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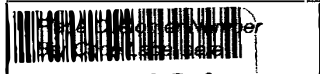
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PROVISIONAL APPLICATION FOR PATENT COVER SHEET

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

Express Mail Label No. 607395366

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			
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<input checked="" type="checkbox"/> Specification Number of Pages 6		<input type="checkbox"/> CD(s), Number 	
<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			
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Respectfully submitted, David Kiewit
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 TYPED or PRINTED NAME David Kiewit
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Date 07/12/02
 REGISTRATION NO. 34640
 (if appropriate)
 Docket Number: PKS

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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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