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Device And Method To Reduce Number Of Sensing Pins Of A Linear Capacitive Sensor

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DEVICE AND METHOD TO REDUCE NUMBER OF SENSING PINS OF A LINEAR CAPACITIVE SENSOR

ABSTRACT

Disclosed herein is a device and method to reduce the number of sensing pins in a controller. The device includes a linear sensor, a plurality of traces, and a controller. The linear sensor detects a position of a finger and transmits signals to the controller. The controller includes sensing pins, which are connected to the linear sensor by the plurality of traces. Each of the traces shares the sensing pins with several other traces, thereby reducing the required number of pins. Further, the traces and pins are mapped carefully in order to avoid duplication of two neighbors.

BACKGROUND

Linear sensors are generally connected to input pins of controllers using traces. The numbers of traces for one linear sensor is proportional to the length of that sensor. Generally, one trace is required every 5-6 mm to ensure that there are at least two traces in close proximity of the finger to satisfy Nyquist. For instance, a 200 mm long sensor would require about 40 traces each of which is connected to the pins of the controller. A large number of pins are, however, undesirable as it increases costs and makes routing challenging or unfeasible.

DESCRIPTION

A device and method are disclosed to reduce the number of sensing pins in a linear capacitive sensor, as illustrated in Fig. 1. The device may include a linear sensor, a plurality of traces, and a controller. The linear sensor may detect a position of a finger, for example, on a touch-sensitive surface. A signal may be transmitted by the linear sensor to the controller, which includes sensing pins. The sensing pins are connected to the linear sensor by the plurality of

traces. Each of the traces shares the sensing pins with several other traces. For example, as shown in Fig. 1, the traces share one common sensing pin. The controller may then interpret and carry out processing of the signals accordingly.

Further, the plurality of traces and sensing pins may be mapped carefully so that each adjacent pair is unique, thus avoiding ambiguity due to finger position. For instance, the sequence "1 2 3 4 5 6 7 2 4 6 1 3 5 7 1 5 2 6 3 7 4" can discriminate 21 positions with only 7 traces assuming the fingers overlap any 2 traces. The method can be extended to any number of pins, whereby the number of unique positions detected can be extended to ${}^{n}C_{2}$, where n is the total number of pins.

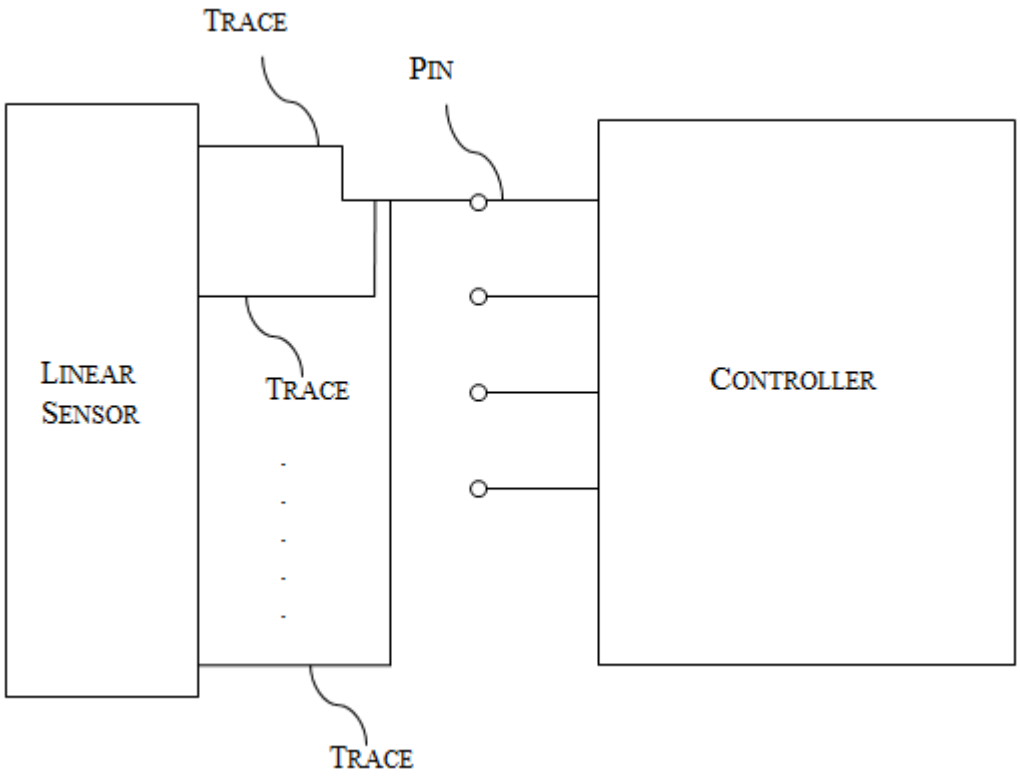

FIG. 1: Method of reducing number of sensing pins in a linear capacitive sensor

Any device which has a long 1-D capacitive sensor may use this method to reduce its cost and size. Further, the reduced number of sensing pins eliminates the challenges and infeasibility

of routing the traces.