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(54) Title: TOUCHSCREEN DATA PROCESSING

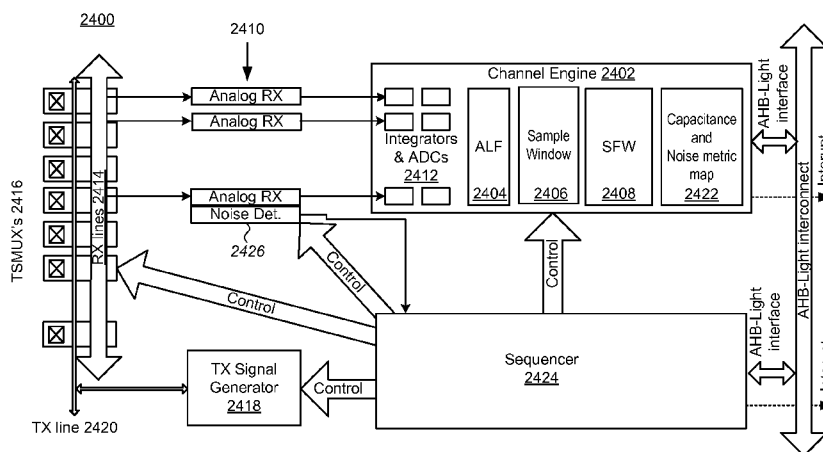


FIGURE 24

(57) Abstract: Capacitive touch sensors and touchscreen data processing methods are provided. In one embodiment, the method includes sequentially integrating and converting charge from each of a plurality of sensing capacitors in an array to digital data, the digital data including sample values corresponding to a measured capacitance for each of the plurality of sensing capacitors. Noise is then separated from useful information by filtering the sample values on a sample-by-sample basis. Finally, the filtered sample values are summed and a position of at least one contact on the array determined using the filtered capacitance values. Other embodiments are also provided.

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A. CLASSIFICATION OF SUBJECT MATTER
 IPC(8) - G06F 3/041, G06F 3/046 (2013.01)
 USPC - 345/178

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
 USPC: 345/178

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
 USPC: 345/178; 178/18.01, 18.06; 702/1, 47, 52, 57 (keyword limited - see search terms below)

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

PatBase; Google; Google Scholar

Terms: touch, sensor, detector, array, capacitive, filter, limit, capacitor, amplitude, value, statistical, sample, coefficient, weight, sort, summing, adding, remove, discard, sliding, window, median.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2012/0013546 A1 (Westhues et al.) 19 January 2012 (19.01.2012), entire document, especially abstract, para [0002], [0003], [0040], [0049], [0051], [0052], [0056], [0082].	1-2, 11, 18-19 and 21 ----- 3-10, 12-17 and 20
Y	US 7,124,312 B2 (Casebolt et al.) 17 October 2006 (17.10.2006), entire document, especially abstract, col. 2, ln 41-61, col. 4, ln 50 to col. 5, ln 25, col. 9, ln 53 to col. 10, ln 4, col. 12, ln 9-31.	3-7
Y	US 2010/0053097 A1 (Goh et al.) 04 March 2010 (04.03.2010), entire document, especially abstract, para [0003], [0040], [0077].	8-10, 12-17, 20
Y	US 2005/0110769 A1 (DaCosta et al.) 26 May 2005 (26.05.2005), entire document, especially abstract, para [0005], [0006], [0043], [0052].	9-10, 12-17
A	US 2012/0044206 A1 (Philipp) 23 February 2012 (23.02.2012), entire document.	1-21

Further documents are listed in the continuation of Box C.

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6,954,867 B2 (Casebolt et al.) 11 October 2005 (11.10.2005), entire document.	1-21
A	US 6,961,015 B2 (Kernahan et al.) 01 November 2005 (01.11.2005), entire document.	1-21
A	US 2012/0133080 A1 (Moussa et al.) 31 May 2012 (31.05.2012), entire document.	1-21
A	US 5,730,165 A (Philipp) 24 March 1998 (24.03.1998), entire document	1-21