

PORTABLE ELECTRONIC DEVICE DOCKING STATION

TECHNICAL FIELD

[0001] The present disclosure relates generally to portable electronic devices and, more specifically, to a universal docking station for a portable electronic device.

BRIEF DESCRIPTION OF THE DRAWINGS

[0002] The written disclosure herein describes illustrative embodiments that are non-limiting and non-exhaustive. Reference is made to certain of such illustrative embodiments that are depicted in the figure(s), in which:

[0003] **FIG. 1** illustrates a diagram of a universal docking station consistent with embodiments of the present disclosure.

[0004] **FIG. 2** illustrates a diagram of a universal docking station communicatively coupled with accessory devices consistent with embodiments of the present disclosure.

[0005] **FIG. 3** illustrates an isometric perspective view of a docking station consistent with embodiments of the present disclosure.

[0006] **FIG. 4** illustrates a rear view of a docking station consistent with embodiments of the present disclosure.

DETAILED DESCRIPTION

[0007] The proliferation of portable electronic devices (PEDs), including notebook computers (e.g., laptops, netbooks, ultrabooks, etc.), tablet computers (e.g., the Apple® iPad™, Amazon® Kindle™, etc.), portable digital assistants (PDAs), and smartphones, has placed more computing power into the hands of users than the computing power of early computers that occupied an entire room. Due to their portability, however, PEDs may not be ideally suited for sustained use over long periods of time. In some instances, PED interfaces may be designed primarily for portability rather than for functionality and ergonomic efficiency. For example, keyboard inputs and displays integrated in a PED device (e.g., a laptop computer) may be sized significantly smaller than keyboard inputs and displays associated with a less-portable system (e.g., a desktop computer). Further, a PED device designer may sacrifice integrating accessory devices in a PED such as, for example, multi-media drives, printers, joysticks, pointing inputs, and the like, for increased portability of the PED.

[0008] To increase functionality and/or ergonomic efficiency during use over sustained periods, a PED may be coupled to a docking station capable of interfacing the PED with more functional and ergonomic inputs/outputs and/or displays. For example, a PED may connect to a docking station configured to interface the PED with a large discrete display (e.g., a 24" computer monitor or the like), a full-sized ergonomic keyboard, and a pointing

input (e.g., a computer mouse). These inputs/outputs and/or displays may then be used to control and/or interact with the PED.

[0009] Conventional docking stations include proprietary interfaces that allow the docking stations to only interface with PEDs manufactured by a particular entity and/or in the same product line. For example, a conventional docking station manufactured by Dell® may only be capable of interfacing with laptop computers manufactured by Dell®, and therefore may not be capable of interfacing with a laptop computer manufactured by Lenovo®. Similarly, a conventional docking station manufactured by Dell® for a certain product line of laptop computers may not be capable of interfacing with a laptop computer manufactured by Dell® in a different product line. Accordingly, a user may not readily switch between PED manufacturer and/or product lines without acquiring new docking stations capable of interfacing with new PED devices.

[0010] Embodiments of the present disclosure provide and describe a universal docking station for a PED. In certain embodiments, the universal docking station may utilize a single or multiple universal interface(s), tethered or untethered, to communicatively couple a PED to one or more inputs/outputs, displays, and/or accessory devices. In some embodiments, the universal interface may be a high-speed and/or super-speed universal data interface (e.g., Universal Serial Bus 3.0, SATA, eSATA, FireWire, DisplayPort™, Thunderbolt, Lightingbolt) or the like. In further embodiments, the universal docking station may be configured to provide electrical power to a PED device. In certain embodiments, the universal docking station may be configured to provide electrical power to a PED device via a single or multiple discrete interface(s) or single or multiple cable(s) integrated, tethered or untethered, with the universal interface. By utilizing a universal data interface, the universal docking station may be utilized with any PED device having the universal data interface regardless of the manufacturer of the PED. In certain embodiments, the universal docking station may be configured to provide electrical power to a PED via one or more discrete interfaces integrated, tethered or untethered, with a fixed or proprietary power interface. In some embodiments, by utilizing a fixed or propriety interface, the universal docking station may be utilized with a single, defined platform of PED devices while streamlining the user experience and minimizing additional parts.

[0011] Embodiments may be best understood by reference to the drawing(s), wherein like parts are designated by like numerals throughout. It will be readily understood that the components of the present disclosure, as generally described and illustrated in the drawing(s) herein, could be arranged and designed in a wide variety of different configurations. Thus, the following more detailed description of the embodiments of the systems, methods and apparatuses is not intended to limit the scope of the disclosure, but is

merely representative of possible embodiments of the disclosure. In some cases, well-known structures, materials, or operations are not shown or described in detail.

[0012] FIG. 1 illustrates a diagram of a universal docking station 100 for a PED 102 consistent with embodiments of the present disclosure. The docking station 100 may also be referred to as a hub, a port replicator, an expansion dock, and the like and, as used herein, does not necessarily imply a device which mechanically retains or secures the PED 102 within the docking station 100, although some embodiments of the docking station 100 may have such functionalities. The PED 102 may be any portable electronic device including, for example, a notebook and/or laptop computer, a netbook computer, an ultrabook computer, an electronic book reader (*e.g.*, the Amazon® Kindle™), a smartphone (*e.g.*, the Apple® iPhone™, the Motorola® Droid®, and the BlackBerry® Storm™), and/or a tablet computer (*e.g.*, the Apple® iPad™, the HP® Slate, and the Samsung® Galaxy™ Tablet).

[0013] In certain embodiments, the docking station 100 may include a body configured to receive a PED 102, and may further function to retain the PED 102 through a mechanical interface (*e.g.*, a spring loaded mechanical clamp or the like). As shown, the docking station 100 may be configured to receive electrical power from a power adapter 110 configured to removably (*i.e.*, untethered) or permanently (*i.e.*, tethered) connect the docking station 100 to an electrical power supply. In some embodiments, the power adapter 110 may be configured to receive electrical power from a standard electrical utility socket (*e.g.*, a 120V wall socket) and provide this power to the docking station 100. In certain embodiments, the power adapter 110 may include a transformer (not shown) and/or other power conditioning equipment configured to condition (*e.g.*, step down) the electrical power provided to the docking station 100. In certain other embodiments, the power adapter 110 may provide unconditioned electrical power (*e.g.*, not stepped-down) directly to the docking station 100, and the docking station 100 may include a transformer and/or other power conditioning equipment. Electrical power provided to the docking station 100 by power adapter 110 may be provided to the PED 102 via a PED power interface 112.

[0014] As illustrated, the docking station 100 may include a lock slot or post 108 configured to allow a user to securely retain the docking station 100 to a secure object (*e.g.*, a desk). In certain embodiments, the lock slot or post 108 may include a locking mechanism (not shown) configured to allow a user to selectively lock the docking station 100 to a secure object via a cable or the like. In certain other embodiments, the lock slot or post 108 may be configured to interface with a cable or the like that includes a locking mechanism separate from the docking station 100.

[0015] The PED 102 may be communicatively coupled with the docking station 100 via a data interface 106. In some embodiments, the data interface 106 may be a standard non-proprietary interface that utilizes a widely available communication standard used by multiple PED 102 manufactures. For example, the data interface 106 may utilize standard or derivatives of Universal Serial Bus (USB), IEEE 1394 (Firewire), Ethernet, eSata, HDMI, DVI, VGA, LightPeak™, CopperPeak™, , ThunderBolt™, DisplayPort™, optical, telephone, and/or other similar communication standards.

[0016] The docking station 100 may include one or more input/output (I/O) accessory interfaces 104 configured to communicatively couple one or more accessory devices (not shown) to the docking station 100. For example, the I/O accessory interfaces 104 may be configured to communicatively couple one or more keyboards, pointer inputs (e.g., computer mice), disk drives, cameras, microphones, printers, scanners, speakers, music players, displays and the like to the docking station 100.

[0017] Accessory devices communicatively coupled to the docking station 100 via I/O accessory interfaces 104 may communicate with the PED 102 via the data interface 106. In certain embodiments, the data interface 106 may be a high-speed, SuperSpeed, HyperSpeed, or the like data interface capable of communicatively coupling the PED 102 with one or more accessory devices via the I/O accessory interfaces 104 of the docking station 100. In preferred embodiments, the data interface 106 may utilize the USB 3.0 communication standard, allowing a connected PED 102 to output high-quality video to a single display or multiple displays (not shown) coupled to one of I/O accessory interfaces 104 and to receive input from one or more input devices (e.g., a pointer input, a keyboard, a joystick, and the like). Further, the data interface 106 may allow a connected PED 102 to interface with communicatively coupled storage devices, printers, external hard drives, flash drives, scanners, digital cameras, digital video recorders, MP3 players, iPods, iPhones, Blackberries, and the like. In this manner, the docking station 100 allows any PED 102 with a universal interface capable of utilizing the data interface 106 to communicate with one or more accessories coupled to the docking station 100 via the I/O accessory interfaces 104. This functionality may allow the docking station 100 to be used by multiple PEDs 102 from different manufacturers and operating system platforms.

[0018] As shown in **FIG. 1**, the PED power interface 112 and data interface 106 may be separate interfaces (e.g., separate cables). In some embodiments, however, the functionality of the PED power interface 112 and data interface 106 may be embodied in a single interface 114 (e.g., a single cable) capable of providing both power to the PED 102 from the docking station 100 and communicatively coupling the PED 102 with the docking

station 100. In certain embodiments, the PED power interface 112 and data interface 106 may be separate interfaces that are physically bundled together for simplicity.

[0019] In some embodiments, the docking station 100 may include a reset button (not shown) configured to reset the data interface 106 and/or one or more of I/O accessory interfaces 104. In certain embodiments, resetting the data interface 106 and/or one or more of I/O accessory interfaces 104 may be functionally equivalent to temporarily disconnecting then reconnecting the PED 102 from the data interface 106 and/or accessory devices from the I/O accessory interfaces 104. The docking station 100 may further include a power button (not shown) configured to control the power delivered to the PED 102. In certain embodiments, the power button may communicatively interface with the PED 102 to enable a controlled powerup, boot-up shutdown, power down, and/or hibernation of the PED 102 when the power button is pressed. Further, in some embodiments, the docking station 100 may be configured to store (e.g., bundle) other components and/or accessories used with the docking station 100 including, for example, cables associated with data interface 106, power tips associated with data interface 106, I/O accessory interfaces 104, PED power interface 112, and power adapter 110.

[0020] **FIG. 2** illustrates a diagram of a universal docking station 100 communicatively coupled with accessory devices 200-208 consistent with embodiments of the present disclosure. As shown, the docking station 100 may be communicatively coupled via I/O accessory interfaces 104 with one or more accessory devices including but not limited to, for example, a display 200, a printer 202, a scanner, 204, a keyboard 206, and a pointer input 208. In turn, the PED 102 may be communicatively coupled with the docking station 100 via the data interface 106 which, in some embodiments, may be a high-speed, SuperSpeed, HyperSpeed, or the like data interface 106. The PED 102 may control and/or receive input from accessory devices 200-208 coupled to the docking station 100 via the data interface 106, the docking station 100, and I/O accessory interfaces 104. For example, the PED 102 may output high-quality video to the display(s) 200, while simultaneously outputting data to the printer 202 or receiving data from the scanner 204, the keyboard 206, and the pointer input 208.

[0021] **FIG. 3** illustrates an isometric perspective view of a docking station 300 consistent with embodiments of the present disclosure. The illustrated docking station 300 may incorporate certain features of the docking station 100 illustrated and described in reference to **FIGS. 1-2**, although all of such features may not be specifically illustrated in **FIG. 3**. The docking station 300 may include a main body 302 and a cover 304 pivotally connected along an edge of the main body 302 via a hinge 306, although other configurations of the main body 302, cover 304, and hinge 306 may be utilized. For example,

in certain configurations, the main body 302, the cover 304, and/or the hinge 306 may be detachable. The main body 302 and cover 304 may comprise plastic, glass, metal, any/or any other suitable material.

[0022] In certain embodiments, the main body 302 may define one or more compartments 308. The one or more compartments 308 may be configured to store (e.g., bundle) one or more components used with the docking station 300. For example, the one or more compartments may be configured to store, house, and/or contain cables associated with any data interfaces, power tips 310 associated with power interfaces, tips associated with data interfaces, I/O accessory interfaces, PED power interfaces, and/or any power adapters or other components used with the docking station 300. The cover 304 may be configured to cover and/or protect one or more components stored in the one or more compartments 308 when closed against the main body 302 about the hinge 306. In certain embodiments, the cover 304 may be configured to snap closed against the main body 302 about the hinge 306 using any suitable mechanical, magnetic, or other closure mechanism.

[0023] One or more accessory cradles or clips 312 configured to securely retain stored components may be included in the compartments 308 defined by the main body 302. For example, as illustrated, power tips 310 associated with power interfaces may be secured by the accessory cradles or clips 312 within the compartments 308. In certain embodiments, the accessory cradles or clips 312 may be configured to secure stored components via a compression mechanism, although any other method of mechanical securment may be utilized. In certain embodiments, the accessory cradles or clips 312 may be configured to pivot about a shaft 315 or other rotational mechanism or removable mechanism, thereby allowing the accessory cradle 312 to be rotated in and out of or removed from the compartments 308 and for easier access to any stored components secured therein.

[0024] **FIG. 4** illustrates a rear view of a docking station 300 consistent with embodiments of the present disclosure. The illustrated docking station 300 may incorporate certain features of the docking station 100 illustrated and described in reference to **FIGS. 1-2**, although all of such features may not be specifically illustrated in **FIG. 4**. As shown, the docking station 300 may include one or more I/O interfaces and/or data interfaces 406-416 and one or more PED power interfaces 400-404. Utilizing the illustrated interfaces 400-416, certain functionalities of the docking station 100 illustrated and described in reference to **FIGS. 1-2**, may be implemented.

[0025] It will be understood by those having skill in the art that changes may be made to the details of the above-described embodiments without departing from the underlying principles presented herein. For example, any suitable combination of various embodiments, or the features thereof, is contemplated.

[0026] Any methods disclosed herein comprise one or more steps or actions for performing the described method. The method steps and/or actions may be interchanged with one another. In other words, unless a specific order of steps or actions is required for proper operation of the embodiment, the order and/or use of specific steps and/or actions may be modified.

[0027] Throughout this specification, any reference to “one embodiment,” “an embodiment,” or “the embodiment” means that a particular feature, structure, or characteristic described in connection with that embodiment is included in at least one embodiment. Thus, the quoted phrases, or variations thereof, as recited throughout this specification are not necessarily all referring to the same embodiment.

[0028] Similarly, it should be appreciated that in the above description of embodiments, various features are sometimes grouped together in a single embodiment, figure, or description thereof for the purpose of streamlining the disclosure. This method of disclosure, however, is not to be interpreted as reflecting an intention that any claim require more features than those expressly recited in that claim. Rather, inventive aspects lie in a combination of fewer than all features of any single foregoing disclosed embodiment. It will be apparent to those having skill in the art that changes may be made to the details of the above-described embodiments without departing from the underlying principles set forth herein.

WHAT IS CLAIMED IS:

1. A docking station for a portable electronic device comprising:
a body configured to receive the portable electronic device;
a power receiving interface configured to receive electrical power from a power supply;
a plurality of accessory interfaces configured to communicatively couple the docking station with a plurality of accessory devices;
a universal data interface configured to communicatively couple the docking station with the portable electronic device; and
a power providing interface configured to deliver electrical power to the portable electronic device.
2. The docking station of claim 1, wherein the universal data interface and the power providing interface are integrated into a single universal interface.
3. The docking station of claim 1, wherein the body is further configured to mechanically retain the portable electronic device.
4. The docking station of claim 3, wherein the body further comprises a spring loaded mechanical clamp configured to mechanically retain the portable electronic device.
5. The docking station of claim 1, wherein the universal data interface comprises a standardized non-propriety interface.
6. The docking station of claim 5, wherein the universal data interface further comprises a high speed interface.
7. The docking station of claim 5, wherein the universal data interface comprises an interface selected from the group comprising: a high speed USB interface, an IEEE 1394 interface, a LightPeak™ interface, a CopperPeak™ interface, an Ethernet interface, an eSata interface, an HDMI interface, a DVI interface, a VGA interface, a ThunderBolt™ interface, and a Display Port interface.
8. The docking station of claim 1, wherein the docking station further includes a reset button configured to reset the universal data interface.

9. The docking station of claim 8, wherein the reset button is further configured to reset the plurality of accessory interfaces.
10. The docking station of claim 1, wherein the docking station further includes a power button configured to control the electrical power delivered to the portable electronic device by the power providing interface.
11. The docking station of claim 1, wherein the body is configured to store cables associated with the plurality of accessory interfaces.
12. The docking station of claim 1, wherein the body is configured to store cables associated with the power receiving interface.
13. The docking station of claim 1, wherein the docking station includes a lock slot configured to secure the body to a secure object.
14. The docking station of claim 13, wherein the lock slot includes a locking mechanism configured to selectively lock the body to the secure object.
15. The docking station of claim 14, wherein the locking mechanism is further configured to selectively lock the body to the secure object using a cable.
16. The docking station of claim 1, wherein the portable electronic device is a portable computer.
17. The docking station of claim 1, wherein the portable electronic device is a smartphone.
18. The docking station of claim 1, wherein the portable electronic device is a tablet computer.
19. The docking station of claim 1, wherein the body is configured to store accessories associated with the portable electronic device.