[0017] There is additionally provided in accordance with an embodiment of the present invention a method for a light-based touch screen, including controlling a plurality of light-emitting diodes (LEDs) to select and deselect at least one of the LEDs, whereby a selected LED emits infra-red light beams, controlling a plurality of photodiode (PD) receivers to select and deselect at least one of the PD receivers, whereby a selected PD measures received light intensity, and determining position and velocity of an object obstructing light from at least one of the PD receivers, based on output currents of the plurality of PD receivers.

[0018] There is further provided in accordance with an embodiment of the present invention a touch screen, including a housing for a display screen, a plurality of sensors, fastened on the housing, for sensing location of an object touching the display screen, and a controller, fastened on the housing and coupled with the plurality of sensors, for receiving as input locations sensed by the plurality of sensors, and for determining therefrom positions of two or more objects simultaneously touching the display screen.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] The present invention will be more fully understood and appreciated from the following detailed description, taken in conjunction with the drawings in which:

[0020] FIG. **1** is a diagram of a touch screen having 16 LEDs and 16 PDs, in accordance with an embodiment of the present invention;

[0021] FIGS. **2**A-**2**C are diagrams of a touch screen that detects two objects that touch the screen simultaneously, in accordance with an embodiment of the present invention;

[0022] FIGS. **3**A and **3**B are diagrams of a touch screen that detects a two finger glide movement, in accordance with an embodiment of the present invention;

[0023] FIGS. **4**A-**4**C are diagrams of a touch screen for a piano keyboard simulator, that detects multiple keys of a displayed piano keyboard that are touched simultaneously, in accordance with an embodiment of the present invention;

[0024] FIG. **5** is a circuit diagram of the touch screen from FIG. **1**, in accordance with an embodiment of the present invention;

[0025] FIG. **6**A is a simplified block diagram of electronics for a touch screen, in accordance with an embodiment of the present invention;

[0026] FIG. **6**B is a simplified block diagram of alternate electronics for touch screen, in accordance with an embodiment of the present invention;

[0027] FIG. **7** is a simplified circuit diagram of an exemplary central processing unit for use with the touch screens of FIGS. **6**A and **6**B, in accordance with an embodiment of the present invention;

[0028] FIG. **8** is a diagram of a shift register for an array of 16 LEDs, in accordance with an embodiment of the present invention;

[0029] FIG. **9** is an illustration of a waveform for activating LEDs, in accordance with an embodiment of the present invention;

[0030] FIG. **10** is a diagram of a touch screen with four LEDs placed in the four corners of the screen, and plural PDs are arranged along the four sides of the screen, in accordance with an embodiment of the present invention;

[0031] FIG. **11** is a diagram of an LED driver matrix for a touch screen, in accordance with an embodiment of the present invention;

[0032] FIG. **12** is a diagram of LED switches, in accordance with an embodiment of the present invention;

[0033] FIG. **13**A is a diagram of a current limiter, used for limiting and directing current to LEDs, in accordance with an embodiment of the present invention;

[0034] FIG. **13**B is a diagram of an alternative current limiter, used for limiting and directing current to LEDs, in accordance with an embodiment of the present invention;

[0035] FIG. **14** is a diagram of a shift register for an array of 16 PDs, in accordance with an embodiment of the present invention;

[0036] FIG. **15** is an illustration of a waveform for activating selected PDs, in accordance with an embodiment of the present invention;

[0037] FIG. **16** is a diagram of a photodiode matrix for a touch screen, in accordance with an embodiment of the present invention;

[0038] FIG. **17** is a diagram of a PD output selector for use in a touch screen, in accordance with an embodiment of the present invention;

[0039] FIG. **18**A is a diagram of a resistor-based current integrator used in conjunction with PD receivers in a touch screen, in accordance with an embodiment of the present invention;

[0040] FIG. **18**B is a diagram of a transistor-based current integrator used in conjunction with PD receivers in a touch screen, in accordance with an embodiment of the present invention;

[0041] FIG. **19** is an illustration of current integration over time, in accordance with an embodiment of the present invention;

[0042] FIG. **20** is a simplified flowchart of a method for PD sampling, in accordance with an embodiment of the present invention;

[0043] FIG. **21** is an illustration of measuring ambient light by summing pulses when an LED is on and subtracting pulses when the LED is off, in accordance with an embodiment of the present invention;

[0044] FIG. **22** is a simplified flowchart of an alternative method for PD, in accordance with an embodiment of the present invention;

[0045] FIG. **23**A is a circuit diagram of a signal filter and amplifier, used for PDs arranged along one edge of a touch screen, in accordance with an embodiment of the present invention;

[0046] FIG. **23**B is a circuit diagram of an alternative signal filter and amplifier circuit, using an OP amplifier, in accordance with an embodiment of the present invention;

[0047] FIG. **24** is a diagram of a prior art lens assembly for an LED and PD;

[0048] FIG. **25**A is a diagram of a lens assembly for use with LEDs and PDs for a touch screen, in accordance with an embodiment of the present invention;

[0049] FIG. **25**B is a diagram of a lens assembly for distributing two groups of light beams, in accordance with an embodiment of the present invention;

[0050] FIGS. **26**A and **26**B are diagrams of simplified lens assemblies corresponding to the respective lens assemblies of FIGS. **25**A and **25**B, in accordance with an embodiment of the present invention;

[0051] FIG. **27** shows three-dimensional measurements of light intensities over the surface of a touch screen, in accordance with an embodiment of the present invention;