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(54) **APPAREL FOR PHYSIOLOGICAL TELEMETRY DURING ATHLETICS**

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A61B 5/00	(2006.01)
A61B 5/024	(2006.01)
A61B 5/0245	(2006.01)

(52) **U.S. Cl.**

CPC ***A61B 5/6804*** (2013.01); ***A61B 5/0002*** (2013.01); ***A61B 5/0006*** (2013.01); ***A61B 5/0245*** (2013.01); ***A61B 5/02438*** (2013.01); ***A61B 5/02444*** (2013.01); ***A61B 5/486*** (2013.01); ***A61B 5/6805*** (2013.01); *A61B 2562/0209* (2013.01)

(58) **Field of Classification Search**

CPC ... A61B 5/6804; A61B 5/6802; A61B 5/6805; A61B 5/6823; A61B 5/6835

USPC 600/388, 587

See application file for complete search history.

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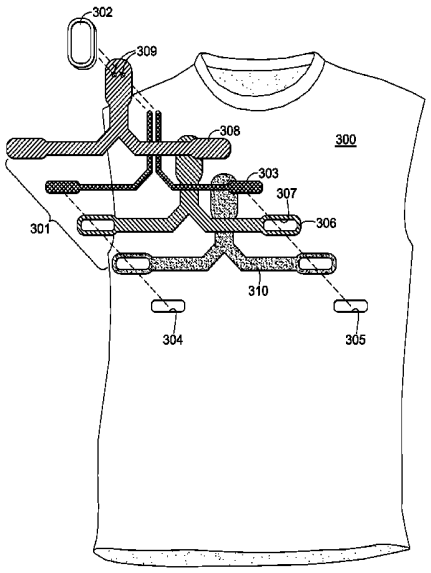
(57) **ABSTRACT**

A user interface component and system for physiological parameters telemetry is provided. A user interface component may be reversibly or irreversibly attached to a garment that allows connection to a user's skin, such as via one or more holes in the garment. Signals transmitted through a conductive transfer layer in the user interface component are provided to a signal receiving unit which can collect and transmit physiological data.

18 Claims, 8 Drawing Sheets



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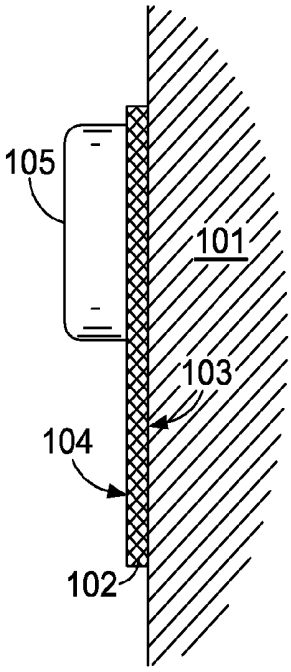

FIG. IA

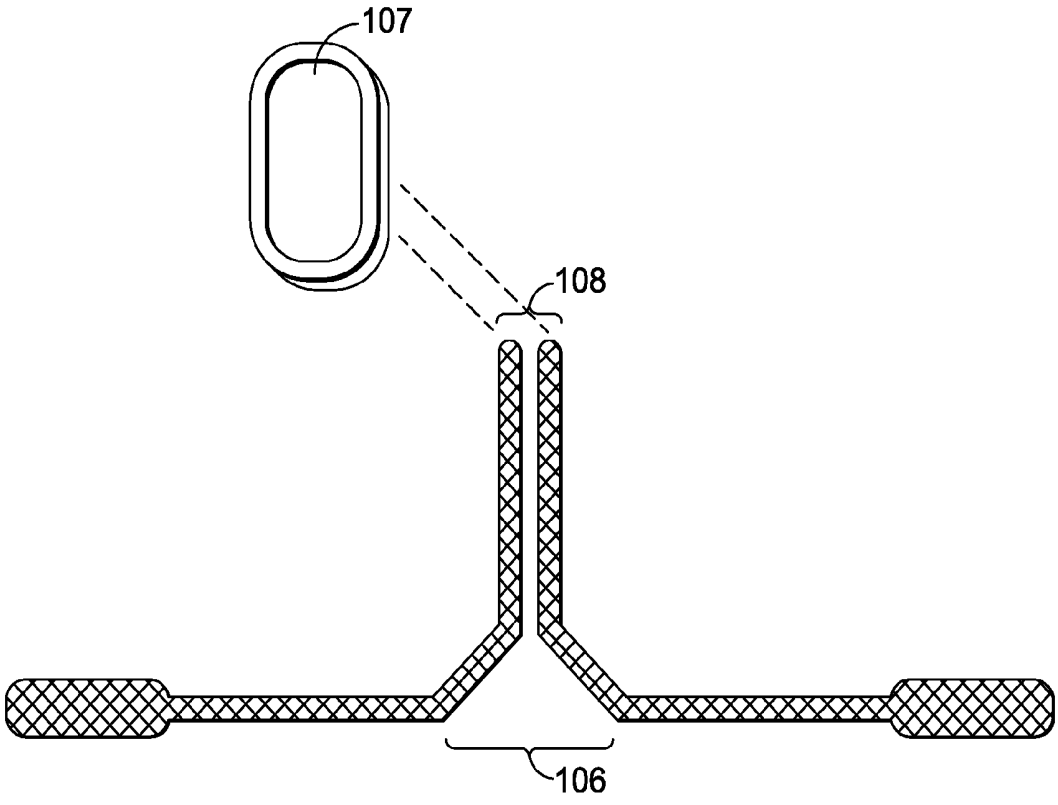

FIG. IB

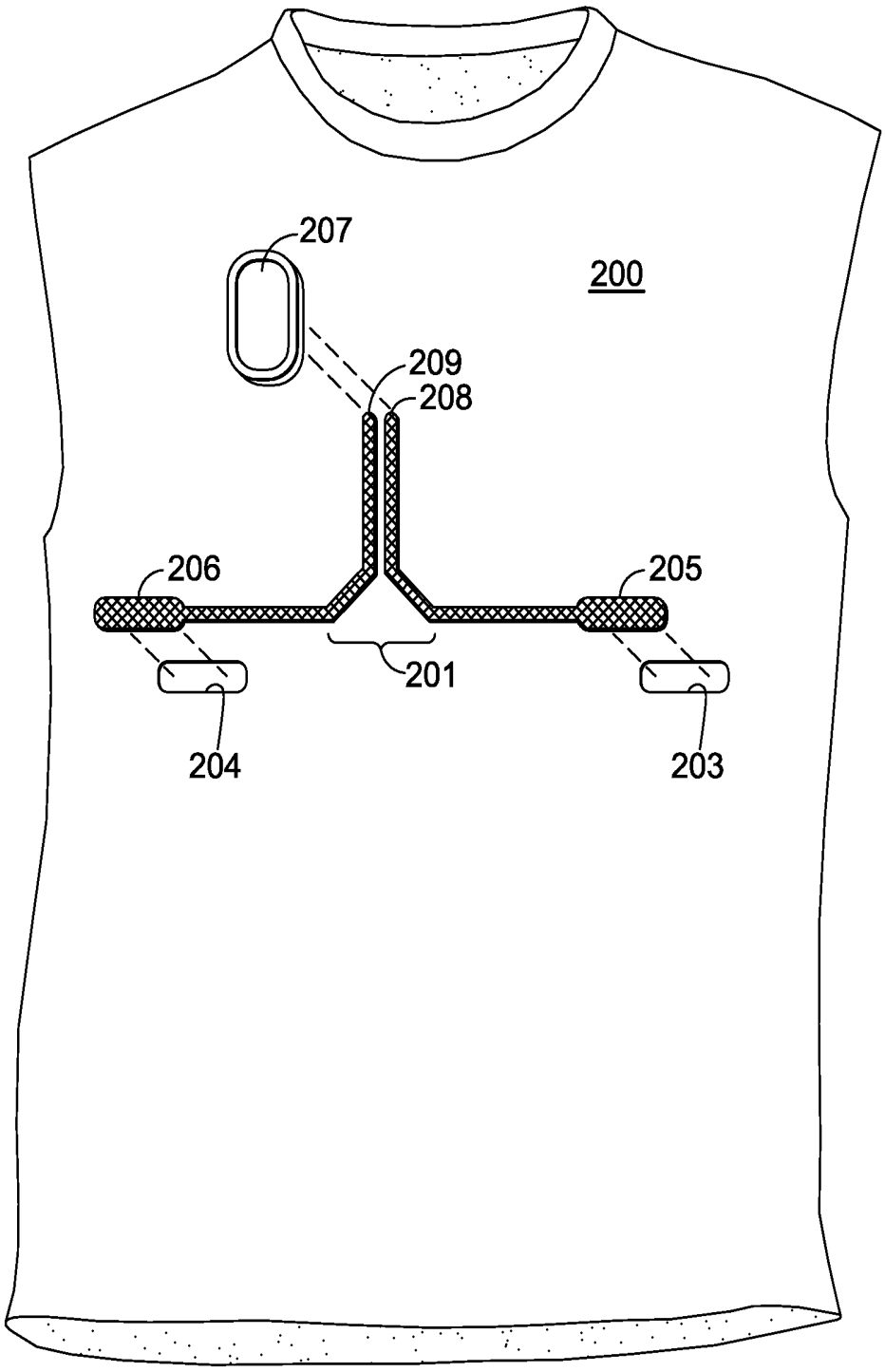

FIG. 2

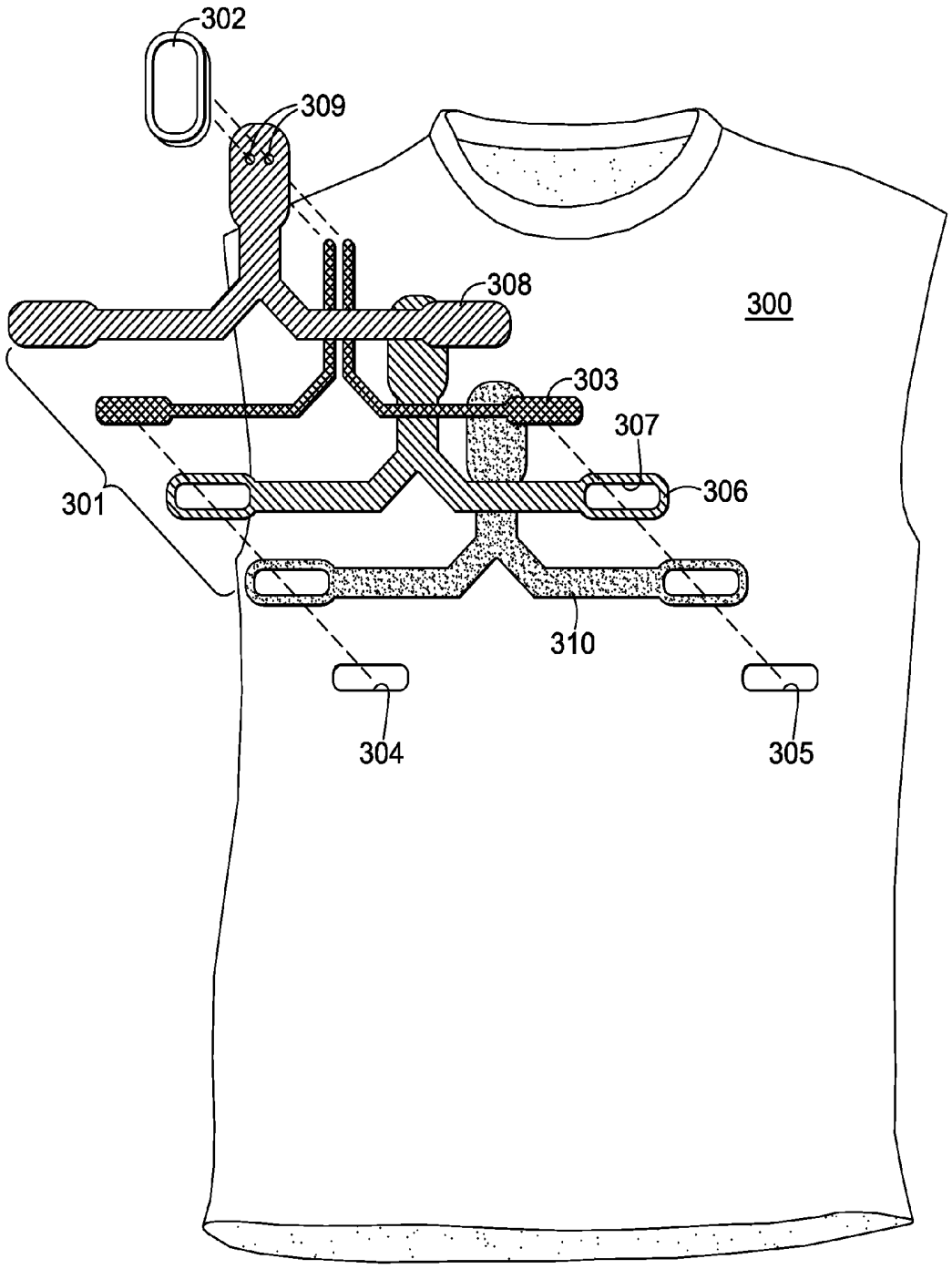

FIG. 3

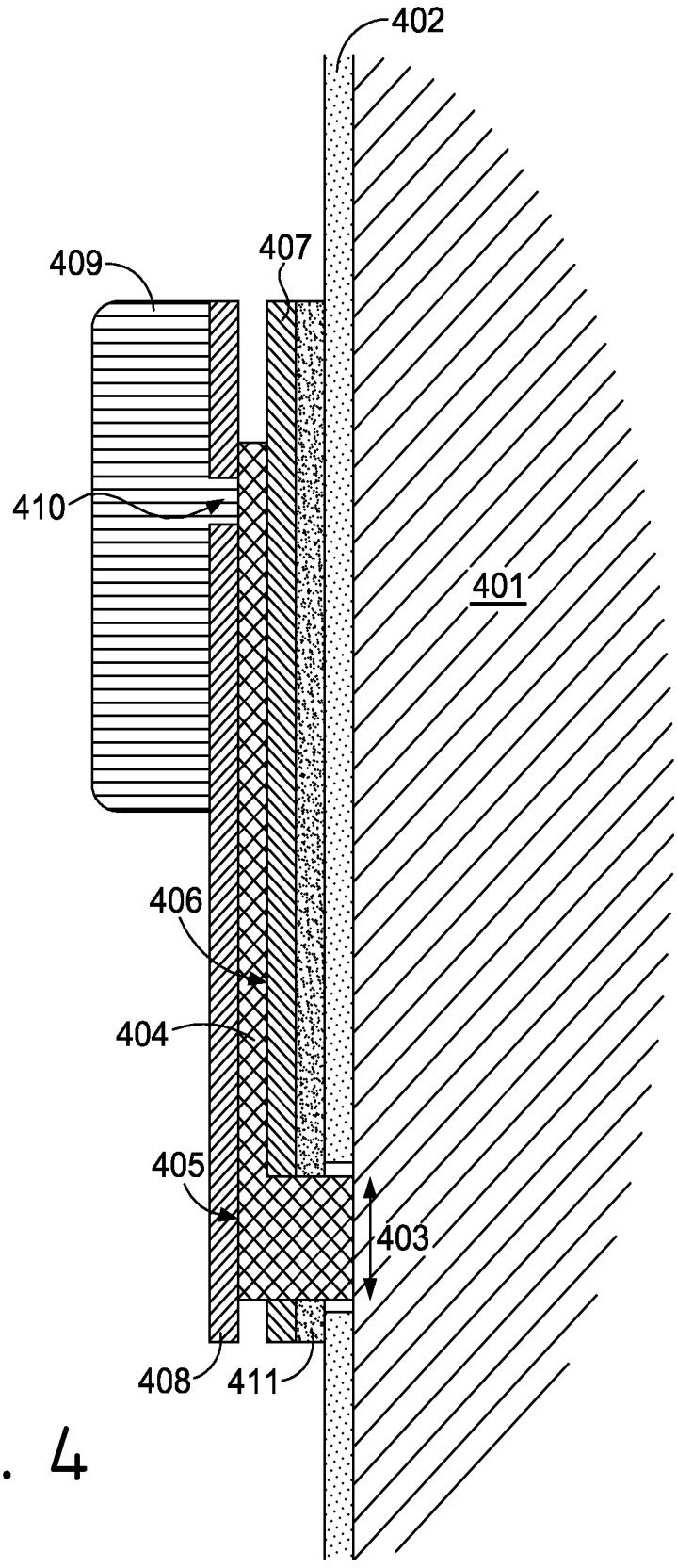

FIG. 4

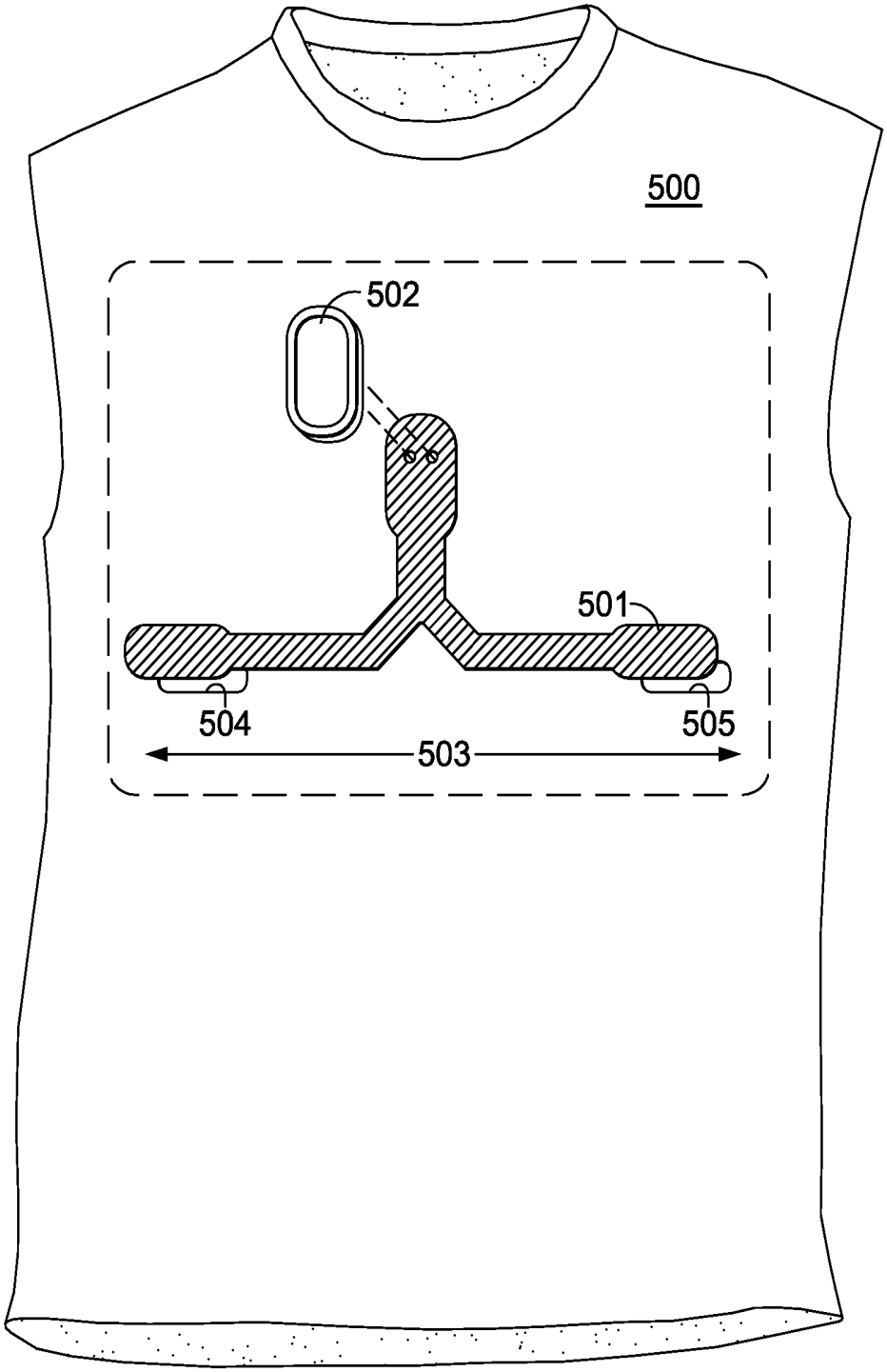

FIG. 5

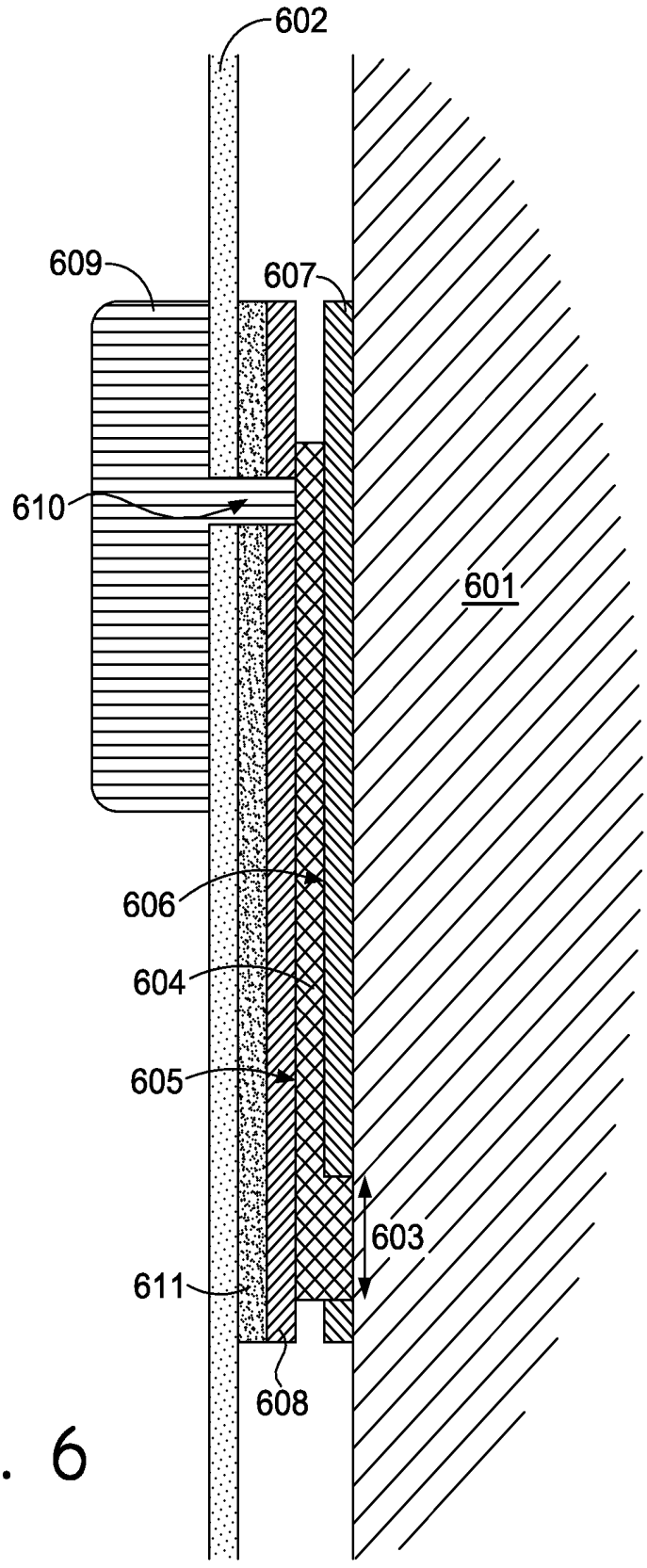

FIG. 6

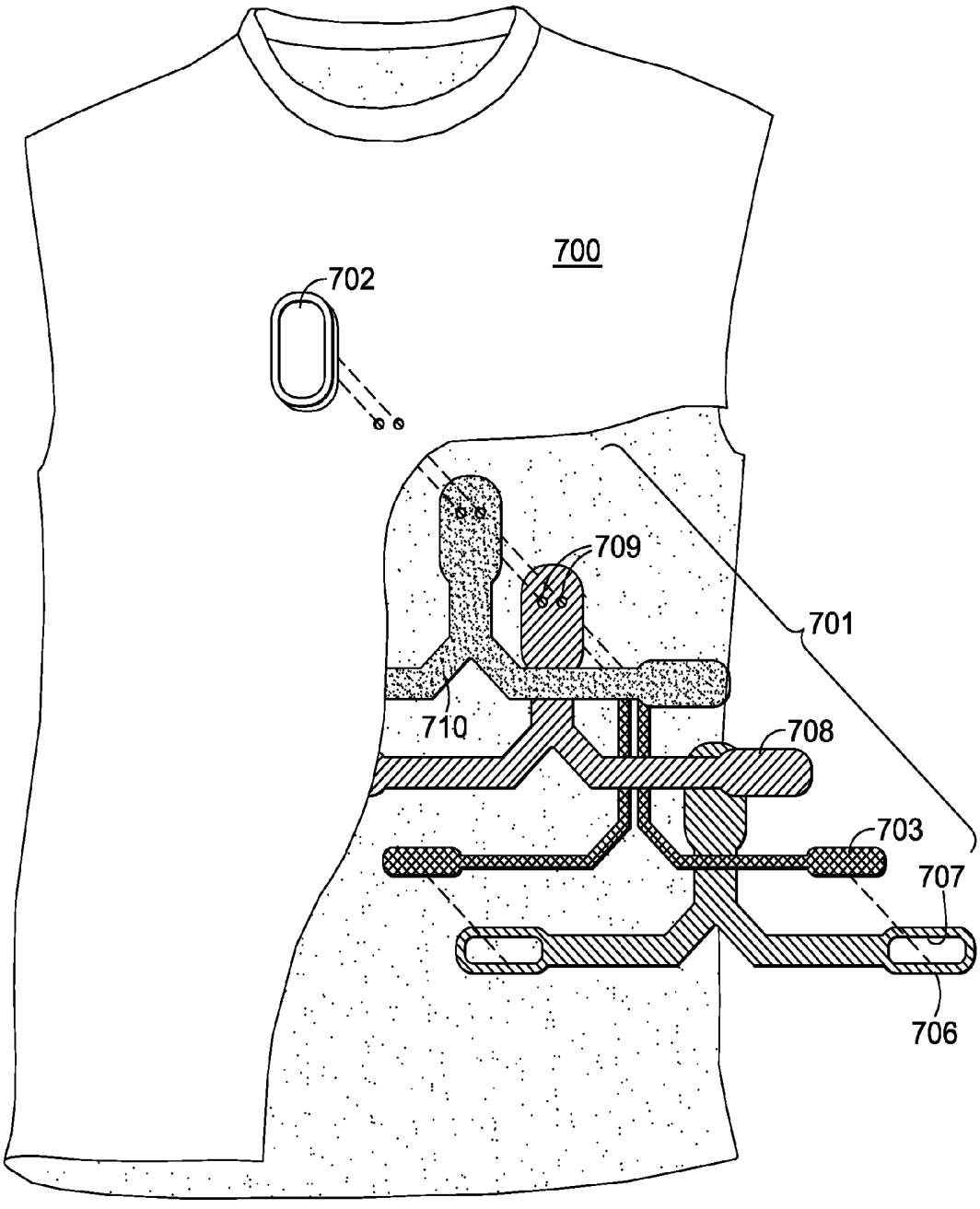

FIG. 7

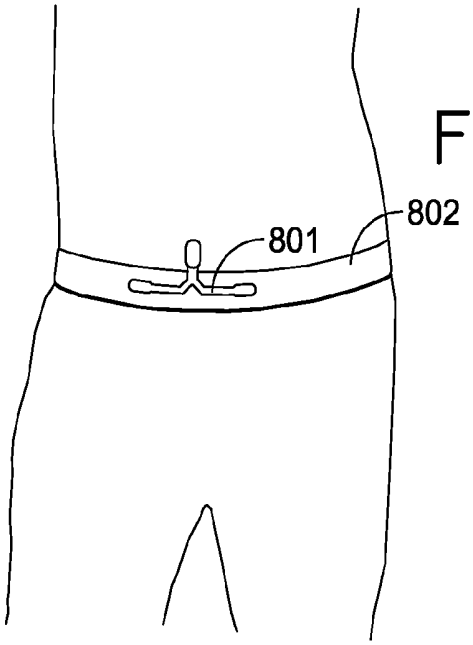

FIG. 8A

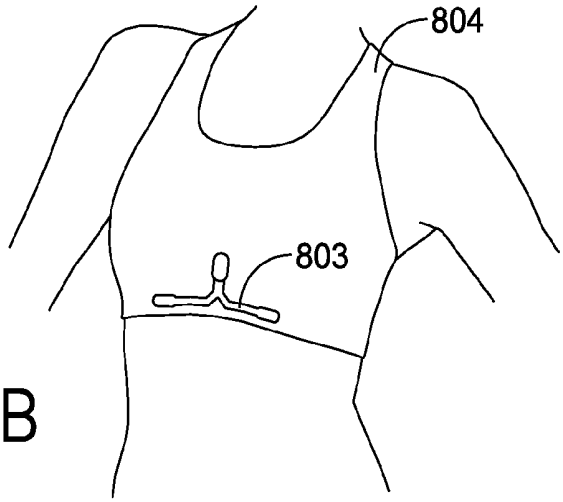

FIG. 8B

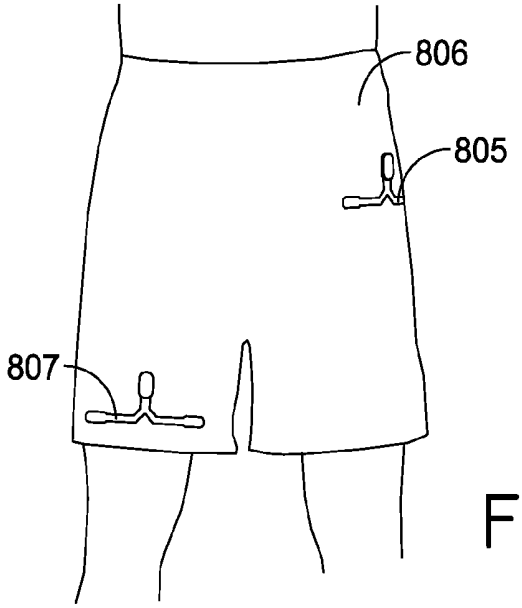

FIG. 8C

APPAREL FOR PHYSIOLOGICAL TELEMETRY DURING ATHLETICS

CROSS-REFERENCE TO RELATED APPLICATIONS

This application referenced by U.S. application No. 14/535,958 and entitled "Apparel for Physiological Telemetry During Athletics" is a Continuation application of co-pending U.S. application Ser. No. 13/051,770, filed Mar. 18, 2011 and entitled "Apparel for Physiological Telemetry During Athletics." The entirety of the aforementioned application is incorporated by reference herein.

FIELD

The present disclosure relates to telemetry of physiological data.

BACKGROUND

During exercise or activity, physiological parameters of an athlete or other individual may fluctuate. Tracking these physiological parameters can provide important data in the study of athletic performance. Monitoring physiological parameters during exertion can be a useful route to optimizing performance and safeguarding the health of an athlete.

SUMMARY

Accordingly, many approaches to monitoring physiological parameters of an athlete are obtrusive and cumbersome, which can discourage use by athletes and other users. For example, a conventional heart rate monitor may require a strap encircling the chest of the wearer that some athletes may find uncomfortable or restrictive during training or competition. Some types of conventional physiological data collection devices may not be practical to wear during athletic training or competition at all. Moreover the amount and types of parameters or data that may be monitored or collected with conventional data collection devices may be limited due to the added weight and dimension of additional conventional monitoring devices. However, collecting physiological data during athletic training and/or competition can provide valuable insights to maximize the benefits of training while minimizing the risk of overtraining and injury. An apparel telemetry heat transfer device or component is presented herein that is easily integrated into apparel and provides less conspicuous athlete telemetry.

In one example, a system for physiological parameters telemetry is provided comprising at least one user interface component comprising at least one conductive transfer layer having a bottom side and a top side, such that at least a portion of the bottom side of the conductive transfer layer is adapted to contact a user's skin. The system also comprises at least one signal receiving unit connected to the top side of the at least one conductive transfer layer and a garment having a back side contacting the user's skin and a face side. The garment is adapted to receive the at least one signal receiving unit at the face side and is further adapted to receiving the at least one user interface component on at least one of the face side or the back side. In one example, the garment may comprise one or more holes exposing the user's skin such that the portion of the bottom side of the user interface component contacts the user's skin at the one or more holes. In another example, the top side of the user interface component is on the back side of the garment.

In additional examples, the at least one user interface component of the system may comprise a bottom insulating layer contacting the bottom side and isolating at least a portion of the bottom side of the at least one conductive transfer layer from the face side of the garment. The at least one user interface component may also comprise a top insulating layer contacting the top side of the at least one conductive transfer layer. The at least one user interface component may comprise an adhesive layer at least in part between the bottom insulating layer and the face side of the garment. In one example, the garment may be a shirt and the one or more holes may be located at the chest area of the shirt. The conductive transfer layer may be an electrically conductive heat transfer layer.

In another example, a user interface component for physiological parameters telemetry is provided, the component comprising at least one conductive transfer layer having a bottom side and a top side and at least a portion of the bottom side is adapted to contact a user's skin through one or more holes in a garment, the garment having a face side and a back side. The user interface component may also comprise a bottom insulating layer contacting the bottom side of the at least one conductive transfer layer and isolating at least a portion of the bottom side of the at least one conductive transfer layer from the face side of the garment. The user interface component may also comprise a top insulating layer contacting the top side of the at least one conductive transfer layer.

Additionally, the user interface component may comprise an adhesive layer at least in part between the bottom insulating layer and the face side of the garment. The user interface component may have the bottom insulating layer bonded to the face side of the garment. Furthermore, the at least one conductive transfer layer may be an electrically conductive heat transfer layer. The at least one conductive transfer layer may comprise a metal or the at least one conductive transfer layer may comprise a carbon material. The garment may be a shirt and the one or more holes, through which the portion of the bottom side of the conductive transfer layer contacts a user's skin, may be located at a chest area of the shirt.

In one example, a user interface component for physiological parameters telemetry is provided, the component comprising at least one conductive transfer layer having a bottom side and a top side and at least a portion of the bottom side is adapted to contact a user's skin when attached to a garment worn by the user, the garment having a face side and a back side. The user interface component may also comprise a bottom insulating layer contacting the bottom side of the at least one conductive transfer layer and isolating at least a portion of the bottom side of the at least one conductive transfer layer. The user interface component may also comprise a top insulating layer contacting the top side of the at least one conductive transfer layer.

This section provides a general summary of the disclosure, and is not a comprehensive disclosure of its full scope or all of its features. Further areas of applicability will become apparent from the description provided herein. The description and specific examples in this summary are intended for purposes of illustration only and are not intended to limit the scope of the present disclosure.

DRAWINGS

The drawings described herein are for illustrative purposes only of selected embodiments and not all possible implementations, and are not intended to limit the scope of the present disclosure.

FIGS. **1**A-B illustrate different views of one example of a user interface component.

FIG. **2** illustrates one example of a system for physiological parameters telemetry.

FIG. **3** illustrates another example of a system for physiological parameters telemetry.

FIG. **4** illustrates an additional view of a system for physiological parameters telemetry.

FIG. **5** illustrates a side view example of a physiological parameters telemetry system.

FIG. **6** illustrates a side view example of a physiological parameters telemetry system.

FIG. **7** illustrates an additional example of a physiological parameters telemetry system.

FIGS. **8**A-C illustrates additional garments incorporated into a physiological parameters telemetry system.

Corresponding reference numerals indicate corresponding parts throughout the several views of the drawings.

DETAILED DESCRIPTION

Referring to FIG. **1**A, one example of a user interface component for physiological parameters telemetry is depicted. A user interface component may comprise at least one conductive transfer layer **102** and a signal receiving unit **105** connected to the at least one conductive transfer layer **102**. The conductive transfer layer **102** may have a top side **104** and a bottom side **103**. Generally, at least a portion of the bottom side **103** of the at least one conductive transfer layer **102** contacts a user's skin **101**. Thermal and/or electrical signals may propagate through the at least one conductive transfer layer **102** and be received by the signal receiving unit **105**. FIG. **1**B illustrates one example of a user interface component **106**. The "inverted-T" shape of the user interface component **106** is merely exemplary. Additional shapes of the user interface component and conductive transfer layers may be employed for various locations of a user's body or to accommodate measurement of varying physiological data. The signal receiving unit **105** transmits the collected physiological parameters data to one or more external recording or computing sources. The signal receiving unit **105** may transmit signals in any form using any useful data transfer formats or protocols. For example, signals may be relayed to external sources by radio transmissions and/or cellular telephone transmissions. Signals may utilize 802.11 protocols, Bluetooth, etc. In one example, the signal receiving unit **105** is connected to a portion of the user interface component. The signal receiving unit **105** may also store data for later downloading or transmission through either a wireless or wired connection. Furthermore, the signal receiving unit **105** may be removable so that the user interface component may be launderable without compromising electronics within the signal receiving unit **105**.

One example of a conductive transfer layer may use a silver or silver impregnated substrate to provide conductivity of electric and/or thermal signals. In another example, carbon is used as the conductive material. Alternately or in conjunction, a conducting polymer or other organic material is employed as a conductive portion of the conductive transfer layer. For example, electrically conductive fabric or fibers may be incorporated into a conductive transfer layer. It may be advantageous to include a plurality of materials in order to transmit different physiological signals.

FIG. **2** illustrates one example of a user interface component incorporated into a system for physiological parameters telemetry. A system for physiological parameters telemetry may include a shirt **200** or other garment or accessory worn such that at least a portion touches the user's skin. A compressive shirt or other compressive garment may be incorporated into a system for physiological parameters telemetry to assure sufficient contact with the user's skin to make measurements. In another example, the system may be incorporated into a belt or sport bra. The example of the shirt **200** includes one or more holes **203**, **204** through the fabric of the shirt to provide an area for the conductive transfer layer **205** to contact the user's skin. The holes **203**, **204** illustrated in FIG. **2** are not necessarily to scale with the shirt **200**. The holes may be of varying size and location to accommodate the user interface component. For example, one or more holes for contact may be in the chest area of a garment and/or the armpit areas of a garment and/or back areas. For some applications, a micro-scale user interface component may be employed, and the contact area to the user's skin provided by the holes may be scaled accordingly. In another example, the garment itself may use conductive portions to bridge between the user's skin and the user interface component so that direct contact of the user's skin with the user interface component is minimized.

Returning to FIG. **2**, a portion of the conductive transfer layer contacts the user's skin through holes **203**, **204** in the garment **200**. Another portion of the conductive transfer layer **208**, **209** contacts the signal receiving unit **207**. The signal receiving unit **207** receives thermal and electrical signals collected from the user through the conductive transfer layer and relays them to various external data collection and analysis units. The user interface component may be removable from the garment **200** and may include a plurality of materials to provide one or more conductive transfer layers. The user interface component may be stitched, bonded, or adhered to the garment to provide stability while being worn by the user. The signal receiving unit **207** may also be separated from the system. The signal receiving unit may be held in place by any means, including stitching, bonding, apparel closures such as snaps or hook-and-eye closures, or using magnetic closures.

Examples of electronic modules that may be incorporated into the signal receiving unit or the sensor are illustrated in U.S. patent application Ser. No. 11/416,458, published as U.S. Patent Application Publication No. 2007/0260421, the entirety of which is incorporated by reference herein and made part of hereof. Aspects of the invention may relate to U.S. patent application Ser. No. 11/166,351, published as U.S. Patent Application 2007/0011919, and also U.S. patent application Ser. No. 11/848,988, patented as U.S. Pat. No. 7,771,320, both of which are incorporated by reference herein and made part of hereof.

FIG. **3** illustrates an additional example of user interface component and system for physiological parameters telemetry. The user interface component **301** may comprise a conductive transfer layer **303**. The conductive transfer layer **303** may be an electrically conductive heat transfer layer. The conductive transfer layer **303** contacts a portion of the user's skin through one or more holes **304**, **305** in a garment **300**. The conductive transfer layer **303** also contacts at least one signal receiving units **302**. Additionally, the user interface component **301** may include a bottom insulating layer **306** contacting the conductive transfer layer **303** on the bottom side and isolating or insulating a portion of the bottom side of the conductive transfer layer **303** from the garment **302**. The bottom insulating layer **306** also provides an exposed region **307** for the conductive transfer layer to line up with the holes **304**, **305** provided in the garment **300** for contacting the user's skin.

The user interface component **301** may also have a top insulating layer **308** contacting the top side of the conductive transfer layer **303**. The top insulating layer **308** may protect the conductive transfer layer **303** from environmental contamination and/or damage. The top insulating layer **308** may also have a point of contact **309** to expose the conductive transfer layer **303** and allow the signal receiving unit **302** to connect with the conductive transfer layer **303**. The top insulating layer **308** may possess decorative elements. While the top insulating layer **308**, the conductive transfer layer **303**, and the bottom insulating layer **306** are illustrated as three separate layers, a plurality of layers may be used for any individual layer. In addition, the top insulating layer **308** and the bottom insulating layer **306** may be formed of one material and encapsulate the conductive transfer layer **303**.

There may also be provided an adhesive layer **310** on either the garment or on the garment facing side of the bottom insulating layer **306** or directly on the conductive transfer layer **303**. The adhesive layer **310** and the bottom insulating layer **306** may be the same layer. The adhesive layer **310** may be provided to any portion of the user interface component **301**. The adhesive layer **310** may have glue or other bonding medium to provide robust attachment of the user interface component **301** to the garment **300**. The adhesive layer **310** may have a reversible or irreversible attachment mechanism. Alternately or in conjunction, conventional apparel fasteners, such as hook-and-eye closures, buttons, or snaps, may be employed to attach the user interface component **301** to the garment **300**.

FIG. **4** illustrates a side view of one example of a system for physiological parameters telemetry. Generally, the user interface component may comprise a conductive transfer layer **404** having a top side **405** and a bottom side **406**. A portion of the bottom side **406** may contact the user's skin **401**. In FIG. **4**, a user's skin **401** is illustrated with a fabric or other garment layer **402**. The fabric or other garment layer **402** may lie substantially between the user interface component and the user's skin **401**. However, the garment or fabric **402** may include at least one hole so that a portion **403** of the conductive transfer layer **404** may contact the user's skin. While FIG. **4** shows direct contact between the conductive transfer layer **404** and the user's skin **401**, there may be additional intervening conductive materials or layers. For example, a conductive adhesive or lubricant may be applied to the conductive transfer layer or the user's skin. In another example, the hole in the garment **402** may be supplemented with a conductive polymer impregnated into the fabric so that direct contact of the user's skin can be avoided. The garment itself may be wholly or partially constructed of a thermal and/or electrically conductive material, in which case, the user interface component may be connected with the user skin via the bridge provided by the conductive garment. The system in FIG. **4** may further comprise a signal receiving unit **409** that contacts **410** the conductive transfer layer **404**.

The garment **402** may have a back side against the user's skin and a face side away from the user's skin. The garment **402** worn by the user with at least one hole **403** provided such that the conductive transfer layer **404** contacts a portion of the user's skin **401**. In one example, the garment may be a compressive shirt and one or more holes may be in the chest area of the compressive shirt. The conductive transfer layer may have a bottom side **406** and a top side **405**. The bottom side of the conductive transfer layer **406** may contact the user's skin. The bottom insulating layer **407** may contact at least a portion of the bottom side **406** of the conductive transfer layer **404**. The bottom insulating layer **407** may protect the bottom side **406** of the conductive transfer layer **404** from the user's body and environment. The adhesive layer **411** may allow robust attachment of the bottom insulating layer **407** to the face side of the garment **402**. The adhesive layer **411** may cover all or a portion of the bottom insulating layer **407**. The adhesive layer **411** may also be applied to the conductive transfer layer **404** while leaving a portion **403** of the conductive transfer layer **404** exposed to allow contact with the user's skin **401**. At least a portion of the conductive transfer layer **404** may be exposed by the bottom insulating layer to allow contact with the user's skin **401**.

The top insulating layer **408** contacts a portion of the top side **405** of conductive transfer layer **404** and may provide protection for the conductive transfer layer **404** from the user's environment. The top insulating layer **408** may include a region where the top side **405** of the conductive transfer layer **404** is partially exposed to provide at least one contact point **410** for at least one signal receiving unit **409**. While it is illustrated that each layer is in direct contact, the layers may include intervening sublayers and/or other components to bridge the connections or provide other functionality.

FIG. **5** illustrates one example of a system for physiological parameters telemetry. The garment **500** may be a shirt as illustrated but may be any garment or accessory worn in close fit with the user's skin. One or more user interface components **501** may be appliquéd to the surface of the garment **500**. As illustrated, the user interface component **501** is not to scale with the garment. The user interface component **501** may have any size ratio in comparison with the garment, which is particularly advantageous as the dimensions of the user interface component **501** may be determined by the physiological parameters to be collected. In FIG. **5**, the user interface component **501** is located in a chest area **503** of the garment **500** and the holes **504**, **505** in the garment provided for the conductive transfer layer to contact the user's skin are located in the chest area **503**. While it is illustrated that a user interface component is located in a chest area, the user interface component may be located anywhere on the garment. For example, it may be useful to include user interface component(s) at the armpit and/or back regions. While it is illustrated that there is one user interface component to one signal receiving unit, any ratio of user interface components to signal receiving units may be utilized in a system for physiological parameters telemetry. For example, it may be useful to have multiple user interface components connected to a single signal receiving unit. Alternately or in conjunction, a single user interface component may transmit a plurality of signals to a plurality of signal receiving units.

FIG. **6** illustrates an additional example of a system for physiological parameters telemetry in which the user interface component lies next to the user's skin such as on the inside of a garment, such as a compressive shirt or other form-fitting apparel. The user interface component may be bonded, stitched, or appliquéd to the back side of a garment. Another example might include a system in which the user interface component is embedded within the shirt. Generally, the user interface component may comprise a conductive transfer layer **604** having a top side **605** and a bottom side **606**. A portion of the bottom side **606** may contact the user's skin **601**. In FIG. **6**, a fabric or other garment layer **602** illustrated with a user interface component that lies substantially between the fabric or other garment layer **602** and the user's skin **601**. While FIG. **6** shows direct contact between the conductive transfer layer **604** and the user's

skin **601**, there may be additional intervening conductive materials or layers. For example, a conductive adhesive or lubricant may be applied to the conductive transfer layer or the user's skin. The system in FIG. **6** may further comprise a signal receiving unit **609** that contacts **610** the conductive transfer layer **604**.

The garment **602** may have a back side against the user's skin and a face side away from the user's skin. The user interface component may be applied against the user's skin and attached to the back side of the garment **602**. In one example, the garment may be a compressive shirt and one or more holes may be in the chest area of the compressive shirt. The conductive transfer layer may have a bottom side **606** and a top side **605**. The bottom side of the conductive transfer layer **606** may contact the user's skin. The bottom insulating layer **607** may contact at least a portion of the bottom side **606** of the conductive transfer layer **604**. The bottom insulating layer **607** may protect the bottom side **606** of the conductive transfer layer **604** from the user's body

The top insulating layer **608** contacts a portion of the top side **605** of conductive transfer layer **604** and may lie substantially between the conductive transfer layer **604** and garment **602** or the back side of the garment. The top insulating layer **608** may include a region where the top side **605** of the conductive transfer layer **604** is partially exposed to provide at least one contact point **610** for at least one signal receiving unit **609**. Contact through the face side and the back side of the garment to the user interface component may be provided by small holes or other conductive bridging materials. While it is illustrated that each layer is in direct contact, the layers may include intervening sublayers and/or other components to bridge the connections or provide other functionality

The adhesive layer **611** may allow robust attachment of the top insulating layer **608** to the back side of the garment **402**. The adhesive layer **611** may cover all or a portion of the top insulating layer **608**. The adhesive layer **611** may also be applied to the conductive transfer layer **604** to adhere the conductive transfer layer to the back side of the garment. At least a portion **603** of the conductive transfer layer **604** may be exposed by the top insulating layer **608** to allow contact with the signal receiving unit.

FIG. **7** illustrates an additional example of user interface component and system for physiological parameters telemetry. The user interface component **701** may comprise a conductive transfer layer **703**. The conductive transfer layer **703** may be an electrically conductive heat transfer layer. The conductive transfer layer **703** contacts a portion of the user's skin and lies substantially between the garment and the user's skin. The conductive transfer layer **703** also contacts at least one signal receiving units **702**. Additionally, the user interface component **701** may include a bottom insulating layer **706** contacting the conductive transfer layer **703** on the bottom side and isolating or insulating a portion of the bottom side of the conductive transfer layer **703** from the user's skin. The bottom insulating layer **706** also provides an exposed region **707** for contacting the user's skin.

The user interface component **701** may also have a top insulating layer **708** contacting the top side of the conductive transfer layer **703**. The top insulating layer **701** may lie substantially between the garment or fabric and the conductive transfer layer **703**. The top insulating layer **708** may also have a point of contact **709** to expose the conductive transfer layer **703** and allow the signal receiving unit **702** to connect with the conductive transfer layer **703**. While the top insulating layer **708**, the conductive transfer layer **703**, and the bottom insulating layer **706** are illustrated as three separate layers, a plurality of layers may be used for any individual layer. In addition, the top insulating layer **708** and the bottom insulating layer **706** may be formed of one material and encapsulate the conductive transfer layer **703**.

There may also be provided an adhesive layer **710** on either the garment or on the garment facing side of the top insulating layer **708** or directly on the top side of the conductive transfer layer **703**. The adhesive layer **710** and the top insulating layer **708** may be the same layer. The adhesive layer **710** may be provided to any portion of the user interface component **701**. The adhesive layer **710** may have glue or other bonding medium to provide robust attachment of the user interface component **701** to the garment **700**. The adhesive layer **710** may have a reversible or irreversible attachment mechanism. Alternately or in conjunction, conventional apparel fasteners, such as hook-and-eye closures, buttons, or snaps, may be employed to attach the user interface component **701** to the garment **700**.

FIGS. **8**A-C illustrates additional examples of garments that are incorporated with a system for physiological parameters telemetry. FIG. **8**A illustrates a user interface component **801** and signal receiving unit may be attached to a belt **802**. FIG. **8**B illustrates a user interface component and signal receiving unit **803** may be attached to a sport bra. FIG. **8**C illustrates user interface components **805**, **807** attached to a pair of shorts **803**, particularly close-fitting bottoms such as undergarments or compressive shorts. The general locations illustrated in FIG. **8**A-C are merely exemplary and further are not to scale. Locations for user interface components may vary according to the user and the physiological parameters to be monitors. A plurality of user interface components may be applied to areas of several garments to achieve comprehensive physiological telemetry.

A variety of physiological data may be obtained and transmitted by the described systems. Non-limiting examples of physiological parameters that may be monitored include: skin temperature, perspiration rate and for content, heart rate, blood pressure, heat flux, muscle contraction, etc. For example, skin temperature and/or core body temperature of an athlete at various levels of exertion and in different environments may be monitored. An athlete's pulse rate and/or blood pressure may be tracked as well. Respiratory rate statistics may be collected. Electrolyte loss via sweat may be monitored. Measurement and collection of different physiological data may include locating one or more user interface components at different areas of an athlete's body. For example, pulse rate may be measured near the carotid artery, the wrist, behind the knee or on the chest. In addition, the material and construction of the user interface component may be adjusted for the type of data to be collected. In an additional example, the user interface component may provide a conductive connection between the signal receiving unit and an additional unit connected with the user's skin. For additional sensing applications, it may be useful to provide a small current from the signal receiving unit having a power source to the user interface component.

The foregoing description of the embodiments has been provided for purposes of illustration and description. It is not intended to be exhaustive or to limit the invention. Individual elements or features of a particular embodiment are generally not limited to that particular embodiment, but, where applicable, are interchangeable and may be used in a selected embodiment, even if not specifically shown or described.

What is claimed is:

1. A system for physiological parameters telemetry, the system comprising:

a garment having a skin-facing side and an outward-facing side, the garment configured to be worn by a user; and

at least one user interface component located on the outward-facing side of the garment, the at least one user interface comprising at least:

a conductive transfer layer having a first surface and a second surface, and a first terminal end and a second terminal end;

a first insulating layer contacting the first surface of the conductive transfer layer, the first insulating layer having at least one aperture to allow at least a portion of the first surface of the conductive transfer layer to contact the user's skin;

a second insulating layer having a first terminal end and a second terminal end, the second insulating layer contacting the second surface of the conductive transfer layer along the entire surface of the second surface of the conductive transfer layer except for at the first terminal end of the conductive transfer layer, wherein the first terminal end of the conductive transfer layer is oriented toward a head region of the user when the garment is being worn by the user, and wherein the first terminal end of the second insulating layer is generally aligned with the first terminal end of the conductive transfer layer; and

a signal receiving unit adapted for connection to the conductive transfer layer second surface at the first terminal end of the conductive transfer layer.

2. The system of claim 1, wherein the garment is a shirt.

3. The system of claim 1, wherein the conductive transfer layer is an electrically conductive transfer layer.

4. The system of claim 1, wherein the first insulating layer is bonded to the outward-facing side of the garment.

5. The system of claim 1, wherein the first surface of the conductive transfer layer is adapted to contact the user's skin through an aperture in the garment when the garment is worn by the user.

6. The system of claim 5, wherein the at least one aperture of the first insulating layer is aligned with the aperture in the garment.

7. A physiological parameters telemetry system worn on a garment, the system comprising:

a garment configured to be worn by a user;

at least one user interface component comprising:

a conductive transfer layer having a first surface and a second surface, and a first terminal end and a second terminal end, at least a first portion of the first surface adapted to contact the user's skin when the garment is worn by the user, wherein the first terminal end of the conductive transfer layer is oriented toward a head region of the user when the garment is worn by the user, and wherein the second terminal end of the conductive transfer layer is oriented toward a foot region of the user when the garment is worn by the user;

a first insulating layer contacting at least a portion of the first surface of the conductive transfer layer, the first insulating layer having one or more apertures;

a second insulating layer having a first terminal end and a second terminal end, the second insulating layer contacting the second surface of the conductive transfer layer along the entire surface of the second surface of the conductive transfer layer except for the first terminal end of the conductive transfer layer, wherein the first terminal end of the second insulating layer is generally aligned with the first terminal end of the conductive transfer layer; and

a signal receiving unit adapted for connection to the conductive transfer layer second surface at the first terminal end of the conductive transfer layer.

8. The physiological parameters telemetry system of claim 7, wherein the first portion of the first surface of the conductive transfer layer is adapted to contact the user's skin via the one or more apertures of the first insulating layer.

9. The physiological parameters telemetry system of claim 7, wherein the first insulating layer is bonded to the garment.

10. The physiological parameters telemetry system of claim 9, wherein the first insulating layer is bonded to an outward-facing side of the garment.

11. The physiological parameters telemetry system of claim 7, wherein the conductive transfer layer is an electrically conductive heat transfer layer.

12. The physiological parameters telemetry system of claim 7, wherein the signal receiving unit is adapted to store physiological data.

13. A system for physiological parameters telemetry, the system comprising:

a garment configured to be worn by a user, the garment having a skin-facing side and an outward-facing side, the garment having at least a first aperture;

a user interface component located on the outward-facing side of the garment, the user interface component comprising:

a conductive transfer layer having a first surface and a second surface, and a first terminal end and a second terminal end, wherein the first terminal end of the conductive transfer layer is oriented toward a head region of the user when the garment is worn by the user, and wherein the second terminal end of the conductive transfer layer is oriented toward a foot region of the user when the garment is worn by the user;

a first insulating layer contacting the first surface of the conductive transfer layer, the first insulating layer having at least a second aperture that is aligned with the at least the first aperture of the garment to allow at least a portion of the first surface of the conductive transfer layer to contact the user's skin;

a second insulating layer having a first terminal end and a second terminal end, the second insulating layer contacting the second surface of the conductive transfer layer along the entire surface of the second surface of the conductive transfer layer except for the first terminal end of the conductive transfer layer, the first terminal end of the second insulating layer generally aligned with the first terminal end of the conductive transfer layer; and

a signal receiving unit adapted for connection to the conductive transfer layer second surface at the first terminal end of the conductive transfer layer.

14. The system of claim 13, wherein the garment comprises at least one of a shirt, a belt, or a sport bra.

15. The system of claim 13, wherein at least the first insulating layer and the second insulating layer are one of stitched, bonded, or adhered to the garment.

16. The system of claim 13, wherein the first insulating layer isolates at least a portion of the conductive transfer layer from the garment.

17. The system of claim 13, wherein the user interface component comprises one or more additional layers.

18. The system of claim 17, wherein at least one of the one or more additional layers comprises an adhesive layer.

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专利名称(译)	运动期间生理遥测的服装		
公开(公告)号	US9782124	公开(公告)日	2017-10-10
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[标]申请(专利权)人(译)	NIKE，Inc.		
申请(专利权)人(译)	NIKE，INC.		
当前申请(专利权)人(译)	NIKE，INC.		
[标]发明人	NORDSTROM MATTHEW D		
发明人	NORDSTROM, MATTHEW D.		
IPC分类号	A61B5/00 A61B5/024 A61B5/0245		
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外部链接	Espacenet USPTO		

摘要(译)

提供了一种用于生理参数遥测的用户界面组件和系统。用户界面组件可以可逆地或不可逆地附接到衣服上，该衣服允许连接到用户的皮肤，例如通过衣服中的一个或多个孔。通过用户界面组件中的导电转移层发送的信号被提供给信号接收单元，该信号接收单元可以收集和发送生理数据。