ATTACHMENT DEVICE AND ELECTRONIC APPARATUS

CROSS-REFERENCE TO RELATED APPLICATION

This application is based upon and claims the benefit of priority from Japanese Patent Application No. 2014-266299, filed DECEMBER 26, 2014; the entire contents of which are incorporated herein by reference.

FIELD

Embodiments described herein relate to an attachment device and an electronic apparatus.

BACKGROUND

In the related art, an electronic apparatus which operates in a state of being attached to a body surface of a user is known.

An example of related art includes JP-A-2009-160328.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of an attachment device and an electronic apparatus including the attachment member attached, according to a first embodiment.

FIG. 2 is a perspective view of the attachment device according to the first embodiment.

FIG. 3 is a perspective view illustrating an attachment relationship between the attachment device and the electronic apparatus according to the first embodiment.

FIG. 4 is an explanatory view illustrating a state in which power supplying is performed from a battery on the attachment device side to the electronic apparatus according to the first embodiment.

FIG. 5 is an explanatory view illustrating a configuration of an attachment device and an electronic apparatus according to a second embodiment.

FIG. 6 is an explanatory view illustrating a configuration of an attachment device and an electronic apparatus according to a third embodiment.

FIG. 7 is an explanatory view illustrating the fact that a battery is attachable and detachable to an attachment member.

FIG. 8 is an explanatory view illustrating a configuration of an attachment device according to a fourth embodiment.

FIG. 9 is an explanatory view illustrating a configuration of a battery fixed to an attachment member.

FIG. 10 is an explanatory view illustrating another configuration of the battery fixed to the attachment member.

FIG. 11 is an explanatory view illustrating a configuration of an attachment device according to a fifth embodiment.

FIG. 12 is a perspective view illustrating a state in which the attachment device according to the fifth embodiment is mounted on an electronic apparatus.

FIG. 13 is a view illustrating a usage example of an electronic apparatus according to a sixth embodiment.

DETAILED DESCRIPTION

[0004]

Exemplary embodiments provide an electronic apparatus which operates in a state of being attached to a body surface of a user and which secures a predetermined drive time, while reducing a size and a weight.

[0005]

In general, according to one embodiment, an attachment device includes an attachment member and a battery. The attachment member includes a first surface, at least a portion of which is covered by an electronic apparatus including a first power terminal and which is attached to the electronic apparatus, and a second surface which is positioned in an opposite side to the first surface, includes adhesion, and is attached to a subject. The battery, at least a portion of which is covered by the electronic apparatus, is fixed to the attachment member, and includes a second power terminal which is electrically connected to the first power terminal and supplies a power to the electronic apparatus, in a state in which the attachment member is attached to the electronic apparatus.

[0007]

The same configuration elements are included in a plurality of embodiments or modification examples in the following description. Thus, hereinafter, the same symbols or reference numerals will be attached to the same configuration elements, and repeated description thereof will be omitted.

<First Embodiment>

[0008]

An attachment device 10 (gel sheet, adhesive pad, gel pad) according to the embodiment has a flexibility, and is a flat device, for example, a rectangular sheet type device. The attachment device 10 is attachable to a surface 14a (sensor surface, top surface, first wall) which is a portion of a housing 14 of an electronic apparatus 12.

[0009]

The electronic apparatus 12 is a portable sensor unit which can detect, for example, a cardiac potential or the like. The housing 14 of the electronic apparatus 12 is formed by insert molding using a synthetic resin material, and is formed in such a manner that a substrate which supports a plurality of electronic components or electrodes described later is covered, in a state in which a synthetic resin material is inserted at the time of insert molding. The housing 14 has, for example, a flat cuboid shape, and electrodes 16a and 16b (probes, terminals, metals, conductors) are disposed on the surface 14a, in a state in which detection surfaces (sensor surfaces, end portions, surfaces, one-end surfaces) thereof are exposed from the surface 14a. The electrode 16a is, for example, a “+ electrode”, the electrode 16b is, for example, a “- electrode”, and both are disposed in a state of being separated from each other. When the electronic apparatus 12 detects a biological signal (potential, cardiac potential) for creating an electrocardiogram, if a distance between the electrode 16a and the electrode 16b is equal to or greater than a predetermined distance, a more stable detection result can be obtained. Meanwhile, the smaller the electronic apparatus 12 is, the better portability and availability of the electronic apparatus 12 becomes. Therefore, in the embodiment, the electrode 16a and the electrode 16b are diagonally disposed on the surface 14a, and thereby a size increment of the electronic apparatus 12 is suppressed, while a predetermined distance is secured between the electrode 16a and the electrode 16b.

[0010]

In a case of FIG. 1, the electrode 16a is disposed in a position close to a corner 18a at which a side 14b and a side 14c of the housing 14 are intersected with each other. Meanwhile, the electrode 16b is disposed in a position close to a corner 18b at which a side 14d and a side 14e are intersected with each other. In this way, the electrode 16a and the electrode 16b are diagonally disposed, and thereby, it is possible to lengthen a distance between the electrode 16a and the electrode 16b without increasing the size of the housing 14, for example, compared to a case in which the electrode 16a and the electrode 16b are disposed in a position parallel to the side 14c or in a position parallel to the side 14b. In addition, the housing 14 is bendable so as to include flexibility (softness). For example, the housing 14 is configured by a soft resin with flexibility. Then, it is possible for the housing 14 to be bent in a shape in which a bus occurs in a direction intersecting the sides 14c and 14e in a longitudinal direction of the housing 14. Then, the electrode 16a is disposed in a position close to the corner 18a, that is, on one end side in a longitudinal direction of the housing 14, and the electrode 16b is disposed in a position close to the corner 18b, that is, on the other end side in a longitudinal direction of the housing 14. As a result, when the electronic apparatus 12 is in contact with a body surface including a curved surface, it is possible to increase stickiness of the electrode 16a and the electrode 16b which exists in both positions in a longitudinal direction, to the body surface, using bending of the housing 14.

[0011]

In addition, data input and output terminals 20a and 20b (connectors, contact points, electrodes, metals, conductors) are disposed on the surface 14a in a state of being exposed. The input and output terminals 20a and 20b can be used for, example, a case in which a detected value, data, information based on the detected value, or the like that is acquired by the electronic apparatus 12 is transferred to an external apparatus using a wire method, or a case in which updating of software for controlling the electronic apparatus 12 is performed using a wire method, or the like. The input and output terminals 20a and 20b can be electrically connected to a terminal of an adaptor apparatus only for, for example, a cradle or the like. In FIG. 1, the input and output terminals 20a and 20b are disposed approximately in parallel to the side 14c, in a position close to, for example, the side 14c. The input and output terminals 20a and 20b are not used in a situation in which the electronic apparatus 12 is detecting a biological signal. In addition, a current does not flow between the input and output terminal 20a and the input and output terminal 20b. Thus, it is not necessary to dispose the input and output terminals 20a and 20b so as to be separated from each other in the same manner as the electrodes 16a and 16b, and the input and output terminals 20a and 20b can be disposed in a state of being relatively close to each other.

[0012]

The disposal of the electrodes 16a and 16b, and the input and output terminals 20a and 20b is an example of disposal appropriate for the electronic apparatus 12 that detects a cardiac potential, and the position of each electrode or terminal is selected according to a specification of the electronic apparatus 12.

[0013]

In addition, in the surface 14a, conductors 22a and 22b (first power terminals, connectors, contact points, electrodes, metals) are disposed in a state of being exposed in an area in which other electrodes or terminals do not exist, for example, in a central area. The conductors 22a and 22b are terminals for receiving a power from external power supply. The conductor 22a is, for example, a “+ power supply terminal”, the conductor 22b is, for example, a “- power supply terminal”, and are both disposed so as to be separated by a predetermined distance from each other.

[0014]

A biological signal which is detected at the electrodes 16a and 16b is stored in a storage unit mounted on a substrate in the electronic apparatus 12, and is transferred to an external apparatus such as an output device (electrocardiograph, monitor device, printing device) of an electrocardiogram at a desired timing, or is transferred to a personal computer, a server, or the like. In addition, the biological signal can be transferred to the output device of the electrocardiogram or a portable terminal in a real time. The electronic apparatus 12 according to the embodiment can transfer the biological signal or the like to an external apparatus using a wire method which uses the input and output terminals 20a and 20b. In addition, it is possible to transfer the biological signal to an external apparatus via a communication unit such as Bluetooth (registered trademark). In this case, for example, it is possible to monitor a electrocardiogram for 24 hours. It is possible to transfer data in a predetermined interval, to transfer data in a desired timing, or to update software of the electronic apparatus 12, via a communication unit such as Bluetooth.

[0015]

As illustrated in FIGS. 1 and 2, the attachment device 10 includes an attachment member 24 (adhesive layer, base, retaining layer) with adhesion, and a battery 26 (battery cell, cell, battery layer). The attachment member 24 can be attached to the surface 14a of the housing 14 of the electronic apparatus 12. In order to increase stickiness of the electrode 16a and the electrode 16b of the electronic apparatus 12 to a body surface, the attachment device 10 is interposed between the surface 14a and a body surface, conductivity is held, and thereby it is possible to detect a cardiac potential of a user (subject) at the electrode 16a and the electrode 16b.

[0016]

The attachment member 24 has a first surface 24a (attachment surface, power supplying surface, first wall, surface), at least a portion of which is covered by the electronic apparatus 12 including the conductors 22a and 22b, and which is attached to the electronic apparatus 12, and a second surface 24b (attachment surface, contact surface, second wall, rear surface) which is positioned in an opposite side to the first surface, has adhesion, and is attached to a user. It is desirable that the first surface 24a of the attachment member 24 is fixed to the surface 14a of the electronic apparatus 12, for example, the first surface 24a may be fixed to the surface 14a by adhesion the attachment member 24 has. In addition, the first surface 24a may be fixed to the surface 14a of the electronic apparatus 12 by mechanically connecting a fixing member extending from the attachment member 24, for example, a belt-shaped member to the electronic apparatus 12. In addition, for example, portions which fit to each other are provided in the first surface 24a of the attachment member 24 and the electronic apparatus 12, the first surface 24a may be fixed to the surface 14a by fitting the portions. Meanwhile, the second surface 24b of the attachment member 24 has an adhesive strength for attaching the electronic apparatus 12 to a body surface of a user via the attachment member 24. In the embodiment, the first surface 24a attaches the attachment device 10 to the surface 14a of the electronic apparatus 12 using adhesion of the attachment member 24, and has a mounting force for maintaining the attitude.

[0017]

The battery 26 is fixed to the attachment member 24 and at least a portion of the battery 26 is covered with the electronic apparatus 12. Then, the battery 26 has electrode 26a and 26b (second power terminals, connectors, contact points, terminals, metals, conductors) that are electrically connected to the conductors 22a and 22b and supply power to the electronic apparatus 12 , in a state in which the attachment member 24 is attached to the electronic apparatus 12. For example, the battery 26 can adopt a primary battery of a sheet shape which is bendable in correspondence to flexibility of the attachment member 24. The battery 26 may be fixed on the first surface 24a of the attachment member 24 by an adhesive strength of the attachment member 24, and may be inserted and fixed in an internal layer of the attachment member 24. The electrodes 26a and 26b are disposed in an approximately the central position of an attachment member 24 in which a central point of the side 24c (24e) in a longitudinal direction of the attachment member 24 interests a central point of the side 24d (24f) in a lateral direction, in a disposal interval corresponding to a disposal interval of the conductors 22a and 22b. For example, the electrode 26a is a “+ electrode”, and the electrode 26b is a “- electrode”. It is necessary for the electrode 16a and the electrode 16b which detects a cardiac potential to be insulated to each other. For this reason, for example, by dividing the attachment member 24 into a first gel area 24g on the electrode 16a and a second gel area 24h on the electrode 16b by the battery 26, the electrode 16a and the electrode 16b may be electrically insulated to each other. In addition, differently from the battery 26, the electrode 16a and the electrode 16b may be electrically insulated by disposing an insulating material in the attachment member 24.

[0018]

In the attachment device 10 configured in this way, it is possible to supply a power of the battery 26 to the electronic apparatus 12, by stacking the electrode 26a on the conductor 22a so as to be electrically connected to each other, and by stacking the electrode 26b on the conductor 22b so as to be electrically connected to each other, as illustrated in FIG. 3. A structure for a position determination may be provided in the surface 14a on the electronic apparatus 12 side and the first surface 24a on the attachment member 24 side, in such a manner that a connection of the electrode 26a and the conductor 22a and a connection of the electrode 26b and the conductor 22b can be easily and correctly realized. For example, the conductors 22a and 22b are exposed in a state of being slightly protruded from the surface 14a. Meanwhile, the electrodes 26a and 26b are recessed from the first surface 24a by an amount corresponding to an amount of protrusion of the conductors 22a and 22b. With this configuration and a combined effect of a concave portion and a convex portion, it is possible to easily and correctly perform a position determination of the electrode 26a and the conductor 22a and a position determination of the electrode 26b and the conductor 22b. In addition, by recessing the electrodes 26a and 26b from the first surface 24a of the attachment member 24 in this way, it is possible to suppress discharging of the battery 26 caused by an electrical connection of the electrode 26a to the electrode 26b, for example, in a state in which the attachment device 10 is not mounted on the electronic apparatus 12.

[0019]

In addition, in a modification example, a fitting structure for a position determination may be disposed in a position different from the electrodes 26a and 26b and the conductors 22a and 22b. For example, when the battery 26 is fixed on the first surface 24a of the attachment member 24, the entire battery 26 is protruded from the first surface 24a. At this time, a concave portion corresponding to a shape of the battery 26 is provided on the surface 14a of the electronic apparatus 12, and thereby the entire battery 26 can be contained in the concave portion, and alignments for an electrical connection of the electrode 26a and the conductor 22a, and for an electrical connection of the electrode 26b and the conductor 22b can be easily and correctly made. In addition, by fitting the battery 26 to the concave portion, it is possible to suppress that the shifts of both the attachment member 24 and the electronic apparatus 12, and to maintain an electrical connection of the an electrical connection of the electrode 26a and the conductor 22a, and an electrical connection of the electrode 26b and the conductor 22b, after the attachment member 24 is attached to the electronic apparatus 12.

[0020]

As illustrated in FIG. 4, by attaching the attachment device 10 to the electronic apparatus 12, it is possible to supply a power supply circuit 28 included in the electronic apparatus 12 with a power of the battery 26 fixed to the attachment member 24. That is, it is not necessary for the electronic apparatus 12 to include a battery for driving the electronic apparatus 12, and miniaturization and a weight decrease of the electronic apparatus 12 is possible. In addition, it is originally possible to dispose other electronic components in a space in which a battery is disposed inside the electronic apparatus 12, to suppress a size increase of the electronic apparatus 12, and to add a new function to the electronic apparatus 12. That is, a higher performance can be easily realized. Capacity of the battery 26 can be determined according to, for example, a continuous drive time of the electronic apparatus 12. For example, when a continuous detection of a cardiac potential is performed for 24 hours, it is desirable that a sufficient capacity of the battery 26 is provided in the attachment device 10. In addition, since including a sheet shape which can be bent according to flexibility of the attachment member 24, the battery 26 is easily bent along a curved surface of a body surface even when being attached to the body surface of a user together with the electronic apparatus 12, and burden on the user can be reduced even if the electronic apparatus 12 is used for a long time. In addition, since it is possible to easily maintain stickiness of the electronic apparatus 12 and the body surface, it is possible to stabilize an acquirement of a biological signal such as a cardiac potential and to improve an acquirement situation of the biological signal.

[0021]

The battery 26 fixed to the attachment member 24 of the attachment device 10 according to the first embodiment is a primary battery which performs only discharge as described above. Thus, when an output of the battery 26 is less than a predetermined value, the attachment device 10 is discarded together with the battery 26. In addition, after being separated from each other, each of the attachment member 24 and the battery 26 are separately discarded.

<Second Embodiment>

[0022]

FIG. 5 is an explanatory view illustrating a configuration of the attachment device 10 and an electronic apparatus 30 according to a second embodiment. The electronic apparatus 12 described in the first embodiment has a configuration in which an internal battery is not included, but a secondary battery 32 (a first secondary battery) is included in the inside of the electronic apparatus 30 according to the second embodiment. In this case, the battery 26 on the attachment deice 10 can function as an auxiliary battery with respect to the electronic apparatus 30. For example, basically, the electronic apparatus 30 provides a power supply circuit 28 with a power of a secondary battery 32, and performs a detection operation of a cardiac potential or the like, a retaining operation of the detected cardiac potential, or the like. That is, when an output of the secondary battery 32 is equal to or higher than a predetermined value, even if the electrodes 26a and 26b are electrically connected to the conductors 22a and 22b, power supplying from the battery 26 to the electronic apparatus 30 (secondary battery32) is not performed. Meanwhile, when the output of the secondary battery 32 is less than a predetermined value, the electronic apparatus 30 receives a power from the battery 26 on the attachment device 10 side via the secondary battery 32, provides the power supply circuit 28 with the power, and continues to perform a detection operation of a cardiac potential or the like, a retaining operation of the detected cardiac potential, or the like. That is, by using the battery 26 as an auxiliary battery, it is possible to realize a long time drive of the electronic apparatus 30. In addition, in another embodiment, drive of the electronic apparatus 12 is usually performed by power supplying from the battery 26, and when the output of the battery 26 is less than a predetermined value, the secondary battery 32 may supply a power for driving the electronic apparatus 30.

[0023]

In this way, a power for driving the electronic apparatus 30 is provided using the secondary battery 32 and the battery 26, and thereby it is possible to decrease each battery capacity. That is, compared to a case in which the same long time drive is realized by only the electronic apparatus 30, miniaturization or a weight decrease of the electronic apparatus 30 are possible. In addition, when the same long time drive is realized by the electronic apparatus 12 described in the first embodiment, it is necessary for the attachment device 10 to include the battery 26 with large capacity. Meanwhile, according to the configuration of the second embodiment, the secondary battery 32 and the battery 26 can provide a required capacity together, and thus miniaturization and a weight decrease of each battery are possible.

[0024]

In addition, it is possible to achieve a configuration in which a standard drive time of the electronic apparatus 30 is provided by the secondary battery 32, and an additional drive time is provided by the battery 26. For example, if a plurality of attachment devices 10 in which batteries 26 with capacities different from each other are included are prepared, it is possible to configure the electronic apparatus 30 which can realize drive times different from each other according to a selection of the disposable attachment device 10. As a result, it is possible to increase a user’s convenience. When a power is supplied from the battery 26 to the electronic apparatus 30, the power may be supplied to the power supply circuit 28 without using the secondary battery 32.

<Third Embodiment>

[0025]

FIG. 6 is an explanatory view illustrating a configuration of an attachment device 34 and an electronic apparatus 30 according to a third embodiment. Since a configuration of the electronic apparatus 30 is the same as in the second embodiment, description thereof will be omitted.

[0026]

The battery 26 included in the attachment device 10 described in the first embodiment and the second embodiment is a primary battery which performs only a discharge, but the attachment member 24 of the attachment device 34 according to the third embodiment includes a secondary battery 36 (second secondary battery) which can charge and discharge. In the same manner as the second embodiment, also in the third embodiment, the secondary battery 36 on the attachment device 34 can function as an auxiliary battery with respect to the electronic apparatus 30. That is, when an output of the secondary battery 32 on the electronic apparatus 30 side is equal to or greater than a predetermined value, a power is not supplied to the electronic apparatus 30 (secondary battery 32) from the secondary battery 36, even when the electrodes 36a and 36b are electrically connected to the conductors 22a and 22b. Meanwhile, when the output of the secondary battery 32 is less than a predetermined value, the electronic apparatus 30 receives a power form the secondary battery 36 on the attachment device 34 via the secondary battery 32, provides the power supply circuit 28 with the power, and continues to perform a detection operation such as a cardiac potential, a retaining operation of the detected cardiac potential, or the like. That is, it is possible to realize a long time drive of the electronic apparatus 30 by using the secondary battery 36 as an auxiliary battery. In addition, in another embodiment, the secondary battery 32 may be used as an auxiliary battery, and the secondary battery 36 may be used as a battery for driving at the time of normally using the electronic apparatus 30. As a result, also in the configuration according to the third embodiment, it is possible to obtain the same effects as in the second embodiment.

[0027]

Furthermore, since the secondary battery 36 of the attachment device 34 can be charged, for example, the secondary battery 36 can be charged from the secondary battery 32 on the electronic apparatus 30 side. In the same manner, when the electronic apparatus 30 is connected to a cradle or the like, thereby being electrically connected to an external power supply, the secondary battery 36 can be charged. That is, when the electronic apparatus 30 is not operated, the secondary battery 36 can be charged.

[0028]

However, in the same manner as an attachment device 38 illustrated in FIG. 7, a battery 40 (primary battery or secondary battery) is configured to be attachable and detachable to the attachment member 24, and thereby the battery 40 can be used again. For example, when the electronic apparatus 30 is fixed to a body surface of a user by an adhesive strength of the attachment member 24 for a long time, there is a possibility that the adhesive strength of the attachment member 24 may be decreased by sweat or attachment of a foreign material. At this time, it is possible to separate the attachment member 24 from the battery 40, and to exchange only the attachment member 24 with a now one (one with sufficient adhesive strength). Then, by fixing the charged battery 40, an attachment device 38 can be used as a new one. That is, by exchanging only the attachment member 24, a user can use the attachment device 38 which has a sufficient adhesive strength, is clean, and moreover can supply a sufficient power, at a low cost. When the battery 40 is fixed to the attachment member 24, the battery 40 may be fixed by an adhesive strength of the attachment member 24, or may include another structure for fixing. For example, the battery 40 may be fixed using a double-sided tape, a surface fastener, or the like. In addition, when the battery 40 is inserted in an inner layer portion of the attachment member 24 and supported, the attachment member 24 has a multi-layer structure, for example, a portion of a surface layer is formed so as to be freely opened and closed, the battery 40 is contained in an inner layer, the surface layer is covered from above, and thereby the battery 40 may be fixed.

[0029]

In addition, when the battery 40 is a primary battery, by providing an attachable and detachable structure as described above, the attachment member 24 and the battery 40 are separated from each other, thereby being able to be separately discarded, and it is easy to contribute to recycling.

<Fourth Embodiment>

[0030]

FIG. 8 is an explanatory view illustrating a configuration of an attachment device 42 according to a fourth embodiment. A portion or the whole of the attachment member 24 is configured by a gel layer which uses, for example, sodium chloride and water as a main ingredient, and thus the gel layer can include a property of electrolyte, in a state in which adhesion or flexibility as an attachment device is maintained. That is, the battery 44 can be configured using the configuration of the attachment device 42.

[0031]

In FIG. 8, the attachment member 24 is configured by a gel layer which wholly uses, for example, sodium chloride and water as a main ingredient, and a cathode electrode 46, an anode electrode 48, and a separator 50 are disposed in an inner layer portion (in gel layer) of the attachment member 24. The separator 50 is configured by non-woven fabric, a porous thin film, or the like which is disposed between the cathode electrode 46 and the anode electrode 48, and the cathode electrode 46 and the anode electrode 48 are separated so as not to be in direct contact. In addition, a configuration portion of the battery 44 including the cathode electrode 46, the anode electrode 48, and the selector 50 is surrounded by a partition wall 52 which is configured by non-woven fabric, a porous thin film, or the like, and insulates an inside and an outside of the battery 44, in the gel layer of the attachment member 24. As described above, the attachment member 24 is also in contact with the electrode 16a and the electrode 16b for detecting a cardiac potential, which are included in the electronic apparatus 12 (30), and thus a current of the battery 44 does not affect a detection of a cardiac potential.

[0032]

The electrode 46a (connector, contact point, terminal, metal, conductor) is derived from the cathode electrode 46, the electrode 48a (connector, contact point, terminal, metal, conductor) is derived from the anode electrode 48, and thus both can be electrically connected to the conductors 22a and 22b of the electronic apparatus 12 (30). The attachment member 24 is configured by a first area 54a which is an outer side (side in which cathode electrode 46 and anode electrode 48 are not included) than the partition wall 52, a second area 54b which is in an internal side of the partition wall 52 including the cathode electrode 46, and a third area 54c which is in an internal side of the partition wall 52 including the anode electrode 48. In the battery 44, if the second area 54b and the third area 54c are electrolytes, ions can move between the cathode electrode 46 and the anode electrode 48, and charging and discharging can be done. Thus, it is not necessary for the first area 54a to be an electrolyte. In the embodiment, the first area 54a, the second area 54b, and the third area 54c are configured by gel layers which use sodium chloride and water as a main ingredient. That is, the battery 44 is configured by inserting the cathode electrode 46, the cathode electrode 48, the separator 50, the partition wall 52, and the like in the attachment member 24 of one type of sheet shape. In this way, by configuring the entire attachment member 24 using a gel layer of an electrolyte, it is possible for the configuration to be simplified, and to reduce cost. A type of metals which configure the cathode electrode 46 and the anode electrode 48, or ingredients of the gel layer which configures the attachment member 24, are appropriately selected according to a format of a battery to be configured. As an example, as the battery terminals, the cathode electrode 46 (+ electrode) can be configured by copper and the anode electrode 48 (- electrode) can be configured by zinc.

[0033]

In this way, when the battery 44 is configured by including a gel layer with electrolyte included in the attachment member 24 and by disposing the cathode electrode 46 and the anode electrode 48 in the gel layer, the presence of the battery 44 can hardly cause a decrease of flexibility of the attachment member 24, for example, compared to when an independent battery is fixed to the attachment member 24. As a result, it is possible to provide a soft attachment device 42 which is easily bent and easily adheres to a surface of a body or the electronic apparatus 12 (30).

[0034]

FIG. 9 is an explanatory view illustrating a configuration of a battery 64 supported by the attachment device 24 (refer to FIG. 2). FIG. 9 illustrated a case in which, in order to increase an output voltage of the battery 64, a plurality of battery cells 66 to 70 (three battery cells as an example, in FIG. 9) is connected in series. Then, an insulating materials 72 (insulating sheets) are disposed between the battery cell 66 and the battery cell 68, and between the battery cell 68 and the battery cell 70, and thereby the battery cells are insulated from each other. In addition, a separator 74 is disposed between a cathode electrode 66a and an anode electrode 66b which are included in the battery cell 66, and the cathode electrode 66a and the anode electrode 66b are configured so as not to be in direct contact with each other. In the same manner, a cathode electrode 68a and an anode electrode 68b of the battery cell 68, and a cathode electrode 70a and an anode electrode 70b of the battery cell 70 are respectively separated by the separators 74. Each of the battery cells 66 to 70 is surrounded by an insulating member 76, and an electrolyte 78 contained in the battery cells is configured so as not to be leaked. Then, the anode electrode 66b of the battery cell 66 is electrically connected to the cathode electrode 68a of the battery cell 68, and the anode electrode 68b of the battery cell 68 is electrically connected to the cathode electrode 70a of the battery cell 70. That is, the battery cells 66 to 70 are connected in series, a terminal 64a extending from the cathode electrode 66a and a terminal 64b extending from the anode electrode 70b respectively become terminals of the battery 64, and are configured so as to be able to be electrically connected to the conductors 22a and 22b of the electronic apparatus 12 (30). The battery 64 is bendable in a longitudinal direction of, for example, the insulating material 72, and thereby the battery cells 66 to 70 can be folded. That is, each battery cell can be stacked in a state of being connected in series, can be folded in a compact manner, and can be supported by the attachment member 24 (refer to FIG. 2). As a result, it is possible to increase the output voltage without increasing a size (sheet area) of the attachment device 10 (34, 38, 42).

[0035]

FIG. 10 is an explanatory view illustrating a configuration of a battery 80 which is supported by the attachment member 24 (refer to FIG. 2). FIG. 10 illustrates a case in which, in order to increase capacity of the battery 80, a plurality of battery cells 82 to 86 (three battery cells as an example, in FIG. 10) are connected in parallel. Then, insulating materials 88 (insulating sheet) are disposed between the battery cell 82 and the battery cell 84, and between the battery cell 84 and the battery cell 86, and the battery cells are insulated from each other. In addition, a separator 90 is disposed between a cathode electrode 82a and an anode electrode 82b which are included in the battery cell 82, and the cathode electrode 82a and the anode electrode 82b are configured so as not to be in direct contact with each other. In the same manner, a cathode electrode 84a and an anode electrode 84b of the battery cell 84, and a cathode electrode 86a and an anode electrode 86b of the battery cell 86 are respectively separated by the separator 90. Each of the battery cells 82 to 86 is surrounded by an insulating member 92, and an electrolyte 94 contained in the battery cells is configured so as not to be leaked. Then, the cathode electrodes 82a, 84a, and 86a are electrically connected in series, the anode electrodes 82b, 84b, and 86b are electrically connected in series, and as the entire battery 80, the battery cell 82, the battery cell 84, and the battery cell 86 are electrically connected in parallel. A terminal 80a extending from the cathode electrode 86a and a terminal 80b extending from the anode electrode 86b respectively become terminals of the battery 80, and are configured so as to be able to be electrically connected to the conductors 22a and 22b of the electronic apparatus 12 (30). The battery 80 is bendable in a longitudinal direction of, for example, the insulating material 88, and thereby the battery cells 82 to 86 can be folded. That is, each battery cell can be stacked in a state of being connected in parallel, can be folded in a compact manner, and can be supported by the attachment member 24 (refer to FIG. 2). As a result, it is possible to increase battery capacity without increasing a size (sheet area) of the attachment device 10 (34, 38, 42). In FIG. 9 and FIG. 10, the number of battery cells that are connected in series or in parallel can be appropriately selected according to the output voltage or the battery capacity which is necessary for the attachment device 10 (34, 38, 42). However, when the battery cell is a cell for a secondary battery, it is preferable that the number of battery cells to be connected is determined by taking a charging and discharging cycle or an amount of charging and discharging into account.

<Fifth Embodiment>

[0036]

FIG. 11 is an explanatory view illustrating a configuration of an attachment device 96 according to a fifth embodiment. In the same manner as the configurations of other embodiments, a battery 98 is fixed to the attachment member 24, in the attachment device 96. However, in the battery 98, differently from the battery 26 of the attachment device 10 illustrated in FIG. 2, electrodes 96a and 96b for performing discharging or charging are disposed in a position separated from the battery 98 by lead wires 98a and 98b. In a case of the attachment device 96 illustrated in FIG. 11, a connection member 100a (connecting piece, winding piece, fixing piece) including flexibility in a strip shape in a direction in which a side 24c (24e) in a longitudinal direction from approximately the central portion of a side 24f in a lateral direction of the attachment member 24 is extended, is formed in a state of being protruded. The electrodes 96a and 96b are disposed in parallel to, for example, the side 24f, on the connection member 100a, so as to be separated in a predetermined interval. In the same manner, a connection member 100b (connecting piece, winding piece, fixing piece) of a strip shape in the same manner as the connection member 100a, is formed in a state of being protruded, in a direction in which a side 24c (24e) in a longitudinal direction from approximately the central portion of a side 24d of the attachment member 24 is extended. In the example of FIG. 11, the electrodes 96a and 96b are not disposed in the connection member 100b, but, for example, the electrode 96a may be disposed in the connection member 100a, and the electrode 96b may be disposed in the connection member 100b. In addition, the connection members 100a and 100b includes a fixing member 102 such as surface fasteners in positions close to end portions on sides farther from the side 24f (24d).

[0037]

A configuration of an electronic apparatus 104 in which the attachment device 96 configured in this way is mounted is illustrated in FIG. 12. A basic configuration of the electronic apparatus 104 is the same as that of the electronic apparatus 12 (30) illustrated in other embodiments, but positions of conductors 108a and 108b which are exposed in a surface of a housing 106 so as to be connected to the battery 98 of the attachment device 96 are different from the electronic apparatus 12. In the electronic apparatus 12 illustrated in FIG. 1, the conductors 22a and 22b are disposed in approximately the central portion of the surface 14a of the housing 14 which is in contact with the first surface 24a of the attachment member 24 of the attachment device 10. Meanwhile, in the electronic apparatus 104, the conductors 108a and 108b are disposed in the rear surface 106b on an opposite side to the surface 106a of the housing 106 which is in contact with the first surface 24a of the attachment member 24 of the attachment device 96. Furthermore, the conductors 108a and 108b are disposed in positions close to a side 106c of the rear surface 106b. That is, as illustrated in FIG. 12, in a state in which the rear surface 106a (sensor surface, top surface, first wall) of the electronic apparatus 104 adheres to the first surface 24a of the attachment device 96 (attachment member 24), the connection members 100a and 100b are wound so as to be in contact with a rear surface 106b side of the housing 106. That is, the conductors 108a and 108b are disposed in positions where the conductors can be in electrical contact with the electrodes 96a and 96b disposed in the connection member 100a. In addition, in the rear surface 106b of the housing 106, a fixing member 110 (for example, surface fastener) is disposed in a position where the fixing member can be in mechanical contact with the fixing member 102 provided in the connection members 100a and 100b.

[0038]

When the attachment device 96 configured as described above is attached to the electronic apparatus 104, the first surface 24a of the attachment device 96 (attachment member 24) first adheres to the surface 106a of the housing 106 of the electronic apparatus 104. in this case, in the same manner as the attachment device 10 and the electronic apparatus 12 illustrated in FIG. 1, in order for the electrodes 26a and 26b (refer to FIG. 2) to be electrically connected to the conductors 22a and 22b, it is not necessary to perform a position determination of a mounting position. Thereafter, the connection member 100a wraps around the rear surface 106b side so as to wind the housing 106, and thus the electrode 96a is electrically connected to the conductor 108a, and the electrode 96b is electrically connected to the conductor 108b. In this case, since the connection member 100a is a strip shaped member with flexibility, it is possible to easily perform a position correction using flexibility of the connection member 100a, even if an attachment attitude of the attachment device 96 with respect to the electronic apparatus 104 is slightly shifted. As a result, it is possible for the electrode 96a to be easily and electrically connected to the conductor 108a, and for the electrode 96b to be easily and electrically connected to the conductor 108b. In addition, at the time of the winding operation, a connection (for example, surface fastener connection) of the fixing member 102 on the attachment device 96 side and the fixing member 110 on the electronic apparatus 104 side is performed, and the attachment device 96 is fixed to the electronic apparatus 104. In the same manner, the connection member 100b wraps around the rear surface 106b side so as to wind the housing 106, a connection (for example, surface fastener connection) of the fixing member 102 on the attachment device 96 side and the fixing member 110 on the electronic apparatus 104 side is performed, and the attachment device 96 is fixed to the electronic apparatus 104.

[0039]

In this way, the attachment device 96 is mounted on the electronic apparatus 104 by the adhesive strength of the attachment member 24, and a fixing strength generated by winding the housing using the connection members 100a and 100b, and thus it is possible to maintain a stable mounting state (adhesion state of attachment device 96 and electronic apparatus 104) of the attachment device 96 and the electronic apparatus 104 for a long time. As a result, it is possible to perform a stable detection of a biological signal being performed by the electronic apparatus 104. In addition, as illustrated in FIG. 12, since the conductors 108a and 10b are disposed in a position different from a body surface in the housing 106, it is possible to increase a sense of security of a user. The example of FIG. 12 illustrates a case in which the conductors 108a and 108b are disposed in the rear surface 106b of the housing 106, but it is possible to obtain the same effects, as long as the conductors 108a and 108b are disposed in a surface other than the surface 106a. In addition, the examples of FIG. 11 and FIG. 12 illustrate the configuration in which the connection members 100a and 100b wind the end portions of the rear surface 106b of the housing 106, but for example, the connection members 100a and 100b may wind a wide area of the rear surface 106b. For example, the connection member 100a and the connection member 100b may overlap each other on the rear surface 106b, and may completely enclose the housing 106. In this case, a mounting force (adhesive strength) of the attachment device 96 with respect to the electronic apparatus 104 can be further increased. In addition, in this way, fixing by winding is performed using the connection members 100a and 100b , shifting or detaching of the electronic apparatus 104 with respect to the attachment device 96 is further suppressed.

<Sixth Embodiment>

[0040]

A usage example of the electronic apparatus 12 (30, 104) according to the above-described embodiments will be described using FIG. 13. When the electronic apparatus 12 detects, for example, a biological signal (potential, cardiac potential, detected value) for an electrocardiogram, the electronic apparatus 12 transmits biological information (information, transmission information) which is obtained based on the detected biological signal to an external apparatus. The electronic apparatus 12 transfers the biological information (information, transmission information) to a communication terminal 200 (mobile phone, smart phone) being carried by a user through an embedded communication function, such as Bluetooth. The communication terminal 200 transmits the acquired biological information to a server 206 which is an external apparatus through a base station 202 or a network 204. The electronic apparatus 12 may be configured so as to transmit the detected biological signal as it is to the server 206. In addition, when including a connection function to the network 204 such as a Wi-Fi communication function, the electronic apparatus 12 may be configured so as to transmit the biological information (biological signal) to the server 206 through the base station 202 and the network 204. In addition, when being able to be connected to a wireless LAN, the electronic apparatus 12 transmits the biological information to the server 206 through a wireless router 208 and the network 204. The electronic apparatus 12 may be configured so as to transmit the biological information through the wireless router 208 via a personal computer 210 once. In the above-describe example, a communication network (electrical communication circuit) using wireless is described, but a communication network using a wire may be used. The communication network includes, for example, a router, a modem, an access point, a cable, and the like. In addition, each apparatus can transmit and receive data according to a predetermined communication protocol.

[0041]

Each time acquiring the biological information, the electronic apparatus 12 may transmit the acquired information to the server 206, and may transmit the information after a predetermined amount of signal is accumulated. In addition, the electronic apparatus 12 may transmit the information every predetermined time period, and may transmit the information at a desired timing of a user in accordance with an operation of the electronic apparatus 12.

[0042]

When transmitting the biological information to the server 206, the electronic apparatus 12 transmits the biological information together with, for example, personal ID and password which are given to each user, in such a manner that each user can be identified on the server 206 side. It is also possible to transmit the information using a method without specifying an individual person, and using a guest ID.

[0043]

When acquiring biological information, the server 206 stores the biological information in a storage device 206a, and performs processing according to the biological information. For example, when the biological information indicates a cardiac potential, the server 206 creates an electrocardiogram. Furthermore, the server 206 performs a creation of health state information for performing analysis based on the electrocardiogram. In addition, when the biological information indicates a pulse wave signal or a temperature signal, the server 206 converts the signal into a pulse or body temperature, and creates the health state information based on the pulse or the body temperature. When creating the health state information, for example, the server 206 creates an electrocardiogram based on development of the biological information of a predetermined time period, and creates a development graph of a pulse or body temperature. In addition, the server 206 may create diagnostic information based on the development. In addition, when the user continually transmits the biological information to the server 206 using a personal ID, the server 206 may perform development or diagnosis of a long-term health state based on a comparison of a past analysis result or diagnostic information and a newest analysis result or diagnostic information, and for example, may create future advice or the like as health state information.

[0044]

The server 206 stores the created health diagnosis information in the storage device 206a, and returns the health diagnosis information to the user who sends the biological information through the network 204. For example, when the user transmits the biological information through the communication terminal 200, the health diagnosis information is displayed on a display screen of the communication terminal 200. In addition, when the user directly transmits the biological information to the server 206, using the communication function of the electronic apparatus 12, the server 206 transmits the health diagnosis information to the electronic apparatus 12. When receiving the health diagnosis information, the electronic apparatus 12 transfers the health diagnosis information which is received in the communication terminal 200 or the personal computer 210 that user has, and the health diagnosis information is displayed on a display screen of the communication terminal 200 or the personal computer 210. In the same manner, when the electronic apparatus 12 transmits the biological information to the server 206 through the wireless router 208, the health diagnosis information may be transmitted to the personal computer 210 of the user, and the health diagnosis information may be displayed on the display screen of the personal computer 210 of the user. The health diagnosis information transmitted from the server 206 may be stored in the communication terminal 200 or the personal computer 210. The biological signal detected by the electronic apparatus 12 may be stored in the communication terminal 200 or the personal computer 210 as original data.

[0045]

In the embodiment, an example in which biological information based on a biological signal detected by the electronic apparatus 12 is transmitted to server 206 and is analyzed there is described, but in another embodiment, a dedicated program may be installed in the communication terminal 200 or the personal computer 210, and a creation of an electrocardiogram or the like, or a creation of health diagnosis information may be performed in the communication terminal 200 or the personal computer 210, thereby being provided to a user. In addition, a creation of a simple analysis or simple health diagnosis information may be performed in the communication terminal 200 or the personal computer 210, and a creation of more detailed analysis or health diagnosis information may be performed in the server 206 according to a request of a user, thereby being provided to the user.

[0046]

As described above, the attachment device according to the embodiment includes: for example, an attachment member including a first surface, at least a portion of which is covered by an electronic apparatus including a first power terminal and which is attached to the electronic apparatus, and a second surface which is positioned in an opposite side to the first surface, includes adhesion, and is attached to a subject; and a battery, at least a portion of which is covered by the electronic apparatus, which is fixed to the attachment member, and which includes a second power terminal that is electrically connected to the first power terminal and supplies a power to the electronic apparatus, in a state in which the attachment member is attached to the electronic apparatus. According to this configuration, for example, it is not necessary to include a battery in the inside of the electronic apparatus, and it is possible to secure a predetermined drive time, while reducing a size and a weight of the electronic apparatus. In addition, by selecting capacity of the battery of the attachment device, a user can easily select a drive time of the electronic apparatus.

[0047]

In addition, the battery of the attachment device according to the embodiment may charge a first secondary battery which is provided in the electronic apparatus. According to this configuration, for example, the battery on the attachment device side can function as an auxiliary battery with respect to the electronic apparatus. As a result, a plurality of batteries can drive the electronic apparatus, and a long time drive of the electronic apparatus can be realized.

[0048]

In addition, the battery of the attachment device according to the embodiment may be a second secondary battery. According to this configuration, for example, only the attachment member is exchanged, and the battery can be used again. As a result, running cost of the electronic apparatus which uses the attachment device can be reduced.

[0049]

In addition, the attachment member of the attachment device according to the embodiment may include a gel layer with an electrolyte, and the battery may be configured by the gel layer, and an anode, a separator, and a cathode which are disposed in the gel layer. According to this configuration, for example, the presence of the battery can hardly cause a decrease of flexibility of the attachment member, compared to when an independent battery is fixed to the attachment member.

[0050]

In addition, the battery of the attachment device according to the embodiment may be attachable and detachable to the attachment member. According to this configuration, for example, it is easy to separate the battery from the attachment member, and to perform discarding work. In addition, it is easy to use the battery again.

[0051]

In addition, the battery of the attachment device according to the embodiment may include a connection member which electrically connects the power terminal provided in a surface different from a surface facing the first surface. According to this configuration, for example, it is easy to view a connection position of a power terminal of the electronic apparatus, and the battery, and to perform connection work. In addition, since the power terminal is disposed on a side different from a body surface of a user, it is possible to increase a sense of secure of the user.

[0052]

In addition, the attachment member of the attachment device according to the embodiment may be configured so as to wind a housing of the electronic apparatus. According to this configuration, for example, the attachment device can be mounted on the electronic apparatus by an adhesive strength of the attachment member, and a fixing strength generated by winding of the connection member, and thus it is possible to maintain a stable mounting state for a long time.

[0053]

In addition, the attachment device according to the embodiment includes: an attachment member including a first surface which is attached to an electronic apparatus including a first power terminal, and a second surface which is positioned in an opposite side to the first surface and includes adhesion; and a battery which is fixed to the attachment member, and includes a second power terminal that is electrically connected to the first power terminal and supplies a power to the electronic apparatus, in a state in which the attachment member is attached to the electronic apparatus. According to this configuration, for example, it is not necessary to include a battery in the inside of the electronic apparatus, and it is possible to secure a predetermined drive time, while reducing a size and a weight of the electronic apparatus. In addition, by selecting capacity of the battery of the attachment device, a user can easily select a drive time of the electronic apparatus.

[0054]

In each embodiment described above, a case in which the electronic apparatus is a sensor unit for detecting a cardiac potential is illustrated, but the electronic apparatus may be an electronic apparatus which needs power supplying and needs fixing to the attachment device, may be, for example, a heart rate monitor or a pulsimeter, may be a low frequency therapeutic apparatus which does not detect a biological signal and conversely, gives an electrical stimulation, or the like, and it is possible to obtain the same effects as in each embodiment described above.

[0055]

While certain embodiments have been described, these embodiments have been presented by way of example only, and are not intended to limit the scope of the inventions. Indeed, the novel embodiments described herein may be embodied in a variety of other forms; furthermore, various omissions, substitutions and changes in the form of the embodiments described herein may be made without departing from the spirit of the inventions. The accompanying claims and their equivalents are intended to cover such forms or modifications as would fall within the scope and spirit of the inventions.

WHAT IS CLAIMED IS:

1. An attachment device comprising:

an attachment member including a first surface, at least a portion of which is covered by an electronic apparatus including a first power terminal and which is attached to the electronic apparatus, and a second surface which is positioned in an opposite side to the first surface, includes adhesion, and is attached to a subject; and

a battery, at least a portion of which is covered by the electronic apparatus, which is fixed to the attachment member, and which includes a second power terminal that is electrically connected to the first power terminal and supplies a power to the electronic apparatus, in a state in which the attachment member is attached to the electronic apparatus.

2. The device according to Claim 1, wherein the battery charges a first secondary battery which is provided in the electronic apparatus.

3. The device according to Claim 1 or 2, wherein the battery is a second secondary battery.

4. The device according to any one of Claims 1 to 3,

wherein the attachment member includes a gel layer with an electrolyte, and

wherein the battery is configured by the gel layer, and an anode, a separator, and a cathode which are disposed in the gel layer.

5. The device according to any one of Claims 1 to 4, wherein the battery can be attachable and detachable to the attachment member.

6. The device according to any one of Claims 1 to 5, wherein the battery includes a connection member which electrically connects the first power terminal provided in a surface different from a surface facing the first surface, to the second power terminal.

7. The device according to Claim 6, wherein the attachment member is configured so as to wind a housing of the electronic apparatus.

8. An electronic apparatus comprising:

the attachment device according any one of Claims 1 to 7.

9. An attachment device comprising:

an attachment member including a first surface which is attached to an electronic apparatus including a first power terminal, and a second surface which is positioned in an opposite side to the first surface and includes adhesion; and

a battery which is fixed to the attachment member, and includes a second power terminal that is electrically connected to the first power terminal and supplies a power to the electronic apparatus, in a state in which the attachment member is attached to the electronic apparatus.

ABSTRACT

According to one embodiment, an attachment device includes an attachment member and a battery. The attachment member includes a first surface at least a portion of which is covered by an electronic apparatus including a first power terminal and which is attached to the electronic apparatus, and a second surface which is positioned in an opposite side to the first surface, includes adhesion, and is attached to a subject. The battery, at least a portion of which is covered by the electronic apparatus, is fixed to the attachment member, and includes a second power terminal which is electrically connected to the first power terminal and supplies a power to the electronic apparatus, in a state in which the attachment member is attached to the electronic apparatus.

Drawing

FIG. 13

208: wireless router

202: base station

204: network

206: server

206a: storage device