An electronic device case includes an upper shell having an upper edge, a lower edge, a left edge, a right edge and a center region surrounded by the edges. A lower shell is pivotally coupled with the upper shell and formed to include a frame configured to surround and hold an electronic device input peripheral. A number of grips are adjustably engaged with a guide track of the upper shell to support and stabilize any of a variety of electronic devices of different sizes. A number of actuation rods having first ends comprising knobs and second ends coupled with the grips cause translation of the grips along the guide track when slid along the upper, left and right edges of the upper shell.
ELECTRONIC DEVICE CASE

BACKGROUND

[0001] Mobile electronic devices such as tablets, phablets and smartphones have become ubiquitous in the new millennium due to the ability to connect and compute from almost anywhere.

[0002] While extremely portable, the compact size of some mobile electronic devices complicates data entry. To overcome this shortcoming, many users assemble a small keyboard to their mobile electronic device through an input port such as a universal serial bus (USB). However, carrying additional accessories like keyboards begins to detract from the general portability of the devices.

[0003] The lightweight materials of manufacture for some mobile electronic devices also predisposes them to damage from shock, abrasion or both. To protect their mobile electronic devices, many users apply a housing, wrap or case to the devices. However, with a number of mobile devices of different sizes a user will typically not be able to use the same wrap or case for more than one device thereby necessitating a number of housings accommodating different sizes of device.

SUMMARY

[0004] A system configured to facilitate operation of one or more electronic devices includes an upper shell and a guide track including a first guide track rod and a second guide track rod oriented generally perpendicular to the first guide track rod. A number of grips are slidably engaged with the guide track to stabilize an electronic device adjacent to the upper shell. A lower shell is pivotally coupled with the upper shell and includes a frame surrounding a mobile electronic device input peripheral configured for operative coupling with a mobile electronic device held by the grips. A plurality of actuation rods include first ends with knobs and second ends coupled with the grips such that sliding of the knobs causes translation of the grips along the guide track. Rotation of the actuation rods about their axes in a first direction decreases resistance to sliding of the grips along the guide track and rotation of the actuation rods about their axes in a second, opposite direction increases resistance to movement of the grips along the guide track.

[0005] An electronic device case includes an upper shell having an upper edge, a lower edge, a left edge, a right edge and a center region surrounded by the edges. A plurality of grips are adjustably engaged with the upper shell to support and stabilize any of a variety of electronic devices of different sizes. A lower shell pivotally coupled with the upper shell includes a frame configured to surround and hold an electronic device input peripheral.

[0006] An electronic device support apparatus includes an upper shell having an upper edge. A plurality of grips are engaged with the upper shell to support and stabilize any of a variety of electronic devices of different sizes against the upper shell during changes in orientation of the upper shell. A lower shell is pivotally coupled with the upper shell and configured to house a mobile electronic device input peripheral.

BRIEF DESCRIPTION OF THE FIGURES

[0007] FIG. 1 illustrates a front view of an example electronic device case in an open arrangement wherein upper and lower shells are pivoted away from one another.

[0008] FIG. 2 illustrates a right side view of the example electronic device case of FIG. 1 again in an open arrangement.

[0009] FIG. 3 illustrates a front view of the example electronic device case of FIGS. 1 & 2 in a closed arrangement wherein upper and lower shells are pivoted into mutual contact.

[0010] FIG. 4 illustrates a rear view of the example electronic device case of FIGS. 1-3 again in a closed arrangement.

[0011] FIG. 5 illustrates a top view of the example electronic device case of FIGS. 1-4 in a closed arrangement.

[0012] FIG. 6 illustrates a front view of an example electronic device case supporting a keyboard and a mobile electronic device in an open arrangement.

DETAILED DESCRIPTION

[0013] A mobile electronic device case or case system in accordance with the present disclosure increases mobility for users accustomed to implementing accessories to effectively operate their electronic device. The electronic device case or case system also offers protection from damage. Adjustable grips eliminate the need for a variety of enclosures for a variety of differently sized electronic devices.

[0014] FIG. 1 illustrates a front view of example electronic device case 1000 in an open arrangement or state. With a number of novel features that will become apparent from the descriptions which follow, the electronic device case or case system 1000 facilitates operation of one or more electronic devices and, in particular, may facilitate operation of one or more mobile electronic devices.

[0015] Mobile electronic devices suitable for use with the disclosed electronic device case include but are not limited to mobile phones, smart telephones, tablet computers, phablet computers, web pads, handheld PCs, Mobile Internet Devices (MIDs), Ultra-Mobile Personal Computers (UMPCs) and Personal Digital Assistants (PDAs).

[0016] An upper shell 100 includes an upper edge 101, a lower edge 102, a left edge 103, a right edge 104 and a center region 105 surrounded by the edges. A number of grips 131, 132, 133 and 134, for supporting and stabilizing an electronic device, are adjustably engaged with the upper shell 100 at guide track rods 124 and 128 and are configured to slide or translate relative to both the upper shell 100 and the guide track rods 124 and 128. Grips 131, 132, 133 and 134 are constructed to hold any of a variety of differently sized electronic devices against upper shell 100 even while the orientation of the upper shell 100 varies. Though the example electronic device case 1000 includes four grips 131, 132, 133 and 134, some example cases may include fewer than four or greater than four.

[0017] Guide track rods 124 and 128 generally provide support and stability to grips 131, 132, 133 and 134. First guide track rod 124 is oriented approximately along a transverse axis directed between upper shell upper edge 101 and upper shell lower edge 102 while a second, perpendicular or approximately perpendicular guide track rod 128 is oriented along a longitudinal axis generally directed between upper shell left edge 103 and upper shell right edge 104.

[0018] Grip 131 is configured for constrained sliding or translation along guide track rod 124 toward and away from the upper edge 101. Grip 132 is configured for constrained sliding or translation along guide track rod 124 toward and away from the lower edge 102. Grip 133 is configured for
constrained sliding or translation along guide track rod 128 toward and away from the left edge 103. Grip 134 is configured for constrained sliding or translation along guide track rod 128 toward and away from the right edge 104.

[0019] A number of control rods or actuation rods 140 are configured to allow remote adjustment of the position of grips 131, 132, 133, and 134. Each actuation rod is coupled to one of the grips 131, 132, 133, and 134 so as to extend generally perpendicular to the corresponding track rod 124 or 128 towards locations adjacent to the upper shell edges 101, 102, 103, and 104. For example, the actuation rod associated with grip 133 is approximately perpendicular to guide track rod 128.

[0020] Knobs 145 are provided to ends of control rods 140 distal from the plurality of grips and extend through slots 106 in the upper shell upper edge 101, the upper shell left edge 103 and the upper shell right edge 104 (FIGS. 2 & 3). Sliding of the knobs 145 along edges 101, 103 and 104 causes a corresponding translation of the respective grips 131, 132, 133 and 134 along the guide track rods 124 and 128.

[0021] Use of knobs 145 to rotate actuation rods 140 about their longitudinal axes in a first direction decreases resistance to movement of the grips 131, 132, 133, and 134 along the guide track 124 and 128. Use of knobs 145 to rotate actuation rods 140 about their longitudinal axes in a second direction, opposite the first direction, increases resistance to movement of the grips 131, 132, 133, and 134 along the guide track rods 124 and 128. Continued rotation of actuation rods 140 in the second direction until a tight feel is achieved at knobs 145 results in a resistance increased sufficiently to completely arrest translation of grips 131, 132, 133, and 134 relative to guide track rods 124 and 128. In this state, grips 131, 132, 133, and 134 are configured to hold an electronic device in place against interior panel 110.

[0022] In the example illustrated in FIGS. 1-6, first and second knobs are accessible to a user from the upper shell top edge 101, a third knob is accessible to a user from the upper shell left edge 103 and a fourth knob is accessible to a user from the upper shell right edge 104. However, an electronic device case in accordance with the present disclosure may have any of a variety of different arrangements of control knobs 145. For example, one or both of the first and second knobs may be provided adjacent to the upper shell lower edge 102 so as to be accessible therefrom.

[0023] An interior panel 110 may be positioned between the guide track rods 124, 128 and grips 131, 132, 133, and 134 to prevent portions of any device held thereby or any foreign objects from disrupting smooth motion of grips 131, 132, 133, and 134 along guide track rods 124 and 128. Actuation rods 140 may also be disposed behind interior panel 110. Slots 115 are formed in panel 110 to allow coupling between the grips 131, 132, 133, and 134 and the guide track rods 124, 128 through a narrow neck (not illustrated) or similar structure. Grips 131, 134, 133, and 134 slide toward and away from the upper shell center region 105 to an extent limited by slots 115.

[0024] Referring to FIG. 1, slots 115 extend approximately 40-60% of the distance between the outer position of grips 131, 132, 133, and 134 and the convergence of guide rods 124 and 128. However, slots 115 may extend any of a variety of distances along guide track rods 124 and 128. In some examples, slots 115 may extend completely to the convergence of the guide track rods 124 and 128 thereby tracing the guide track rods. In such examples, translation of grips 131, 132, 133, and 134 is only limited by interference between grips.

[0025] A lower shell 200 (FIG. 1) is pivotally coupled with upper shell 100 by a hinge 150 and is formed so as to include a frame 210 configured to surround and hold an electronic device input accessory or electronic device input peripheral within chamber 220. Input peripherals suitable for use with the disclosed electronic device case include but are not limited to keyboards, mice and touch pads.

[0026] Hinge 150 may be provided as any of a variety of hinges allowing pivoting of upper shell 100 relative to lower shell 200. Example hinges include but are not limited to barrel hinges, pivot hinges, case hinges, strap hinges or combinations of these.

[0027] In some examples, upper shell 100 may pivot between an angle of approximately zero degrees whereby it abuts frame 210 of lower shell 200 and an angle of approximately 360 degrees whereby panel 115 and frame 210 face nearly directly away from one another.

[0028] A tensioning knob 155 is provided to one or both ends of hinge 150. Rotation of tensioning knob 155 in a first direction decreases resistance to relative pivoting of the upper and lower shells 100 and 200 while rotation of the tensioning knob 155 in a second, opposite direction, increases resistance to relative pivoting of the upper and lower shells (FIG. 5). With continued rotation of tensioning knob 155 in the second direction upper shell 100 and lower shell 200 are configured to lock against pivoting. In this way, the upper and lower shells may be held at any of a variety of relative angles. FIG. 2 illustrates a right side view of the example electronic device case of FIG. 1 in an open arrangement.

[0029] A sleeve 310 may be provided adjacent hinge 150 between the upper 100 and lower 200 shells for harnessing a connector, such as a USB cable of an electronic device input peripheral.

[0030] In some examples cases, a power source (not illustrated) may be included with lower shell 200. A removable power source may be provided to a compartment formed in an exterior surface of lower shell 200. In an alternative, a power source may be imbedded in a portion of lower shell 200, for example, within frame 210 near hinge 150. A power supply provided in either manner, may be operatively coupled with an input peripheral such as a keyboard which may, in turn, supply power from the power source to an electronic device held by grips 131, 132, 133, and 134 or the power supply may offer a direct power line to the electronic device. Operative coupling between a power source and an input peripheral or between a power source and an electronic device may be accomplished by any of a variety of electrical conduits including but not limited to universal serial bus.

[0031] FIG. 3 illustrates a front view of the example electronic device case of FIGS. 1 & 2 in a closed arrangement wherein upper and lower shells are pivoted into mutual contact. A lock 107 slides between a first position in which the upper shell upper edge 101 is locked to the lower shell 200 and second position in which the upper shell upper edge 101 is free to move away from lower shell 200.

[0032] FIG. 4 illustrates a rear view and FIG. 5 illustrates a top view of an example electronic device case in a closed arrangement. In this arrangement, any electronic device and any accessories held within the case are substantially protected from shock and abrasion.

[0033] The exterior of case 1000 may be formed from any of a variety of lightweight, durable materials including but not limited to polymers, composites, metals, leather or combinations of these while the interior may comprise lightweight...
materials conducive to absorbing shock. In one example, exterior portions of the upper and lower shells 100 and 200 are constructed from aluminum and interior portions are composed of low-slip foam rubber.

Case 100 may be manufactured to any of a variety of dimensions suitable for temporarily housing electronic devices and related accessories or peripherals. In one example, case 100 is approximately 0.5 m from left to right, approximately 0.5 m from lower edge to upper edge and approximately 0.05 m thick in the closed arrangement (FIGS. 3-5).

Case 100 may also be provided in any of a variety of shapes conducive to encompassing electronic devices and related accessories and peripherals. In one example, case 100 resembles a rectangular prism when in the closed arrangement.

Case 100 may be provided alone or with any of a number of accessories. In some examples, case 100 may be provided with a keyboard coupled to lower shell 200.

Cases in accordance with the present disclosure may be implemented to perform any of a variety of methods for supporting, containing, securing or assembling a mobile electronic device to a case, an upper shell 100 is provided with an upper edge 101, a lower edge 102, a left edge 103, a right edge 104 and a center region 105 surrounded by the upper, lower, left and right edges 101, 102, 103 and 104; a number of guide tracks 124 and 128 are provided to the upper shell 100 and a lower shell 200 is pivotally coupled to the upper shell 100.

A number of grips 131, 132, 133 and 134 are engaged with the guide tracks 124 & 128 for stabilizing any of a variety of electronic devices adjacent to the upper shell 100 and a number of actuation rods 140 are coupled to the grips 131, 132, 133, 134 and provided with control knobs 145 at ends remote from the grips.

To liberate relative pivoting of the upper and lower shells, lock 107 is slid from a locked position securing the upper lower shells 100 and 200 together to an unlocked position.

A tensioning knob 155 provided at one end of hinge 150 is rotated in a first direction to decrease resistance to relative pivoting of the upper and lower shells 100 and 200. Upper shell 100 may now be pivoted to increase the distance between upper edge 101 and the lower shell 200 and may assume any of a variety of angles therewith. While operating an electronic device, a user may, for example, prefer to orient upper 100 shell at an angle of approximately 90 degrees relative to lower shell 200 or may prefer an angle of 100 degrees or an angle of 80 degrees.

With upper shell 100 pivoted to the desired orientation, a tensioning knob 155 provided at one end of hinge 150 is rotated in a second direction to increase resistance to relative pivoting of the upper and lower shells 100 and 200. Continued rotation of knob 155 until a tight feel is achieved, results in a resistance sufficiently increased to completely arrest relative pivoting.

Actuation rods 140 are rotated about their axes in a first direction to decrease resistance of the grips 131, 132, 133 and 134 to movement along guide track rods 124 and 128. With resistance to movement sufficiently decreased, knobs 145, and thereby, grips 131, 132, 133 and 134 are translated along guide track rods 124 and 128 in a first, generally outward direction away from center region 105 of upper shell 100.

With grips expanded away from center region 105, a mobile electronic device 500 may be positioned adjacent to center region 105, between or within the grips 131, 132, 133 and 134. Through use of knobs 145, grips 131, 132, 133 and 134 are translated along guide track rods 124 and 128 in a second, generally inward direction toward the center region 105 until they contact and grasp positioned mobile electronic device 500.

With mobile electronic device 500 and the grips in position at upper shell 100, actuation rods 140 are rotated about their longitudinal axes in a second direction opposite the first direction so as to increase resistance to movement of grips 131, 132, 133 and 134 along the guide track rods 124 and 128. The mobile electronic device 500 is held in the desired position by the arrested grips.

It should be noted that grips 131, 132, 133 and 134 may be independently actuated. As such, in some example methods, one or more of grips 131, 132, 133 and 134 may be positioned to grasp an electronic device before the remainder of the grips are positioned. For example, grip 132 may be translated away from lower edge 102, secured against translation with rotation of knob 145 and an electronic device may be supported by grip 132 before grip 133 is translated into place engaging a side of the electronic device.

FIG. 6 illustrates a front view of an example electronic device case in an open arrangement supporting a mobile electronic device and a mobile electronic device input peripheral. Frame 210 surrounds a keyboard 400 operatively coupled by connector 410 to a tablet computing device 500 held by the plurality of grips 131, 132, 133 and 134.

A user may now operate the mobile electronic device with or without the input peripheral adjusting the orientation of upper shell 100 relative to lower shell 200 as conditions require by loosening and then re-tightening tensioning knob 155. When the user desires to discontinue working and close case 1000, tensioning knob 155 is rotated in the first direction to decrease resistance to relative pivoting of the upper 100 and lower shells 200. Upper shell 100 may then be pivoted to decrease the distance between the upper edge 101 and the lower shell 200 and close case 1000.

Once upper shell 100 and lower shell 200 are in abutting relation, lock 107 may be slid from the liberating position to the securing position. Secured between upper shell 100 and lower shell 200, the mobile electronic device and the input peripheral are contained together in one place and protected from undesirable damage.

While the description has been presented with respect to certain specific embodiments, it will be appreciated that many modifications and changes may be made by those skilled in the art without departing from the spirit and scope of the disclosure. It is intended, therefore, by the appended claims to cover all such modifications and changes as fall within the true spirit and scope of the disclosure.

What is claimed is:

1. A system configured to facilitate operation of one or more electronic devices, comprising:
   - an upper shell;
   - a guide track including a first guide track rod and a second guide track rod oriented generally perpendicular to the first guide track rod;
a plurality of grips slidably engaged with the guide track to stabilize an electronic device adjacent to the upper shell; a lower shell including a frame surrounding a mobile electronic device input peripheral configured for operative coupling with a mobile electronic device held by the plurality of grips, wherein the lower shell is pivotally coupled with the upper shell; a plurality of actuation rods having first ends comprising knobs and second ends coupled with the grips whereby sliding of the knobs causes translation of the grips along the guide track; and wherein rotation of the actuation rods about their axes in a first direction decreases resistance to sliding of the grips along the guide track and rotation of the actuation rods about their axes in a second, opposite direction increases resistance to movement of the grips along the guide track.

2. The system as set forth in claim 1, wherein the actuation rods are oriented generally perpendicular with the track rods of the grips to which they are coupled.

3. The system as set forth in claim 2, wherein the mobile electronic device input peripheral is a keyboard.

4. An electronic device case, comprising: an upper shell having an upper edge, a lower edge, a left edge, a right edge and a center region surrounded by the edges; a plurality of grips adjusably engaged with the upper shell to support and stabilize any of a variety of electronic devices of different sizes; and a lower shell pivotally coupled with the upper shell and further comprising a frame configured to surround and hold an electronic device input peripheral.

5. The case as set forth in claim 4, wherein the upper and lower shells are configured to lock against pivoting at any of a variety of relative angles.

6. The case as set forth in claim 4, further comprising a hinge pivotally coupling the upper and lower shells and a tensioning knob provided at one end of the hinge whereby rotation of the tensioning knob in a first direction decreases resistance to relative pivoting of the upper and lower shells and rotation of the tensioning knob in a second, opposite direction increases resistance to relative pivoting of the upper and lower shells.

7. The case as set forth in claim 4, wherein at least one of the plurality of grips is configured to move toward and away from the upper edge.

8. The case as set forth in claim 7, wherein at least one of the plurality of grips is configured to move toward and away from the right edge.

9. The case as set forth in claim 8, wherein at least one of the plurality of grips is configured to move toward and away from the lower edge.

10. The case as set forth in claim 9, wherein at least one of the plurality of grips is configured to move toward and away from the left edge.

11. The case as set forth in claim 4, wherein at least one of the plurality of grips is constrained to moving along a transverse axis.

12. The case as set forth in claim 11, wherein at least one of the plurality of grips is constrained to moving along a longitudinal axis.

13. The case as set forth in claim 4, further comprising first and second guide track rods coupled with the upper shell and configured to constrain adjustment of the plurality of grips.

14. The case as set forth in claim 4, further comprising a plurality of actuation rods configured to adjust the plurality of grips.

15. The case as set forth in claim 14, wherein the plurality of actuation rods are coupled to the grips so as to extend to locations adjacent to the upper shell edges.

16. The case as set forth in claim 14, wherein the actuation rods further comprise knobs distal from the plurality of grips.

17. An electronic device support apparatus, comprising: an upper shell having an upper edge; a plurality of grips engaged with the upper shell to support and stabilize any of a variety of electronic devices of different sizes against the upper shell during changes in orientation of the upper shell; and a lower shell pivotally coupled with the upper shell and configured to house a electronic device input peripheral.

18. The system as set forth in claim 17, further comprising a lock configured to slide between a first position to lock the upper shell upper edge to the lower shell and second position to unlock the upper shell upper edge from the lower shell.