a pop-up application on the touch screen of the present invention, providing the benefits of a secondary debugging display with no extra cost or bulk. In the example of **FIG. 13**C, image **1340** includes command buttons **1342** and source code display window **1344**.

[**0104**] Users of ideographic languages like Chinese and Japanese typically rely on input methods beyond the simple direct keystroke mapping used in Western languages. A variety of input methods are in use for ideographic languages, many of which require or benefit greatly from providing visual feedback to the user through a special window. This window can obstruct the application for which the input is intended. According to the present invention, the input method dialog can be implemented as a pop-up image on the touch screen. One popular input method is handwriting recognition, in which case the touch screen can also serve as the handwriting input device for added benefit.

[**0105**] **FIG. 14** illustrates an example Chinese handwriting entry system on touch screen **1400**. Handwriting entry area **1402** responds to finger touch to enter a Chinese character. In this application, the touch screen sensing technology advantageously senses pens as well as fingers; although handwriting with fingers has been shown to work quite well, many users prefer to write with a pen. Pen or finger motions in area **1402** can leave an "ink" trail **1408** on the touch screen display to allow the user to see the character as it is being drawn. Once a character is drawn in area **1402**, the software attempts to recognize it as a valid Chinese character. The software creates an ordered list of possible matches, which are displayed in area **1404**. The user can touch one of the match characters in area **1404** to "type" the selected character into the application running on the main display. Area **1406** contains touch-sensitive buttons to control the character recognition software in various ways.

[**0106**] Handwriting with "inking" is also useful in applications such as signature capture, signature recognition, and sketching, all of which are enhanced by the touch screen of the present invention.

[**0107**] Another useful class of pop-up screen applications is in the area of security. Portable computers are especially vulnerable to theft, so many portable computers include some kind of password or biometric interlock. For maximum effectiveness, the interlock should validate the user's identity before the main processor of the computer is even allowed to run. Because the main display is operated by the main processor of the computer, the security interlock would need to use alternate output mechanisms to interact with the user. The touch screen of the present invention provides an excellent user interface device for a security interlock. The software that manages the interlock can be implemented in the touch screen controller itself, or in another peripheral controller within the computer. This implementation fits well with the architecture of many portable computers today, where a peripheral controller is already present in between the main processor and the touch pad, and this peripheral controller is also already tasked with power management and system reset control for the main processor.

[**0108**] **FIG. 15A** illustrates a pop-up screen **1500** that appears when the computer system is first switched on. The user must enter a correct personal identification number (PIN) on keypad icons **1502** before the main computer processor will operate. In an alternate embodiment, the user enters a signature on the touch screen or uses some other mechanism such as a smart card or fingerprint to authenticate himself or herself to the system.

[**0109**] **FIG. 15B** illustrates an exemplary hardware architecture implementing the security interlock of **FIG. 15A**. Computer system **1520** includes touch screen module **1522**, which in turn contains the hardware and control circuitry illustrated in **FIG. 2**. Touch screen **1522** communicates to peripheral controller **1524**. Controller **1524** also manages other peripherals **1526** such as keyboards, external pointing devices, and optional biometric authentication devices. During operation of the computer, controller **1524** serves as a conduit between touch screen **1522** and central processor **1528**. Central processor **1528** in turn operates other devices **1530** such as the main display and hard drive. Power supply **1532** powers central processor **1528** as well as all other components of the system. At system start-up, power supply **1532** withholds power from processor **1528** until it receives a signal from controller **1524** by direct connection **1534** stating that the user has been authenticated and system start-up can proceed. Alternatively, controller **1524** holds processor **1528** in reset, or it simply withholds access to the keyboard, touch sensor, and other user interface peripherals, hence rendering the computer system useless until the user is authenticated. In yet another alternative, controller **1524** could participate in higherlevel security functions such as delivering a decryption key for data stored on a hard disk.

[**0110**] The security interlock of **FIG. 15A** and the debugging screen disclosed previously are examples of the general class of applications that use the touch screen to communicate with the user when the rest of the computer system is indisposed due to special circumstances. Another example of this class would be the reporting of information about hardware failures in vital system devices such as the keyboard and the hardware of the main display.

[**0111**] Many other applications of pop-up screens are supported by the touch screen of the present invention. For example, pop-up games could be implemented entirely on the touch screen, leaving the main display unobstructed.

[**0112**] Referring back to **FIG. 2**, touch screen assembly **200** may advantageously include a backlight **206** or an equivalent. Backlights draw more power than the other components that make up a touch screen, so it is advantageous to switch the backlight off when it is not needed. In an illustrative embodiment, backlight controller **212** is capable of dimming or extinguishing the backlight at the request of controller **216** or host computer **214**. Controller **216** and host computer **214** may use heuristics to switch the backlight on and off without explicit direction by the user. For example, the backlight could be switched on if an application installs an auxiliary screen image that replaces the default iconic image, and then switched off if the touch screen goes a certain amount of time without being used. Similarly, the backlight could be switched on whenever the touch screen is in the activated state.

[**0113**] Switching on the backlight when the touch screen is activated has the added benefit of reminding the user that the behavior of the touch screen has changed. The backlight can serve more generally as an attention mechanism for software applications and for the operating system. For example, the backlight can be flashed on or off to notify the user of the arrival of new e-mail or of an impending