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Hotelling

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(54) **FORCE AND LOCATION SENSITIVE DISPLAY**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 246 days.

This patent is subject to a terminal disclaimer.

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(51) **Int. Cl.**
G09G 5/00 (2006.01)

(52) **U.S. Cl.** 345/173; 345/174; 178/18.06

(58) **Field of Classification Search** 345/173-179; 178/18.01, 18.03, 18.06

See application file for complete search history.

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(57) **ABSTRACT**

A unit to provide both force and location detection includes a first transparent substrate (having first and second sets of conductive traces oriented in a first direction), a second transparent substrate (having a third set of conductive traces oriented in a second direction) and a plurality of deformable members (e.g., rubber beads) arranged between the first and second transparent substrates. The first set of conductive traces, in combination with the conductive traces of the second transparent element, provide a capacitance signal representing where a user touches the display element. The second set of conductive traces, in combination with the conductive traces of the second transparent element, provide a capacitance signal representing the amount of force applied to the display element. When used with a display element (e.g., a LCD or CRT), an input-output unit capable of both location sensing and force sensing operations is provided.

51 Claims, 4 Drawing Sheets

