CLAIMS

[Claim 1]

A body state detecting apparatus for detecting a body state of a subject on a bed, the apparatus comprising:

a plurality of load detectors which are placed in the bed or under feet of the bed and which detect a load variation depending on a respiration of the subject; and

a body state detecting unit which determines an extending direction of a body axis of the subject and a head placement of the subject based on the detected load variation,

wherein the body state detecting unit includes a body axis direction determining unit which determines the extending direction of the body axis of the subject based on the detected load variation, and a head placement determining unit which determines the head placement of the subject, in the determined extending direction of the body axis of the subject, based on the detected load variation.

[Claim 2]

The body state detecting apparatus according to claim 1, wherein the head placement determining unit determines the head placement of the subject based on a waveform exhibiting the detected load variation.

[Claim 3]

The body state detecting apparatus according to claim 1, further comprising a center of gravity position calculating unit which acquires a temporal variation of a center of gravity position of the subject based on the detected load variation,

wherein the body axis direction determining unit determines the extending direction of the body axis of the subject based on a temporal variation of the center of gravity position of the subject and/or the head placement determining unit determines the head placement of the subject based on the temporal variation of the center of gravity position of the subject.

[Claim 4]

The body state detecting apparatus according to claim 3, wherein the head placement determining unit determines the head placement of the subject based on a waveform exhibiting the temporal variation of the center of gravity position of the subject.

[Claim 5]

A body state detecting apparatus for detecting a body state of a subject on a bed, the apparatus comprising:

a plurality of load detectors which are placed in the bed or under feet of the bed and which detect a load variation depending on a respiration of the subject; and

a body state detecting unit which determines an extending direction of a body axis of the subject and a head placement of the subject based on the detected load variation,

wherein the body state detecting unit determines the head placement of the subject based on a waveform exhibiting the detected load variation.

[Claim 6]

The body state detecting apparatus according to claim 5, further comprising a center of gravity position calculating unit which acquires a temporal variation of a center of gravity position of the subject based on the detected load variation,

wherein the body state detecting unit determines the extending direction of the body axis of the subject based on the temporal variation of the center of gravity position of the subject, and/or determines the head placement of the subject based on a waveform exhibiting the temporal variation of the center of gravity position of the subject.

[Claim 7]

The body state detecting apparatus according to claim 2 or 5, wherein the waveform exhibiting the detected load variation includes an inhalation period exhibiting a rising or a falling depending on an inhalation of the subject, an expiration period exhibiting a rising or a falling

depending on an expiration of the subject, and a hold period between the inhalation period and the expiration period; and

the head placement of the subject is determined based on at least one of the inhalation period, the expiration period and the hold period.

[Claim 8]

The body state detecting apparatus according to any one of claims 1, 2, 5, and 7, further comprising a sleeping form determining unit which determines a sleeping form of the subject based on a waveform exhibiting the detected load variation.

[Claim 9]

The body state detecting apparatus according to claim 4 or 6, wherein the waveform exhibiting the temporal variation of the center of gravity position includes an inhalation period exhibiting a rising or a falling depending on an inhalation of the subject, an expiration period exhibiting a rising or a falling depending on an expiration of the subject, and a hold period between the inhalation period and the expiration period; and

the head placement of the subject is determined based on at least one of the inhalation period, the expiration period and the hold period.

[Claim 10]

The body state detecting apparatus according to any one of claims 3, 4, 6, and 9, further comprising a sleeping form determining unit which determines a sleeping form of the subject based on the waveform exhibiting the temporal variation of the center of gravity position of the subject.

[Claim 11]

A bed system comprising:

a bed; and

the body state detecting apparatus according to any one of claims 1 to 10.

[Claim 12]

A body state detecting method for detecting a body state of a subject on a bed, the method comprising:

detecting a load variation depending on a respiration of the subject with a plurality of load detectors placed in the bed or under feet of the bed; and

determining an extending direction of a body axis of the subject and a head placement of the subject based on the detected load variation,

wherein the extending direction of the body axis of the subject is determined based on the detected load variation, and then the head placement of the subject is determined, in the determined extending direction of the body axis of the subject, based on the detected load

variation.

[Claim 13]

The body state detecting method according to claim 12, wherein the head placement of the subject is determined based on a waveform exhibiting the detected load variation.

[Claim 14]

The body state detecting method according to claim 12, further comprising acquiring a temporal variation of a center of gravity position of the subject based on the detected load variation,

wherein the determining of the extending direction of the body axis of the subject and/or the head placement of the subject based on the detected load variation includes determining the extending direction of the body axis of the subject and/or the head placement of the subject based on the temporal variation of the center of gravity position of the subject.

[Claim 15]

The body state detecting method according to claim 14, wherein the head placement of the subject is determined based on a waveform exhibiting the temporal variation of the center of gravity position of the subject.

[Claim 16]

A body state detecting method for detecting a body state of a subject on a bed, the method comprising:

detecting a load variation depending on a respiration of the subject with a plurality of load detectors placed in the bed or under feet of the bed; and

determining an extending direction of a body axis of the subject and a head placement of the subject based on the detected load variation,

wherein the head placement of the subject is determined based on a waveform exhibiting the detected load variation.

[Claim 17]

The body state detecting method according to claim 16, further comprising acquiring a temporal variation of a center of gravity position of the subject based on the detected load variation,

wherein the determining of the extending direction of the body axis of the subject and/or the head placement of the subject based on the detected load variation includes determining the extending direction of the body axis of the subject based on the temporal variation of the center of gravity position of the subject and/or determining the head placement of the subject based on a waveform exhibiting the temporal variation of the center of gravity position of the subject.

[Claim 18]

The body state detecting method according to claim 13 or 16, wherein the waveform exhibiting the detected load variation includes an inhalation period exhibiting a rising or a falling depending on an inhalation of the subject, an expiration period exhibiting a rising or a falling depending on an expiration of the subject, and a hold period between the inhalation period and the expiration period; and the head placement of the subject is determined based on at least one of the inhalation period, the expiration period and the hold period.

[Claim 19]

The body state detecting method according to any one of claims 12, 13, 16 and 18, further comprising determining a sleeping form of the subject based on a waveform exhibiting the detected load variation.

[Claim 20]

The body state detecting method according to claim 15 or 17, wherein the waveform exhibiting the temporal variation of the center of gravity position includes an inhalation period exhibiting a rising or a falling depending on an inhalation of the subject, an expiration period exhibiting a rising or a falling depending on an expiration of the subject, and a hold period between the inhalation period and the expiration period; and the head

placement of the subject is determined based on at least one of the inhalation period, the expiration period and the hold period.

[Claim 21]

The body state detecting method according to any one of claims 14, 15, 17 and 20, further comprising determining a sleeping form of the subject based on a waveform exhibiting the temporal variation of the center of gravity position of the subject.

[Claim 22]

A body state detecting apparatus for detecting a body state of a subject on a bed, the apparatus comprising:

a plurality of load detectors which are placed in the bed or under feet of the bed and which detect a load variation depending on a respiration of the subject; and

a body state detecting unit which determines a head placement of the subject based on the detected load variation.

[Claim 23]

The body state detecting apparatus according to claim 22, wherein the body state detecting unit determines the head placement of the subject based on a waveform exhibiting the detected load variation.