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User-Generated Patterns to Initiate Electronic System Reset

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Abstract:

An electronic device generates a hard-reset signal after receiving a sequential input via various sensors or a power supply of the electronic device. The sensors include components that measure physical characteristics or attributes like pressure, acceleration, temperature, light, rotation, changes in a magnetic field, or electricity. The sensors or the power supply generally serve other purposes in the electronic device, and the sequential input prevents an accidental or inadvertent hard-reset signal.

Keywords:

Reset, restart, reboot, hardware, hard-reset, button, power, electronic device, sensor.

Background:

At times, electronic devices stall or become unresponsive to user inputs or commands and need to be reset or restarted. Historically, a user could press and hold a power on/off button for a predetermined amount of time or press a dedicated reset button, which would force the electronic device to reset or restart. However, as electronic devices decrease in size and designers strive for clean lines or waterproof or dustproof features, dedicated buttons often shrink, individual buttons must multitask and handle multiple inputs, or buttons may disappear altogether. Thus, a user needs an input mechanism for intentionally sending a reset or restart signal to an unresponsive electronic device without a dedicated button to do so.

Description:

An electronic device generates a hard-reset signal after receiving a sequential input via various sensors or a power supply of the electronic device. The sensors include components that measure physical characteristics or attributes like pressure, acceleration, temperature, light,

rotation, changes in a magnetic field, or electricity. The sensors or the power supply generally serve other purposes in the electronic device, and the sequential input prevents an accidental or inadvertent hard-reset signal.

Many electronic devices require a power supply to either provide direct power or to recharge a storage battery. Monitoring the power supply can be used to provide a restart signal to the electronic device. For example, Figure 1 shows a laptop computer with an attached power supply.

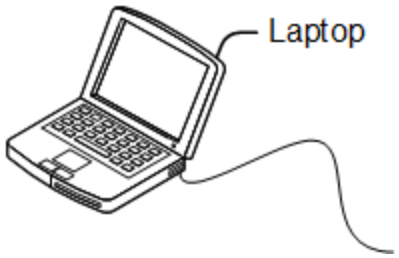

Figure 1

In the event the laptop becomes unresponsive and a user desires to restart or reset the laptop, the user may connect and disconnect the power supply in a predetermined pattern in which each step is performed within a certain time frame or in a certain manner. For example, the user could connect and disconnect the power supply three times within ten seconds. A user could reset a wearable electronic device like a smart watch, a fitness tracker, or glasses in a similar manner. Such wearable electronic devices often charge wirelessly (e.g., inductively) and can be sealed, such as to prevent water leaking in to the electronic components. A dedicated or separate reset button would be impractical in such a device. A user could place and remove any of the wearable electronic devices in a charging cradle or connect the device to a power supply three times in succession for three seconds each time to reset the device.

The complexity or irregularity of the sequence prevents an accidental or inadvertent hard-reset signal. A more-complex pattern might require the user to connect the power supply for

more than thirty seconds but less than a minute, disconnect the power supply for more than twenty seconds but less than thirty seconds, and repeat the sequence of connecting and disconnecting twice more to instruct the electronic device to generate a hard-reset or restart signal. Further, an electronic device designer could build in tolerances for the input sequence based on the type of device. For example, an input sequence to reset a child's toy could feature broad tolerances while resetting a mobile phone could require a particularly complex or precise input sequence.

Additionally, a single electronic device could be configured to receive multiple different restart signal sequences. One particular sequence could generate a restart or reboot signal, which would cause the electronic device to reboot in more or less the same condition in which the device was in prior to becoming unresponsive. Another particular sequence could generate a restart or reboot signal that would place the device in a safe or diagnostic mode. Still another sequence could generate a restart signal that instructs the electronic device to return to factory or initial settings and configurations. An option to reset an electronic device back to factory or initial settings could be very useful when transferring ownership of the electronic device.

The electronic device can be configured to receive a restart or reset signal through more than just the power supply. An electronic device often includes many other sensors or components, such as those that measure pressure, acceleration, temperature, light, rotation, changes in a magnetic field, or electricity. Figure 2 illustrates a number of different electronic devices, which may include a variety of different sensors or components, including buttons that provide other features or functions.

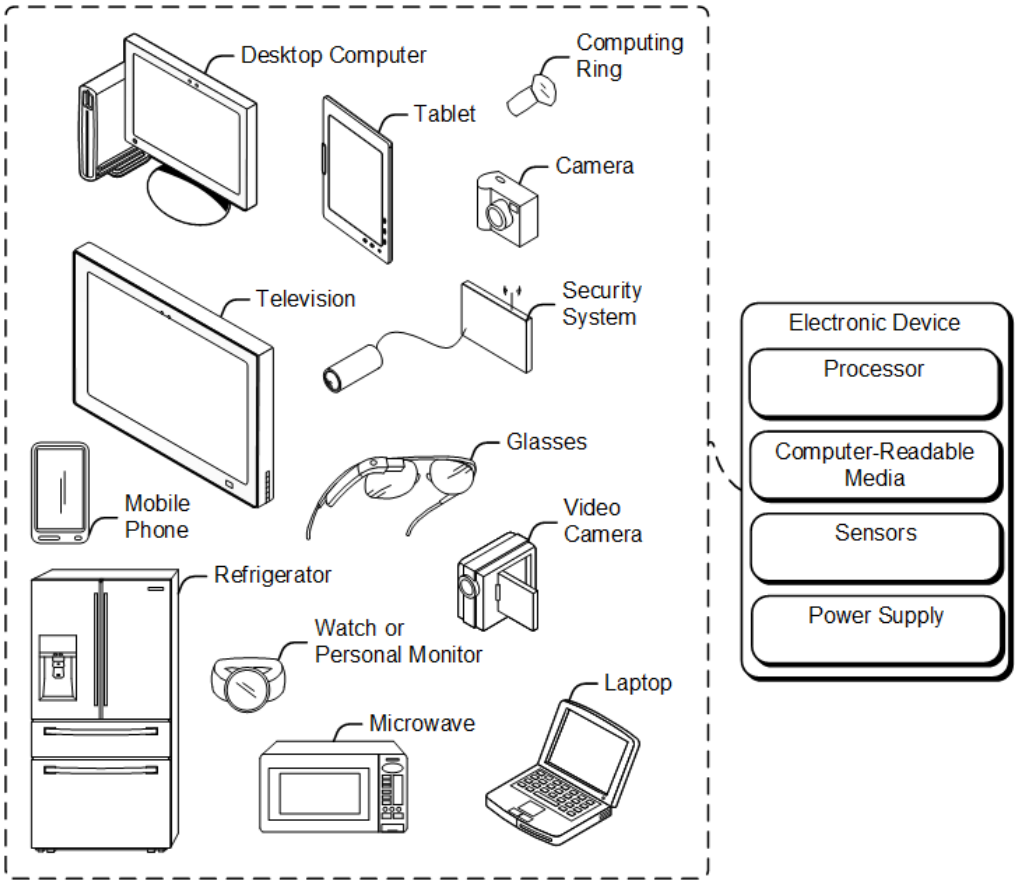

Figure 2

Any one sensor or a combination of these sensors or other components could be configured to receive input that the electronic device interprets as a restart or reset signal. For example, a pattern of temperature changes could generate the restart signal. A user could place a mobile phone of Figure 2 in a freezer for five minutes, remove the device for five minutes, and repeat the pattern of in and out of the freezer a certain number of times to generate the restart signal. In another example, a rotational pattern could be sensed by an internal accelerometer, which could generate the restart signal. A camera or other light-sensing component of the electronic could receive a light pattern and initiate the restart or rebooting of the device. A restart or reboot signal could also be generated by combining inputs to multiple components or sensors of an electronic device. For example, a button that receives input during the normal

operation of the electronic device could be used alone or in combination with other sensors or components to input the reset or restart signal to the electronic device. This multi-tasking capability of existing inputs can increase the functionality without increasing the number of buttons or other inputs of the electronic device.

Often times when an electronic device becomes unresponsive, individual sensors or components may not function normally or properly. A dedicated or separate hardware component may receive the reset or restart signal. For example, an electronic device may incorporate an inexpensive or simple programmable array separate from the primary hardware and software components that execute the normal functions of the device. If the primary hardware or software components stall or otherwise become compromised, the separate programmable array can receive the restart or reset signal and restart the electronic device. In this manner, the ability to reset a device is protected from viruses or other malicious content that could be encountered in the everyday use of the electronic device. Minimizing the complexity of the programmable array or other similar components helps to increase the reliability of these components, especially at times when other components of the electronic device may be inoperable. Additionally, the reset or restart signal could be received by a hardware only circuit, simple firmware, or a system-on-chip component.

A simple, human-generated pattern of interaction with existing components of the electronic device can eliminate the need for dedicated or additional buttons. Using existing sensors or a power supply of the electronic device allows electronic devices to be simpler, more efficient, and still provide users with necessary options to restart or reboot an electronic device. Additionally, in the event that a particular sensor or component of the electronic device

malfunctions, a user may still be able to reboot or restart the electronic device by interacting with another component of the device.