

storage and retrieval capabilities for personal and/or business use. PDAs are severally capable of tracking names, addresses, phone numbers and appointments. They are also often capable of taking notes, performing calculations, paging, data messaging, and electronic mail. PDAs may also include functionality for playing simple games, music, and other media files. Examples of PDAs include the Palm Pilot and Blackberry.

[0044] Like most hand-held devices, PDAs typically include a display and various input devices. The input devices may include a stylus and touch screen that work in combination with a handwriting recognition program, keypads, mini-keyboards, navigation pads, and/or soft or fixed function buttons.

[0045] Cell phones are mobile telephones that allow a user to connect to other telephones using a cellular network. Cell phones typically include a transceiver for transmitting and receiving telephone calls, controls such as a navigation pad for traversing through a display, a keypad for making numeric entries (and in some cases alphabetic entries), and soft or fixed function buttons. For example, in many cell phones one fixed function button is used for starting a call and another fixed function button is used for ending a call.

[0046] Media players come in a variety of forms. Music players are generally configured to store, process and output music. Music players can be based on the MP3 or AAC format, which is a compression system for music. Music Players typically include a microprocessor, memory, display, audio jack, data port and playback controls. The playback controls typically include features such as menu, play/pause, next, previous, volume up, and volume down. Video players are similar to music players in most respects. In some cases, they may include a data storage device for receiving a removable storage medium such as a DVD. The iPod® media player manufactured by Apple Computer, Inc. of Cupertino, Calif. is one example of a media player.

[0047] Handtops are general purpose computers similar to laptops, but in a smaller form factor. Handtops typically include a display and a full keyboard.

[0048] FIG. 2 is a simplified diagram of a multi-functional hand-held device 100. The multi-functional hand-held device 100 integrates at least two devices 102 into a single device. Each device 102 includes both hardware and software components 104 and 106, which are integrated into multi-functional hand-held device 100. It should be pointed out that the multi-functional hand-held device 100 is not limited to only two devices, and may in fact integrate any number of devices.

[0049] Multi-functional device 100 also includes switch 110, which that allows multi-functional device 100 to be switched from one device operating mode to another device operating mode. For example, switch 110 may allow a user to cycle through cell phone, media player, and PDA modes of operation. Once a particular operating mode is selected, the multi-functional device 100 operates as the selected device. For example, the programming related to the selected device is activated for use by the multi-functional hand-held device. The programming may include reconfiguring the UI based on the selected device so that the inputs made by the user correlate to the device in use. For example, the functions of any physical buttons, switches or dials as

well as soft buttons, switches or dials can be reconfigured to correspond to the selected device.

[0050] However, the operating modes of multi-functional hand-held device 100 need not completely independent. In many cases, it will be desirable to allow the multiple functionalities to interact with each other. For Example, a user may look up a telephone number of a contact in the PDA and pass this number to the phone to be dialed.

II. Form Factor

[0051] The form factor of a hand-held device is generally a device that can easily be held in one hand. A typical hand-held device includes a small display in an upper portion of the front surface of the device and input controls in a lower portion of the front surface of the device. The device may additionally include controls and ports on the top, bottom, and side surfaces. Prior art hand-held devices have typically had small displays which causes some dissatisfaction for users of these devices. It is generally preferred to have larger displays so that more information can be displayed or the information being displayed can be more easily viewable (e.g., larger text). In the case of video players and game players in particular, larger displays are much preferred over smaller ones.

[0052] However, the use of large displays has been limited in the past because the required input controls often take up substantial portions of the available space. Furthermore, as device functionality converges, the number of controls on the device typically increases as each device includes its own dedicated controls. Therefore devices must be made larger or the displays must be smaller to accommodate all the new controls. Both of these outcomes are unsatisfactory. Larger devices are bulky and hard to use, and smaller screens are difficult to utilize for both relaying information and reading information from the screen.

A. One-Handed vs. Two-Handed Operation

[0053] A hand-held electronic device may be directed at one-handed operation or two-handed operation. In one-handed operation, a single hand is used to both support the device as well as to perform operations with the user interface during use. Cellular phones and media players are examples of hand-held devices are generally intended to can be operated solely with one hand. In the case of a cell phone, for example, a user may grasp the phone in one hand between the fingers and the palm and use the thumb to make entries using keys, buttons or a # joy pad.

[0054] In two-handed operation, one hand is used to support the device while the other hand performs operations with a user interface during use or, alternatively, both hands support the device as well as perform operations during use. PDA's and game players are examples of hand-held device that are typically operated with two hands. In the case of a PDA, for example, the user may grasp the device with one hand and make entries using the other hand, for example, using a stylus. In the case of a game player, the user typically grasps the device in both hands and make entries using either or both hands while holding the device.

B. Footprint/Size

[0055] Hand-held devices may have a variety different footprints or sizes. The footprint is typically associated with how the device is going to be used. Devices such as PDAs