

capable of receiving a data plug/cable assembly configured for transmitting and receiving data to and from a host device, such as a general purpose computer (e.g., desktop computer, portable computer). For example, the data port may be used to upload or download data to and from the hand-held device. Such data may include songs and play lists, audio books, e-books, photos, address books, documents, appointments, etc. into the hand-held device. The data port may be a PS/2 port, serial port, parallel port, network interface port, USB port, Firewire port etc. The hand-held device may also include a power port that receives a power plug/cable assembly configured for delivering power to the hand-held device. In some cases, the data port may serve as both a data and power port by employing either standard or proprietary connectors.

B. Wireless

[0166] To send and receive data wirelessly, the device generally requires a transmitter, a receiver (or a transceiver) and some sort of antenna. The wireless communication link may correspond to Bluetooth, WiFi (802.11), IR (infrared), etc. The antenna may be fully contained within the device or they may extend outside the device. The antenna may take a variety of forms depending on the frequency to be used, etc. For example be a rugged rubber duck that consists of a coiled up element encased in rubber. Alternatively, the antenna may be printed on a circuit board within the device.

[0167] The hand-held device may also include a radio transceiver for communications via a cellular network or a GPS receiver.

C. Change UI Based on Received Communication Signals

[0168] A hand-held electronic device may be configured to actively look for signals in the surrounding environment, and change its mode based on the signal. That is, the device tries to match the mode with the signal. If the device receives a phone signal over the cellular network, the device may turn into a phone, i.e., the phone mode is activated or brought forward relative to the other modes. If a device receives an email, the device may turn into an email terminal. As another example, when a user walks into a home theater room, the device may sense signals from the media control unit and turn itself into a remote control including functionality to control the various devices of the home theater (TV, amp, DVD, lighting). In other cases, the device may sense signals, which are being broadcast in physical stores, and turn itself into a device that is well suited for that store. For example, in a bank, the device may change into a calculator or bring a money program into view, or in a grocery store, the device may turn into a money payment device or bring a grocery list into view.

VII. Other Components of Hand-Held Device

[0169] The hand held device may additionally include one or more of the following hardware components: a controller (e.g., microprocessor, DSP, A/D, D/A, converters, codes), memory (e.g., RAM, ROM, solid state (flash), hard disk (micro-drive)), storage (SD card slots, mini-DVD), battery (e.g., lithium ion), etc.

VIII. Overall Block Diagram

[0170] FIG. 28 is a block diagram of an exemplary hand-held device 600. The hand-held device 600 typically includes a controller 602 (e.g., CPU) configured to execute

instructions and to carry out operations associated with the hand-held device. For example, using instructions retrieved for example from memory, the controller 602 may control the reception and manipulation of input and output data between components of the hand-held device 600. The controller 602 can be implemented on a single chip, multiple chips or multiple electrical components. For example, various architectures can be used for the controller 602, including dedicated or embedded processor, single purpose processor, controller, ASIC, etc. By way of example, the controller may include microprocessors, DSP, A/D converters, D/A converters, compression, decompression, etc.

[0171] In most cases, the controller 602 together with an operating system operates to execute computer code and produce and use data. The operating system may correspond to well known operating systems such as OS/2, DOS, Unix, Linux, and Palm OS, or alternatively to special purpose operating system, such as those used for limited purpose appliance-type devices. The operating system, other computer code and data may reside within a memory block 604 that is operatively coupled to the controller 602. Memory block 604 generally provides a place to store computer code and data that are used by the hand-held device. By way of example, the memory block 604 may include read-only memory (ROM), random-access memory (RAM), hard disk drive (e.g., a micro drive), flash memory, etc. In conjunction with the memory block 604, the hand-held device may include a removable storage device such as an optical disc player that receives and plays DVDs, or card slots for receiving mediums such as memory cards (or memory sticks). Because the form factor of the hand-held device is small, the optical drive may only be configured for mini DVDs.

[0172] The hand-held device 600 also includes various input devices 606 that are operatively coupled to the controller 602. The input devices 606 are configured to transfer data from the outside world into the hand-held device 600. As shown, the input devices 606 may correspond to both data entry mechanisms and data capture mechanisms. In particular, the input devices 606 may include touch sensing devices 608 such as touch screens, touch pads and touch sensing surfaces, mechanical actuators 610 such as button or wheels or hold switches (611), motion sensing devices 612 such as accelerometers, force sensing devices 614 such as force sensitive displays and housings, image sensors 616, and microphones 618. The input devices 606 may also include a clickable display actuator 619.

[0173] The hand-held device 600 also includes various output devices 620 that are operatively coupled to the controller 602. The output devices 620 are configured to transfer data from the hand-held device 600 to the outside world. The output devices 620 may include a display 622 such as an LCD, speakers or jacks 624, audio/tactile feedback devices 626, light indicators 628, and the like

[0174] The hand-held device 600 also includes various communication devices 630 that are operatively coupled to the controller 602. The communication devices 630 may, for example, include both wired and wireless connectivity selected from I/O ports 632 such as IR, USB, or Firewire ports, GPS receiver 634, and a radio receiver 636.

[0175] The hand-held device 600 also includes a battery 650 and possibly a charging system 652. The battery may be