Unlocking a Device by Performing Gestures on an Unlock Image

RELATED APPLICATIONS

[0001] This application is related to U.S. Patent Application No. 11/322,550, titled "Indication of Progress Towards Satisfaction of a User Input Condition," filed December 23, 2005.

TECHNICAL FIELD

[0002] The disclosed embodiments relate generally to user interfaces that employ touch-sensitive displays, and more particularly, to the unlocking of user interfaces on portable electronic devices.

BACKGROUND

[0003] Touch-sensitive displays (also known as "touch screens" or "touch-screens") are well known in the art. Touch screens are used in many electronic devices to display graphics and text, and to provide a user interface through which a user may interact with the devices. A touch screen detects and responds to contact on the touch screen. A device may display one or more soft keys, menus, and other user-interface objects on the touch screen. A user may interact with the device by contacting the touch screen at locations corresponding to the user-interface objects with which she wishes to interact.

[0004] Touch screens are becoming more popular for use as displays and as user input devices on portable devices, such as mobile telephones and personal digital assistants (PDAs). One problem associated with using touch screens on portable devices is the unintentional activation or deactivation of functions due to unintentional contact with the touch screen. Thus, portable devices, touch screens on such devices, and/or applications running on such devices may be locked upon satisfaction of predefined lock conditions, such as upon entering an active call, after a predetermined time of idleness has elapsed, or upon manual locking by a user.

[0005] Devices with touch screens and/or applications running on such devices may be

unlocked by any of several well-known unlocking procedures, such as pressing a predefined set of buttons (simultaneously or sequentially) or entering a code or password. These unlock procedures, however, have drawbacks. The button combinations may be hard to perform. Creating, memorizing, and recalling passwords, codes, and the like can be quite burdensome. These drawbacks may reduce the ease of use of the unlocking process and, as a consequence, the ease of use of the device in general.

[0006] Accordingly, there is a need for more efficient, user-friendly procedures for unlocking such devices, touch screens, and/or applications. More generally, there is a need for more efficient, user-friendly procedures for transitioning such devices, touch screens, and/or applications between user interface states (e.g., from a user interface state for a first application to a user interface state for a second application, between user interface states in the same application, or between locked and unlocked states). In addition, there is a need for sensory feedback to the user regarding progress towards satisfaction of a user input condition that is required for the transition to occur.

WO2004/001560 relates to a method of deactivating the touch screen lock in a portable electronic device comprising a touch screen and means for locking the touch screen. The method comprises detecting touches on predetermined contact areas on the touch screen in a given order during touch screen lock and deactivating the touch screen lock once said touches on said predetermined contact areas are detected.

US5,821,933 relates to a system in which computer users access and/or execute a selected restricted function on a computer using a graphical user interface (GUI) by entering an iconic password that is defined by selecting two or more visual icons, called code icons, in a sequence called an iconic password sequence. The entered sequence is compared to a target sequence that represents the restricted function. If the entered sequence matches the target sequence, the user is permitted to execute/access the restricted function. The number of possible combinations in the target sequence, and therefore system security, can be increased by inputting both a code icon and a target site for one or more of the components of the target sequence.

The document "ACCESS/CONTROL ICONS (ICON KEYS)" published in the IBM Technical Disclosure Bulletin vol. 38, no. 4 of 1 April 1995 discloses a key (i.e.,

access/control) icon which may be inserted into (or moved on top of) another icon, or moved into or on top of a "lock" section of another icon, in order to gain access to functions provided by the (receptor) icon. The access/control/key icons may also be used to suspend, lock, or terminate processes in an intuitive, controlled manner. The access/control icons may further be used to alter various states of files and programs represented by the receptor icon. (For clarity, the term "key" is used to designate the access/control icon.)

US5,907,327 describes a coordinate input system and a method of controlling the coordinate input system, which can notify a user of a state of having come into a drag lock mode in an easily discernable manner, and hence can keep the user from being embarrassed as far as possible. When the user operates a coordinate detecting device (PD) such as a pad, the operating action is sent to a coordinate outputting device (PC) such as a personal computer. If the user makes a predetermined drag lock action, this action is detected by a measuring unit, causing a mode converter to effect shift to a drag lock mode. The coordinate outputting device (PC) is thereby held in a similar state as allowing continuous dragging of an icon or window indicated on the screen of a display. At this time, a controller replaces the cursor indicated on the screen by other one having a different shape specific to the drag lock mode. After that, if the user makes an action to release the drag lock mode, the mode converter effects shift to a drag mode and the controller restores the cursor on the screen to the original one having the shape before the shift to the drag lock mode.

WO01/77792 relates to a system and method for the authentication of a user based on graphical input provided by the user. The user enters graphical input, such as a squiggle, into a graphical interface. A verifier compares the input pattern to a secret input pattern to determine if the two patterns are approximately similar in order to authenticate the user. Typically, the verifier uses an approximation parameter to determine if the input and secret patterns are similar. Once the verifier authenticates the user, the user is allowed access to a resource, such as a computer system, portable computer, software application running on a computer system or other hardware device.

The paper "Touchscreen Toggle Design" by Plaisant *et al* compares six different touchscreen based toggle switches to be used by novice or occasional users to control two state (on/off) devices in a touchscreen environment.

US2002/191029 discloses is a graphical user interface in a computing device having a processor running an operating system and a display. The graphical user interface comprises a touch screen and a driver coupling the touch screen to the operating system. The driver can display a plurality of icons on the touch screen, or a plurality of screen images having at least one icon, with each of the icons associated with operations on the display and/or the touch screen. Other embodiments include the touch screen having unactivated and activated states, as well as the presence of an application programming interface that enables an application to display at least one image on the touch screen.

SUMMARY

[0007] In some embodiments, a method of controlling an electronic device with a touch-sensitive display includes: detecting contact with the touch-sensitive display