[0337] [K: Eleventh Embodiment]

[0338] In this embodiment, description will be given on an electronic device having a plurality of vibration generators and controlling the signal waveforms of the drive signals applied to each of the vibration generators based on a touched position on the touch panel. Note that in this embodiment, the same reference numerals will be used for portions common with the fifth embodiment. Further, explanations of portions common with the fifth embodiment will be omitted.

[0339] [K-1: Configuration of Eleventh Embodiment]

[0340] **FIG. 55** is a view for explaining an ATM according to this embodiment. As shown in the figure, the back surface of the liquid crystal display panel **501** over which the touch panel **502** is laid is provided at its four comers with a total of four oscillatory actuators **115***a*, **115***b*, **115***c*, and **115***d*. The plurality of oscillatory actuators **115***a* to **115***d* are provided in this way because in an electronic device having a large sized display screen such as an ATM or a personal computer it is difficult to give sufficient vibration by a single vibration generator to the fingertip of a user performing a touch operation.

[0341] In this embodiment, description will be given of the control for efficiently driving the oscillatory actuators **115***a* to **115***d* to give a larger vibration to the fingertip of the user while keeping down the power consumption required for the vibration report when performing reporting operation by vibration using these plurality of oscillatory actuators **115***a* to **115***d*.

[0342] **FIG. 56** is a block diagram illustrating the hardware configuration of the ATM **90** according to this embodiment. As shown in this figure, the ATM **90** has a touch panel **502**, a display unit **901**, a memory **902**, a drive signal generation circuit **903**, oscillatory actuators **115***a* to **115***d*, and a CPU **904**.

[0343] The touch panel **502** outputs to the CPU **904***a* touch signal showing a touched position on the touch panel **502** in response to a touch operation. Further, the display unit **901** has a liquid crystal display panel **501** and a drive circuit for controlling the display of the liquid crystal display panel **501**. The memory **902** stores programs and data etc. for controlling the ATM **90**. Further, the memory **902** stores waveform data of drive signals to be applied to the oscillatory actuators **115***a* to **115***d*. Note that in the present embodiment, the shapes of the waveforms of the drive signals to be applied to the oscillatory actuators **115***a* to **115***d* are the same. Further, the frequencies of the drive signals are made to match with the frequency causing the liquid crystal display panel **501** provided with the touch panel **502** to resonate or the frequency causing the oscillatory actuators **115***a* to **115***d* themselves to resonate.

[0344] The drive signal generation circuit **903** generates drive signals for driving each of the oscillatory actuators **115***a* to **115***d* in accordance with waveform data and phase data supplied from the CPU **904**. Further, the drive signal generation circuit **903** applies drive signals to the oscillatory actuators **115***a* to **115***d* in accordance with instructions from the CPU **904**. The oscillatory actuators **115***a* to **115***d* are the same as the oscillatory actuator **115** explained in the first embodiment.

[0345] The CPU **904** controls the parts of the device interconnected through a bus **905** by executing a program stored in the memory **902**. The CPU **904** executes the vibration control processing **6** (see **FIG. 57** and **FIG. 58**). In the case of detecting a touch operation on the touch panel **502**, it drives each of the oscillatory actuators **115***a* to **115***d* through the drive signal generation circuit **903** to cause the touch panel **502** and the liquid crystal display panel **501** to vibrate.

[0346] [K-2: Operation of Eleventh Embodiment]

[0347] **FIG. 57** and **FIG. 58** show a flow chart for explaining the operation of the vibration control processing **6** executed by the CPU **904** in the ATM **90** according to this embodiment. This vibration control processing **6** is executed by the CPU **904** at every predetermined period in a period in which a touch operation on the touch panel **502** is permitted.

[0348] As shown in **FIG. 57**, first, the CPU **904** determines whether a touch signal has been input from the touch panel **502** (step S**701**). When it is determined that a touch signal has not been input, the CPU **904** ends the vibration control processing **6**. Further, when it is determined that a touch signal has been input, the CPU **904** identifies a touched position (XY coordinates) on the touch panel **502** based on the touch signal (step S**702**). Note that when it is determined that a touched position on the touch panel **502** falls outside of the display areas of the touch buttons displayed on the display screen, the CPU **904** need not execute the processing of step S**703** and may end the vibration control processing **6**.

[0349] Next, the CPU **904**, as shown in **FIG. 55**, finds the positional relationship between a touched position and each of the oscillatory actuators **115***a* to **115***d* such as calculating the straight line distance between the touched position and each of the oscillatory actuators **115***a* to **115***d* (step S**703**). Further, the CPU **904** performs vibration analysis using as parameters the positional relationship between the touched position and each of the oscillatory actuators **115***a* to **115***d*, the material of the liquid crystal display panel **501** where the oscillatory actuators **115***a* to **115***d* are placed, the elasticity of the damper **503**, and others. Note that it is also possible to store in advance the data of the results of vibration analysis for different touched positions on the touch panel **502** in the memory **902** and utilize them. By adopting such a configuration, there is no need to perform the vibration analysis for each touched position in real time. Further, the CPU **904** calculates the phase of a drive signal to be applied to each of the oscillatory actuators **115***a* to **115***d* so that the amplitude of the vibration at each touched position becomes the greatest due to mutual interference of oscillatory waves generated from each of the oscillatory actuators **115***a* to **115***d* (step S**704**).

[0350] Next, the CPU **904** reads the waveform data of the same drive signal to be applied to the oscillatory actuators **115** from the memory **902** (step S**705**). Next, the CPU **904** outputs to the drive signal generation circuit **903** the waveform data read from the memory **904** and the phase data for each of the oscillatory actuators **115***a* to **115***d* calculated at step S**704**. At the same time, the CPU **904** instructs the drive signal generation circuit **903** to generate a drive signal (step S**706**). The drive signal generation circuit **903** uses the waveform data and the phase data supplied from the CPU