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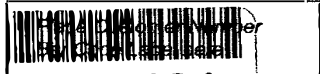
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PROVISIONAL APPLICATION FOR PATENT COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c).

Express Mail Label No. 607395368

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INVENTOR(S)					
Given Name (first and middle [if any])	Family Name or Surname	Residence (City and either State or Foreign Country)			
Harald	Philipp	Hamble, Hampshire, GB			
<input type="checkbox"/> Additional inventors are being named on the ___ separately numbered sheets attached hereto					
TITLE OF THE INVENTION (280 characters max)					
Capacitive Keyboard with Reduced Keying Ambiguity					
Direct all correspondence to: CORRESPONDENCE ADDRESS					
<input checked="" type="checkbox"/> Customer Number		<input type="text"/>		 020191 PATENT TRADEMARK OFFICE	
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ENCLOSED APPLICATION PARTS (check all that apply)					
<input checked="" type="checkbox"/> Specification Number of Pages		6		<input type="checkbox"/> CD(s), Number <input type="text"/>	
<input checked="" type="checkbox"/> Drawing(s) Number of Sheets		4		<input checked="" type="checkbox"/> Other (specify) return card	
<input checked="" type="checkbox"/> Application Data Sheet. See 37 CFR 1.76					
METHOD OF PAYMENT OF FILING FEES FOR THIS PROVISIONAL APPLICATION FOR PATENT					
<input checked="" type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27.				FILING FEE AMOUNT (\$)	
<input checked="" type="checkbox"/> A check or money order is enclosed to cover the filing fees				80 ⁰⁰	
<input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge filing fees or credit any overpayment to Deposit Account Number:		50 10 12			
<input type="checkbox"/> Payment by credit card. Form PTO-2038 is attached.					
The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.					
<input checked="" type="checkbox"/> No.					
<input type="checkbox"/> Yes, the name of the U.S. Government agency and the Government contract number are: _____					

Respectfully submitted,

David Kiewit

Date 07/12/02

SIGNATURE

TYPED or PRINTED NAME

David Kiewit

REGISTRATION NO.
(if appropriate)
Docket Number:

34640

PKS

TELEPHONE

727 866 0669

USE ONLY FOR FILING A PROVISIONAL APPLICATION FOR PATENT

This collection of information is required by 37 CFR 1.51. The information is used by the public to file (and by the PTO to process) a provisional application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 8 hours to complete, including gathering, preparing, and submitting the complete provisional application to the PTO. 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, Washington, D.C. 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Box Provisional Application, Assistant Commissioner for Patents, Washington, D.C. 20231.

Application Data Sheet

Application Information

Application Type:: Provisional
Subject Matter:: Utility
Title:: Capacitive Keyboard with Reduced Keying Ambiguity
Attorney Docket Number:: PKS
Total Drawing Sheets:: 4
Small Entity?:: Yes

Applicant Information

Applicant Authority Type:: Inventor
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Correspondence Information

Correspondent Customer Number:: 20191

Representative Information

Representative Customer Number::	20191
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TITLE: Capacitive Keyboard with Reduced Keying Ambiguity

FIELD OF THE INVENTION

The invention relates to method and apparatus for controlling an array of capacitive position sensors, and, more specifically for preventing accidental false inputs from keys adjacent to a selected key in a capacitive keyboard..

BACKGROUND INFORMATION

Arrays of capacitive proximity sensors are often used in keyboards, keypads and other touch-input apparatus. Two characteristics of capacitive sensors that lead to their use instead of conventional metallic switches are: 1) Capacitive sensors can be made in small sizes, which is desirable if a small, tightly packed keyboard is required; and 2) Capacitive sensors are particularly easy to environmentally seal, which is desirable if the keyboard is to be used in a wet environment or where there is a concern that contaminants may be spilled on the keyboard.

Conventional capacitive sensors, when tightly packed, or when used in the presence of conductive liquid films, suffer a keying ambiguity problem. In a small keyboard, for example, a user's finger is likely to overlap from a desired key to onto adjacent ones. This is especially problematic if the user has large fingers or if he or she presses on the keyboard surface hard enough to deform his or her finger. The same sort of effect is found when a conducting film is spilled on a keyboard, in which case the user's finger is sensed as though it were the size of the puddle. Problems of this sort are particularly acute in cash register keyboards used in food service establishments where beverage and food sauce spills are a frequent occurrence.

In his US Patent 5,730,165, the inventor teaches a capacitive field sensor employing a single coupling plate and a method of detecting a change in capacitance of the coupling plate, C_x , to ground. The apparatus taught in US 5,730,165 comprises pulse circuitry for charging the coupling plate and for subsequently transferring the charge from the plate into a charge detector, which may be a sampling capacitor, C_s . The transferring operation is carried out by means of a transfer switch electrically connected between the coupling plate and the charge detector. The disclosure of US 5,730,165 is herein incorporated by reference.

In his US patent application S/N 09/390,869, the inventor teaches pulse circuitry for measuring capacitance to ground, the circuitry comprising a plurality of electrical switching elements, each of which has one side electrically connected to either a power supply voltage or to a circuit ground point. This circuit arrangement, which may be used with a keyboard as well as for many other applications, is more compatible with available integrated circuit design and manufacturing practices than is prior art pulse circuitry, which commonly had one side of at least one switching element floating. These improved arrangements thereby provide superior performance at a lower manufacturing cost. The disclosure of US patent application S/N 09/390,869 is herein incorporated by reference.

SUMMARY OF THE INVENTION

One aspect of the invention provides a method of removing keying ambiguity by measuring a detected signal strength associated with each key in an array, comparing the measured signal strengths to find a maximum, determining that the key having the maximum signal strength is the unique user-selected key and suppressing or ignoring signals from all other keys as long as the signal from the selected key remains above some nominal threshold value. In this aspect, the array under consideration may be a keyboard, or any convenient subset thereof,

Another aspect of the invention is a capacitive keyboard in which each key has a respective detection integrator counter (DIC) associated with it. Each DIC is a clocked counter that counts up by one incremental value on each clock cycle during which a signal strength from the associated key is above some nominal threshold value, and that counts down by one value if the signal strength is less than the nominal value. A controller receives a respective input from each DIC and determines that one of the keys is active, or selected, when the detection integration (DI) count associated with that key exceeds a selected terminal count value, TC. When one of the keys is active, the controller controls all of the detection integrators associated with keys in a selected neighborhood of the active key to stop counting until the count associated with the active key falls below terminal count value -- i.e., until the key that had been active becomes inactive.

In another aspect of the invention, the signal from one key having a DI count close to TC is compared with the signals from other keys in a neighborhood, and if a signal from one of the other keys is greater than that from the one selected key during the time period before the one selected key is determined to be active, the selected key is cleared of its pending detection status, which may

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