1> SELECT<n+m-1>
Y<m> SELECT<n+m>
PROCESS
SAMPLE

FIG. 5

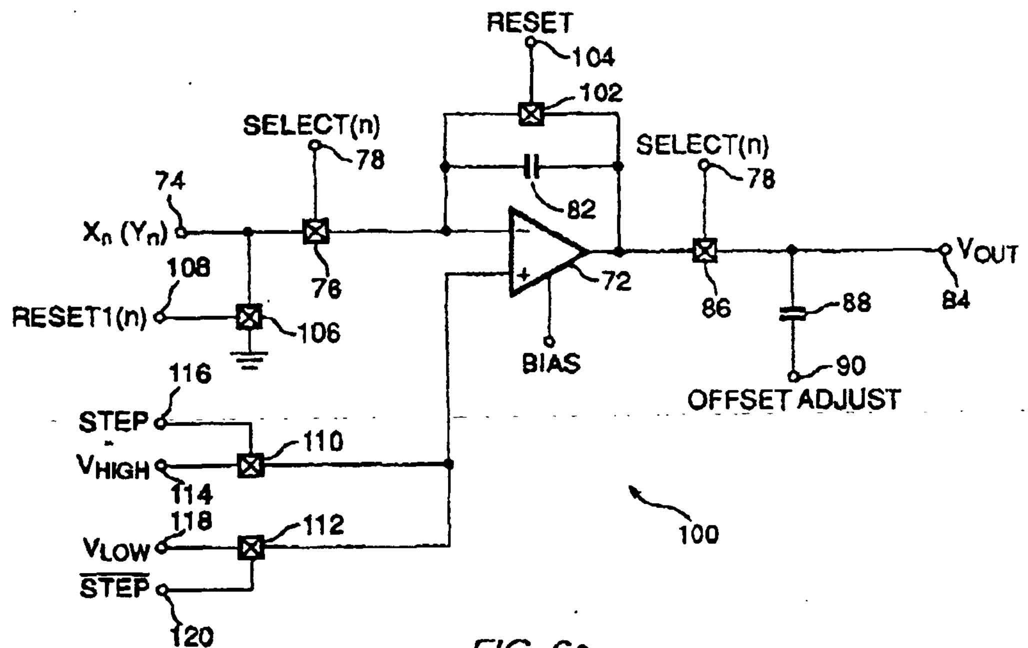

RESET
104
102
SELECT(n)
78
SELECT(n)
78
74
82
X_n (Y_n)
76
72
108
86
88
V_{OUT}
84
RESET1(n)
106
BIAS
90
OFFSET ADJUST
116
STEP
110
V_{HIGH}
114
118
112
100
V_{LOW}
$\overline{STEP}$
120

FIG. 6a

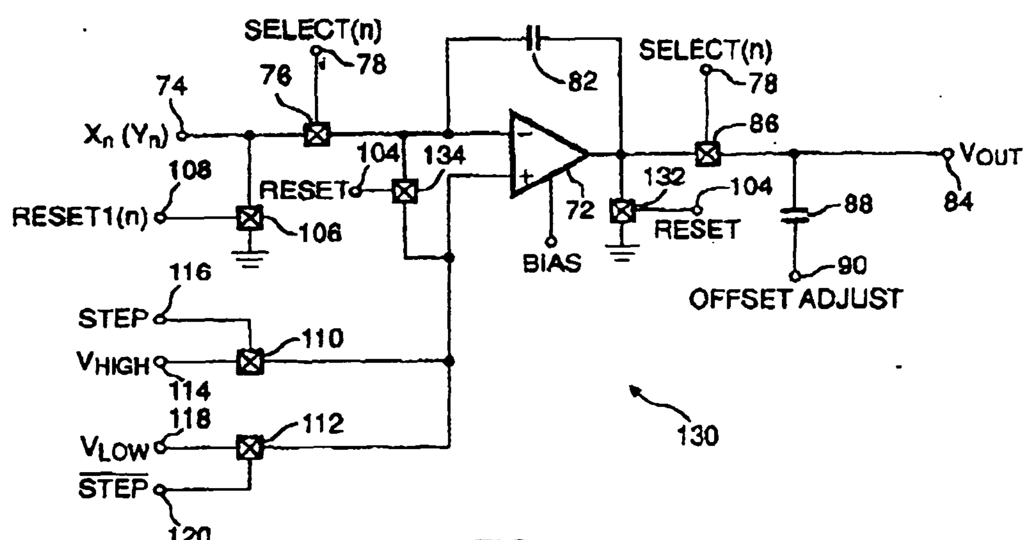

SELECT(n)
78
76
74
82
SELECT(n)
78
86
X_n (Y_n)
104
134
108
RESET
132
104
V_{OUT}
RESET1(n)
106
72
RESET
88
84
BIAS
90
116
OFFSET ADJUST
STEP
110
V_{HIGH}
114
118
112
130
V_{LOW}
$\overline{STEP}$
120

FIG. 7a

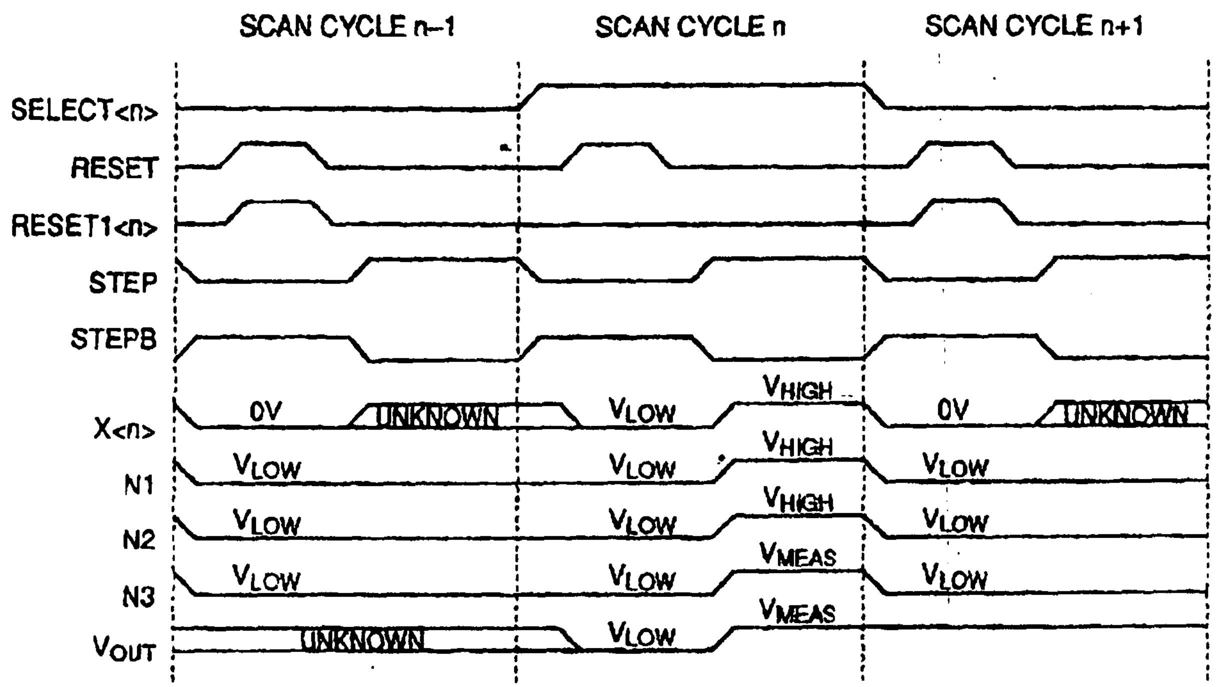

SCAN CYCLE n–1
SCAN CYCLE n
SCAN CYCLE n+1
SELECT<n>
RESET
RESET1<n>
STEP
STEPB
X<n>
N1
N2
N3
V_{OUT}
0V
UNKNOWN
V_{LOW}
V_{HIGH}
V_{MEAS}

FIG. 6b

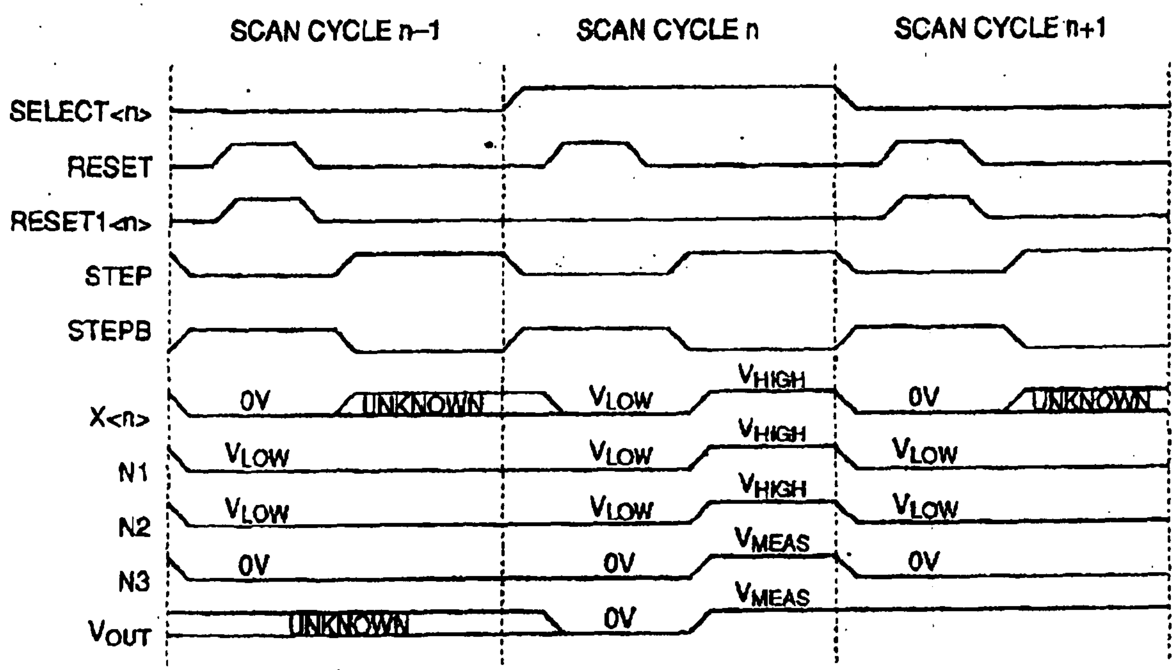

SCAN CYCLE n–1
SCAN CYCLE n
SCAN CYCLE n+1
SELECT<n>
RESET
RESET1<n>
STEP
STEPB
X<n>
N1
N2
N3
V_{OUT}
0V
UNKNOWN
V_{LOW}
V_{HIGH}
V_{MEAS}

FIG. 7b

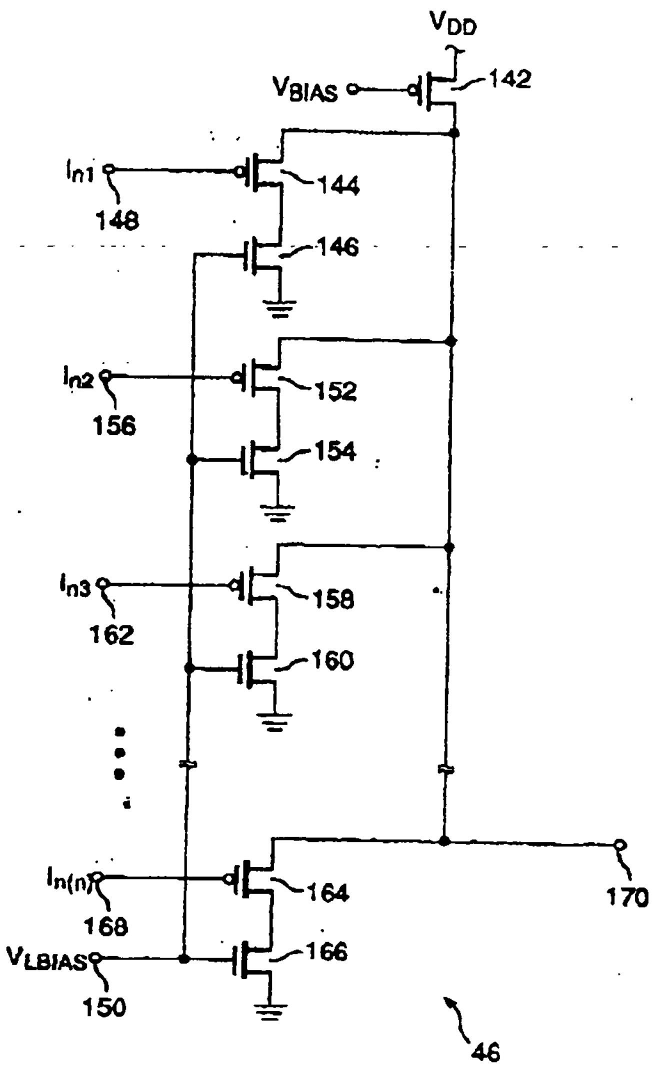
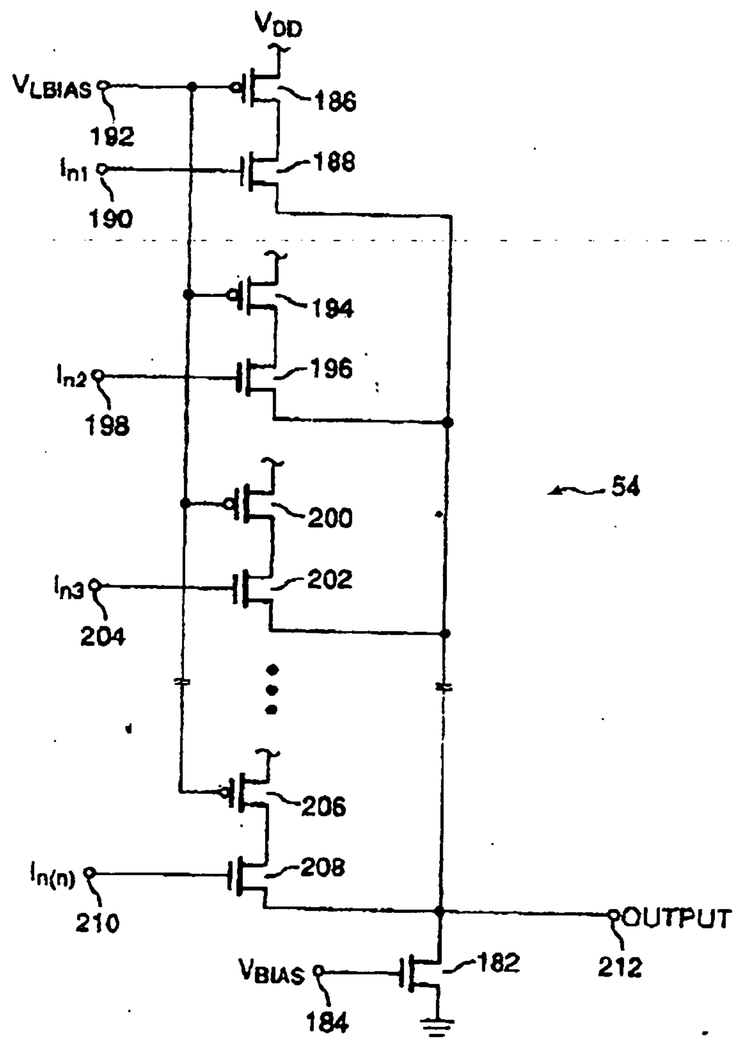

VDD
VBIAS
142
In1
148
144
146
In2
156
152
154
In3
162
158
160
In(n)
168
164
VLBIAS
150
166
170
46

FIG. 8



V_DD
V_LBIAS
192
I_n1
190
186
188
194
196
I_n2
198
54
200
202
I_n3
204
206
208
I_n(n)
210
OUTPUT
212
V_BIAS
184
182

FIG. 9

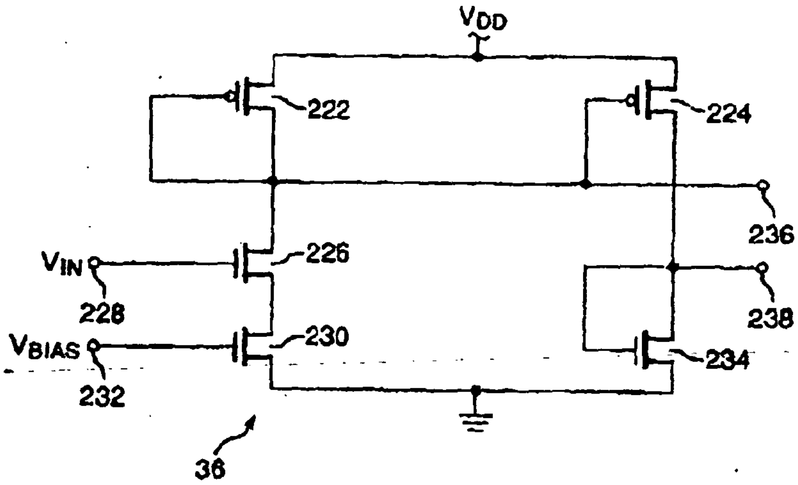

VDD
222
224
236
VIN
226
228
238
VBIAS
230
232
234
36

FIG. 10

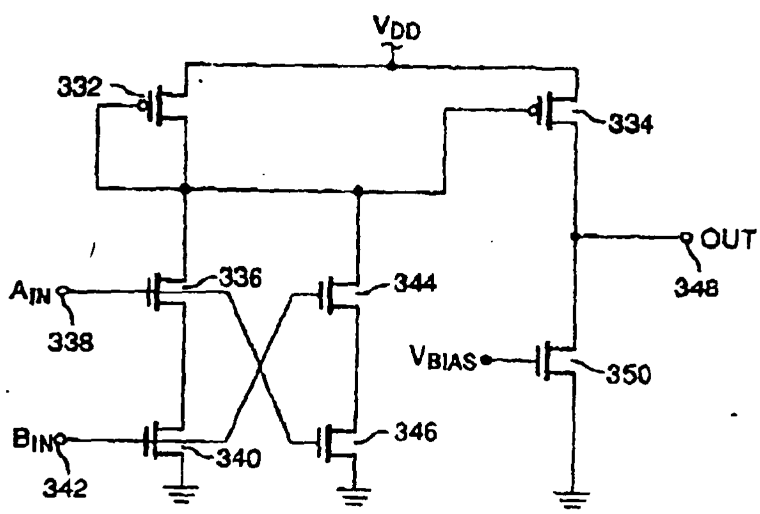

VDD
332
334
OUT
348
AIN
336
344
338
VBIAS
350
BIN
340
346
342

FIG. 13

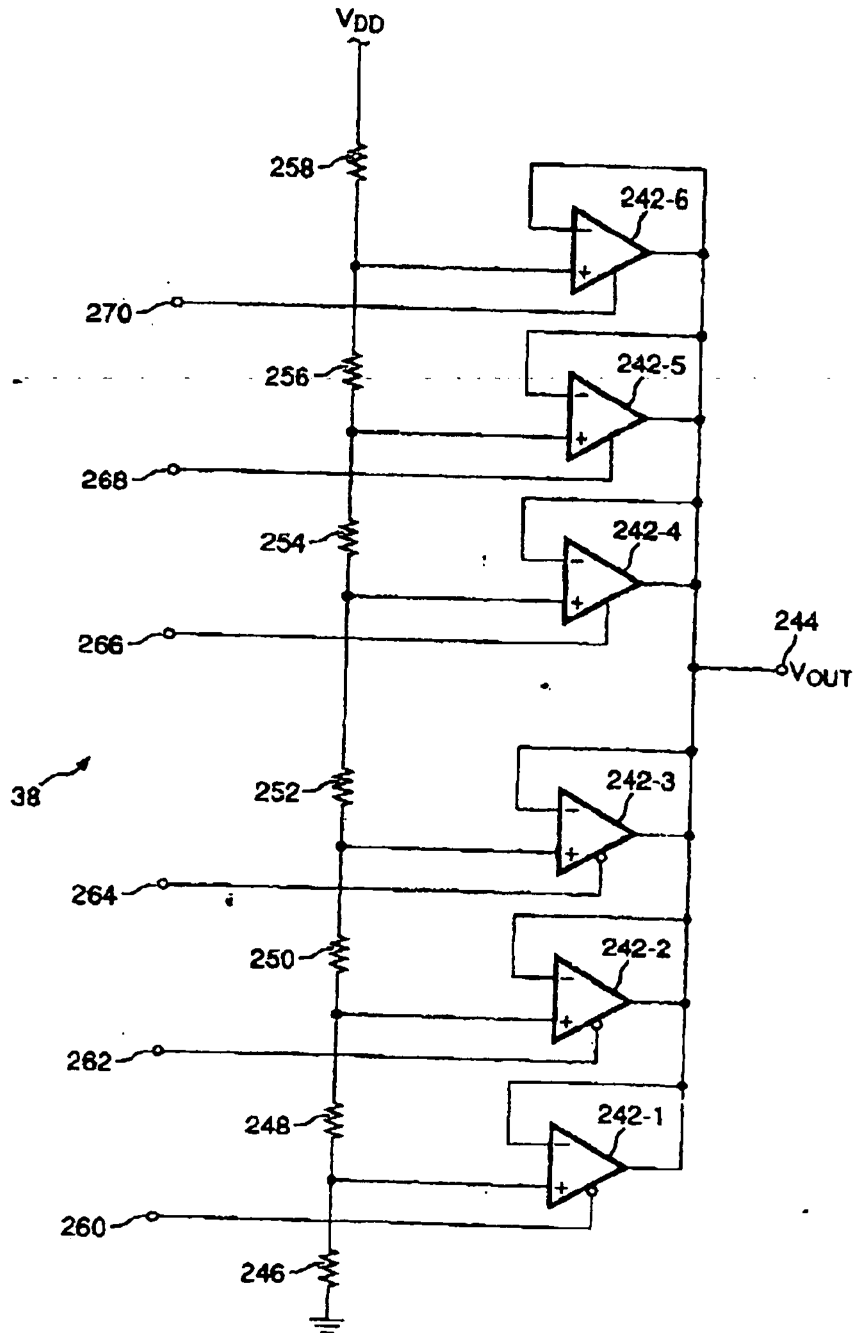
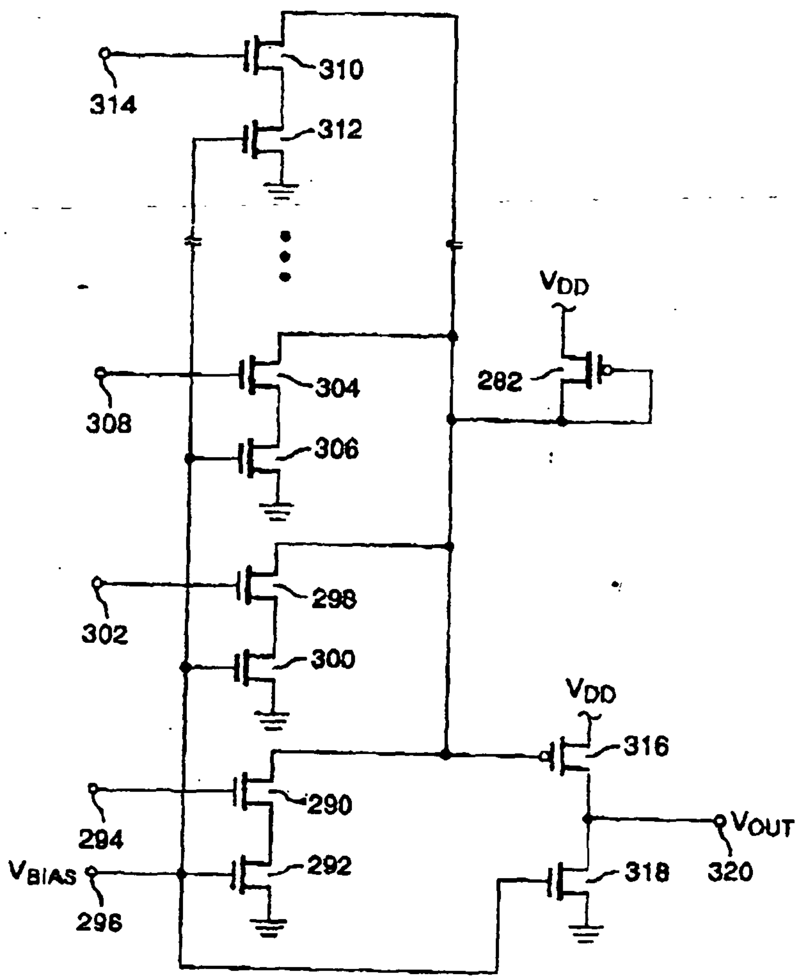

VDD
258
242-6
270
256
242-5
268
254
242-4
266
244
VOUT
38
252
242-3
264
250
242-2
262
248
242-1
260
246

FIG. 11



314
310
312
VDD
308
304
282
306
302
298
300
VDD
294
290
316
VOUT
VBIAS
292
318
320
296

FIG. 12

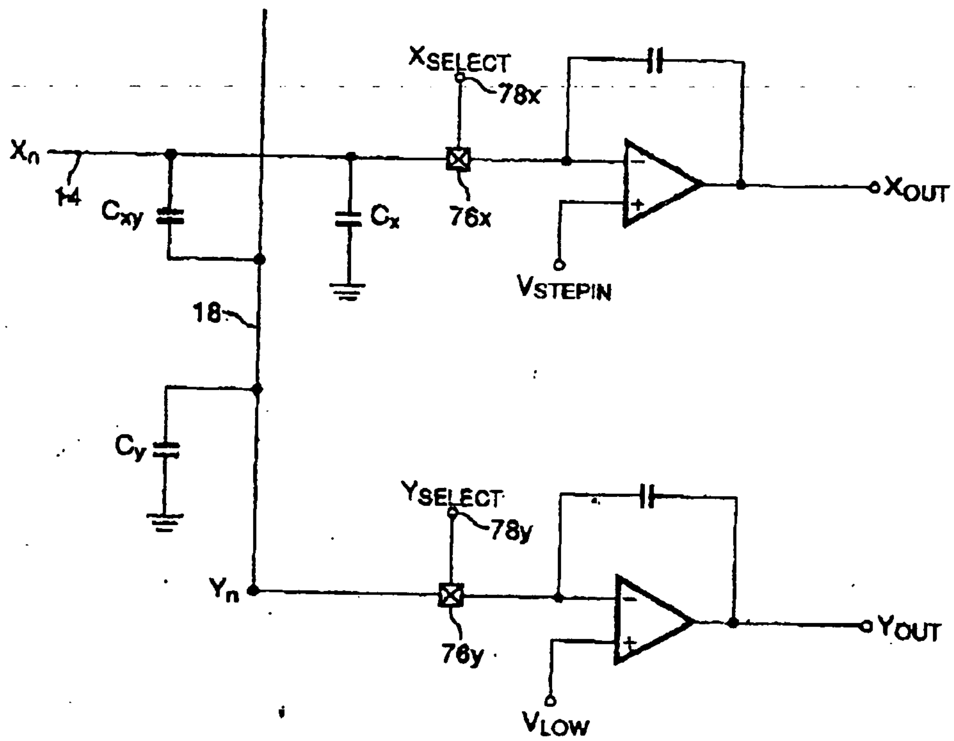

XSELECT
78x
Xn
14
Cxy
Cx
76x
XOUT
VSTEPIN
18
Cy
YSELECT
78y
Yn
76y
YOUT
VLOW

FIG. 14

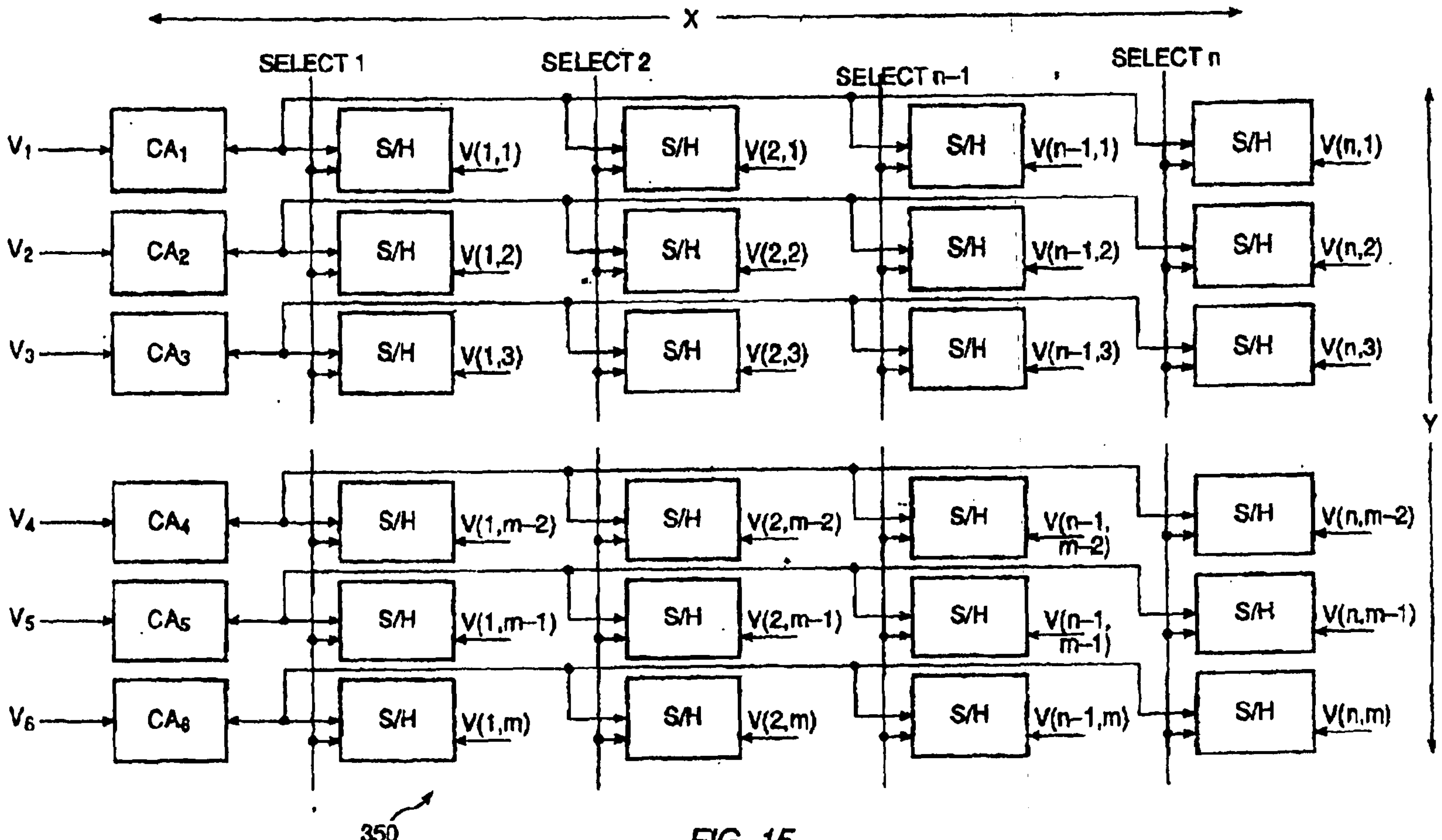
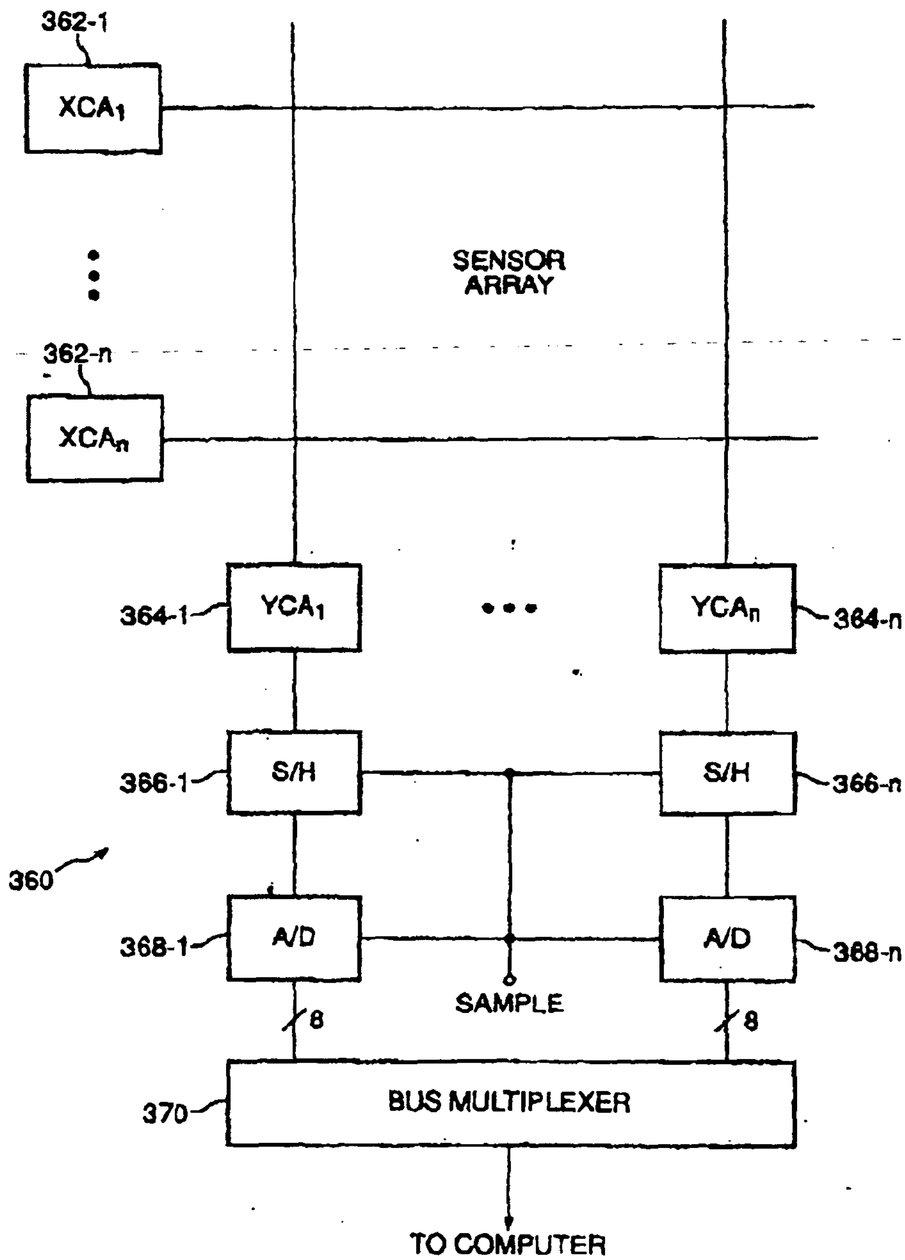

X
Y
SELECT 1
SELECT 2
SELECT n–1
SELECT n
V1
V2
V3
V4
V5
V6
CA1
CA2
CA3
CA4
CA5
CA6
S/H
V(1,1)
V(2,1)
V(n–1,1)
V(n,1)
V(1,2)
V(2,2)
V(n–1,2)
V(n,2)
V(1,3)
V(2,3)
V(n–1,3)
V(n,3)
V(1,m–2)
V(2,m–2)
V(n–1, m–2)
V(n,m–2)
V(1,m–1)
V(2,m–1)
V(n–1, m–1)
V(n,m–1)
V(1,m)
V(2,m)
V(n–1,m)
V(n,m)
350

FIG. 15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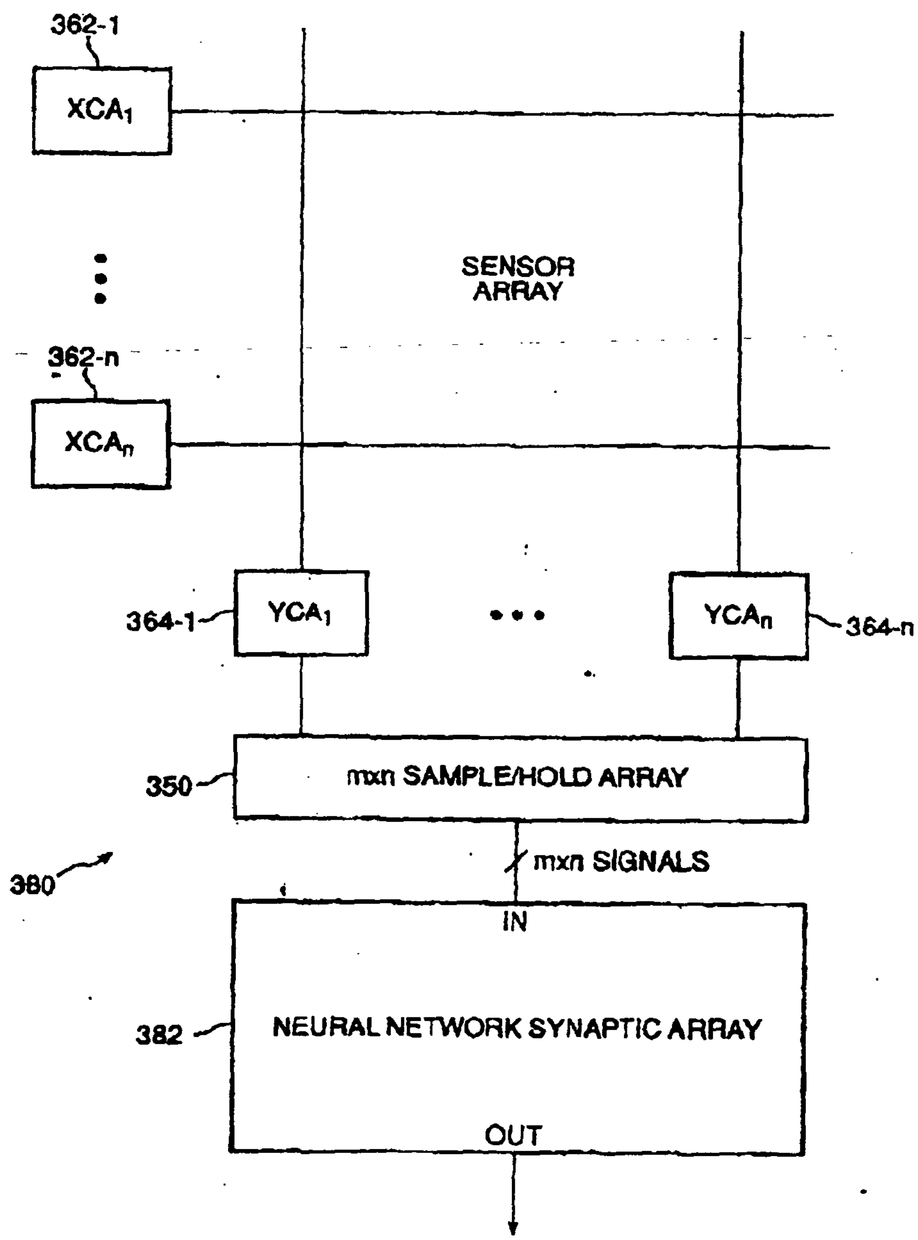
ARRAY
362-n
XCAn
364-1
YCA1
YCAn
364-n
366-1
S/H
S/H
366-n
360
368-1
A/D
A/D
368-n
8
SAMPLE
8
370
BUS MULTIPLEXER
TO COMPUTER

FIG. 16a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ARRAY
362-n
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YCAn
364-n
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380
mxn SIGNALS
IN
382
NEURAL NETWORK SYNAPTIC ARRAY
OUT

FIG. 16b

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 93 30 4403

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	US-A-4 550 221 (MABUSTH)	1,2,11, 12,14, 21,22,24	G06K11/16
Y	* column 2, line 41 - line 68 *	3,4,6-8, 13, 16-18, 23,25	
A	* column 3, line 42 - column 7, line 50 * * column 8, line 46 - column 9, line 57; figures 1-5,7 * ---	9,19	
X A	FR-A-2 662 528 (SEXTANT AVIONIQUE) * page 3, line 1 - page 8, line 24; figures * ---	21,22,24 1,2,6,7, 11,12, 16,17,25	
Y	IEEE TRANSACTIONS ON ELECTRON DEVICES vol. ED-32, no. 7, July 1985, NEW YORK US pages 1196 - 1201 K.CHUN ET AL. 'A High-Performance Silicon Tactile Imager Based on a Capacitive Cell'	3,4,6-8, 13,16-18	
A	* page 1196, right column, line 34 - page 1197, left column, line 38 * * page 1198, left column, line 4 - page 1199, left column, line 12; figures 1-4 * ---	1,11,21	TECHNICAL FIELDS SEARCHED (Int. Cl.5) G06K
Y A	US-A-4 736 191 (MATZKE ET AL.) * column 2, line 12 - column 3, line 47 * * column 4, line 13 - column 6, line 25 * * column 8, line 23 - line 59; figures 1-4 * -----	23,25 1,6,11, 16,21	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	06 SEPTEMBER 1993	SEMPLE M.

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Electronic Patent Application Fee Transmittal

Application Number:	11437517
Filing Date:	18-May-2006
Title of Invention:	TWO-PIN BUTTONS
First Named Inventor/Applicant Name:	Jiang XiaoPing
Filer:	Larry Joel Johnson/Lauren Navarro
Attorney Docket Number:	CD06039

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
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Pages:				
Claims:				
Miscellaneous-Filing:				
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Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
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		Total in USD ($)		**810**

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EFS ID:	10014492
Application Number:	11437517
International Application Number:	
Confirmation Number:	2623
Title of Invention:	TWO-PIN BUTTONS
First Named Inventor/Applicant Name:	Jiang XiaoPing
Customer Number:	60909
Filer:	Larry Joel Johnson/Lauren Navarro
Filer Authorized By:	Larry Joel Johnson
Attorney Docket Number:	CD06039
Receipt Date:	03-MAY-2011
Filing Date:	18-MAY-2006
Time Stamp:	20:40:09
Application Type:	Utility under 35 USC 111(a)

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Payment Type	Deposit Account
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2	Transmittal Letter	CD06039_TransmittalLetter_05032011.pdf	26887 3d99c578d8a4bc675188b6937b59af5f8a965558	no	2
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Information:					
3	Information Disclosure Statement (IDS) Filed (SB/08)	CD06039_IDSform_05032011.pdf	806003 fc812711bb0fe091f6bb939b31538417d6ac0ccc	no	4
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Information:					
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8	Information Disclosure Statement (IDS) Filed (SB/08)	CD05171_IDSform1_04262011_5.pdf	793743 b0ade39bb313343b9453fd5262c558aac09c6dd0	no	4

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Application Number	11437517
Filing Date	2006-05-18
First Named Inventor	Jiang XiaoPing
Art Unit	2629
Examiner Name	KETEMA, BENYAM
Attorney Docket Number	CD06039

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	4	USPTO Non-Final Rejection for Application Number 11/493,350 (CD06097) dated 06/16/2010; 8 pages	☐
	5	USPTO Notice of Allowance for Application Number 11/700,314 (CD06163) dated 09/16/2010; 8 pages	☐
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	Application Number	11437517
	Filing Date	2006-05-18
	First Named Inventor	Jiang XiaoPing
	Art Unit	2629
	Examiner Name	KETEMA, BENYAM
	Attorney Docket Number	CD06039

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	Filing Date	2006-05-18
	First Named Inventor	Jiang XiaoPing
	Art Unit	2629
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7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

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9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	11437517
	Filing Date	2006-05-18
	First Named Inventor	Jiang XiaoPing
	Art Unit	2629
	Examiner Name	KETEMA, BENYAM
	Attorney Docket Number	CD06039

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code1	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	4039940	B1	1976-02-01	Jacob et al.	Entire Document
	2	4145748	B1	1979-03-20	Eichelberger et al.	Entire Document
	3	4614937	B1	1986-09-30	Poujois, Robert	Entire Document
	4	4728932	B1	1988-03-01	Atherton, James H.	Entire Document
	5	4825147	B1	1989-04-25	Cook et al.	Entire Document
	6	7683641	B1	2010-03-23	Hargreaves et al.	Entire Document
	7	7453270	B1	2008-11-18	Hargreaves et al.	Entire Document
	8	7423437	B1	2008-09-09	Hargreaves et al.	Entire Document

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	Attorney Docket Number	CD06039

	9	7521941	B1	2009-04-21	Ely et al.	Entire Document
	10	7417441	B1	2008-08-26	Reynolds, Joseph Kurth	Entire Document
	11	7148704	B1	2006-12-12	Philipp, Harald	Entire Document
	12	5801340	B1	1998-09-01	Peter, Walter H.	Entire Document
	13	7453279	B1	2008-11-18	Corbin Jr. et al.	Entire Document
	14	7451050	B1	2008-11-11	Hargreaves, Kirk	Entire Document
	15	5920309	B1	1999-07-06	Bisset et al.	Entire Document
	16	7450113	B1	2008-11-11	Gillespie et al.	Entire Document
	17	6191723	B1	2001-02-20	Lewis, Jason D.	Entire Document
	18	6353200	B1	2002-03-05	Schwankhart, Gerhard	Entire Document
	19	7449895	B1	2008-11-11	Ely et al.	Entire Document

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	11437517
	Filing Date	2006-05-18
	First Named Inventor	Jiang XiaoPing
	Art Unit	2629
	Examiner Name	KETEMA, BENYAM
	Attorney Docket Number	CD06039

	20	7423437	B1	2008-09-09	Hargreaves et al.	Entire Document
	21	7417411	B1	2008-08-26	Hoffman et al.	Entire Document
	22	7339580	B1	2008-03-04	Westerman et al.	Entire Document
	23	5760852	B1	1998-06-02	Wu et al.	Entire Document
	24	6859159	B1	2005-02-22	Michalski, Christopher	Entire Document
	25	6970120	B1	2005-11-29	Bjornsen, Johnny	Entire Document
	26	7031886	B1	2006-04-18	Hargreaves, Kirk	Entire Document
	27	7078916	B1	2006-07-18	Denison, Timothy J.	Entire Document
	28	7129935	B1	2006-10-31	Mackey, Bob Lee	Entire Document
	29	7235983	B1	2007-06-26	O'Dowd et al.	Entire Document
	30	7262609	B1	2007-08-28	Reynolds, Joseph Kurth	Entire Document

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		11437517
	Filing Date		2006-05-18
	First Named Inventor	Jiang XiaoPing	
	Art Unit		2629
	Examiner Name	KETEMA, BENYAM	
	Attorney Docket Number		CD06039

	31	7288946	B1	2007-10-30	Hargreaves et al.	Entire Document
	32	7301350	B1	2007-11-27	Hargreaves et al.	Entire Document

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Examiner Initial*	Cite No	Publication Number	Kind Code1	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20080278178	A1	2008-11-13	Philipp, Harald	Entire Document
	2	20080128182	A1	2008-06-05	Westerman et al.	Entire Document
	3	20060038793	A1	2006-02-23	Philipp, Harald	Entire Document
	4	20080042994	A1	2008-02-21	Westerman et al.	Entire Document
	5	20080116904	A1	2008-05-22	Reynolds et al.	Entire Document
	6	20070268273	A1	2007-11-22	Westerman et al.	Entire Document
	7	20070268274	A1	2007-11-22	Westerman et al.	Entire Document

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number: 11437517
	Filing Date: 2006-05-18
	First Named Inventor: Jiang XiaoPing
	Art Unit: 2629
	Examiner Name: KETEMA, BENYAM
	Attorney Docket Number: CD06039

	8	20070268275	A1	2007-11-22	Westerman et al.	Entire Document
	9	20080041639	A1	2008-02-21	Westerman et al.	Entire Document
	10	20080041640	A1	2008-02-21	Gillespie et al.	Entire Document
	11	20080068100	A1	2008-03-20	Goodnow et al.	Entire Document
	12	20080042986	A1	2008-02-21	Westerman et al.	Entire Document
	13	20080042987	A1	2008-02-21	Westerman et al.	Entire Document
	14	20080042988	A1	2008-02-21	Westerman et al.	Entire Document
	15	20080042989	A1	2008-02-21	Westerman et al.	Entire Document

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	11437517
	Filing Date	2006-05-18
	First Named Inventor	Jiang XiaoPing
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	Examiner Name	KETEMA, BENYAM
	Attorney Docket Number	CD06039

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Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

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	Application Number	11437517
	Filing Date	2006-05-18
	First Named Inventor	Jiang XiaoPing
	Art Unit	2629
	Examiner Name	KETEMA, BENYAM
	Attorney Docket Number	CD06039

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ None

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Larry Johnson/	Date (YYYY-MM-DD)	2011-05-03
Name/Print	Larry Johnson	Registration Number	56861

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

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2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

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5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

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9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Acknowledgement Receipt

EFS ID:	10014513
Application Number:	11437517
International Application Number:	
Confirmation Number:	2623
Title of Invention:	TWO-PIN BUTTONS
First Named Inventor/Applicant Name:	Jiang XiaoPing
Customer Number:	60909
Filer:	Larry Joel Johnson/Lauren Navarro
Filer Authorized By:	Larry Joel Johnson
Attorney Docket Number:	CD06039
Receipt Date:	03-MAY-2011
Filing Date:	18-MAY-2006
Time Stamp:	20:46:45
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	NPL Documents	CD06101finalrejection093010.pdf	738006 9ad769bc8ccd9e370cbe8aa16613fca927c7ab0a	no	19

Warnings:

Information:

2	NPL Documents	CD06043noa061010.pdf	249517 0cfff0c3a7280d415176f46a5d6b7d99c6a3a589	no	4
Warnings:					
Information:					
3	NPL Documents	CD06065finalrejection112410.pdf	394217 762e9cb366e6e9232d2a25b6dc0b42c78e901512	no	10
Warnings:					
Information:					
4	NPL Documents	CD06065nonfinal072010.pdf	382172 727efad7d78d93abeb0b986e5e3d58f1160f937f	no	10
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5	NPL Documents	CD06097nonfinal110910.pdf	304408 a3371f2f3e61908a6d752b0653cad602985786ab	no	9
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Warnings:					
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7	NPL Documents	CD06101_NonFinalOA_01262011.pdf	452363 de88142601f31a31dd03ea7cff280b00c296a7e5	no	12
Warnings:					
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8	NPL Documents	CD06138noa07272010.pdf	307481 2fdb9e0d3b720a1f60153654875e6685505fc883	no	6
Warnings:					
Information:					
9	NPL Documents	CD06138nonfinal03292010.pdf	260847 4cc34bce168e54f3c8efd4b7a4704493910d8e10	no	10
Warnings:					
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10	NPL Documents	CD06099noa040907.pdf	329312 0b42e4c1d276db811ec6aff415dc710583f676cb	no	7
Warnings:					
Information:					

11	NPL Documents	CD06099noa052407.pdf	80345 014bac462330def7e2a38b4b2bd8c70d63ed9a07	no	2

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If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

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If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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NOTICE OF ALLOWANCE AND FEE(S) DUE

60909 7590 05/19/2011
CYPRESS SEMICONDUCTOR CORPORATION
198 CHAMPION COURT
SAN JOSE, CA 95134-1709

EXAMINER	
KETEMA, BENYAM	
ART UNIT	PAPER NUMBER
2629	

DATE MAILED: 05/19/2011

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/437,517	05/18/2006	Jiang XiaoPing	CD06039	2623

TITLE OF INVENTION: TWO-PIN BUTTONS

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1510	$300	$0	$1810	08/19/2011

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

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I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

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B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

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III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

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Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
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Alexandria, Virginia 22313-1450
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CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

60909 7590 05/19/2011

CYPRESS SEMICONDUCTOR CORPORATION
198 CHAMPION COURT
SAN JOSE, CA 95134-1709

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(Depositor's name)

(Signature)

(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/437,517	05/18/2006	Jiang XiaoPing	CD06039	2623

TITLE OF INVENTION: TWO-PIN BUTTONS

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1510	$300	$0	$1810	08/19/2011

EXAMINER	ART UNIT	CLASS-SUBCLASS
KETEMA, BENYAM	2629	345-173000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
   - ❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
   - ❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
   (1) the names of up to 3 registered patent attorneys or agents OR, alternatively,
   (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

   1 ______________________
   2 ______________________
   3 ______________________

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. The following fee(s) are submitted:
- ❑ Issue Fee
- ❑ Publication Fee (No small entity discount permitted)
- ❑ Advance Order - # of Copies ______________

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- ❑ Payment by credit card. Form PTO-2038 is attached.
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5. **Change in Entity Status** (from status indicated above)
- ❑ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27.
- ❑ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

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Authorized Signature ______________________ Date ______________________

Typed or printed name ______________________ Registration No. ______________________

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/437,517	05/18/2006	Jiang XiaoPing	CD06039	2623

60909 7590 05/19/2011

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SAN JOSE, CA 95134-1709

EXAMINER	
KETEMA, BENYAM	
ART UNIT	PAPER NUMBER
2629	

DATE MAILED: 05/19/2011

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 749 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 749 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

PTOL-85 (Rev. 02/11)

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 11/437,517	Applicant(s) XIAOPING, JIANG	
	Examiner BENYAM KETEMA	Art Unit 2629	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *05/03/2011*.
2. ☒ The allowed claim(s) is/are *1-20*.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☐ All b) ☐ Some* c) ☐ None of the:
   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
   1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date 05/03/2011
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

DETAILED ACTION

Information Disclosure Statement

1. Due to the excessively lengthy Information Disclosure Statement submitted by applicant, the examiner has given only a cursory review of the listed references. In accordance with MPEP 609.04(a), applicant is encouraged to provide a concise explanation of why the information is being submitted and how it is understood to be relevant. Concise explanations (especially those which point out the relevant pages and lines) are helpful to the Office, particularly where documents are lengthy and complex and applicant is aware of a section that is highly relevant to patentability or where a large number of documents are submitted and applicant is aware that one or more are highly relevant to patentability. Applicant is required to comply with this statement for any non-English language documents. See 37 CFR § 1.56 Duty to Disclose Information Material to Patentability.

Examiner's Statement of Reasons for Allowance

2. The following is an examiner's statement of reasons for allowance: The prior art of record fails to disclose the claimed invention. **The features of independent claim 1** directed towards allowable subject matter is "*detecting a presence of a conductive object on a capacitance sensing device, the sensing device comprising at least two*

sensing areas each coupled to a capacitance measurement input; and recognizing activation of at least three button performed by the detected presence of the conductive object, wherein the number of buttons is equal to at least the number of sensing areas plus one and wherein a combination of the at least two sensing areas is used to recognize at least one of the activated buttons". **Tsujioka et al (US Pat NO 5,518,078)** discloses that the presence of users finger (i.e. conductive object) is detected by sensing device (col. 9- 10), the sensing device comprising at least two sensing areas each coupled to a capacitance measurement input (fig 5 & 6) wherein the user can perform multiple input operation using his/her finger or pen as it is clearly shown in fig 5 in order to perform an input operation. But Tsujioka et al fails to disclose **the number of buttons** is **equal** to at least **the number of sensing areas plus one** and wherein a combination of the at least two sensing areas is used to recognize at least one of the activated buttons. These features in combination with the remaining language of claim 1, are not taught by the prior art of record.

The prior art of record fails to disclose the claimed invention. **The features of independent claim 5** directed towards allowable subject matter is " *a first sensor element; a second sensor elements; and a third sensor element comprising a first portion coupled to the first sensor element and second portion coupled to the second sensor element, wherein the first and second portions of the third sensor element are electrically isolated.* **Tsujioka et al (US Pat NO 5,518,078)** discloses a device having multiple sensor elements, but fails to disclose a third sensor element comprising a first portion coupled to the first sensor element and second portion coupled to the second

<u>sensor element</u>. These features in combination with the remaining language of claims 1, 5, are not taught by the prior art of record. Therefore claims 1- 9 are found to be allowable over the prior art of record.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

3. Any inquiry concerning this communication or earlier communications from the examiner should be directed to BENYAM KETEMA whose telephone number is (571)270-7224. The examiner can normally be reached on Monday- Friday 8:00AM - 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shalwala Bipin H can be reached on 571-272-7681. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business

Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/ B.K. /

Examiner, Art Unit 2629

/Bipin Shalwala/

Supervisory Patent Examiner, Art Unit 2629

Notice of References Cited	Application/Control No. 11/437,517	Applicant(s)/Patent Under Reexamination XIAOPING, JIANG	
	Examiner BENYAM KETEMA	Art Unit 2629	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-5,518,078	05-1996	Tsujioka et al.	178/18.05
*	B	US-2004/0239616	12-2004	Collins, Ryan V.	345/156
*	C	US-2006/0097992	05-2006	Gitzinger et al.	345/173
*	D	US-2006/0227117	10-2006	Proctor, David W.	345/173
*	E	US-7,158,125	01-2007	Sinclair et al.	345/173
*	F	US-2007/0291013	12-2007	WON, Jong Sung	345/173
*	G	US-7,466,307	12-2008	Trent et al.	345/173
*	H	US-7,495,659	02-2009	Marriott et al.	345/173
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Issue Classification

Application/Control No.	Applicant(s)/Patent Under Reexamination
11437517	XIAOPING, JIANG
Examiner	**Art Unit**
BENYAM KETEMA	2629

ORIGINAL

CLASS	SUBCLASS
345	173

INTERNATIONAL CLASSIFICATION

CLAIMED					NON-CLAIMED
G	0	6	F	3 / 041 (2006.0)	
G	0	6	F	3 / 045 (2006.0)	
G	0	6	F	3 / 033 (2006.0)	

CROSS REFERENCE(S)

CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)				
345	174	179			
178	18.01	18.06			

☒ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
	1		17												
	2		18												
	3		19												
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	15														
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/BENYAM KETEMA/ Examiner.Art Unit 2629 (Assistant Examiner)	(Date)	**Total Claims Allowed:** 20	
/BIPIN SHALWALA/ Supervisory Patent Examiner.Art Unit 2629 (Primary Examiner)	05/17/2011 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 6B

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11437517	XIAOPING, JIANG
	Examiner	**Art Unit**
	BENYAM KETEMA	2629

SEARCHED

Class	Subclass	Date	Examiner
345	173	7/16/2009	bk

SEARCH NOTES

Search Notes	Date	Examiner
Inventor Search	7/16/2009	bk
See Attaches EAST Search	7/16/2009	bk
Above EAST Search have been updated	1/19/2010	b.k
Above East search have been updated	7/30/2010	BK
above search have been updated	1/20/2011	BK
Above search have been updated	5/17/2011	BK

INTERFERENCE SEARCH

Class	Subclass	Date	Examiner
	Searched all of the above	1/28/2011	B.K

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BIB DATA SHEET

CONFIRMATION NO. 2623

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
11/437,517	05/18/2006 **RULE**	345	2629	CD06039

APPLICANTS
Jiang XiaoPing, Shanghai, CHINA;

** **CONTINUING DATA** *************************

** **FOREIGN APPLICATIONS** *************************

** **IF REQUIRED, FOREIGN FILING LICENSE GRANTED** **
06/15/2006

		STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
Foreign Priority claimed ☐ Yes ☑ No 35 USC 119(a-d) conditions met ☐ Yes ☑ No Verified and Acknowledged /BENYAM KETEMA/ Examiner's Signature	☐ Met after Allowance Initials	CHINA	10	20	3

ADDRESS

CYPRESS SEMICONDUCTOR CORPORATION
198 CHAMPION COURT
SAN JOSE, CA 95134-1709
UNITED STATES

TITLE

TWO-PIN BUTTONS

FILING FEE RECEIVED		
1000	FEES: Authority has been given in Paper No.____________ to charge/credit DEPOSIT ACCOUNT No.____________ for following:	☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other ________________ ☐ Credit

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	279	("20030091220" | "20040239616" | "20040178989" | "20040217945" | "20050031175" | "20050159126" | "20060097992" | "20060227117" | "20060038793" | "20060197750" | "20060232559" | "20060262101" | "20070291013" | "20070076897" | "20070247443" | "20070257894" | "20070268265" | "20070268273" | "20070268274" | "20070268275" | "20070296709" | "20080007534" | "20080024455" | "20080036473" | "20080041639" | "20080041640" | "20080042986" | "20080042987" | "20080042988" | "20080042989" | "20080042994" | "20080068100" | "20080111714" | "20080116904" | "20080128182" | "20080179112" | "20080278178" | "3979745" | "4039940" | "4113378" | "4145748" | "4193063" | "4238711" | "4264903" | "4266144" | "4292604" | "4305135" | "4586260" | "4614937" | "4728932" | "4736191" | "4825147" | "4831325" | "4831325" | "5305017" | "5518078" | "5008497" | "5214388" | "5237879" | "5323158" | "5373245" | "5386219" | "5541580" | "5670915" | "5760852" | "5801340" | "5920309" | "5942733" | "6188391" | "6380931" | "6037929" | "6060957" | "6145850" | "6184871" | "6191723" | "6297811" | "6353200" | "6353200" | "6366099" | "6377129" | "6448911" | "6448911" | "6490203" | "6535200" | "6577140" | "6583632" | "6700392" | "6781577" | "6806693" | "6825673" |	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2011/05/17 10:06

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S20	1	2006/0097992	US-PGPUB; USPAT; USOCR	AND	ON	2009/07/18 16:19
S21	1	"20060097992"	US-PGPUB; USPAT; USOCR	AND	ON	2009/07/18 16:20
S22	12	345/173.ccls. and cypress.as.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:28
S23	3731	cypress.as.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:31
S24	0	"cypress.as.and" (Capacitive and sensor)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:33
S25	51	cypress.as. and (Capacitive and sensor)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:33
S26	1	cypress.as. and (Capacitive and sensor) and (touch near button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:34
S27	1167	(Capacitive and sensor) and (sensing near areas)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:47
S28	47	(Capacitive and sensor) and (sensing near areas) same buttons	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:48

S29	26	(touch near screen) and (Capacitive and sensor) and (sensing near areas) same buttons	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:49
S30	3	(touch near screen) and (Capacitive and sensor) and (sensing near areas) same sensing near buttons	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:57
S31	0	(touch near screen near buttons) and (Capacitive and sensor) and (sensing near areas) same sensing near buttons	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:57
S32	4	(touch near screen near buttons) and (Capacitive and sensor) and (sensing near areas)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:58
S33	2	"6947031"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 17:01
S34	89	"4476463"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 17:29
S35	106	"5565658"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 17:45
S36	212	"5730165"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 17:51
S37	162	"4736191"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:02

S38	90	"4680430"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:09
S39	0	345/4.ccls. and ((capacitance near sensor) same (vertual near button) same (pin))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:15
S40	0	345/4.ccls. and (capacitance near sensor)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:15
S41	0	"345"/$.ccls. and ((capacitance near sensor) same (vertual near button) same (pin))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:15
S42	369	"345"/$.ccls. and (capacitance near sensor)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:16
S43	162	"345"/$.ccls. and (capacitance near sensor) and (touch near screen)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:16
S44	32	"345"/$.ccls. and (capacitance near sensor) and (touch near screen) and multi$touch	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:17
S45	20	three near sensing near area	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:28
S46	8710	capacitance near sensor	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:29

S47	158	(electrically adj isolated) same (sensor near element)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:34
S48	0	S45 and S46 and S47	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:35
S49	24	S46 and S47	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:35
S50	307	(touch near sensor near button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:50
S51	60	S50 and S46	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:51
S52	0	(Multiple near sens$4 near area) and (button near operation) and (touch near screen)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 07:57
S53	2	(Multiple near sens$4 near area) and (touch near screen)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 07:58
S54	0	(Multiple near sens$4 near button $2) and (touch near screen) and (capacitance$2)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 08:04
S55	4	(Multiple near sens$4 near button $2) and (capacitance)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 08:05

S56	3	"20050133262"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 08:13
S57	2	"20080278453"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 08:22
S58	2	"20080246735"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 08:23
S59	4	"61000784"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 08:25
S60	1202	345/173.ccls. and capacitance	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 08:29
S61	613	345/174-179.ccls. and capacitance	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 11:09
S63	29	(touch near screen) and (Capacit$6 and sens$3) and (sensing near areas) same buttons	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 12:11
S64	2784	178/18.01-18.11.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 15:47
S65	439	178/18.01-18.11.ccls. and (touch near panel)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 15:48

S66	900	178/18.01-18.11.ccls. and (capacit$6 and sens$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 16:35
S67	30	178/18.01-18.11.ccls. and capacit$6 same sens$3 near (second or third)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 16:37
S68	33	(Capacit$6 and sens$3) and (sensing near areas) and (input near button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 17:23
S69	24064	(touch near screen or pad) and (capacit$6 and sens$3) and (button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 17:31
S70	90998	(touch near screen or pad) and (capacit$6 and sens$3) and (first or second and button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 17:32
S71	73385	(touch near screen or pad) and (capacit$6 and sens$3) and (first or second and button) and (sens$3 and area)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 17:33
S72	20303	(touch near screen or pad) and (capacit$6 and sens$3) and (button) and (sens$3 and area)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 17:33
S73	20303	(touch near screen or pad) and (capacit$6 and sens$3 and button) and (sens$3 and area)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 17:34
S74	2438	(touch near screen or pad) and (capacit$6 and sens$3 and button) and (sens$3 and area) and "345"/$.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 17:35

S76	1334	(touch near screen or pad) and (capacit$6 and sens$3 and button) and (sens$3 and area) and "345"/$.ccls. and portable	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 17:36
S77	61	345/173.ccls. and capacit$6 same sens$3 near (second or third)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/21 13:51
S78	560	345/173.ccls. and capacit$6 same sens$3 same (second or third)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/01/19 16:58
S79	396	(touch near screen or pad) same (capacit$6 and sens$3 and button) and (sens$3 and area) and "345"/$.ccls. and portable	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2010/01/19 16:58
S80	35	(touch near screen or pad) same (capacit$6 and sens$3 and button) same(sens$3 and area) and "345"/$.ccls. and portable	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2010/01/19 16:59
S81	567	(touch near (screen or pad)) same (capacit$6 and sens$3) same (button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/01/19 17:10
S82	504	(touch (screen or pad)) same (capacit$6 same sens$3) same (button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/01/19 17:11
S83	311	(touch (screen or pad)) same (capacit$6 sens$3) same (button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/01/19 17:11
S84	85	"345"/$.ccls. and (touch (screen or pad)) same (capacit$6 sens$3) same (button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/01/19 17:12

S85	42	"345"/173.ccls. and (touch (screen or pad)) same (capacit$6 sens$3) same (button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/07/30 12:03
S86	0	(Multiple near sens$4 near button $2) and (touch near screen) and (capacit$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2010/07/30 12:06
S87	2	"20080252608"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2011/01/10 10:30
S88	19	"7030860"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2011/01/11 09:34
S89	2	"20060097992"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2011/01/24 09:55
S90	0	("2008/0074398").URPN.	USPAT	ADJ	ON	2011/01/24 11:18
S93	339	(sens$4 near button$2) and (touch near screen) and (capacit $4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2011/01/24 18:42
S94	93	(sens$4 near button$2) same (touch near screen) and (capacit $4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2011/01/24 18:43
S95	38	(sens$4 near button$2) same (touch near screen) same (capacit$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2011/01/24 18:43

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	11437517
	Filing Date	2006-05-18
	First Named Inventor	Jiang XiaoPing
	Art Unit	2629
	Examiner Name	KETEMA, BENYAM
	Attorney Docket Number	CD06039

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	1	5237879	B1	1993-08-24	Speeter, Thomas H.	Entire Document

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	1	20070076897	A1	2007-04-05	Philipp, Harald	Entire Document

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	Application Number	11437517
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	First Named Inventor	Jiang XiaoPing
	Art Unit	2629
	Examiner Name	KETEMA, BENYAM
	Attorney Docket Number	CD06039

	1	USPTO Final Rejection for Application Number 11/600,896 (CD06101) dated 09/30/10; 19 pages	☐
	2	USPTO Notice of Allowance for Application Number 11/484,085 (CD06043) dated 06/10/10; 4 pages	☐
	3	USPTO Final Rejection for Application Number 11/477,179 (CD06065) dated 11/24/10; 10 pages	☐
	4	USPTO Non-Final Rejection for Application Number 11/477,179 (CD06065) dated 07/20/10; 10 pages	☐
	5	USPTO Non-Final Rejection for Application Number 11/493,350 (CD06097) dated 11/09/10; 9 pages	☐
	6	USPTO Non-Final Rejection for Application Number 11/600,896 (CD06101) dated 05/14/10; 15 pages	☐

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	Attorney Docket Number	CD06039

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	1	5541580	B1	1996-07-30	Gerston et al.	Entire Document
	2	4266144	B1	1981-05-05	Bristol, Robert G.	Entire Document
	3	4305135	B1	1981-12-08	Dahl et al.	Entire Document
	4	7078916	B1	2006-07-18	Denison, Timothy J.	Entire Document
	5	7359816	B1	2008-04-15	Kumar et al.	Entire Document
	6	7479788	B1	2009-01-20	Bolender et al.	Entire Document
	7	7098675	B1	2006-08-29	Inaba et al.	Entire Document
	8	4831325	B1	1989-05-16	Watson Jr., Charles W.	Entire Document

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number: 11437517
	Filing Date: 2006-05-18
	First Named Inventor: Jiang XiaoPing
	Art Unit: 2629
	Examiner Name: KETEMA, BENYAM
	Attorney Docket Number: CD06039

	9	6583632	B1	2003-06-24	Von Basse et al.	Entire Document
	10	6946853	B1	2005-09-20	Gifford et al.	Entire Document
	11	7006078	B1	2006-02-28	Kim, Wonchan	Entire Document
	12	6184871	B1	2001-02-06	Teres et al.	Entire Document
	13	4113378	B1	1978-09-12	Wirtz, John Stanley	Entire Document
	14	6825673	B1	2004-11-30	Yamaoka, Shuji	Entire Document
	15	7598822	B1	2009-10-06	Rajagopal et al.	Entire Document
	16	6781577	B1	2004-08-24	Shigetaka, Hiroshi	Entire Document
	17	6145850	B1	2000-11-14	Rehm, Fritz	Entire Document
	18	6891531	B1	2005-05-10	Lin, Jaoching	Entire Document
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	20	5214388	B1	1993-05-25	Vranish et al.	Entire Document
	21	7075316	B1	2006-07-11	Umeda et al.	Entire Document
	22	7068039	B1	2006-06-27	Parker, Kenneth P.	Entire Document
	23	6448911	B1	2002-09-10	Somajayula, Shyam S.	Entire Document
	24	5942733	B1	1999-08-24	Allen et al.	Entire Document

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	1	20060197750	A1	2006-09-07	Kerr et al.	Entire Document
	2	20030091220	A1	2003-05-15	Sato et al.	Entire Document
	3	20050031175	A1	2005-02-10	Hara et al.	Entire Document

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	1	USPTO Notice of Allowance for Application Number 11/395,417 (CD05044) dated 11/06/2008; 7 pages	☐
	2	USPTO Non-Final Rejection for Application Number 11/395,417 (CD05044) dated 04/25/2008; 7 pages	☐
	3	USPTO Non-Final Rejection for Application Number 11/395,417 (CD05044) dated 11/01/2007; 8 pages	☐
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**	Application Number	11437517
	Filing Date	2006-05-18
	First Named Inventor	Jiang XiaoPing
	Art Unit	2629
	Examiner Name	KETEMA, BENYAM
	Attorney Docket Number	CD06039

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	Art Unit	2629
	Examiner Name	KETEMA, BENYAM
	Attorney Docket Number	CD06039

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**	Application Number: 11437517
	Filing Date: 2006-05-18
	First Named Inventor: Jiang XiaoPing
	Art Unit: 2629
	Examiner Name: KETEMA, BENYAM
	Attorney Docket Number: CD06039

	1							☐

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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T5
	1	USPTO Advisory Action for Application Number 11/477,179 (CD06065) dated 06/07/2010; 3 pages	☐
	2	USPTO Non-Final Rejection for Application Number 11/477,179 (CD06065) dated 07/20/2010; 10 pages	☐
	3	USPTO Notice of Allowance for Application Number 12/367,279 (CD05044D) dated 08/23/2010; 7 pages	☐
	4	USPTO Non-Final Rejection for Application Number 11/493,350 (CD06097) dated 06/16/2010; 8 pages	☐
	5	USPTO Notice of Allowance for Application Number 11/700,314 (CD06163) dated 09/16/2010; 8 pages	☐
	6	USPTO Final Rejection for Application Number 12/367,279 (CD05044D) dated 04/01/2010; 6 pages	☐
	7	USPTO Advisory Action for Application Number 12/367,279 (CD05044D) dated 06/25/2010; 3 pages	☐

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	11437517
	Filing Date	2006-05-18
	First Named Inventor	Jiang XiaoPing
	Art Unit	2629
	Examiner Name	KETEMA, BENYAM
	Attorney Docket Number	CD06039

EXAMINER SIGNATURE			
Examiner Signature	/Benyam Ketema/	Date Considered	05/17/2011
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U.S.PATENTS						Remove
Examiner Initial*	Cite No	Patent Number	Kind Code1	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	4039940	B1	1976-02-01	Jacob et al.	Entire Document
	2	4145748	B1	1979-03-20	Eichelberger et al.	Entire Document
	3	4614937	B1	1986-09-30	Poujois, Robert	Entire Document
	4	4728932	B1	1988-03-01	Atherton, James H.	Entire Document
	5	4825147	B1	1989-04-25	Cook et al.	Entire Document
	6	7683641	B1	2010-03-23	Hargreaves et al.	Entire Document
	7	7453270	B1	2008-11-18	Hargreaves et al.	Entire Document
	8	7423437	B1	2008-09-09	Hargreaves et al.	Entire Document

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	Art Unit	2629
	Examiner Name	KETEMA, BENYAM
	Attorney Docket Number	CD06039

	9	7521941	B1	2009-04-21	Ely et al.	Entire Document
	10	7417441	B1	2008-08-26	Reynolds, Joseph Kurth	Entire Document
	11	7148704	B1	2006-12-12	Philipp, Harald	Entire Document
	12	5801340	B1	1998-09-01	Peter, Walter H.	Entire Document
	13	7453279	B1	2008-11-18	Corbin Jr. et al.	Entire Document
	14	7451050	B1	2008-11-11	Hargreaves, Kirk	Entire Document
	15	5920309	B1	1999-07-06	Bisset et al.	Entire Document
	16	7450113	B1	2008-11-11	Gillespie et al.	Entire Document
	17	6191723	B1	2001-02-20	Lewis, Jason D.	Entire Document
	18	6353200	B1	2002-03-05	Schwankhart, Gerhard	Entire Document
	19	7449895	B1	2008-11-11	Ely et al.	Entire Document

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	20	7423437	B1	2008-09-09	Hargreaves et al.	Entire Document
	21	7417411	B1	2008-08-26	Hoffman et al.	Entire Document
	22	7339580	B1	2008-03-04	Westerman et al.	Entire Document
	23	5760852	B1	1998-06-02	Wu et al.	Entire Document
	24	6859159	B1	2005-02-22	Michalski, Christopher	Entire Document
	25	6970120	B1	2005-11-29	Bjornsen, Johnny	Entire Document
	26	7031886	B1	2006-04-18	Hargreaves, Kirk	Entire Document
	27	7078916	B1	2006-07-18	Denison, Timothy J.	Entire Document
	28	7129935	B1	2006-10-31	Mackey, Bob Lee	Entire Document
	29	7235983	B1	2007-06-26	O'Dowd et al.	Entire Document
	30	7262609	B1	2007-08-28	Reynolds, Joseph Kurth	Entire Document

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	First Named Inventor	Jiang XiaoPing
	Art Unit	2629
	Examiner Name	KETEMA, BENYAM
	Attorney Docket Number	CD06039

	31	7288946	B1	2007-10-30	Hargreaves et al.	Entire Document
	32	7301350	B1	2007-11-27	Hargreaves et al.	Entire Document

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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20080278178	A1	2008-11-13	Philipp, Harald	Entire Document
	2	20080128182	A1	2008-06-05	Westerman et al.	Entire Document
	3	20060038793	A1	2006-02-23	Philipp, Harald	Entire Document
	4	20080042994	A1	2008-02-21	Westerman et al.	Entire Document
	5	20080116904	A1	2008-05-22	Reynolds et al.	Entire Document
	6	20070268273	A1	2007-11-22	Westerman et al.	Entire Document
	7	20070268274	A1	2007-11-22	Westerman et al.	Entire Document

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	8	20070268275	A1	2007-11-22	Westerman et al.	Entire Document
	9	20080041639	A1	2008-02-21	Westerman et al.	Entire Document
	10	20080041640	A1	2008-02-21	Gillespie et al.	Entire Document
	11	20080068100	A1	2008-03-20	Goodnow et al.	Entire Document
	12	20080042986	A1	2008-02-21	Westerman et al.	Entire Document
	13	20080042987	A1	2008-02-21	Westerman et al.	Entire Document
	14	20080042988	A1	2008-02-21	Westerman et al.	Entire Document
	15	20080042989	A1	2008-02-21	Westerman et al.	Entire Document

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Examiner Initial*	Cite No	Foreign Document Number3	Country Code2 i	Kind Code4	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T5
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NON-PATENT LITERATURE DOCUMENTS Remove

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1		☐

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EXAMINER SIGNATURE

Examiner Signature	/Benyam Ketema/	Date Considered	05/17/2011

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[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

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PTO/SB/30EFS (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL
(Submitted Only via EFS-Web)

Application Number	11/437,517	Filing Date	2006-05-18	Docket Number (if applicable)	CD06039	Art Unit	2629
First Named Inventor	Jiang XiaoPing			Examiner Name	KETEMA, BENYAM		

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV

SUBMISSION REQUIRED UNDER 37 CFR 1.114

Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

☐ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

- ☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on ____________
- ☐ Other ____________

☒ Enclosed

- ☐ Amendment/Reply
- ☒ Information Disclosure Statement (IDS)
- ☐ Affidavit(s)/ Declaration(s)
- ☐ Other ____________

MISCELLANEOUS

☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months ____________
(Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

☐ Other ____________

FEES

☒ **The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.**
The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to
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SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature

☐ Applicant Signature

PTO/SB/30EFS (07-09)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Signature of Registered U.S. Patent Practitioner			
Signature	/Larry Johnson/	Date (YYYY-MM-DD)	2011-05-25
Name	Larry Johnson	Registration Number	56861

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The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

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8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

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Electronic Patent Application Fee Transmittal

Application Number:	11437517
Filing Date:	18-May-2006
Title of Invention:	TWO-PIN BUTTONS
First Named Inventor/Applicant Name:	Jiang XiaoPing
Filer:	Larry Joel Johnson/Lauren Navarro
Attorney Docket Number:	CD06039

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
Request for continued examination	1801	1	810	810
	Total in USD ($)			**810**

Electronic Acknowledgement Receipt

EFS ID:	10186895
Application Number:	11437517
International Application Number:	
Confirmation Number:	2623
Title of Invention:	TWO-PIN BUTTONS
First Named Inventor/Applicant Name:	Jiang XiaoPing
Customer Number:	60909
Filer:	Larry Joel Johnson/Lauren Navarro
Filer Authorized By:	Larry Joel Johnson
Attorney Docket Number:	CD06039
Receipt Date:	27-MAY-2011
Filing Date:	18-MAY-2006
Time Stamp:	15:57:54
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$810
RAM confirmation Number	2487
Deposit Account	503781
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Filed (SB/08)	CD06039_IDSform_05252011.pdf	614617 8508a516c003aa9c2f9120225e1aa6fb37d6bacf	no	4

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Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
2	Transmittal Letter	CD06039_TransmittalLetter_05252011.pdf	22875 4d0cdf613b88f4f57affd93be95e3f75647dfa87	no	2

Warnings:

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3	NPL Documents	CD06030_NonFinalOA_02252011.pdf	457451 15e1bda9ad1e99db76ffeb9f682114733aa4e695	no	13

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4	Request for Continued Examination (RCE)	CD06039_RCE_05252011.pdf	700036 3939c7f9048c51dc9b3aa265e79cb213b531e4ad	no	3

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5	Fee Worksheet (PTO-875)	fee-info.pdf	30482 97ed8534903a375546cd53eec270ecccaafa5bcd	no	2

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<u>New Applications Under 35 U.S.C. 111</u>
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

<u>National Stage of an International Application under 35 U.S.C. 371</u>
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

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	First Named Inventor	Jiang XiaoPing
	Art Unit	2629
	Examiner Name	KETEMA, BENYAM
	Attorney Docket Number	CD06039

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	First Named Inventor	Jiang XiaoPing
	Art Unit	2629
	Examiner Name	KETEMA, BENYAM
	Attorney Docket Number	CD06039

	1	USPTO Non-Final Rejection for Application Number 11/442,212 (CD06030) dated 02/25/2011; 13 pages	☐

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Examiner Signature		Date Considered	

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	First Named Inventor	Jiang XiaoPing
	Art Unit	2629
	Examiner Name	KETEMA, BENYAM
	Attorney Docket Number	CD06039

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ None

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Larry Johnson/	Date (YYYY-MM-DD)	2011-05-25
Name/Print	Larry Johnson	Registration Number	56861

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	Examiner: Benyam Ketema
Jiang Xiaoping	Group Art Unit: 2629
Application No.: 11/437,517	Confirmation No.: 2623
Filed: May 18, 2006	
For: Two-pin buttons	

REQUEST FOR CONTINUED EXAMINATION AND INFORMATION DISCLOSURE STATEMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Applicant hereby submits the Request for Continued Examination to be considered with the IDS for the above referenced application. In compliance with the duty of disclosure under 37 CFR § 1.56 and in accordance with the practice under 37 CFR §§ 1.97 and 1.98, the Examiner's attention is directed to the documents listed on the enclosed PTO-1449.

In accordance with 37 CFR § 1.97(h), this Information Disclosure Statement is not to be construed as an admission that the information cited is or is considered to be material to patentability as defined in 37 CFR § 1.56(b), nor as an admission that the information constitutes prior art within the meaning of 35 USC §§ 102 and/or 103.

It is respectfully requested that the information listed on the PTO-1449 be considered by the Examiner, and that an initialed copy of the PTO-1449 be returned indicating that such information was considered.

Customer No.: 60909

The Commissioner is hereby authorized to charge any appropriate fees under 37 C.F.R. §§ 1.16, 1.17, 1.18, 1.20 and 1.21 that may be required to maintain pendency of the present application, and to credit any overpayments, to Deposit Account No. 50-3781.

Should the Patent Office have any questions regarding this submission or the application in general, the Patent Office is urged to contact the Applicant's attorney, Larry Johnson, by telephone at (408) 545-7194. All correspondence should continue to be directed to the address given below.

/

/

Respectfully submitted,

Date: 05/25/2011 By: /Larry Johnson/

Larry Johnson
Attorney for Applicant
Registration No. 56,861

Cypress Semiconductor Corporation
198 Champion Court
San Jose, CA 95134
Facsimile: (408) 545-6911
Customer No.: 60909

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

60909 7590 06/16/2011
CYPRESS SEMICONDUCTOR CORPORATION
198 CHAMPION COURT
SAN JOSE, CA 95134-1709

EXAMINER	
KETEMA, BENYAM	
ART UNIT	PAPER NUMBER
2629	

DATE MAILED: 06/16/2011

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/437,517	05/18/2006	Jiang XiaoPing	CD06039	2623

TITLE OF INVENTION: TWO-PIN BUTTONS

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1510	$300	$0	$1810	09/16/2011

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

60909 7590 06/16/2011

CYPRESS SEMICONDUCTOR CORPORATION
198 CHAMPION COURT
SAN JOSE, CA 95134-1709

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)

(Signature)

(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/437,517	05/18/2006	Jiang XiaoPing	CD06039	2623

TITLE OF INVENTION: TWO-PIN BUTTONS

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1510	$300	$0	$1810	09/16/2011

EXAMINER	ART UNIT	CLASS-SUBCLASS
KETEMA, BENYAM	2629	345-173000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
   - ❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
   - ❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
   (1) the names of up to 3 registered patent attorneys or agents OR, alternatively,
   (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.
   1 ______________________
   2 ______________________
   3 ______________________

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. The following fee(s) are submitted:
- ❑ Issue Fee
- ❑ Publication Fee (No small entity discount permitted)
- ❑ Advance Order - # of Copies ______________

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
- ❑ A check is enclosed.
- ❑ Payment by credit card. Form PTO-2038 is attached.
- ❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number ________ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
   - ❑ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27.
   - ❑ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature ______________________ Date ______________________

Typed or printed name ______________________ Registration No. ______________________

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/437,517	05/18/2006	Jiang XiaoPing	CD06039	2623

60909 7590 06/16/2011

CYPRESS SEMICONDUCTOR CORPORATION
198 CHAMPION COURT
SAN JOSE, CA 95134-1709

EXAMINER	
KETEMA, BENYAM	
ART UNIT	**PAPER NUMBER**
2629	

DATE MAILED: 06/16/2011

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)

(application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 749 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 749 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

Privacy Act Statement

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The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
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5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 11/437,517	Applicant(s) XIAOPING, JIANG
	Examiner BENYAM KETEMA	Art Unit 2629

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 05/27.

2. ☒ The allowed claim(s) is/are 1-20.

3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☐ All b) ☐ Some* c) ☐ None of the:
   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
   1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date 05/27/2011
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement (IDS) submitted on May 27, 2011 was filed after the mailing date of the Notice of Allowance on May 19, 2011. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Examiner's Statement of Reasons for Allowance

2. The following is an examiner's statement of reasons for allowance: The prior art of record fails to disclose the claimed invention. **The features of independent claim 1** directed towards allowable subject matter is "*detecting a presence of a conductive object on a capacitance sensing device, the sensing device comprising at least two sensing areas each coupled to a capacitance measurement input; and recognizing activation of at least three button performed by the detected presence of the conductive object, wherein the number of buttons is equal to at least the number of sensing areas plus one and wherein a combination of the at least two sensing areas is used to recognize at least one of the activated buttons*". **Tsujioka et al (US Pat NO 5,518,078)** discloses that the presence of users finger (i.e. conductive object) is detected by sensing device (col. 9- 10), the sensing device comprising at least two sensing areas each coupled to a capacitance measurement input (fig 5 & 6) wherein the user can

perform multiple input operation using his/her finger or pen as it is clearly shown in fig 5 in order to perform an input operation. But Tsujioka et al fails to disclose **the number of buttons** is **equal** to at least **the number of sensing areas plus one** and wherein a combination of the at least two sensing areas is used to recognize at least one of the activated buttons. These features in combination with the remaining language of claim 1, are not taught by the prior art of record.

The prior art of record fails to disclose the claimed invention. **The features of independent claim 5** directed towards allowable subject matter is " *a first sensor element; a second sensor elements; and a third sensor element comprising a first portion coupled to the first sensor element and second portion coupled to the second sensor element, wherein the first and second portions of the third sensor element are electrically isolated.* **Tsujioka et al (US Pat NO 5,518,078)** discloses a device having multiple sensor elements, but fails to disclose a third sensor element comprising a first portion coupled to the first sensor element and second portion coupled to the second sensor element. These features in combination with the remaining language of claims 1, 5, are not taught by the prior art of record. Therefore claims 1- 9 are found to be allowable over the prior art of record.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

3. Any inquiry concerning this communication or earlier communications from the examiner should be directed to BENYAM KETEMA whose telephone number is (571)270-7224. The examiner can normally be reached on Monday- Friday 8:00AM - 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shalwala Bipin H can be reached on 571-272-7681. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/ B.K. /

Examiner, Art Unit 2629

/Bipin Shalwala/

Supervisory Patent Examiner, Art Unit 2629

Notice of References Cited	Application/Control No. 11/437,517	Applicant(s)/Patent Under Reexamination XIAOPING, JIANG	
	Examiner BENYAM KETEMA	Art Unit 2629	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-5,518,078	05-1996	Tsujioka et al.	178/18.05
*	B	US-2004/0239616	12-2004	Collins, Ryan V.	345/156
*	C	US-2006/0097992	05-2006	Gitzinger et al.	345/173
*	D	US-2006/0227117	10-2006	Proctor, David W.	345/173
*	E	US-7,158,125	01-2007	Sinclair et al.	345/173
*	F	US-2007/0291013	12-2007	WON, Jong Sung	345/173
*	G	US-7,466,307	12-2008	Trent et al.	345/173
*	H	US-7,495,659	02-2009	Marriott et al.	345/173
*	I	US-2008/0007534	01-2008	Peng et al.	345/173
*	J	US-2008/0179112	07-2008	Qin et al.	178/18.06
*	K	US-7,821,274	10-2010	Philipp et al.	324/662
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Substitute for form 1449A/PTO				Complete If Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT *(use as many sheets as necessary)*				Application Number	
				Filing Date	
				First Named Inventor	Jiang XiaoPing
				Art Unit	
				Examiner Name	
Sheet	1	**of**	2	Attorney Docket Number	16820P456

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number - Kind Code[2] *(if known)*	Publication Date or Issue Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US-6,380,931	04-30-2002	Gillespie et al.	
		US-5,305,017	04-19-1994	Gerpheide	
		US-6,188,391	02-13-2001	Seely et al.	
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FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3] - Number[4] - Kind Code[5] *(if known)*	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]

Examiner Signature	/Benyam Ketema/	Date Considered	06/07/2011

*Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication.

[1]Applicant's unique citation designation number (optional). [2]See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3]Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4]For Japanese patent documents, the indication of the year of reign of the Emperor must precede the serial number of the patent document. [5]Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. [6]Applicant is to place a check mark here if English language Translation is attached.

Based on PTO/SB/08A (08-03) as modified by Blakely, Sokokoff, Taylor & Zafman (wlr) 08/11/2003.

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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.K./

Substitute for form 1449A/PTO				Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				Application Number	
				Filing Date	
				First Named Inventor	Jiang XiaoPing
				Art Unit	
				Examiner Name	
Sheet	2	**of**	2	Attorney Docket Number	16820P456

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
		Chapweske, Adam, "The PS/2 Mouse Interface", PS/2 Mouse Interfacing, 2001, 10 pages.	
		Mack, Chris, "Semiconductor Lithography - The Basic Process", Gentleman Scientist, 12 pages, downloaded April 20, 2006, http://www.lithoguru.com/scientist/lithobasics.html	
		"Photolithography", Wikipedia, the free encyclopedia, 3 pages, downloaded April 20, 2006, http://en.wikipedia.org/wiki/Photolithography	
		"CY8C21x34 Data Sheet", Cypress Semiconductore Corporation, CSR User Module, CSR v1.0, October 6, 2005, pgs. 1-36	

Examiner Signature	/Benyam Ketema/	Date Considered	06/07/2011

*Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication.

[1]Applicant's unique citation designation number. [2]Applicant is to place a check mark here if English language Translation is attached.

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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.K./

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11437517	XIAOPING, JIANG
	Examiner	**Art Unit**
	BENYAM KETEMA	2629

ORIGINAL	
CLASS	SUBCLASS
345	173

CROSS REFERENCE(S)

CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)				
345	174	179			
178	18.01	18.06			

INTERNATIONAL CLASSIFICATION

CLAIMED					NON-CLAIMED
G	0	6	F	3 / 041 (2006.0)	
G	0	6	F	3 / 045 (2006.0)	
G	0	6	F	3 / 033 (2006.0)	

☒ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
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/BENYAM KETEMA/ Examiner.Art Unit 2629 (Assistant Examiner)	6/2/2011 (Date)	Total Claims Allowed: 20	
/BIPIN SHALWALA/ Supervisory Patent Examiner.Art Unit 2629 (Primary Examiner)	06/02/2011 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 6B

Search Notes	**Application/Control No.** 11437517	**Applicant(s)/Patent Under Reexamination** XIAOPING, JIANG
	Examiner BENYAM KETEMA	**Art Unit** 2629

SEARCHED

Class	Subclass	Date	Examiner
345	173	7/16/2009	bk

SEARCH NOTES

Search Notes	Date	Examiner
Inventor Search	7/16/2009	bk
See Attaches EAST Search	7/16/2009	bk
Above EAST Search have been updated	1/19/2010	b.k
Above East search have been updated	7/30/2010	BK
above search have been updated	1/20/2011	BK
Above search have been updated	5/17/2011	BK
Above search have been updated	6/2/2011	BK

INTERFERENCE SEARCH

Class	Subclass	Date	Examiner
	Searched all of the above	1/28/2011	B.K

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CONFIRMATION NO. 2623

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
11/437,517	05/18/2006 RULE	345	2629	CD06039

APPLICANTS
Jiang XiaoPing, Shanghai, CHINA;

** **CONTINUING DATA** *************************

** **FOREIGN APPLICATIONS** *************************

** **IF REQUIRED, FOREIGN FILING LICENSE GRANTED** **
06/15/2006

Foreign Priority claimed ❑ Yes ☑ No 35 USC 119(a-d) conditions met ❑ Yes ☑ No Verified and Acknowledged /BENYAM KETEMA/ Examiner's Signature ❑ Met after Allowance ____ Initials	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
	CHINA	10	20	3

ADDRESS

CYPRESS SEMICONDUCTOR CORPORATION
198 CHAMPION COURT
SAN JOSE, CA 95134-1709
UNITED STATES

TITLE

TWO-PIN BUTTONS

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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	279	("20030091220" | "20040239616" | "20040178989" | "20040217945" | "20050031175" | "20050159126" | "20060097992" | "20060227117" | "20060038793" | "20060197750" | "20060232559" | "20060262101" | "20070291013" | "20070076897" | "20070247443" | "20070257894" | "20070268265" | "20070268273" | "20070268274" | "20070268275" | "20070296709" | "20080007534" | "20080024455" | "20080036473" | "20080041639" | "20080041640" | "20080042986" | "20080042987" | "20080042988" | "20080042989" | "20080042994" | "20080068100" | "20080111714" | "20080116904" | "20080128182" | "20080179112" | "20080278178" | "3979745" | "4039940" | "4113378" | "4145748" | "4193063" | "4238711" | "4264903" | "4266144" | "4292604" | "4305135" | "4586260" | "4614937" | "4728932" | "4736191" | "4825147" | "4831325" | "4831325" | "5305017" | "5518078" | "5008497" | "5214388" | "5237879" | "5323158" | "5373245" | "5386219" | "5541580" | "5670915" | "5760852" | "5801340" | "5920309" | "5942733" | "6188391" | "6380931" | "6037929" | "6060957" | "6145850" | "6184871" | "6191723" | "6297811" | "6353200" | "6353200" | "6366099" | "6377129" | "6448911" | "6448911" | "6490203" | "6535200" | "6577140" | "6583632" | "6700392" | "6781577" | "6806693" | "6825673" | "6838887" | "6859159" | "6882338" | "6891531" | "6940291" | "6946853" | "6970120" | "6970126" | "7158125" | "7466307" | "7495659" | "7006078" | "7031886" | "7046230" |	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2011/06/02 09:10

		"7068039" | "7075316" | "7078916" | "7098675" | "7129935" | "7148704" | "7235983" | "7253643" | "7262609" | "7288946" | "7301350" | "7307485" | "7339580" | "7359816" | "7375535" | "7381031" | "7382139" | "7417411" | "7417441" | "7423437" | "7449895" | "7450113" | "7451050" | "7453270" | "7453279" | "7479788" | "7499040" | "7521941" | "7548073" | "7598822" | "7683641").PN.				
L2	1	"11442212"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2011/06/02 09:19
S1	6	("5305017" | "6188391" | "6380931").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 09:51
S2	9	XIAOPING-JIANG.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 10:25
S3	2	"11437517"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 13:10
S6	76	"5543590"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 15:50
S7	4	XIAOPING-JIANG.in. and ((first and second) and (sensing adj areas))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 17:00

S8	3	XIAOPING-JIANG.in. and ((first and second) and (sensing adj areas).clm.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 17:00
S9	2	XIAOPING-JIANG.in. and ((first and sensing adj areas).clm. and (second and sensing adj areas).clm.)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 17:03
S10	1202	345/173.ccls. and capacitance	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 17:07
S11	604	345/173.ccls. and capacitance and button	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 17:07
S12	0	345/173.ccls. and capacitance and button and ("multiple sensing areas")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 17:08
S13	48	345/173.ccls. and capacitance and button and (sensing adj areas)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 17:09
S14	31	345/173.ccls. and capacitance and button and (sensing adj areas) and (touch adj pad)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/16 17:09
S15	77	"5943052"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 13:50
S16	34	2004/0252109	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 15:26

S17	0	2007/0146349	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 15:31
S18	2	"20070146349"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 15:32
S19	173	("20020063688" | "20020191029" | "20030025679" | "20030062889" | "20030063428" | "20030080755" | "20030156098" | "20030160808" | "20030183864" | "20030183884" | "20030184315" | "20040169594" | "20040178989" | "20040178997" | "20040252109" | "20040263864" | "20050021269" | "20050024341" | "20050052425" | "20050073302" | "20050073322" | "20050083110" | "20060032680" | "20060097991" | "20060113974" | "20060164142" | "20060273804" | "4264903" | "4283713" | "4438404" | "4475151" | "4497575" | "4736097" | "4736191" | "4773024" | "4802103" | "4876534" | "4879461" | "4935702" | "4953928" | "4962342" | "5049758" | "5055827" | "5059920" | "5068622" | "5073759" | "5083044" | "5095284" | "5097305" | "5107149" | "5109261" | "5119038" | "5120996" | "5122800" | "5126685" | "5146106" | "5160899" | "5165054" | "5166562" | "5204549" | "5243554" | "5248873" | "5260592" | "5270963" | "5276407" | "5289023" | "5303329" | "5305017" | "5324958" | "5331215" | "5336936" | "5339213" | "5349303" | "5374787" | "5381515" | "5384467" | "5408194" | "5488204" | "5495077" | "5541878" | "5543588" | "5543590" | "5543591" | "5555907" | "5565658" | "5566702" | "5629891" | "5648642" | "5682032" | "5730165" | "5757368" | "5763909" | "5767457" | "5796183" |	US-PGPUB; USPAT; USOCR	AND	ON	2009/07/18 15:45

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S20	1	2006/0097992	US-PGPUB; USPAT; USOCR	AND	ON	2009/07/18 16:19
S21	1	"20060097992"	US-PGPUB; USPAT; USOCR	AND	ON	2009/07/18 16:20
S22	12	345/173.ccls. and cypress.as.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:28
S23	3731	cypress.as.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:31

S24	0	"cypress.as.and" (Capacitive and sensor)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:33
S25	51	cypress.as. and (Capacitive and sensor)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:33
S26	1	cypress.as. and (Capacitive and sensor) and (touch near button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:34
S27	1167	(Capacitive and sensor) and (sensing near areas)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:47
S28	47	(Capacitive and sensor) and (sensing near areas) same buttons	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:48
S29	26	(touch near screen) and (Capacitive and sensor) and (sensing near areas) same buttons	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:49
S30	3	(touch near screen) and (Capacitive and sensor) and (sensing near areas) same sensing near buttons	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:57
S31	0	(touch near screen near buttons) and (Capacitive and sensor) and (sensing near areas) same sensing near buttons	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:57
S32	4	(touch near screen near buttons) and (Capacitive and sensor) and (sensing near areas)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 16:58

S33	2	"6947031"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 17:01
S34	89	"4476463"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 17:29
S35	106	"5565658"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 17:45
S36	212	"5730165"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 17:51
S37	162	"4736191"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:02
S38	90	"4680430"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:09
S39	0	345/4.ccls. and ((capacitance near sensor) same (vertual near button) same (pin))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:15
S40	0	345/4.ccls. and (capacitance near sensor)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:15
S41	0	"345"/$.ccls. and ((capacitance near sensor) same (vertual near button) same (pin))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:15

S42	369	"345"/$.ccls. and (capacitance near sensor)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:16
S43	162	"345"/$.ccls. and (capacitance near sensor) and (touch near screen)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:16
S44	32	"345"/$.ccls. and (capacitance near sensor) and (touch near screen) and multi$touch	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:17
S45	20	three near sensing near area	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:28
S46	8710	capacitance near sensor	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:29
S47	158	(electrically adj isolated) same (sensor near element)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:34
S48	0	S45 and S46 and S47	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:35
S49	24	S46 and S47	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:35
S50	307	(touch near sensor near button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:50

S51	60	S50 and S46	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/18 18:51
S52	0	(Multiple near sens$4 near area) and (button near operation) and (touch near screen)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 07:57
S53	2	(Multiple near sens$4 near area) and (touch near screen)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 07:58
S54	0	(Multiple near sens$4 near button $2) and (touch near screen) and (capacitance$2)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 08:04
S55	4	(Multiple near sens$4 near button $2) and (capacitance)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 08:05
S56	3	"20050133262"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 08:13
S57	2	"20080278453"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 08:22
S58	2	"20080246735"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 08:23
S59	4	"61000784"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 08:25

S60	1202	345/173.ccls. and capacitance	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 08:29
S61	613	345/174-179.ccls. and capacitance	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 11:09
S63	29	(touch near screen) and (Capacit $6 and sens$3) and (sensing near areas) same buttons	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 12:11
S64	2784	178/18.01-18.11.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 15:47
S65	439	178/18.01-18.11.ccls. and (touch near panel)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 15:48
S66	900	178/18.01-18.11.ccls. and (capacit $6 and sens$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 16:35
S67	30	178/18.01-18.11.ccls. and capacit $6 same sens$3 near (second or third)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 16:37
S68	33	(Capacit$6 and sens$3) and (sensing near areas) and (input near button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 17:23
S69	24064	(touch near screen or pad) and (capacit$6 and sens$3) and (button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 17:31

S70	90998	(touch near screen or pad) and (capacit$6 and sens$3) and (first or second and button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 17:32
S71	73385	(touch near screen or pad) and (capacit$6 and sens$3) and (first or second and button) and (sens $3 and area)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 17:33
S72	20303	(touch near screen or pad) and (capacit$6 and sens$3) and (button) and (sens$3 and area)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 17:33
S73	20303	(touch near screen or pad) and (capacit$6 and sens$3 and button) and (sens$3 and area)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 17:34
S74	2438	(touch near screen or pad) and (capacit$6 and sens$3 and button) and (sens$3 and area) and "345"/$.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 17:35
S76	1334	(touch near screen or pad) and (capacit$6 and sens$3 and button) and (sens$3 and area) and "345"/$.ccls. and portable	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/20 17:36
S77	61	345/173.ccls. and capacit$6 same sens$3 near (second or third)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2009/07/21 13:51
S78	560	345/173.ccls. and capacit$6 same sens$3 same (second or third)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/01/19 16:58
S79	396	(touch near screen or pad) same (capacit$6 and sens$3 and button) and (sens$3 and area) and "345"/$.ccls. and portable	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2010/01/19 16:58

S80	35	(touch near screen or pad) same (capacit$6 and sens$3 and button) same(sens$3 and area) and "345"/$.ccls. and portable	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2010/01/19 16:59
S81	567	(touch near (screen or pad)) same (capacit$6 and sens$3) same (button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/01/19 17:10
S82	504	(touch (screen or pad)) same (capacit$6 same sens$3) same (button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/01/19 17:11
S83	311	(touch (screen or pad)) same (capacit$6 sens$3) same (button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/01/19 17:11
S84	85	"345"/$.ccls. and (touch (screen or pad)) same (capacit$6 sens$3) same (button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/01/19 17:12
S85	42	"345"/173.ccls. and (touch (screen or pad)) same (capacit$6 sens$3) same (button)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2010/07/30 12:03
S86	0	(Multiple near sens$4 near button $2) and (touch near screen) and (capacit$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2010/07/30 12:06
S87	2	"20080252608"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2011/01/10 10:30
S88	19	"7030860"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2011/01/11 09:34

S89	2	"20060097992"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2011/01/24 09:55
S90	0	("2008/0074398").URPN.	USPAT	ADJ	ON	2011/01/24 11:18
S93	339	(sens$4 near button$2) and (touch near screen) and (capacit $4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2011/01/24 18:42
S94	93	(sens$4 near button$2) same (touch near screen) and (capacit $4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2011/01/24 18:43
S95	38	(sens$4 near button$2) same (touch near screen) same (capacit $4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	AND	ON	2011/01/24 18:43
S99	279	("20030091220" | "20040239616" | "20040178989" | "20040217945" | "20050031175" | "20050159126" | "20060097992" | "20060227117" | "20060038793" | "20060197750" | "20060232559" | "20060262101" | "20070291013" | "20070076897" | "20070247443" | "20070257894" | "20070268265" | "20070268273" | "20070268274" | "20070268275" | "20070296709" | "20080007534" | "20080024455" | "20080036473" | "20080041639" | "20080041640" | "20080042986" | "20080042987" | "20080042988" | "20080042989" | "20080042994" | "20080068100" | "20080111714" | "20080116904" | "20080128182" | "20080179112" | "20080278178" | "3979745" | "4039940" | "4113378" | "4145748" | "4193063" | "4238711" | "4264903" | "4266144" | "4292604" | "4305135" | "4586260" | "4614937" | "4728932" | "4736191" | "4825147" | "4831325" | "4831325" | "5305017" | "5518078" | "5008497" | "5214388" | "5237879" | "5323158" | "5373245" | "5386219" | "5541580" | "5670915" |	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2011/05/17 10:06

		"5760852" | "5801340" | "5920309" | "5942733" | "6188391" | "6380931" | "6037929" | "6060957" | "6145850" | "6184871" | "6191723" | "6297811" | "6353200" | "6353200" | "6366099" | "6377129" | "6448911" | "6448911" | "6490203" | "6535200" | "6577140" | "6583632" | "6700392" | "6781577" | "6806693" | "6825673" | "6838887" | "6859159" | "6882338" | "6891531" | "6940291" | "6946853" | "6970120" | "6970126" | "7158125" | "7466307" | "7495659" | "7006078" | "7031886" | "7046230" | "7068039" | "7075316" | "7078916" | "7098675" | "7129935" | "7148704" | "7235983" | "7253643" | "7262609" | "7288946" | "7301350" | "7307485" | "7339580" | "7359816" | "7375535" | "7381031" | "7382139" | "7417411" | "7417441" | "7423437" | "7449895" | "7450113" | "7451050" | "7453270" | "7453279" | "7479788" | "7499040" | "7521941" | "7548073" | "7598822" | "7683641").PN.				
S101	0	"11600896""11484085"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2011/05/17 10:10
S102	2	"11600896" | "11484085"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2011/05/17 10:10
S103	16	"11600896" | "11484085" | "11477179" | "11493350" | "11600896" | "11395417" | "12367279" | "11600255" | "11273708" | "11502267" | "11230719" | "11484085" | "11489944" | "11700314" | "11477179"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2011/05/17 10:20

6/2/2011 9:22:51 AM
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	11437517
	Filing Date	2006-05-18
	First Named Inventor	Jiang XiaoPing
	Art Unit	2629
	Examiner Name	KETEMA, BENYAM
	Attorney Docket Number	CD06039

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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.K./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	11437517
	Filing Date	2006-05-18
	First Named Inventor	Jiang XiaoPing
	Art Unit	2629
	Examiner Name	KETEMA, BENYAM
	Attorney Docket Number	CD06039

	1	USPTO Non-Final Rejection for Application Number 11/442,212 (CD06030) dated 02/25/2011; 13 pages	☐

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EXAMINER SIGNATURE

Examiner Signature	/Benyam Ketema/	Date Considered	06/02/2011

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[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

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PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

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60909 7590 06/16/2011

CYPRESS SEMICONDUCTOR CORPORATION
198 CHAMPION COURT
SAN JOSE, CA 95134-1709

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

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I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/437,517	05/18/2006	Jiang XiaoPing	CD06039	2623

TITLE OF INVENTION: TWO-PIN BUTTONS

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1510	$300	$0	$1810	09/16/2011

EXAMINER	ART UNIT	CLASS-SUBCLASS
KETEMA, BENYAM	2629	345-173000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
   - ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
   - ☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
   (1) the names of up to 3 registered patent attorneys or agents OR, alternatively,
   (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.
   1 ____________
   2 ____________
   3 ____________

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE: Cypress Semiconductor Corporation

(B) RESIDENCE: (CITY and STATE OR COUNTRY): San Jose, CA

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☑ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:
- ☑ Issue Fee
- ☑ Publication Fee (No small entity discount permitted)
- ☐ Advance Order - # of Copies ____________

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- ☐ A check is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number 50-3781 (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
- ☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27.
- ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature: Andrew J. Bateman   Date: 06/24/2011

Typed or printed name: Andrew Bateman   Registration No. 45,573

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	)	Examiner: KETEMA, BENYAM
	)	
Jiang XiaoPing	)	Group Art Unit: 2629
	)	
Application No.: 11/437,517	)	Confirmation No.: 2623
	)	
Filed: 05-18-2006	)	
	)	
For: TWO-PIN BUTTONS	)	
	)	

ISSUE FEE TRANSMITTAL

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Applicant is in receipt of a Notice of Allowance and Fee Due Form, mailed June 16, 2011, in connection with the above-identified application. The Issue Fee is due on or before September 16, 2011. Applicant hereby submits the Issue Fee and/or the Publication Fee.

The Commissioner is hereby authorized to charge any appropriate fees under 37 C.F.R. §§ 1.16, 1.17, 1.18, 1.19, 1.20 and 1.21 that may be required to issue the present application, and to credit any overpayments, to Deposit Account No. 50-3781.

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Customer No.: 60909

Should the Patent Office have any questions regarding this submission or the application in general, the Patent Office is urged to contact the Applicant's attorney, Andrew Bateman, by telephone at (408) 943-6878. All correspondence should continue to be directed to the address given below.

Respectfully submitted,

Dated: JUNE 24, 2011

By: Andrew J. Bateman
Andrew Bateman
Attorney for Applicant
Registration No. 45,573

Cypress Semiconductor Corporation
198 Champion Court
San Jose, CA 95134
Facsimile: (408) 545-6911
Customer No.: 60909

Electronic Patent Application Fee Transmittal

Application Number:	11437517
Filing Date:	18-May-2006
Title of Invention:	TWO-PIN BUTTONS
First Named Inventor/Applicant Name:	Jiang XiaoPing
Filer:	Andrew J. Bateman/Hilary Link
Attorney Docket Number:	CD06039

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Utility Appl issue fee	1501	1	1510	1510
Publ. Fee- early, voluntary, or normal	1504	1	300	300

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**1810**

Electronic Acknowledgement Receipt

EFS ID:	10384196
Application Number:	11437517
International Application Number:	
Confirmation Number:	2623
Title of Invention:	TWO-PIN BUTTONS
First Named Inventor/Applicant Name:	Jiang XiaoPing
Customer Number:	60909
Filer:	Andrew J. Bateman/Hilary Link
Filer Authorized By:	Andrew J. Bateman
Attorney Docket Number:	CD06039
Receipt Date:	24-JUN-2011
Filing Date:	18-MAY-2006
Time Stamp:	16:08:10
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$1810
RAM confirmation Number	2709
Deposit Account	503781
Authorized User	

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Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	CD06039_IssueFeePage_06242011.pdf	925157 8a71cc9c53cd10230229d49ee6e76a2a15e5d2b9	no	1
Warnings:					
Information:					
2	Transmittal Letter	CD06039_TransmittalLetterPDF_06242011.pdf	551423 f4292b03f866eb2a94cf8a79af6f406083fe0b34	no	2
Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	32081 840f69b52a933369fa71b1308d16da6c2eebab12	no	2
Warnings:					
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		Total Files Size (in bytes):	1508661		

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<u>New Applications Under 35 U.S.C. 111</u>
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

<u>National Stage of an International Application under 35 U.S.C. 371</u>
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

<u>New International Application Filed with the USPTO as a Receiving Office</u>
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	11437517
	Filing Date	2006-05-18
	First Named Inventor	Jiang XiaoPing
	Art Unit	2629
	Examiner Name	KETEMA, BENYAM
	Attorney Docket Number	CD06039

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Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
/B.K./	1	4039940	B1	1977-08-07 ~~1970-02-01~~	Butler et al. ~~Jacob et al.~~	Entire Document
	2	4145748	B1	1979-03-20	Eichelberger et al.	Entire Document
	3	4614937	B1	1986-09-30	Poujois, Robert	Entire Document
	4	4728932	B1	1988-03-01	Atherton, James H.	Entire Document
	5	4825147	B1	1989-04-25	Cook et al.	Entire Document
	6	7683641	B1	2010-03-23	Hargreaves et al.	Entire Document
	7	7453270	B1	2008-11-18	Hargreaves et al.	Entire Document
	8	7423437	B1	2008-09-09	Hargreaves et al.	Entire Document

 ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.K./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	11437517
	Filing Date	2006-05-18
	First Named Inventor	Jiang XiaoPing
	Art Unit	2629
	Examiner Name	KETEMA, BENYAM
	Attorney Docket Number	CD06039

	9	7521941	B1	2009-04-21	Ely et al.	Entire Document
	10	7417441	B1	2008-08-26	Reynolds, Joseph Kurth	Entire Document
	11	7148704	B1	2006-12-12	Philipp, Harald	Entire Document
	12	5801340	B1	1998-09-01	Peter, Walter H.	Entire Document
	13	7453279	B1	2008-11-18	Corbin Jr. et al.	Entire Document
	14	7451050	B1	2008-11-11	Hargreaves, Kirk	Entire Document
	15	5920309	B1	1999-07-06	Bisset et al.	Entire Document
	16	7450113	B1	2008-11-11	Gillespie et al.	Entire Document
	17	6191723	B1	2001-02-20	Lewis, Jason D.	Entire Document
	18	6353200	B1	2002-03-05	Schwankhart, Gerhard	Entire Document
	19	7449895	B1	2008-11-11	Ely et al.	Entire Document

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.K./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**	
Application Number	11437517
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Attorney Docket Number	CD06039

	20	7423437	B1	2008-09-09	Hargreaves et al.	Entire Document
	21	7417411	B1	2008-08-26	Hoffman et al.	Entire Document
	22	7339580	B1	2008-03-04	Westerman et al.	Entire Document
	23	5760852	B1	1998-06-02	Wu et al.	Entire Document
	24	6859159	B1	2005-02-22	Michalski, Christopher	Entire Document
	25	6970120	B1	2005-11-29	Bjornsen, Johnny	Entire Document
	26	7031886	B1	2006-04-18	Hargreaves, Kirk	Entire Document
	27	7078916	B1	2006-07-18	Denison, Timothy J.	Entire Document
	28	7129935	B1	2006-10-31	Mackey, Bob Lee	Entire Document
	29	7235983	B1	2007-06-26	O'Dowd et al.	Entire Document
	30	7262609	B1	2007-08-28	Reynolds, Joseph Kurth	Entire Document

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	11437517
	Filing Date	2006-05-18
	First Named Inventor	Jiang XiaoPing
	Art Unit	2629
	Examiner Name	KETEMA, BENYAM
	Attorney Docket Number	CD06039

	31	7288946	B1	2007-10-30	Hargreaves et al.	Entire Document
	32	7301350	B1	2007-11-27	Hargreaves et al.	Entire Document

If you wish to add additional U.S. Patent citation information please click the Add button. Add

U.S.PATENT APPLICATION PUBLICATIONS Remove

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20080278178	A1	2008-11-13	Philipp, Harald	Entire Document
	2	20080128182	A1	2008-06-05	Westerman et al.	Entire Document
	3	20060038793	A1	2006-02-23	Philipp, Harald	Entire Document
	4	20080042994	A1	2008-02-21	Westerman et al.	Entire Document
	5	20080116904	A1	2008-05-22	Reynolds et al.	Entire Document
	6	20070268273	A1	2007-11-22	Westerman et al.	Entire Document
	7	20070268274	A1	2007-11-22	Westerman et al.	Entire Document

 ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.K./

INFORMATION DISCLOSURE STATEMENT BY APPLICANT **(Not for submission under 37 CFR 1.99)**	
Application Number	11437517
Filing Date	2006-05-18
First Named Inventor	Jiang XiaoPing
Art Unit	2629
Examiner Name	KETEMA, BENYAM
Attorney Docket Number	CD06039

	8	20070268275	A1	2007-11-22	Westerman et al.	Entire Document
	9	20080041639	A1	2008-02-21	Westerman et al.	Entire Document
	10	20080041640	A1	2008-02-21	Gillespie et al.	Entire Document
	11	20080068100	A1	2008-03-20	Goodnow et al.	Entire Document
	12	20080042986	A1	2008-02-21	Westerman et al.	Entire Document
	13	20080042987	A1	2008-02-21	Westerman et al.	Entire Document
	14	20080042988	A1	2008-02-21	Westerman et al.	Entire Document
	15	20080042989	A1	2008-02-21	Westerman et al.	Entire Document

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	1							☐

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	11437517
	Filing Date	2006-05-18
	First Named Inventor	Jiang XiaoPing
	Art Unit	2629
	Examiner Name	KETEMA, BENYAM
	Attorney Docket Number	CD06039

NON-PATENT LITERATURE DOCUMENTS			Remove
Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T5
	1		☐

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EXAMINER SIGNATURE			
Examiner Signature	/Benyam Ketema/	Date Considered	07/15/2011

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /B.K./

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/437,517	05/18/2006	Jiang XiaoPing	CD06039	2623

60909 7590 07/21/2011
CYPRESS SEMICONDUCTOR CORPORATION
198 CHAMPION COURT
SAN JOSE, CA 95134-1709

EXAMINER	
KETEMA, BENYAM	

ART UNIT	PAPER NUMBER
2629	

MAIL DATE	DELIVERY MODE
07/21/2011	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

PTOL-90A (Rev. 04/07)

Interview Summary	**Application No.** 11/437,517	**Applicant(s)** XIAOPING, JIANG	
	Examiner BENYAM KETEMA	**Art Unit** 2629	

All participants (applicant, applicant's representative, PTO personnel):

(1) BENYAM KETEMA. (3)_____.

(2) Ryan Seguine. (4)_____.

Date of Interview: 15 July 2011.

Type: a)☒ Telephonic b)☐ Video Conference
c)☐ Personal [copy given to: 1)☐ applicant 2)☒ applicant's representative]

Exhibit shown or demonstration conducted: d)☐ Yes e)☒ No.
If Yes, brief description: _____.

Claim(s) discussed: n/a.

Identification of prior art discussed: n/a.

Agreement with respect to the claims f)☐ was reached. g)☐ was not reached. h)☐ N/A.

Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: *Examiner called Applicant representative (Ryan Seguine) and discussed discrepancy on the IDS filed on 05/19/2011 wherein patent NO 4039940 could not be verified. Applicant acknowledged that the information was incorrect as filed and provided the correct issue date and name of the patentee.* .

(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims allowable, if available, must be attached. Also, where no copy of the amendments that would render the claims allowable is available, a summary thereof must be attached.)

THE FORMAL WRITTEN REPLY TO THE LAST OFFICE ACTION MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW. (See MPEP Section 713.04). If a reply to the last Office action has already been filed, APPLICANT IS GIVEN A NON-EXTENDABLE PERIOD OF THE LONGER OF ONE MONTH OR THIRTY DAYS FROM THIS INTERVIEW DATE, OR THE MAILING DATE OF THIS INTERVIEW SUMMARY FORM, WHICHEVER IS LATER, TO FILE A STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. See Summary of Record of Interview requirements on reverse side or on attached sheet.

/Bipin Shalwala/
Supervisory Patent Examiner, Art Unit 2629

Summary of Record of Interview Requirements

Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record
A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews
Paragraph (b)

In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

37 CFR §1.2 Business to be transacted in writing.
All business with the Patent or Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

The action of the Patent and Trademark Office cannot be based exclusively on the written record in the Office if that record is itself incomplete through the failure to record the substance of interviews.

It is the responsibility of the applicant or the attorney or agent to make the substance of an interview of record in the application file, unless the examiner indicates he or she will do so. It is the examiner's responsibility to see that such a record is made and to correct material inaccuracies which bear directly on the question of patentability.

Examiners must complete an Interview Summary Form for each interview held where a matter of substance has been discussed during the interview by checking the appropriate boxes and filling in the blanks. Discussions regarding only procedural matters, directed solely to restriction requirements for which interview recordation is otherwise provided for in Section 812.01 of the Manual of Patent Examining Procedure, or pointing out typographical errors or unreadable script in Office actions or the like, are excluded from the interview recordation procedures below. Where the substance of an interview is completely recorded in an Examiners Amendment, no separate Interview Summary Record is required.

The Interview Summary Form shall be given an appropriate Paper No., placed in the right hand portion of the file, and listed on the "Contents" section of the file wrapper. In a personal interview, a duplicate of the Form is given to the applicant (or attorney or agent) at the conclusion of the interview. In the case of a telephone or video-conference interview, the copy is mailed to the applicant's correspondence address either with or prior to the next official communication. If additional correspondence from the examiner is not likely before an allowance or if other circumstances dictate, the Form should be mailed promptly after the interview rather than with the next official communication.

The Form provides for recordation of the following information:
- Application Number (Series Code and Serial Number)
- Name of applicant
- Name of examiner
- Date of interview
- Type of interview (telephonic, video-conference, or personal)
- Name of participant(s) (applicant, attorney or agent, examiner, other PTO personnel, etc.)
- An indication whether or not an exhibit was shown or a demonstration conducted
- An identification of the specific prior art discussed
- An indication whether an agreement was reached and if so, a description of the general nature of the agreement (may be by attachment of a copy of amendments or claims agreed as being allowable). Note: Agreement as to allowability is tentative and does not restrict further action by the examiner to the contrary.
- The signature of the examiner who conducted the interview (if Form is not an attachment to a signed Office action)

It is desirable that the examiner orally remind the applicant of his or her obligation to record the substance of the interview of each case. It should be noted, however, that the Interview Summary Form will not normally be considered a complete and proper recordation of the interview unless it includes, or is supplemented by the applicant or the examiner to include, all of the applicable items required below concerning the substance of the interview.

A complete and proper recordation of the substance of any interview should include at least the following applicable items:
1) A brief description of the nature of any exhibit shown or any demonstration conducted,
2) an identification of the claims discussed,
3) an identification of the specific prior art discussed,
4) an identification of the principal proposed amendments of a substantive nature discussed, unless these are already described on the Interview Summary Form completed by the Examiner,
5) a brief identification of the general thrust of the principal arguments presented to the examiner,
   (The identification of arguments need not be lengthy or elaborate. A verbatim or highly detailed description of the arguments is not required. The identification of the arguments is sufficient if the general nature or thrust of the principal arguments made to the examiner can be understood in the context of the application file. Of course, the applicant may desire to emphasize and fully describe those arguments which he or she feels were or might be persuasive to the examiner.)
6) a general indication of any other pertinent matters discussed, and
7) if appropriate, the general results or outcome of the interview unless already described in the Interview Summary Form completed by the examiner.

Examiners are expected to carefully review the applicant's record of the substance of an interview. If the record is not complete and accurate, the examiner will give the applicant an extendable one month time period to correct the record.

Examiner to Check for Accuracy

If the claims are allowable for other reasons of record, the examiner should send a letter setting forth the examiner's version of the statement attributed to him or her. If the record is complete and accurate, the examiner should place the indication, "Interview Record OK" on the paper recording the substance of the interview along with the date and the examiner's initials.

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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Alexandria, Virginia 22313-1450
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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/437,517	08/23/2011	8004497	CD06039	2623

60909 7590 08/03/2011

CYPRESS SEMICONDUCTOR CORPORATION
198 CHAMPION COURT
SAN JOSE, CA 95134-1709

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 1012 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

Jiang XiaoPing, Shanghai, CHINA;

AO 120 (Rev. 2/99)

TO: **Mail Stop 8** **Director of the U.S. Patent & Trademark Office** **P.O. Box 1450** **Alexandria, VA 22313-1450**	**REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK**

In Compliance with 35 § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court NDCA on the following X Patents or ☐ Trademarks:

DOCKET NO.	DATE FILED	U.S. DISTRICT COURT
CV 13-04034 DMR	8/29/13	Oakland Division, 1301 Clay St., Suite 400S, Oakland, CA 94612

PLAINTIFF	DEFENDANT
CYPRESS SEMICONDUCTOR CORPORATION	LG ELECTRONICS, INC.,ET.AL

PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 6,012,103		*See attached complaint
2 6,249,825		
3 6,493,770		
4 8,004,497		
5 8,059,015		

In the above—entitled case, the following patent(s) have been included:

DATE INCLUDED	INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading	
PATENT OR TRADEMARK NO.	**DATE OF PATENT OR TRADEMARK**	**HOLDER OF PATENT OR TRADEMARK**
1 8,519,973		
2		
3		
4		
5		

In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT

CLERK	(BY) DEPUTY CLERK	DATE
Richard W. Wieking	Valerie Kyono	August 30, 2013

Copy 1—Upon initiation of action, mail this copy to Commissioner Copy 3—Upon termination of action, mail this copy to Commissioner
Copy 2—Upon filing document adding patent(s), mail this copy to Commissioner Copy 4—Case file copy

enjoined by this Court.

42. On information and belief, LGE's infringement has been, and continues to be, willful, wanton, and deliberate, without license or excuse and with full knowledge of the '825 patent.

THIRD CLAIM FOR RELIEF
(Infringement of the '770 Patent)

43. Cypress incorporates and realleges the allegations of the preceding paragraphs as though set forth in full herein.

44. Cypress has not licensed or otherwise authorized LGE to make, use, offer for sale, sell, or import into the United States any products that embody the inventions of the '770 patent.

45. LGE has directly infringed and continues to directly infringe the '770 patent by making, using, importing, offering for sale or selling the LGE Infringing USB Products in the United States.

46. LGE has had actual knowledge of the '770 patent since at least April 1, 2011.

47. LGE has indirectly infringed and continues to indirectly infringe the '770 patent by inducing end-users to infringe the '770 patent by using the LGE Infringing USB Products. LGE intentionally took action that induced end-users to infringe the '770 patent by marketing, selling, and supporting the infringing devices. On information and belief, at least one LGE end customer or distributor has directly infringed the '770 patent by acting as instructed by LGE. For example, LGE supplies end customers and distributors of the LGE Infringing USB Products with user manuals and other information that instruct downstream users how to operate the LGE Infringing USB Products, with knowledge that use in accordance with such instructions infringes the '770 patent. As detailed by the user manuals and other information supplied by LGE, the LGE Infringing USB Products infringe multiple Cypress patents. Sale or use of the LGE Infringing USB Products by end customers or distributors in accordance with LGE's instructions constitutes direct infringement of the '770 patent. LGE had awareness of the '770 patent and knew, or was willfully blind to the fact, that its actions would cause direct infringement by end-users.

48. LGE has indirectly infringed and continues to indirectly infringe the '770 patent

by contributing to direct infringement by end-users who use the LGE Infringing USB Products. LGE supplied a component whose use by downstream users is infringing; the component is not a common component suitable for non-infringing use; and LGE supplied the component with the knowledge of the '770 patent and knowledge that the component was especially made or adapted for use in an infringing manner.

49. LGE's actions are in violation of one or more of the provisions of 35 U.S.C. § 271.

50. Cypress has been damaged and irreparably injured by LGE's infringing activities and will continue to be so damaged and irreparably injured unless LGE's infringing activities are enjoined by this Court.

51. On information and belief, LGE's infringement has been, and continues to be, willful, wanton, and deliberate, without license or excuse and with full knowledge of the '770 patent.

FOURTH CLAIM FOR RELIEF
(Infringement of the '497 Patent)

52. Cypress incorporates and realleges the allegations of the preceding paragraphs as though set forth in full herein.

53. Cypress has not licensed or otherwise authorized LGE to make, use, offer for sale, sell, or import into the United States any products that embody the inventions of the '497 patent.

54. LGE has directly infringed and continues to directly infringe the '497 patent by making, using, importing, offering for sale or selling the LGE Infringing Touchscreen Products in the United States.

55. LGE has had actual knowledge of the '497 patent since at least August 25, 2011.

56. LGE has had actual knowledge of the published application that finally issued as the '497 patent since at least July 12, 2011.

57. LGE has indirectly infringed and continues to indirectly infringe the '497 patent by inducing end-users to infringe the '497 patent by using the LGE Infringing Touchscreen Products. LGE intentionally took action that induced end-users to infringe the '497 patent by marketing, selling, and supporting the infringing devices. On information and belief, at least one

LGE end customer or distributor has directly infringed the '497 patent by acting as instructed by LGE. For example, LGE supplies end customers and distributors of the LGE Infringing Touchscreen Products with user manuals and other information that instruct downstream users how to operate the LGE Infringing Touchscreen Products, with knowledge that use in accordance with such instructions infringes the '497 patent. As detailed by the user manuals and other information supplied by LGE, the LGE Infringing Touchscreen Products infringe multiple Cypress patents. Sale or use of the LGE Infringing Touchscreen Products by end customers or distributors in accordance with LGE's instructions constitutes direct infringement of the '497 patent. LGE had awareness of the '497 patent and knew, or was willfully blind to the fact, that its actions would cause direct infringement by end-users.

58. LGE has indirectly infringed and continues to indirectly infringe the '497 patent by contributing to direct infringement by end-users who use the LGE Infringing Touchscreen Products. LGE supplied a component whose use by downstream users is infringing; the component is not a common component suitable for non-infringing use; and LGE supplied the component with the knowledge of the '497 patent and knowledge that the component was especially made or adapted for use in an infringing manner.

59. LGE's actions are in violation of one or more of the provisions of 35 U.S.C. § 271.

60. Cypress has been damaged and irreparably injured by LGE's infringing activities and will continue to be so damaged and irreparably injured unless LGE's infringing activities are enjoined by this Court.

61. Cypress is entitled to damages based on the provisional rights granted under 35 U.S.C. § 154 (d).

62. On information and belief, LGE's infringement has been, and continues to be, willful, wanton, and deliberate, without license or excuse and with full knowledge of the '497 patent.

FIFTH CLAIM FOR RELIEF
(Infringement of the '015 Patent)

63. Cypress incorporates and realleges the allegations of the preceding paragraphs as though set forth in full herein.

KAYE|SCHOLER LLP

64. Cypress has not licensed or otherwise authorized LGE to make, use, offer for sale, sell, or import into the United States any products that embody the inventions of the '015 patent.

65. LGE has directly infringed and continues to directly infringe the '015 patent by making, using, importing, offering for sale or selling the LGE Infringing Touchscreen Products in the United States.

66. LGE has had actual knowledge of the '015 patent since at least March 7, 2012.

67. LGE has had actual knowledge of the published application that finally issued as the '015 patent since at least July 12, 2011.

68. LGE has indirectly infringed and continues to indirectly infringe the '015 patent by inducing end-users to infringe the '015 patent by using the LGE Infringing Touchscreen Products. LGE intentionally took action that induced end-users to infringe the '015 patent by marketing, selling, and supporting the infringing devices. On information and belief, at least one LGE end customer or distributor has directly infringed the '015 patent by acting as instructed by LGE. For example, LGE supplies end customers and distributors of the LGE Infringing Touchscreen Products with user manuals and other information that instruct downstream users how to operate the LGE Infringing Touchscreen Products, with knowledge that use in accordance with such instructions infringes the '015 patent. As detailed by the user manuals and other information supplied by LGE, the LGE Infringing Touchscreen Products infringe multiple Cypress patents. Sale or use of the LGE Infringing Touchscreen Products by end customers or distributors in accordance with LGE's instructions constitutes direct infringement of the '015 patent. LGE had awareness of the '015 patent and knew, or was willfully blind to the fact, that its actions would cause direct infringement by end-users.

69. LGE has indirectly infringed and continues to indirectly infringe the '015 patent by contributing to direct infringement by end-users who use the LGE Infringing Touchscreen Products. LGE supplied a component whose use by downstream users is infringing; the component is not a common component suitable for non-infringing use; and LGE supplied the component with the knowledge of the '015 patent and knowledge that the component was especially made or adapted for use in an infringing manner.

70. LGE's actions are in violation of one or more of the provisions of 35 U.S.C. § 271.

71. Cypress has been damaged and irreparably injured by LGE's infringing activities and will continue to be so damaged and irreparably injured unless LGE's infringing activities are enjoined by this Court.

72. Cypress is entitled to damages based on the provisional rights granted under 35 U.S.C. § 154 (d).

73. On information and belief, LGE's infringement has been, and continues to be, willful, wanton, and deliberate, without license or excuse and with full knowledge of the '015 patent.

SIXTH CLAIM FOR RELIEF
(Infringement of the '973 Patent)

74. Cypress incorporates and realleges the allegations of the preceding paragraphs as though set forth in full herein.

75. Cypress has not licensed or otherwise authorized LGE to make, use, offer for sale, sell, or import into the United States any products that embody the inventions of the '973 patent.

76. LGE has directly infringed and continues to directly infringe the '973 patent by making, using, importing, offering for sale or selling the LGE Infringing Touchscreen Products in the United States.

77. LGE has had actual knowledge of the '973 patent since at least August 29, 2013.

78. LGE has indirectly infringed and continues to indirectly infringe the '973 patent by inducing end-users to infringe the '973 patent by using the LGE Infringing Touchscreen Products. LGE intentionally took action that induced end-users to infringe the '973 patent by marketing, selling, and supporting the infringing devices. On information and belief, at least one LGE end customer or distributor has directly infringed the '973 patent by acting as instructed by LGE. For example, LGE supplies end customers and distributors of the LGE Infringing Touchscreen Products with user manuals and other information that instruct downstream users how to operate the LGE Infringing Touchscreen Products, with knowledge that use in accordance with such instructions infringes the '973 patent. As detailed by the user manuals and other information supplied by LGE, the LGE Infringing Touchscreen Products infringe multiple

Cypress patents. Sale or use of the LGE Infringing Touchscreen Products by end customers or distributors in accordance with LGE's instructions constitutes direct infringement of the '973 patent. LGE had awareness of the '973 patent and knew, or was willfully blind to the fact, that its actions would cause direct infringement by end-users.

79. LGE has indirectly infringed and continues to indirectly infringe the '973 patent by contributing to direct infringement by end-users who use the LGE Infringing Touchscreen Products. LGE supplied a component whose use by downstream users is infringing; the component is not a common component suitable for non-infringing use; and LGE supplied the component with the knowledge of the '973 patent and knowledge that the component was especially made or adapted for use in an infringing manner.

80. LGE's actions are in violation of one or more of the provisions of 35 U.S.C. § 271.

81. Cypress has been damaged and irreparably injured by LGE's infringing activities and will continue to be so damaged and irreparably injured unless LGE's infringing activities are enjoined by this Court.

82. On information and belief, LGE's infringement has been, and continues to be, willful, wanton, and deliberate, without license or excuse and with full knowledge of the '973 patent.

PRAYER FOR RELIEF

WHEREFORE, Cypress requests that this Court grant the following relief:

a. Enter judgment that the LGE Infringing USB Products infringe the '103, '825, and '770 patents and the LGE Infringing Touchscreen Products infringe the '497, '015, and '973 patents;

b. Enter an order permanently enjoining LGE and its officers, directors, agents, servants, employees, attorneys, licensees, successors, assigns, and customers, and those in active concert or participation with any of them, from making, using, offering to sell, or selling in the United States or importing into the United States any devices that infringe any claim of the Asserted Patents;

c. Award Cypress its damages, including lost profits, resulting from LGE's infringement in an amount to be determined at trial, pursuant to 35 U.S.C. §§ 154 and 284;

d. Find this to be an exceptional case pursuant to 35 U.S.C. § 285;

e. Award Cypress prejudgment interest and post-judgment interest on its damages and award Cypress its costs;

f. Perform an accounting of LGE's infringing sales not presented at trial and award Cypress additional damages from any such infringing sales; and

g. Award Cypress its costs and attorneys' fees and such other and further relief as the Court deems just and appropriate.

DEMAND FOR JURY TRIAL

Pursuant to Rule 38(b) of the Federal Rules of Civil Procedure, Cypress hereby demands trial by jury on all issues raised by the Complaint.

Dated: August 29, 2013

Respectfully submitted,

KAYE SCHOLER LLP

By *_/s/ Michael J. Malecek_*
Michael J. Malecek
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CYPRESS SEMICONDUCTOR
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Attorneys for Plaintiff
CYPRESS SEMICONDUCTOR CORPORATION

UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

CYPRESS SEMICONDUCTOR CORPORATION, Plaintiff, v. LG ELECTRONICS, INC., LG ELECTRONICS U.S.A., INC., and LG ELECTRONICS MOBILECOMM U.S.A., INC., Defendants.	Case No. **COMPLAINT FOR PATENT INFRINGEMENT** **JURY TRIAL DEMANDED**

Plaintiff Cypress Semiconductor Corporation ("Cypress" or "Plaintiff") alleges:

PARTIES

1. Cypress is a corporation organized and existing under the laws of the State of Delaware with its principal place of business located at 198 Champion Court, San Jose, California. Cypress is a supplier of high-performance, mixed-signal, programmable solutions that provide customers with rapid time-to-market and exceptional system value. Cypress's innovations are used in a wide variety of consumer electronics, such as networking and telecommunication equipment, touchscreen devices, mobile handsets, video and imaging devices, as well as in military communication devices.

2. On information and belief, Defendant LG Electronics, Inc. ("LGE Inc.") is a corporation organized and existing under the laws of Korea with a principal place of business at 20, Yeouido-dong, Yeongdeungpo-Gu, Seoul 150-721, Korea.

3. On information and belief, Defendant LG Electronics U.S.A., Inc. ("LGE U.S.A.") is a corporation organized and existing under the laws of the State of Delaware with a principal place of business at 1000 Sylvan Avenue, Englewood Cliffs, New Jersey 07632.

4. On information and belief, Defendant LG Electronics Mobilecomm U.S.A., Inc. ("LGE Mobilecomm") is a corporation organized and existing under the laws of the State of California with a principal place of business at 10225 Willow Creek Road, San Diego, California 92131.

5. As further described below, LGE Inc., LGE U.S.A., and LGE Mobilecomm (collectively, "LGE") manufacture and sell mobile phones and other products that infringe multiple Cypress patents.

JURISDICTION AND VENUE

6. This action arises under the patent laws of the United States, 35 U.S.C. § 100, *et seq*. This Court has subject matter jurisdiction over this action under 28 U.S.C. §§ 1331 and 1338(a).

7. This Court has personal jurisdiction over LGE and venue is proper in the Northern District of California pursuant to 28 U.S.C. § 1391(b) and (c) and § 1400(b). LGE maintains

offices in this District, transacts business involving infringing products within this District, and offers infringing products for sale in this District. On information and belief, LGE derives significant revenue from the sale of infringing products distributed and used within this District, and/or expects or should reasonably expect its actions to have consequences within this District, and derives substantial revenue from interstate and international commerce.

INTRADISTRICT ASSIGNMENT

8. This is an Intellectual Property Action to be assigned on a district-wide basis pursuant to Civil Local Rule 3-2(c).

BACKGROUND

9. For over thirty years, Cypress has been a pioneer and market innovator in semiconductor technology. Cypress products include the PSoC® 1, PSoC® 3, PSoC® 4, and PSoC® 5 programmable system-on-chip families, and Cypress is the world leader in capacitive user interface solutions including CapSense® touch sensing, TrueTouch® touchscreens, and trackpad solutions for notebook PCs and peripherals. Cypress is also the world leader in universal serial bus ("USB") controllers, which enhance connectivity and performance in a wide range of consumer and industrial products. Cypress is also the world leader in static random access memory ("SRAM") and nonvolatile RAM memories.

10. To develop its industry-leading products, Cypress has made extensive and continuous investments in research and development ("R&D"). Cypress's R&D efforts have been essential to its success as a supplier of semiconductor solutions. Cypress's R&D organization works closely with its manufacturing facilities, suppliers and customers to improve semiconductor designs and lower manufacturing costs.

11. To protect these critical R&D efforts, Cypress places a high value on its intellectual property. Cypress has applied for and received over 2000 patents worldwide in a variety of semiconductor-related technologies, and has more than 800 pending U.S. and foreign patent applications. Cypress has over 250 issued U.S. patents and over 200 pending U.S. patent applications directed towards USB and touchscreen technology.

12. To protect the interests of Cypress's customers, who benefit from Cypress's leading-edge technology and rely upon Cypress's proprietary solutions to compete in the marketplace, Cypress cannot allow unauthorized use of its intellectual property.

CYPRESS PATENTS

13. On January 4, 2000, the United States Patent and Trademark Office duly and legally issued United States Patent No. 6,012,103 ("the '103 patent"), entitled "Bus Interface System and Method," to Cypress. Cypress owns the '103 patent by assignment. A true and correct copy of the '103 patent is attached as Exhibit A to this Complaint.

14. On June 19, 2001, the United States Patent and Trademark Office duly and legally issued United States Patent No. 6,249,825 ("the '825 patent"), entitled "Universal Serial Bus Interface System and Method," to Cypress. Cypress owns the '825 patent by assignment. A true and correct copy of the '825 patent is attached as Exhibit B to this Complaint.

15. On December 10, 2002, the United States Patent and Trademark Office duly and legally issued United States Patent No. 6,493,770 ("the '770 patent"), entitled "System for Reconfiguring a Peripheral Device by Downloading Information from a Host and Electronically Simulating a Physical Disconnection and Reconnection to Reconfigure the Device," to Cypress. Cypress owns the '770 patent by assignment. A true and correct copy of the '770 patent is attached as Exhibit C to this Complaint.

16. On August 23, 2011, the United States Patent and Trademark Office duly and legally issued United States Patent No. 8,004,497 ("the '497 patent"), entitled "Two-Pin Buttons," to Cypress. Cypress owns the '497 patent by assignment. A true and correct copy of the '497 patent is attached as Exhibit D to this Complaint.

17. On November 15, 2011, the United States Patent and Trademark Office duly and legally issued United States Patent No. 8,059,015 ("the '015 patent"), entitled "Capacitance Sensing Matrix for Keyboard Architecture," to Cypress. Cypress owns the '015 patent by assignment. A true and correct copy of the '015 patent is attached as Exhibit E to this Complaint.

18. On August 27, 2013, the United States Patent and Trademark Office duly and legally issued United States Patent No. 8,519,973 ("the '973 patent"), entitled "Apparatus and

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Methods for Detecting a Conductive Object at a Location," to Cypress. Cypress owns the '973 patent by assignment. A true and correct copy of the '973 patent is attached as Exhibit F to this Complaint.

19. The '103 patent, '825 patent, and '770 patent will be referred to below as the "Cypress USB Patents." The '497 patent, '015 patent, and '973 patent will be referred to below as the "Cypress Touchscreen Patents" (and together with the USB Patents, the "Asserted Patents").

INFRINGEMENT BY LGE

20. The products manufactured, imported and sold by LGE that infringe one or more claims of the Cypress USB Patents include, but are not limited to, the Fathom VS750 mobile phone and associated software, firmware, and peripheral components, as well as other LGE mobile phones and products, and associated software, firmware, and peripheral components that incorporate the same or similar USB features, functionality, and/or architecture (collectively, the "LGE Infringing USB Products"). The identification of products and parts in this Complaint is by way of example only, and on information and belief, the exemplary products and parts identified in this Complaint are representative of all LGE products and parts with reasonably similar features, functionality and/or architecture, whether discontinued, current or future.

21. The products manufactured, imported and sold by LGE that infringe one or more claims of the Cypress Touchscreen patents include, but are not limited to, the Optimus S LS670 mobile phone and associated software, firmware, and peripheral components, as well as other LGE mobile phones and products, and associated software, firmware, and peripheral components that incorporate the same or similar touchscreen features, functionality, and/or architecture (collectively, the "LGE Infringing Touchscreen Products"). The identification of products and parts in this Complaint is by way of example only, and on information and belief, the exemplary products and parts identified in this Complaint are representative of all LGE products and parts with reasonably similar features, functionality and/or architecture, whether discontinued, current or future.

22. The LGE Infringing USB Products and LGE Infringing Touchscreen Products (collectively, the "LGE Infringing Products") have no substantial non-infringing use.

23. According to LGE's website and other publicly available documents, and on information and belief, the LGE Infringing Products are sold to distributors and end customers in the United States. These distributors and end customers are supplied with user manuals and other information that instruct downstream users how to operate the LGE Infringing Products, and LGE provides these instructions while knowing since at least 2011 that the LGE Infringing Products infringe multiple Cypress patents, including one or more of the Asserted Patents. Sale or use of the LGE Infringing Products in accordance with LGE's instructions on how to operate these devices constitutes direct infringement of the Asserted Patents.

24. LGE is aware that the LGE Infringing Products infringe the Asserted Patents. In an effort to resolve LGE's infringement without resorting to litigation, Cypress made LGE aware of the Cypress USB Patents in April 2011 and the Cypress Touchscreen Patents in July 2011, and on multiple subsequent occasions. LGE ultimately refused to participate in any further licensing negotiations and, on information and belief, continued infringing the Asserted Patents.

FIRST CLAIM FOR RELIEF
(Infringement of the '103 Patent)

25. Cypress incorporates and realleges the allegations of the preceding paragraphs as though set forth in full herein.

26. Cypress has not licensed or otherwise authorized LGE to make, use, offer for sale, sell, or import into the United States any products that embody the inventions of the '103 patent.

27. LGE has directly infringed and continues to directly infringe the '103 patent by making, using, importing, offering for sale or selling the LGE Infringing USB Products in the United States.

28. LGE has had actual knowledge of the '103 patent since at least April 1, 2011.

29. LGE has indirectly infringed and continues to indirectly infringe the '103 patent by inducing end-users to infringe the '103 patent by using the LGE Infringing USB Products. LGE intentionally took action that induced end-users to infringe the '103 patent by marketing,

selling, and supporting the infringing devices. On information and belief, at least one LGE end customer or distributor has directly infringed the '103 patent by acting as instructed by LGE. For example, LGE supplies end customers and distributors of the LGE Infringing USB Products with user manuals and other information that instruct downstream users how to operate the LGE Infringing USB Products, with knowledge that use in accordance with such instructions infringes the '103 patent. As detailed by the user manuals and other information supplied by LGE, the LGE Infringing USB Products infringe multiple Cypress patents. Sale or use of the LGE Infringing USB Products by end customers or distributors in accordance with LGE's instructions constitutes direct infringement of the '103 patent. LGE had awareness of the '103 patent and knew, or was willfully blind to the fact, that its actions would cause direct infringement by end-users.

30. LGE has indirectly infringed and continues to indirectly infringe the '103 patent by contributing to direct infringement by end-users who use the LGE Infringing USB Products. LGE supplied a component whose use by downstream users is infringing; the component is not a common component suitable for non-infringing use; and LGE supplied the component with the knowledge of the '103 patent and knowledge that the component was especially made or adapted for use in an infringing manner.

31. LGE's actions are in violation of one or more of the provisions of 35 U.S.C. § 271.

32. Cypress has been damaged and irreparably injured by LGE's infringing activities and will continue to be so damaged and irreparably injured unless LGE's infringing activities are enjoined by this Court.

33. On information and belief, LGE's infringement has been, and continues to be, willful, wanton, and deliberate, without license or excuse and with full knowledge of the '103 patent.

SECOND CLAIM FOR RELIEF
(Infringement of the '825 Patent)

34. Cypress incorporates and realleges the allegations of the preceding paragraphs as though set forth in full herein.

35. Cypress has not licensed or otherwise authorized LGE to make, use, offer for sale,

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sell, or import into the United States any products that embody the inventions of the '825 patent.

36. LGE has directly infringed and continues to directly infringe the '825 patent by making, using, importing, offering for sale or selling the LGE Infringing USB Products in the United States.

37. LGE has had actual knowledge of the '825 patent since at least April 1, 2011.

38. LGE has indirectly infringed and continues to indirectly infringe the '825 patent by inducing end-users to infringe the '825 patent by using the LGE Infringing USB Products. LGE intentionally took action that induced end-users to infringe the '825 patent by marketing, selling, and supporting the infringing devices. On information and belief, at least one LGE end customer or distributor has directly infringed the '825 patent by acting as instructed by LGE. For example, LGE supplies end customers and distributors of the LGE Infringing USB Products with user manuals and other information that instruct downstream users how to operate the LGE Infringing USB Products, with knowledge that use in accordance with such instructions infringes the '825 patent. As detailed by the user manuals and other information supplied by LGE, the LGE Infringing USB Products infringe multiple Cypress patents. Sale or use of the LGE Infringing USB Products by end customers or distributors in accordance with LGE's instructions constitutes direct infringement of the '825 patent. LGE had awareness of the '825 patent and knew, or was willfully blind to the fact, that its actions would cause direct infringement by end-users.

39. LGE has indirectly infringed and continues to indirectly infringe the '825 patent by contributing to direct infringement by end-users who use the LGE Infringing USB Products. LGE supplied a component whose use by downstream users is infringing; the component is not a common component suitable for non-infringing use; and LGE supplied the component with the knowledge of the '825 patent and knowledge that the component was especially made or adapted for use in an infringing manner.

40. LGE's actions are in violation of one or more of the provisions of 35 U.S.C. § 271.

41. Cypress has been damaged and irreparably injured by LGE's infringing activities and will continue to be so damaged and irreparably injured unless LGE's infringing activities are

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