WEARABLES SECURITY DEVICE

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WEARABLES SECURITY DEVICE

FIELD OF THE INVENTION

[0001] Embodiments of the present invention relate generally to merchandise display security devices for displaying and protecting an article of merchandise from theft, such as a wearable device.

BACKGROUND OF THE INVENTION

[0002] Retailers routinely display articles of merchandise, such as cellular phones, portable computers (e.g. notebooks, laptops, tablets, etc.), e-readers, media players, and the like for customers to evaluate before making a purchase. These articles of merchandise are continually being made smaller and lighter in weight due to advances in technology and materials. As a result, such merchandise is increasingly vulnerable and susceptible to theft. Accordingly, these articles of merchandise need to be secured by a security device that effectively and cost efficiently protects the merchandise from theft.

[0003] “Smart” devices are beginning to propagate into the traditional watch and wearable computer (“wearables”) space. It would be desirable for some retailers to protect such smart watches and wearables from theft, while providing suitable customer interaction with the watch.

[0004] Accordingly, there exists a need for an improved merchandise display security device for protecting wrist watches and wearables from theft. There exists a further need for a merchandise display security device that provides adequate security without hindering a customer’s experience in a retail environment.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] The attached figures illustrate various embodiments of the invention.

DETAILED DESCRIPTION OF EMBODIMENTS OF THE INVENTION

[0006] Embodiments of the present invention will now be described more fully hereinafter with reference to the accompanying drawings, in which various embodiments of the invention are shown. This invention may, however, be embodied in many different forms and should not
be construed as limited to the embodiments set forth herein. Rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art.

[0007] Referring now to the accompanying drawing figures wherein like reference numerals denote like elements throughout the various views, one or more embodiments of a merchandise display security device for displaying and protecting an article of merchandise from theft are shown. More particularly, the drawing figures show embodiments of a merchandise display security device 10 for being attached to an article of merchandise M. In one embodiment, the article of merchandise is a wrist watch or wearable computer having a band and a body (collectively “wearable devices”). The body may include any number of components, such as an internal battery, processor, wireless communication circuitry, etc. The article of merchandise may be a smartwatch in some embodiments. A smartwatch may be like a wrist watch in some respects but include additional functionality, such as similar functionality provided by a computer, mobile phone, or personal digital assistant. In other embodiments, the article of merchandise is any device configured to be secured about a wearer’s wrist or otherwise worn by a consumer (e.g., about a consumer’s wrist, ankle, neck, etc.). For example, the article of merchandise may be any “wearable” device.

[0008] In one embodiment, the security device 10 includes a sensor 12 coupled to the article of merchandise. In the illustrated embodiment, the security device 10 comprises a sensor body 14 and a cable 16 coupled thereto. The sensor body 14 may be configured to be secured to the article of merchandise for protecting the article from theft or unauthorized removal, as explained in further detail below. The sensor 12 may be adaptable for use with a variety of wearable devices such that the illustrated embodiments are not intended to be limiting.

[0009] Cable 16 may be configured to electrically connect the article of merchandise M to an alarm module 30 and to activate a security signal (e.g., an audible and/or a visible alarm) in the event that the cable is cut, severed, or removed from the article of merchandise M and/or sensor 12, or should the article of merchandise be removed from the sensor. As such, cable 16 may comprise one or more conductors disposed within a protective outer sheath. At least one of the conductors may conduct a security signal between the sensor 12 and the alarm module 30, which
is configured to activate an alarm in the event that the electrical signal or sense loop is interrupted indicating a possible theft condition. In some embodiments, the cable 16 may be operably engaged with a recoiler for facilitating extension and retraction of the cable relative to the display stand 18. The recoiler may be positioned within the stand or below a display surface and may be electrically connected to the alarm module 30. In one embodiment, the recoiler may be similar to that disclosed in U.S. Provisional Application No. 62/189,273, entitled Winch Recoiler for a Merchandise Security System and filed on July 7, 2015, the entire contents of which are incorporated herein by reference.

[0010] The alarm module 30 may be configured to be armed or disarmed with a key, such as an electronic key configured to wirelessly transmit a security code. For example, the alarm module may include a port for communicating with a key. A plug or other connector, for example a USB connector, may be disposed at one end of the cable for electrically connecting the cable to an input port in the display stand 18 or the alarm module 30, which may be in turn connected to an external source of electrical power, for example a conventional 110V AC power outlet. The other end of the cable may be connected to the sensor via hardwiring or a connector for electrically connecting the cable to the sensor and any associated sensor electronics.

[0011] As will be understood and appreciated, cable 16 alternatively may be a mechanical security cable, for example a high strength, cut resistant cable, with or without a security signal conductor in the event that the displayed article of merchandise does not require electrical power or obtains electrical power from another power cable. Likewise, the cable may alternatively be a power cable that provides electrical power to the electronic article of merchandise without a security signal conductor in the event that the mechanical security provided by the electro-mechanical power cable is sufficient for protecting the article of merchandise from theft.

[0012] In the embodiment of the security device 10 illustrated in FIG. 9, the alarm module 30 is shown positioned in a secure location, for example underneath a display counter or within a locked cabinet, so that the alarm module is not readily accessible to unauthorized persons. The alarm module may contain alarm electronics for monitoring the state of the security signal conducted by the cable and for activating an internal or remote audible and/or visible alarm in the event of a possible theft condition. The alarm module may optionally contain voltage
regulating and/or power management electronics for modulating the voltage (e.g. 18V) of the external source of electrical power to provide an appropriate operating voltage (e.g. 5V) to the article of merchandise.

[0013] As shown FIGS. 1-4 and 10-13, the security device may include a display stand 18 for supporting the article of merchandise, although such a display stand is not required in some embodiments. The display stand may be in the form of a pedestal for supporting the article of merchandise in a displayed position and may be various sizes and configurations as shown. The display stand may be configured to be secured to a display surface, such as a counter, fixture, table, shelf, or the like, such as with a pressure-sensitive adhesive. The display stand may include a support member 20 configured to support the article of merchandise thereon. The article of merchandise and sensor may be readily removed from the display stand for inspection. The cable 16 may extend between and be connected to both the sensor 12 and the display stand 18. The cable 16 could be releasably connected to the display stand with a connector or could be hardwired thereto. In other cases, the display stand 18 may define an opening 22 configured to receive the cable 16 therethrough. A portion of the cable may be elastically extendable and retractable such that the article of merchandise attached thereto may be extended away from the display stand for inspection. In addition, the display stand could include an alignment mechanism for cooperating with the sensor 12 coupled to the article of merchandise for securing the article in a desired position. For example, the display stand could include one or more magnets or magnetically attractable material configured to cooperate with corresponding magnets or magnetically attractable material on the sensor and/or the article of merchandise.

[0014] The display stand 18 may also include electronics (e.g., circuitry or a printed circuit board) for electrically connecting the alarm module and the sensor. The electronics in the display stand could also be employed to pass power to the article of merchandise when supported thereon. For example, the display stand may include a contact or inductive charging mechanism 28 for providing power to a body having corresponding contact or inductive charging functionality. The alarm module may be configured to generate a security signal should the cable be removed from the display stand. It is understood that the display stand may be electrically connected to a remote alarm module, or the alarm module may be integrated with the display stand. Thus, the alarming electronics may be integrated within the display stand if
desired for providing a standalone security solution. It is further understood that the size and configuration of the display stand may be modified to accommodate any desired wearable device, as well as sensors having different sizes and configurations. In the instance where power is desired to be provided to the wearable device, the display stand may be electrically connected to a power source 31 via a power cable. Thus, the security device may permit a potential purchaser to examine and operate the wearable device in a powered state while secured.

[0015] In some embodiments, the display stand may provide for locking the wearable device to the display stand. Such a lock mechanism may be useful for retailers who wish to secure the wearable device to the display stand, such as after hours. In one example, a lock mechanism may be configured to mechanically engage the sensor, body, and/or band. For instance, a lock mechanism may be configured to engage the sensor in some embodiments. In other embodiments, a lock mechanism may be configured to apply tension to the band to lock the wearable device to the display stand. For example, the display stand may include a recess for receiving a locking element therein (see, e.g., FIGS. 2 and 3). Insertion of the locking element in the recess may result in engagement with the band and tensioning the band such that the body and band are secured to the display stand.

[0016] In one embodiment, the cable 16 terminates with a sensor 12 that is configured to attach to the article of merchandise M, such as a wrist watch or other wearable device. In the illustrated embodiments, the wearable device may include a body 24 configured to be secured to a band 26, wherein the band is configured to be secured to a wearer’s wrist. The sensor 12 may be configured to clamp to the band in some embodiments (see, e.g., FIGS. 6 and 16). In this regard, the sensor body may include a first member and a second member that are configured to engage with one another and about the band. The first and second members may be secured together with one or more fasteners. The first and second members cooperate with one another to define an opening for receiving a portion of the band therethrough. In some cases, the band includes one or more openings for adjusting the diameter of the band, and the sensor may be configured to engage one or more of the openings to be secured thereto (see, e.g., FIGS. 7 and 17), such as via one or more fasteners. It is understood that the sensor may be secured to the band using other additional or alternative techniques, such as with an adhesive and/or one or more fasteners.
Moreover, the sensor 12 may include a sensing device configured to detect removal of the band in an unauthorized manner. For example, the sensing device may be a pressure or plunger switch that is configured to engage the band when the sensor is secured thereto. The sensing device may be in communication with sensor electronics in the sensor that is configured to detect actuation of the sensing device to thereby provide a signal to the alarm module via the cable for generating an alarm. Thus, the sensor electronics may be in electrical communication with the alarm module and associated alarm electronics via the cable. In some embodiments, the sensor electronics includes circuitry, a printed circuit board, or the like that is electrically connected to the sensing device and the cable. Engagement of the sensing device with the band may cause the sense loop to be completed and the alarm module to be armed. Alternatively, a key may be used to arm the sensing device.

In one embodiment, the security device 10 also includes a secondary sensor 32 (see, e.g., FIGS. 1 and 2). The secondary sensor may be configured to electrically connect to the first sensor and to be coupled to the body. For example, the secondary sensor may be a cable that is electrically connected to both the first sensor and the body. In this case, the secondary sensor may be a cable that is electrically connected to both the first sensor and the body. In this case, the secondary sensor may facilitate power transfer to the wearable device and in some embodiments, the secondary sensor completes a sense loop such that removal of the secondary sensor results in interruption of the sense loop. The secondary sensor may include a connector at its free end that is configured to releasably engage an input port on the body (e.g., a micro-USB connector). The other end of the secondary sensor may be hard wired to the sensor 12 or could be releasably engaged in alternative embodiments.

In other embodiments, the secondary sensor comprises a flexible circuit 34 (see, e.g., FIGS. 6, 16, and 17). The flexible circuit is configured to be electrically connected to the sensor 12 and in some cases, may be releasably engaged therewith, for example, via a connection or one or more mating electrical contacts. All or a portion of the flexible circuit may be flexible. In some embodiments, the flexible circuit is ribbon-like and bendable so as to be conformable to various surface contours. In some instances, the flexible circuit may have a serpentine or non-linear profile to allow for adjustment in length. In addition, the flexible circuit may be various shapes for conforming to different types of wearable devices, as well as include one or more openings to avoid interfering with any input ports or charging mechanism. The flexible circuit
may include one or more conductors extending along its length for completing a sense loop with the first sensor.

[0020] An end of the flexible circuit may include a switch 50 that is configured to engage the watch body (see, e.g., FIG. 8). The switch may be closed when engaged with the watch body and configured to open when removed therefrom. For example, the switch may include a pair of electrical contacts that are configured to contact one another when the switch is closed and not contact one another when the switch is open. The switch may be attached to the body using various techniques, such as via an adhesive. For instance, application of a pressure-sensitive or releasable adhesive to the end of the sensor may cause the switch to close when secured to the body. Thus, should the secondary sensor be cut, torn, disconnected, or removed, or the switch opened, the alarm module may be configured to detect an interruption in the sense loop and to generate a security signal. The flexible circuit may be attached to any desired location on the body, such as the rear surface of the body, and in some cases, may be attached to the body and the band. The flexible circuit or switch could also be positioned between the body and the band. When attached to the body and/or band, the flexible circuit has a low profile that does not interfere with a customer’s ability to try on the wearable device, and may also be positioned so as to no interfere with any electrical contacts or sensors on the body. According to some embodiments, the flexible circuit may be similar to that disclosed in International Application No. PCT/US2014/62769, entitled Flexible Sensor for a Portable Electronic Device and filed October 29, 2014, the entire contents of which are incorporated herein by reference.

[0021] FIG. 8 shows an embodiment of an enlarged view of a switch 50 at an end of the flexible circuit. In this example, the switch includes a flexible component 110, wherein an end of the flexible component includes a bend 132. The bend 132 may function as a contact spring to allow for a predetermined amount of tolerance or over travel before contact is broken between the flexible component 112 and the conductor 130. In this regard, when the switch is secured to the body and/or band, the bend 132 will be biased towards a position that is generally parallel to the conductor 130. Thus, should the flexible circuit be moved (but not removed from the body and/or band), the bend 132 may allow for some bias of the flexible component 112, but the sense loop will not be interrupted. Only when the switch is removed will the bend 132 bias to its relaxed state, and the flexible component 112 may in turn bias away from the conductor 130.
Thus, the bend 132 may reduce the incidence of false alarms in some instances.

[0022] In one embodiment, FIG. 8 also shows that the flexible circuit 114 includes a conductor 130 (e.g., copper) that may be surrounded by, or otherwise coupled to, an insulating or non-conductive layer of material 134 (e.g., a polyimide file such as Kapton® polyimide film). A portion of the conductor 130 is exposed for electrically contacting the flexible component 112 when the flexible component is biased into engagement with the conductor to complete the electrical circuit. The conductor 130 may be a contact electrically connected to one or more conductors within the flexible circuit 114 or may extend along the entire length of the flexible circuit, and there may be more than one contact or conductor in some embodiments. FIG. 8 also shows that the flexible component 112 may be secured to the flexible circuit 114 with an adhesive layer 136 and that the flexible circuit may also include an adhesive layer 136 for securing to the camera 102.

[0023] The flexible circuit 114 may include a releasable adhesive (see, e.g., FIG. 8). For example, at least a portion of the flexible circuit 114 may be a “peel-and-stick” configuration for adhering to the body and/or band. However, it is understood that other suitable techniques may be used to secure the flexible circuit 114 and secondary circuit 110 in position on the body and/or band.

[0024] In another embodiment, the secondary sensor comprises a bi-directional switch 52 (see, e.g., FIGS. 5 and 14). In this example, the bi-directional switch may be configured to engage the body and be positioned between the body and the band. The bi-directional switch may be configured to extend outwardly from an end of the band and pivot in clockwise and counter-clockwise directions. For instance, where the band is capable of being attached to the body in one of two possible directions (e.g., via sliding engagement), the bi-directional switch is configured to be actuated in response to the band being attached to the body in either direction. Thus, the switch is configured to be actuated regardless of the direction that the band is attached to the body. The bi-directional switch may be integrated in the band in some cases, and one or more conductors for defining a sense loop may be routed through at least a portion of the length of the band to a sensor 12 and/or a cable 16. Thus, in some cases, the secondary switch may be hidden from view, and only the bi-directional switch may extend outwardly from an end of the
band. As shown in FIG. 15, when the band is engaged with the body, the bi-directional switch is hidden from view, and removing the band from the body in either direction results in interruption of a sense loop. In some embodiments, the bi-directional switch is capable of securing an Apple® watch, wherein the band is configured to slidably engage the body in either of two possible directions.

[0025] According to another embodiment, the sensor 12 may be form fitted to a variety of bodies and components thereof (see, e.g., FIGS. 18-25). In this case, the sensor includes a “cage” or shroud 54 configured to conform to the rear of the body without hindering the functionality of the watch. The shroud 54 is configured to extend about the watch band and/or body. In the illustrated embodiment, the shroud is configured to extend about the band and the sides of the body, as well as along a rear surface of the body. At least a portion of the shroud may be pliable or flexible, such as for closely conforming to a rear surface of the body and/or band. The shroud may be attached to the body and/or band with a snap fit, adhesives, or other securement techniques. In one embodiment, the shroud is configured to be attached to the body, and the band is configured to be attached to the body. As noted above, the band may be configured to slidably engage the body, and in this embodiment, the sensor may be configured to detect removal of the band from one or both sides of the body. As shown in FIG. 23, the shroud may include a slot that aligns with a slot in the body for allowing the band to slidably engage the body. In some instances, the band may also or alternatively slidably engage the shroud. In other cases, the shroud is unable to be removed from the body until the band has been removed from the body and the shroud. One or more access openings may be defined through the shroud for allowing a tool to engage a release mechanism on the band for removing the band from the body. Moreover, the sensor may include a sensing device configured to engage the body and/or band, such as a sensing device described above. For example, a plunger switch may engage the band when the band is attached to the body. Thus, removal of the band from the body or removing the shroud from the band and/or the body may result in generation of a security signal.

[0026] As noted above, a locking mechanism may be provided for locking the wearable device to the stand. FIGS. 24 and 25 show an embodiment of a lock mechanism 60 that is configured to engage the shroud for locking the wearable device to the display stand. For example, FIG. 25 shows an enlarged view of the shroud engaged with the lock mechanism,
wherein the lock mechanism is a mechanical member that physically engages the shroud such that the wearable device is unable to be lifted from the display stand. The mechanical member could be configured to pivot or otherwise move into and out of engagement with the shroud, such as in response to actuation by a mechanical or an electronic key. Moreover, when the wearable device is locked to the display stand, any access openings in the shroud for releasing the band from the body are inaccessible.

[0027] Notably in some embodiments, the sensor may be located on the band of the wearable device, while the sensor and/or the secondary sensor are of a low profile. As a result, the customer is able to model the wearable device on his or her wrist without interference of the sensor and/or the secondary sensor. For example, the sensor and secondary sensor may be sized and configured so as not hinder a customer’s ability to wear the watch. The security device may also not require large clamps or other features that surround the body of the wearable device and take away from the display of the wearable device. Furthermore, the sensor and/or the secondary sensor may be of a low profile to allow for various types of power charging, including inductive charging.

[0028] The foregoing has described one or more embodiments of a merchandise display for displaying and protecting an article of merchandise such as a wrist watch or wearable. Those of ordinary skill in the art will understand and appreciate that numerous variations and modifications of the invention may be made without departing from the spirit and scope of the invention. Accordingly, all such variations and modifications are intended to be encompassed by the appended claims.
That which is claimed is:

1. A merchandise display security device for displaying and protecting a wearable device from theft, the wearable device comprising a body and a band secured thereto, the security device comprising:
   a sensor configured to be coupled to the band;
   a cable electrically connected to the first sensor;
   a secondary sensor configured to be coupled to the body and to be electrically connected to the sensor, the secondary sensor comprising a bi-directional switch; and
   an alarm module electrically connected to the cable,
   wherein a sense loop is configured to be defined through the cable, the sensor, and the secondary sensor, and
   wherein the alarm module is configured to generate a security signal in response to interruption of the sense loop.

2. The security device of Claim 1, wherein the sensor comprises clamp configured to engage the band.

3. The security device of Claim 2, wherein an opening is defined in the first sensor and is configured to receive a portion of the band.

4. The security device of Claim 1, wherein the sensor comprises a sensing device configured to engage the band when secured thereto.

5. The security device of Claim 1, further comprising a display stand for removably supporting the wearable device thereon.

6. The security device of Claim 5, wherein the alarm module is integrated with the display stand.

7. The security device of Claim 5, wherein the display stand comprises a support member for receiving and supporting the sensor thereon.

8. The security device of Claim 5, further comprising a lock mechanism configured to lock the wearable device to the display stand.
9. The security device of Claim 8, wherein the lock mechanism is configured to tension the band for locking the wearable device to the display stand.

10. The security device of Claim 1, wherein the secondary sensor is configured to releasably engage the sensor.

11. The security device of Claim 1, wherein the band is configured to releasably engage the body in one of two possible directions, and wherein the bi-directional switch is configured to be actuated in response to engagement with the body.

12. The security device of Claim 11, wherein the bi-directional switch is configured to be pivotably actuated.

13. The security device of Claim 11, wherein the secondary sensor is configured to slidably engage the body.

14. The security device of Claim 1, wherein the cable is operably engaged with a recoiler for facilitating extension and retraction of the cable.

15. A merchandise display security device for displaying and protecting a wearable device from theft, the security device comprising:

   a wearable device comprising a body and a band secured thereto; and

   a security device comprising:

   a sensor configured to be coupled to the band;

   a cable electrically connected to the sensor;

   a secondary sensor configured to be coupled to the body and to be electrically connected to the sensor, the secondary sensor comprising a bi-directional switch; and

   an alarm module electrically connected to the cable,

   wherein a sense loop is configured to be defined through the cable, the sensor, and the secondary sensor, and

   wherein the alarm module is configured to generate a security signal in response to interruption of the sense loop.

16. The security device of Claim 15, wherein the wearable device comprises a wrist
17. A method of displaying and protecting a wearable device from theft, the wearable device comprising a body and a band secured thereto, the method comprising:
   coupling a sensor to the band;
   coupling a secondary sensor to the body, the secondary sensor comprising a bi-directional switch; and
   arming the security device such that a sense loop is defined through the cable, the sensor, and the secondary sensor.

18. The method of Claim 17, wherein the secondary sensor is coupled to the band, and wherein coupling the secondary sensor to the body comprises sliding the secondary sensor relative to the body in one of two possible directions.

19. The method of Claim 17, further comprising locking the wearable device to the display stand.

20. The method of Claim 19, wherein locking comprises tensioning the band.
ABSTRACT

A merchandise display security device for displaying and protecting a wearable device from theft is provided. In one example, the wearable device includes a body and a band secured thereto. The merchandise security device includes a sensor configured to be coupled to the band and a cable electrically connected to the first sensor. The security device also includes a secondary sensor configured to be coupled to the body and to be electrically connected to the first sensor. The secondary sensor includes a bi-directional switch. The security device further includes an alarm module electrically connected to the cable. A sense loop is configured to be defined through the cable, the sensor, and the secondary sensor, and the alarm module is configured to generate a security signal in response to interruption of the sense loop.