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SYSTEMS AND METHODS FOR SECURITY SENSING

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SYSTEMS AND METHODS FOR SECURITY SENSING

FIELD OF THE INVENTION

[0001] Embodiments of the present invention relate generally to systems and methods for security sensing, including security sensing for electronic devices from theft.

BACKGROUND OF THE INVENTION

[0002] Retailers routinely display articles of merchandise, such as portable computers (e.g. notebooks, laptops, tablets, etc.), mobile phones, 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. At the same time, the retail price and profit margin for such merchandise continues to decline. Accordingly, these articles of merchandise need to be secured by a security device that effectively and cost efficiently protects the merchandise from theft.

[0003] It is common in the retail security industry to have electronic devices tethered to a store fixture to prevent theft yet allow a customer to interact with the device. In addition, it is desirable to provide power to the electronic device so that the device may be charged and operable for use by a potential customer, while at the same time providing security to an electronic device.

BRIEF DESCRIPTION OF THE DRAWINGS

[0004] FIG. 1 is a schematic of a security system according to one embodiment of the present invention.

[0005] FIG. 2 is a schematic of a monitoring device including a base and a sensor according to one embodiment of the present invention.

[0006] FIG. 3 is a perspective view of a connector according to an embodiment of the present invention.

[0007] FIG. 4 is a schematic of a connector and an input port of an article of

merchandise according to one embodiment of the present invention.

DETAILED DESCRIPTION OF EMBODIMENTS OF THE INVENTION

[0008] Embodiments of the present invention will now be described more fully hereinafter with reference to the accompanying drawings, in which exemplary 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, the exemplary 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.

[0009] Reference will now be made to the accompanying drawing figures wherein identical reference numerals denote the same or similar elements throughout the various views. One or more embodiments of a security system 10 for securing an article of merchandise “M” from theft are described below. The article of merchandise M may be a display model or an operational sample of electronic merchandise, such as portable computers (e.g. notebooks, laptops, tablets, etc.), e-readers, mobile phones, smart phones, media players, and the like, for a customer to examine before making a decision to purchase the item. The article of merchandise M may be typically displayed in a manner that permits a prospective purchaser to evaluate the operation and features of the merchandise, while protecting the merchandise from a potential thief. A power cord or tether 12 may be operably engaged with the article of merchandise M at one end, and according to one embodiment, a security event (e.g., removal, cutting, or tampering of the power cord) may result in the generation of a security signal (e.g., an audible and/or visual alarm).

[0010] For example, the power cord 12 may be operably engaged with a monitoring device 25 configured to generate a security signal upon detecting a security event. In one embodiment, the power cord 12 includes a connector 14 configured to operably engage a monitoring device 25 (see, e.g., Figure 1). The power cord 12 may electrically connect the monitoring device 25 to the article of merchandise M. Thus, upon the occurrence of a

security event, the monitoring device 25 may include circuitry for detecting the security event and generating an appropriate security signal. For example, the monitoring device 25 may be similar to those manufactured by InVue Security Products Inc. In one embodiment, the monitoring device 25 may include a display module 27 configured to removably support the article of merchandise M, as well as provide power and security to the article of merchandise (see, e.g., FIG. 2). According to some embodiments, the monitoring device may be similar to those disclosed in U.S. Patent Nos. 7,710,266, entitled Security System with Product Power Capability and issued May 4, 2010, and U.S. Patent No. 7,727,843, entitled Programmable Alarm Module and System for Protecting Merchandise and issued June 15, 2010, each of which is incorporated by reference herein in its entirety. The monitoring device 25 may include any other suitable device, such as a sensor 29 configured to be attached to the article of merchandise M. The sensor could be in communication with a display module, base, or stand 27 that is configured to generate a security signal. Moreover, the monitoring device 25 could be integrated with an input power source or controller 18, such as for providing and/or receiving power and/or security signals from a connector 15 connected to the article of merchandise M and/or the article of merchandise. In one embodiment, the display module 27 and the sensor 29 are electrically connected via the cord 12 for transmitting power and/or security signals, wherein the cord may be continuous or separated into one or more segments between the display module and the article of merchandise.

[0011] Embodiments of the present invention provide for the delivery of at least power to the article of merchandise M on display through a power cord 12, cable, tether or the like. The power cord 12 may include a plurality of conductors 16. For example, a pair of conductors 16 in the power cord 12 (e.g., a positive power line and a ground line) may provide power to the article of merchandise M. An input power source or controller 18 may be in electrical communication with the power cord for transmitting power and other signals through the cord 12 and to the article of merchandise M. The power cord 12 may include additional conductors 16 if desired, such as for transmitting data, audio, video, optical and/or communication signals. Moreover, in one embodiment, the power cord 12 includes at least one conductor 16 for transmitting a security signal. For example, the power cord 12 may include a plurality of conductors 16, one of which for

transmitting a signal to the connector 15, and a second conductor for returning the signal back through the power cord. Should the signal be disrupted (e.g., the cord 12 and/or connector 15 is removed or cut), a security signal may be generated. For instance, an audible and/or a visible signal may be generated. In addition, the functionality of the article of merchandise M may be interrupted and locked from further use without being overridden by an authorized user, such as by inputting a passcode or using an appropriate key.

[0012] One end of the power cord 12 includes a connector 15 configured to electrically couple to the article of merchandise M. The opposite end of the power cord may be configured to be coupled to the monitoring device 25, as explained above, such as with connector 14. In other embodiments, the end of the power cord 12 may be connected to a power source 18, such as a USB-port on another electronic device or an electrical outlet. Thus, the power cord 12 may include a USB connector or the like that is electrically connected to the connector 15 at the opposite end of the cord. The connector 15 may be configured to provide at least power and security signals to the article of merchandise.

[0013] Generally, the connector 15 may include a body portion 20 and a connection portion 22 extending outwardly therefrom (see, e.g., FIG. 3). The body portion 20 and connection portion 22 may be separate members coupled to one another or integrally formed as a single component. Although the body portion 20 and the connection portion may be various sizes and configurations, the connection portion is illustrated as having a smaller cross-sectional dimension than the body portion. The power cord 12 is coupled to the body portion 20, while the connection portion 22 is configured to be inserted within an input port of the article of merchandise M so as to be electrically connected thereto. The body portion 20 may be hard wired to the power cord 12 or connected using a suitable releasable coupling. The connection portion 22 comprises a plurality of conductors 24, contacts, or pins that correspond to one or more of the conductors 16 in the power cord, as discussed above. Thus, the conductors 24 may correspond to power, data, audio, video, optical and/or communication signals. The connection portion 22 may include any number of conductors 24, such as 2, 4, 6, 8, etc. The conductors 24 may be

disposed, embedded, or otherwise integrated with a conductive shield 26. Thus, the shield 26 may surround the conductors 24 and form an outer surface of the connection portion 22. The shield 26 may surround the conductors 24 and include a conductive material. In some embodiments, the connector 15 is similar to a USB connector, such as a USB-A, micro-USB, or a USB-C connector, although other types of connectors may be employed (e.g., an Apple Lightning® connector).

[0014] As shown in FIG. 4, the input port 40 of the article of merchandise M may include a plurality of conductors 30, pins, contacts, or pads that are configured to electrically connect to corresponding conductors 24 on the connection portion 22 and/or conductive shield 26 when the connection portion is engaged with the input port. In one embodiment, the input port 40 includes a plurality of conductors 30 that are configured to electrically connect to the conductors 24 and/or the conductive shield 26 of the connector. In some instances, the input port 40 of the article of merchandise M includes a conductor 30 corresponding to an accessory power pin 42 configured to electrically connect to one of the conductors 24 of the connector 15. The accessory power pin 42 may be configured to provide power to an accessory from a power source 50 of the article of merchandise. In one example, the accessory power pin 42 may be similar to “usb-on-the-go” applications for providing power from the power source 50 of the article of merchandise to an accessory connected thereto.

[0015] In one embodiment, the accessory power pin 42 may be utilized to determine whether a security event has occurred. For instance, a change in a signal injected on the conductor 32 electrically connected to the accessory power pin 42 may be indicative of a security event. In some cases, the signal is configured to be injected on one of the conductors 16 in the cord 12. The conductor 46 carrying the signal may be electrically connected to a conductor 32 in the connector 15 electrically connected to the accessory power pin 42. At least a pair of the plurality of conductors 34, 36 in the cord 12 are configured to transmit power between the connector and the article of merchandise, and in one embodiment the signal is not injected on the conductors configured to transmit power. Thus, the signal is not injected on any of the conductors providing power to the article of merchandise. In one aspect, the monitoring device 25 is configured to inject the

signal on one of the plurality of conductors 16 in the cord 12. A sense loop or circuit may be defined between a plurality of conductors 16 in the cord 12, wherein one of the conductors is a ground conductor 48 and the other conductor 46 is a conductor not providing power to the article of merchandise. Moreover, the monitoring device 25 may be configured to detect a change in capacitance of the article of merchandise M in response to the signal injected on the conductor 46 in the cord. A return signal detected by the monitoring device 25 may be indicative of the change in capacitance. For instance, the monitoring device 25 may be configured to detect a change in the magnitude, size, and/or shape of the return sign. The change in the return signal may be indicative of a security event, such as the connector 15 being removed or the cord 12 being cut.

[0016] In another embodiment, one of the conductors 30 of the input port of the article of merchandise M corresponds to a host pin. In one example, the host pin is configured to provide power from a power source 50 of the article of merchandise M when a connector is connected to the input port of the article. Thus, the host pin may be configured to provide power out when the connector 15 is connected to the input port. The power provided from the power source of the article of merchandise via the host pin may be transmitted through one of the conductors 16 in the cord 12 and to the monitoring device 25 when the connector 15 is electrically connected to the article of merchandise. Thus, in one embodiment, the monitoring device 25 may monitor for a voltage signal of the power provided via the host pin. A security event may occur when the monitoring device 25 no longer detects power. In some cases, the article of merchandise M may include a software program that prohibits the article from being powered off. Thus, the incidence of false alarms may be reduced or eliminated since the article of merchandise will be unable to be powered off.

[0017] Therefore, embodiments of the present invention may allow for the use of standard connectors for detecting various security events. In addition, embodiments of the present invention take advantage of existing functionality of articles of merchandise to detect various security events.

[0018] The foregoing has described one or more embodiments of a security system and method for securing an article of merchandise from theft. 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 security system for securing an article of merchandise from theft, the security system comprising:

a connector comprising a plurality of conductors;

wherein the connector is configured to engage the article of merchandise to thereby electrically connect one or more of the conductors in the connector with the article of merchandise,

wherein the article of merchandise comprises an accessory power pin configured to electrically connect to one of the conductors in the connector, and

wherein a change in a signal injected on the conductor electrically connected to the accessory power pin is indicative of a security event.

2. The security system according to Claim 1, wherein the connector is a USB connector.

3. The security system according to Claim 1, wherein the connector is a micro-USB connector.

4. The security system according to Claim 1, further comprising a cord comprising a plurality of conductors electrically connected to respective conductors in the connector.

5. The security system according to Claim 4, wherein the signal is configured to be injected on one of the plurality of conductors electrically connected to the conductor in the connector electrically connected to the accessory power pin.

6. The security system according to Claim 4, wherein at least a pair of the plurality of conductors in the cord are configured to transmit power between the connector and the article of merchandise.

7. The security system according to Claim 6, wherein the signal is not injected on the conductors configured to transmit power.

8. The security system according to Claim 4, wherein the cord is configured

to operably engage a monitoring device for generating a security signal in response to a security event.

7. The security system according to Claim 7, wherein the monitoring device is configured to inject the signal on one of the plurality of conductors in the cord.

8. The security system according to Claim 7, wherein the monitoring device is configured to detect a change in capacitance of the article of merchandise in response to the signal injected on the conductor in the cord.

9. A security system for securing an article of merchandise from theft, the security system comprising:

a connector comprising a plurality of conductors; and

a cord comprising a plurality of conductors electrically connected to respective conductors in the connector,

wherein the connector is configured to engage the article of merchandise to thereby electrically connect one or more of the conductors in the connector with the article of merchandise,

wherein the article of merchandise comprises an accessory power pin configured to electrically connect to one of the conductors in the connector,

wherein one of the conductors in the cord is configured to transmit a signal to the conductor in the connector electrically connected to the accessory power pin, and

wherein a change in the signal is indicative of a security event.

10. A method for securing an article of merchandise from theft, the method comprising:

providing a connector comprising a plurality of conductors; and

engaging the connector with the article of merchandise to thereby electrically connect one or more of the conductors in the connector with an accessory power pin of the article of merchandise,

wherein a change in a signal injected on the conductor electrically connected to the accessory power pin is indicative of a security event.

11. A method for securing an article of merchandise from theft, the method comprising:

injecting a signal on one of a plurality of conductors electrically connected to an accessory power pin of the article of merchandise; and

detecting a change in the signal on the conductor that is indicative of a security event.

12. The method of Claim 11, wherein detecting comprises detecting a change in the capacitance of the article of merchandise.

13. The method of Claim 11, wherein injecting does not comprise injecting the signal on any of the conductors configured to transmit power to the article of merchandise.

14. A security system for securing an article of merchandise from theft, the security system comprising:

a connector comprising a plurality of conductors;

wherein the connector is configured to engage the article of merchandise to thereby electrically connect one or more of the conductors in the connector with the article of merchandise,

wherein the article of merchandise comprises a pin configured to electrically connect to one of the conductors in the connector,

wherein the pin does not transfer power to the article of merchandise, and

wherein a change in a signal provided via the pin electrically connected to the conductor is indicative of a security event.

15. The security system of Claim 14, wherein the change in the signal is a change in a capacitance of the article of merchandise in response to the signal injected on the pin.

16. The security system of Claim 14, wherein a change in the signal is a change in a voltage signal provided by the pin.

ABSTRACT

A security system for securing an article of merchandise from theft is provided. The security system includes a connector comprising a plurality of conductors, wherein the connector is configured to engage the article of merchandise to thereby electrically connect the conductors in the connector with the article of merchandise. The article of merchandise includes a pin configured to electrically connect to one of the conductors in the connector, and the pin does not transfer power to the article of merchandise. A change in a signal provided via the pin electrically connected to the conductor is indicative of a security event.

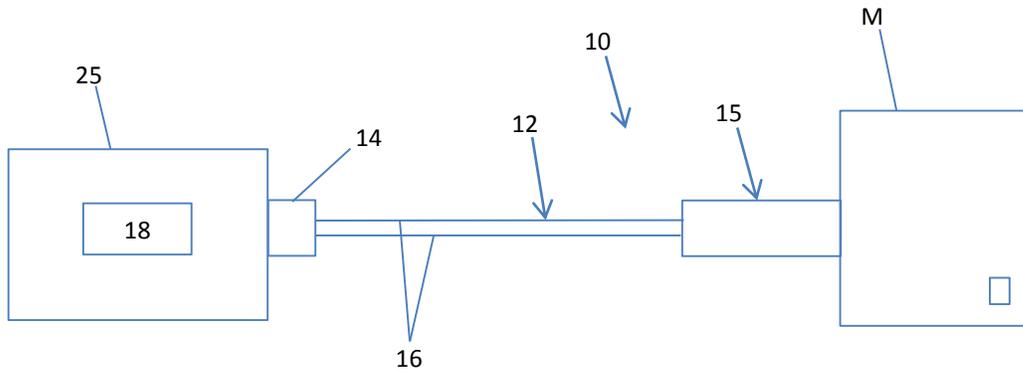


FIGURE 1

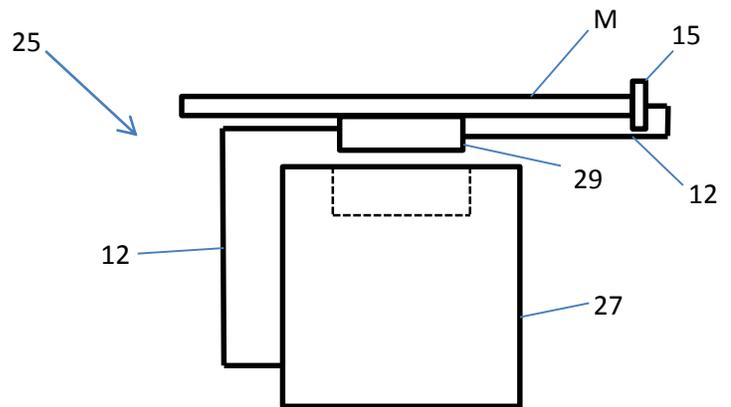


FIGURE 2

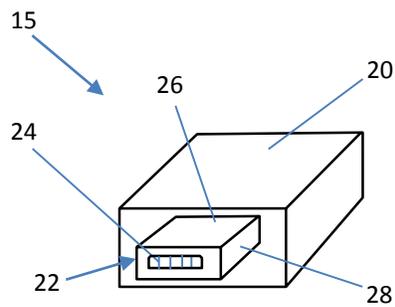


FIGURE 3

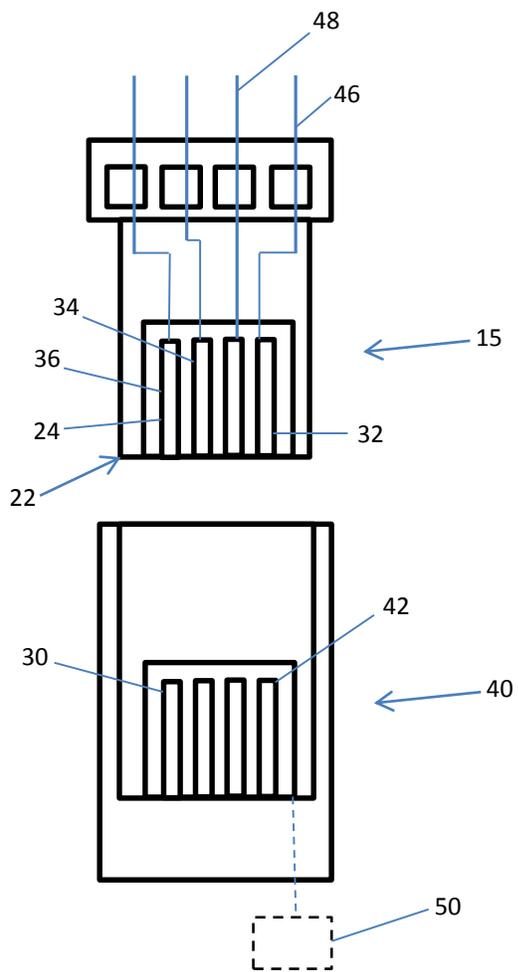


FIGURE 4