PTO-1390 (01-17)
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TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A SUBMISSION UNDER 35 U.S.C. 371

Attorney Docket No.: MDOA.4026.USN1_Jouzen003

U.S. Application No. (if known, see 37 CFR 1.5):

International Application No.	International Filing Date	Priority Date Claimed
PCT/FI2016/050113	23 February 2016	26 February 2015

Title of Invention: METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER

First Named Inventor: Hannu KINNUNEN

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information.

1. ☑ This is an express request to begin national examination procedures (35 U.S.C. 371(f)). NOTE: The express request under 35 U.S.C. 371(f) will not be effective unless the requirements under 35 U.S.C. 371(c)(1), (2), and (4) for payment of the basic national fee, copy of the International Application and English translation thereof (if required), and the oath or declaration of the inventor(s) have been received.
2. ☑ A copy of the International Application (35 U.S.C. 371(c)(2)) is attached hereto (not required if the International Application was previously communicated by the International Bureau or was filed in the United States Receiving Office (RO/US)).
3. An English language translation of the International Application (35 U.S.C. 371(c)(2))
   a. ☐ is attached hereto.
   b. ☐ has been previously submitted under 35 U.S.C. 154(d)(4).
4. An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4))
   a. ☐ is attached.
   b. ☐ was previously filed in the international phase under PCT Rule 4.17(iv).

Items 5 to 8 below concern amendments made in the international phase.

PCT Article 19 and 34 amendments

5. ☐ Amendments to the claims under PCT Article 19 are attached (not required if communicated by the International Bureau) (35 U.S.C. 371(c)(3)).
6. ☐ English translation of the PCT Article 19 amendment is attached (35 U.S.C. 371(c)(3)).
7. ☐ English translation of annexes (Article 19 and/or 34 amendments only) of the International Preliminary Examination Report is attached (35 U.S.C. 371(c)(5)).

Cancellation of amendments made in the international phase

8a. ☐ Do not enter the amendment made in the international phase under PCT Article 19.

8b. ☐ Do not enter the amendment made in the international phase under PCT Article 34.

NOTE: A proper amendment made in English under Article 19 or 34 will be entered in the U.S. national phase application absent a clear instruction from applicant not to enter the amendment(s).

The following items 9 to 17 concern a document(s) or information included.

9. ☑ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
10. ☑ A preliminary amendment.
11. ☑ An Application Data Sheet under 37 CFR 1.76.
12. ☐ A substitute specification. NOTE: A substitute specification cannot include claims. See 37 CFR 1.125(b).
13. ☑ A power of attorney and/or change of address letter.
14. ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 13*ter*.3 and 37 CFR 1.821-1.825.
15. ☐ Assignment papers *(cover sheet and document(s))*. Name of Assignee: _____
16. ☐ 37 CFR 3.73(c) Statement *(when there is an Assignee)*.

This collection of information is required by 37 CFR 1.414 and 1.491-1.492. The information is required to obtain or retain a benefit by the public, which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 15 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Mail Stop PCT, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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U.S. APPLN. No. (if known – see 37 CFR 1.5)	INTERNATIONAL APPLICATION No.	ATTORNEY DOCKET No.
	PCT/FI2016/050113	MDOA.4026.USN1_Jouzen00

17. ☐ Other items or information:

The following fees have been submitted.	CALCULATIONS	PTO USE ONLY
18. ☑ Basic national fee (37 CFR 1.492(a)) **$280**	$ 280	
19. ☑ Examination fee (37 CFR 1.492(c)) If the written opinion prepared by ISA/US or the international preliminary examination report prepared by IPEA/US indicates all claims satisfy provisions of PCT Article 33(1)-(4) ..... **$0** All other situations **$720**	$ 720	
20. ☑ Search fee (37 CFR 1.492(b)) If the written opinion prepared by ISA/US or the international preliminary examination report prepared by IPEA/US indicates all claims satisfy provisions of PCT Article 33(1)-(4) ..... **$0** Search fee (37 CFR 1.445(a)(2)) has been paid on the international application to the USPTO as an International Searching Authority ..... **$120** International Search Report prepared by an ISA other than the US and provided to the Office or previously communicated to the US by the IB ..... **$480** All other situations **$600**	$ 480	
TOTAL OF 18, 19, and 20 =	$ 1480	
☐ Additional fee for specification and drawings filed in paper over 100 sheets (excluding sequence listing in compliance with 37 CFR 1.821(c) or (e) in an electronic medium or computer program listing in an electronic medium) (37 CFR 1.492(j)). Fee for each additional 50 sheets of paper or fraction thereof **$400**		

Total Sheets	Extra Sheets	Number of each addition 50 or fraction thereof (round **up** to a whole number)	RATE	
- 100 =	/ 50 =		x **$400**	$

Surcharge of **$140.00** for furnishing any of the search fee, examination fee, or the oath or declaration after the date of commencement of the national stage (37 CFR 1.492(h)).	$	

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	- 20 =		x **$80**	$	
Independent claims	- 3 =		x **$420**	$	
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			**+ $780**	$	
Processing fee of **$140.00** for furnishing the English translation later than 30 months from the earliest claimed priority date (37 CFR 1.492(i)). +				$	
TOTAL OF ABOVE CALCULATIONS =				$ 1480	
☑ **Applicant asserts small entity status.** See 37 CFR 1.27. Fees above are reduced by ½.					
☐ **Applicant certifies micro entity status.** See 37 CFR 1.29. Fees above are reduced by ¾. Applicant must attach form PTO/SB/15A or B or equivalent.					
TOTAL NATIONAL FEE =				$ 740	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). **$40.00** per property. +				$	
TOTAL FEES ENCLOSED =				$ 740	
				Amount to be refunded:	$
				Amount to be charged:	$

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a. ☐ A check in the amount of $_____ to cover the above fees is enclosed.

b. ☐ Please charge my Deposit Account No. _____ in the amount of $_____ to cover the above fees.

c. ☐ The Director is hereby authorized to charge additional fees which may be required, or credit any overpayment, to Deposit Account No. _____ as follows:

i. ☐ any required fee.

ii. ☐ any required fee except for excess claims fees required under 37 CFR 1.492(d) and (e) and multiple dependent claim fee required under 37 CFR 1.492(f).

d. ☑ Fees are to be charged to a credit card. **WARNING:** Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038. The PTO-2038 should only be mailed or faxed to the USPTO. However, when paying the basic national fee, the PTO-2038 may NOT be faxed to the USPTO.

ADVISORY: If filing by EFS-Web, do **NOT** attach the PTO-2038 form as a PDF along with your EFS-Web submission. Please be advised that this is **not** recommended and by doing so your **credit card information may be displayed via PAIR**. To protect your information, it is recommended to pay fees online by using the electronic payment method.

NOTE: Where an appropriate time limit under 37 CFR 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the International Application to pending status.

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File)Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013, and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.

NOTE 1: By providing this statement under 37 CFR 1.55 or 1.78, **this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA**.

NOTE 2: A U.S. national stage application may not claim priority to the international application of which it is the national phase. The filing date of a U.S. national stage application is the international filing date. See 35 U.S.C. 363.

Correspondence Address

☑ The address associated with Customer Number: 93582 **OR** ☐ Correspondence address below

Name					
Address					
City		State		Zip Code	
Country		Telephone			
Email					

Signature	/gcz44004/	Date	17 August 2017
Name (Print/Type)	Geza C. Ziegler	Registration No. (Attorney/Agent)	44004

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Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT(s):	Hannu KINNUNEN	CONF. NO.
SERIAL NO.:		ART UNIT:
FILING DATE:		EXAMINER:
TITLE:	METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER	
ATTORNEY REFERENCE NO.:	MDOA.4026.USN1	Jouzen003US

Mail Stop Amendment
Commissioner of Patents
P.O. Box 1450
Alexandria, VA 22313-1450

PRELIMINARY AMENDMENT

I. Introduction

Prior to commencing examination of this National Stage application of PCT/FI2016/050113, please amend the application as follows:

Amendments to the Claims are presented on page **2** of this paper.

Amendments to the Abstract are presented on page **5** of this paper.

Remarks begin on page **6** of this paper.

II. Claim Amendments

The following listing of claims will replace all prior versions and listings of claims in the application:

1. (Original) A method for assessing readiness of a user, the method comprising:
- obtaining the user's movements;
- using the obtained user's movements to determine a nature of the period, wherein the nature of the period is selected from an activity period and a rest period;
- measuring at least one biosignal of the user during the rest period;
- determining a rest summary for the rest period, based on the measured at least one biosignal and at least one biosignal of a previous rest period;
- determining an activity summary for the activity period, based on the obtained movements of an activity period and obtained movements of at least one previous activity period;
- determining a body response summary based on the rest summary and the activity summary; and
- calculating a readiness score based on the body response summary and a previous body response summary, whereby the readiness score indicates a level of readiness of the user.

2. (Original) A method according to claim 1, wherein obtaining the user's movements is performed by measuring the user's movements or by retrieving the user's movement data from a separate device.

3. (Currently Amended) A method according to claim 1 ~~or 2~~, further comprising measuring at least one biosignal during the activity period.

4. (Currently Amended) A method according to ~~any of the preceding~~ claim~~s~~ 1, wherein the at least one biosignal is selected from the group consisting of an electrocardiogram, a photoplethysmogram, an electromyogram, an electroocylogram, a heart rate, a heart rate variability, a body temperature, a resting heart rate, an average heart rate and signals related to breathing.

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5. (Currently Amended) A method according to ~~any of the preceding~~ claim~~s~~ 1, wherein determining the rest summary comprises at least one of determining a sleep factor, determining a sleep balance, determining lowest body temperature during rest and determining a resting heart rate.

6. (Currently Amended) A method according to ~~any of the preceding~~ claim~~s~~ 1, further comprising providing the user with appropriate instructions, related to at least one of physical activity, mental activity and rest, for improving the user's readiness score.

7. (Currently Amended) A method according to ~~any of the preceding~~ claim~~s~~ 1, further comprising using historical data of the user to calculate the readiness score.

8. (Currently Amended) A method according to claim 1 ~~any of the preceding claims~~, further comprising using at least one of target information provided by the user, personal characteristics provided by the user and personal characteristics previously determined by the method.

9. (Original) A system for assessing readiness of a user, the system comprising:
- a ring configured to be worn by the user and comprising means for measuring at least one biosignal of the user during a rest period,
- a mobile communication device configured to communicate with the ring,
- means for measuring user's movements during an activity period and the rest period, and
- a server configured to communicate with the mobile communication device, the server being operable to
    - use the measured user's movements to determine a nature of the period, wherein the nature of the period is selected from the activity period and the rest period,
    - determine a rest summary for the rest period, based on the measured at least one biosignal and at least one biosignal of a previous rest period,
    - determine an activity summary for the activity period, based on the measured movements and measured movements of at least one previous activity period,

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- determine a body response summary based on the rest summary and the activity summary; and
- calculate a readiness score based on the body response summary and a previous body response summary, whereby the readiness score indicates a level of readiness of the user.

10. (Original) A system according to claim 9, wherein the means for measuring user's movements are arranged on the ring, in the mobile communication device or in an activity determination device.

11. (Currently Amended) A system according to claim 9 ~~or 10~~, wherein the mobile communication device is configured to visually present the readiness score to the user.

12. (Currently Amended) A system according to ~~any of the~~ claims 9 ~~11~~, wherein the means for measuring user's movements is selected from the group consisting of an accelerometer, a gyroscope and a magnetic field sensor.

13. (Currently Amended) A system according to ~~any of the~~ claims 9 ~~12~~, wherein the means for measuring a heart rate comprises a photon source arranged on the inner surface of the ring and a photon detector arranged on the inner surface of the ring.

14. (Currently Amended) A system according to ~~any of the~~ claims 9 ~~13~~, wherein the ring further comprises a first electrode and a second electrode adapted to measure an electrocardiogram.

15. (Original) A user interface comprising an area indicating a readiness score of the user, an area indicating parameters affecting the readiness score and an area indicating change of at least one of said parameters with respect to an earlier point of time.

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III. Abstract

Please amend the abstract as rewritten below.

~~Disclosed is a~~A method and a system for assessing readiness of a user, the method ~~comprising~~ including obtaining the user's movements; using the obtained user's movements to determine a nature of the period, wherein the nature of the period is selected from an activity period and a rest period; measuring at least one biosignal of the user during the rest period; determining a rest summary for the rest period, based on the measured at least one biosignal and at least one biosignal of a previous rest period; determining an activity summary for the activity period, based on the obtained movements of an activity period and obtained movements of at least one previous activity period; determining a body response summary based on the rest summary and the activity summary; and calculating a readiness score based on the body response summary and a previous body response summary, whereby the readiness score indicates a level of readiness of the user.

~~FIG. 1~~

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IV. Remarks

Claims 1-15 are pending in this National Stage application of PCT/FI2016/050113 with claims 1, 9 and 15 as the independent claims. Claims 3-8, and 11-14 are amended to remove multiple dependencies.

The abstract is amended to comply with U.S. practice requirements.

No new matter is added.

Respectfully submitted,

/gcz44004/ 17 August 2017

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Date

Petitioner Samsung Ex-1004, 0010

COMBINED DECLARATION AND ASSIGNMENT FOR A UTILITY PATENT APPLICATION

As the below named inventor(s), I/we declare that:

1) This declaration and assignment are directed to:

Title of Invention **METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER**

☐ The specification of which is attached hereto; OR

☒ United States application or PCT international application number:

PCT/FI2016/050113 filed on **23 February 2016**

☐ As amended on _____ (if applicable);

(I/We hereby authorize and request the Company or its designated attorneys, representatives or agents to insert above the title, application number and filing date of the application, or any other information herein, when known.)

2) The above-identified application was made or authorized to be made by me/us.
3) I/We believe that I/we are the original and/or joint inventors of a claimed invention in the application.
4) I/We hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. §1001 by fine or imprisonment of not more than five (5) years, or both.
5) I/We have reviewed and understand the contents of the above-identified application, including the claims, as amended by any amendment referred to above.
6) I/We acknowledge the continuing duty to disclose to the United States Patent and Trademark Office all information known to us to be material to patentability of this application, as defined in Title 37, Code of Federal Regulations, Section 1.56, including, for continuation-in-part applications, material information which becomes available between the filing date of the prior application and the filing date of the continuation-in-part application.

Authorization To Permit Access To Application by Participating Office

☒ If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the above-identified patent application is filed access to the above-identified patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the above-identified patent application is filed to have access to the above-identified patent application. In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the above-identified patent application with respect to: 1) the above-identified patent application-as-filed; 2) any foreign application to which the above-identified patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the above-identified patent application; and 3) any U.S. application-as-filed from which benefit is sought in the above-identified patent application. In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date of filing the Authorization to Permit Access to Application by Participating Offices.

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OATH:

I/We do hereby declare that all statements made herein of my/our own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

ASSIGNMENT OF RIGHTS:

Whereas, I/we have invented certain new and useful improvements in the Invention identified above and described in the above-identified patent application(s) and/or patent(s) (hereinafter referred to as "Invention"); and,

Whereas I/we desire to assign my above-identified rights, title and interest in the Invention to the Assignee identified herein;

Now, this indenture witnesseth, that for good and valuable consideration, the receipt whereof is hereby acknowledged, I/we,

Inventor(s) (assignor(s))

Name	*Address*
Hannu KINNUNEN	Piimäperäntie 2 90800 Oulu, Finland
Harri LAAKKONEN	Pasuritie 6 90550 Oulu, Finland
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Markku KOSKELA	Pateniementie 68 A 1 90800 Oulu, Finland
Heidi JURVELIN	Hippiäiskuja 6 C 90420 Oulu, Finland

do hereby assign, sell and transfer to:

Assignee

Name of Company	*Address*
Oura Health Oy	Elektroniikkatie 3 90590 Oulu, Finland

herein referred to as the "Company", its successors and assigns, my entire rights, titles and interests in and to the Invention and improvements made or conceived by me/us described the application(s) listed above and in the following table:

Country	*Type of Filing*	*Application Number*	*Filing Date*	*Title*
US	Provisional	62/121,425	26 February 2015	METHOD AND SYSTEM FOR ASSESSING RECOVERY OF USER FROM MENTAL AND PHYSICAL LOAD

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US	Provisional	62/205,114	14 August 2015	METHOD AND SYSTEM FOR ASSESSING RECOVERY OF USER FROM MENTAL AND PHYSICAL LOAD
US	Provisional	62/260,760	30 November 2015	METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER

(We hereby authorize and request the Company or its delegated attorneys, representatives or agents to insert above the relevant application number, filing date and other information required herein, when known.)

and any and all applications for patent or patents therefrom in any and all countries, including all divisions, continuations, and continuations-in-part, reexaminations, reissues and renewals thereof, and all benefits, rights of priority resulting from the filing of the application(s), and any and all Letters Patent of the United States, and countries foreign thereto, which may be granted or have granted for the Invention, and other benefits accruing or to accrue to us with respect to the filing of applications for patents or securing of patents in the United States and countries foreign thereto, unto the Company;

and I/we hereby authorize and request the Director of the United States Patent and Trademark Office to issue any United States Letters Patent which may issue for the Invention to the Company, as assignee of the whole right, title and interest thereto;

and I/we further agree to, without any further consideration, communicate to the Company or its representatives or nominees any facts known to me/us respecting the Invention and improvements and testify in any legal proceeding, make all rightful oaths, sign and execute all necessary and lawful future documents required or requested for the making and prosecution of any applications of any type for patent, utility model, or other similar rights in all countries including but not limited to, any provisional, non-provisional, continuation, continuation-in-part, divisional, renewal or substitute thereof, for any derivation proceedings relating thereto, and, as to any patents that issue from such applications, for any supplemental examination, derivation proceeding, opposition, post grant review, reissue, re-examination, inter partes review, or extension thereof, and generally do everything possible to aid the Company, its successors, assigns and nominees, to obtain and enforce proper patent protection for the Invention and its improvements in all countries.

Inventor(s) Signature(s)

Name	*Signature*	*Date*
Hannu KINNUNEN		21 Jun 2017
Harri LAAKKONEN		21 Jun 2017
Kari KIVELÄ		21 Jun 2017
Ashley COLLEY		20 July 2017
Petteri LAHTELA		21 Jun 2017
Markku KOSKELA		21 JUN 2017
Heidi JURVELIN		26 Jun 2017

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PTO/AIA/80 (07-12)
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POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(c).

I hereby appoint:

☒ Practitioners associated with Customer Number: 93582

OR

☐ Practitioner(s) named below (If more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number

As attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignments documents attached to this form in accordance with 37 CFR 3.73(c).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(c) to:

☒ The address associated with Customer Number: 93582

OR

☐	Firm or Individual Name		
	Address		
	City	State	Zip
	Country		
	Telephone	Email	

Assignee Name and Address: Oura Health Oy
Elektroniikkatie 3
90590 Oulu, Finland

A copy of this form, together with a statement under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent) is required to be Filed in each application in which this form is used. The statement under 37 CFR 3.73(c) may be completed by one of The practitioners appointed in this form, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record
The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature		Date	04/26/2017
Name	Markku Koskela	Telephone	00358503874020
Title	Chief Technology Specialist, Co-Founder		

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PCT

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(PCT Rule 92*bis*.1 and Administrative Instructions, Section 422)

To:

MOOSEDOG OY
Rykmentintie 2B
20810 Turku
FINLANDE

Date of mailing *(day/month/year)*
17 May 2017 (17.05.2017)

Applicant's or agent's file reference
Jouzen003PCT

IMPORTANT NOTIFICATION

International application No.
PCT/FI2016/050113

International filing date *(day/month/year)*
23 February 2016 (23.02.2016)

1. The following indications appeared on record concerning:

☒ the applicant ☐ the inventor ☐ the agent ☐ the common representative

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Finland

State of Nationality: FI
State of Residence: FI
Telephone No.
Facsimile No.
E-mail address

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

☐ the person ☒ the name ☐ the address ☐ the nationality ☐ the residence

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E-mail address
☐ Notifications by e-mail authorized

3. Further observations, if necessary:

4. A copy of this notification has been sent to:

☒ the receiving Office
☐ the International Searching Authority
☐ the Authority(ies) specified for supplementary search
☐ the International Preliminary Examining Authority
☒ the designated Offices concerned
☐ the elected Offices concerned
☐ other:

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Petitioner Samsung Ex-1004, 0016

(12) 特許協力条約に基づいて公開された国際出願

(19) 世界知的所有権機関
国際事務局

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WIPO | PCT

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(26) 国際公開の言語: 日本語

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(81) 指定国 (表示のない限り、全ての種類の国内保護が可能): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

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添付公開書類:

— 国際調査報告（条約第 21 条(3)）

WO 2013/161072 A1

(54) **Title**: DEVICE FOR CALCULATING AMOUNT OF RETAINED PHYSICAL ACTIVITY, METHOD FOR CALCULATING AMOUNT OF RETAINED PHYSICAL ACTIVITY AND SYSTEM FOR CALCULATING AMOUNT OF RETAINED PHYSICAL ACTIVITY

(54) 発明の名称 : 保有活動量算出装置、保有活動量算出方法及び保有活動量算出システム

[図1]

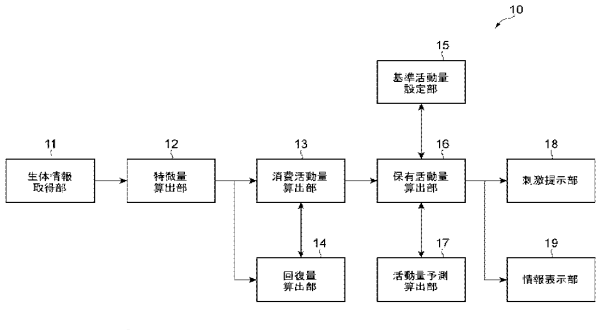


FIG. 1:
11 Bioinformation-acquiring unit
12 Feature value-calculating unit
13 Expended physical activity amount-calculating unit
14 Recovery amount-calculating unit
15 Reference physical activity amount-setting unit
16 Retained physical activity amount-calculating unit
17 Predicted physical activity amount-calculating unit
18 Stimulus display unit
19 Information display unit

(57) **Abstract**: An expended physical activity amount-calculating unit calculates the amount of expended physical activity, which is the amount of physical activity expended by the subject calculated from bioinformation acquired by a bioinformation-acquiring unit. A recovery amount-calculating unit calculates the recovery amount, which is the amount of physical activity recovered by the subject calculated from bioinformation acquired by the bioinformation-acquiring unit. A retained physical activity amount-calculating unit calculates the retained physical activity amount, which is the amount of physical activity retained by the subject calculated from a reference physical activity amount set by a reference physical activity amount-setting unit, the expended physical activity amount calculated by the expended physical activity amount-calculating unit, and the recovery amount calculated by the recovery amount-calculating unit. The amount of physical activity retained by the subject can thereby be calculated immediately.

(57) 要約:

[続葉有]

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消費活動量算出部は、生体情報取得部により取得された生体情報から対象者が消費した活動量である消費活動量を算出する。回復量算出部は、生体情報取得部により取得された生体情報から対象者が回復した活動量である回復量を算出する。保有活動量算出部は、基準活動量設定部により設定された基準活動量、消費活動量算出部により算出された消費活動量、及び回復量算出部により算出された回復量から、対象者が保有する活動量である保有活動量を算出する。このため、即時的に対象者の保有する活動量を算出することができる。

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明　細　書

発明の名称 ：

保有活動量算出装置、保有活動量算出方法及び保有活動量算出システム

技術分野

[0001] 本発明の一実施形態は、保有活動量算出装置、保有活動量算出方法及び保有活動量算出システムに関し、対象者が保有する活動量を算出する保有活動量算出装置、保有活動量算出方法及び保有活動量算出システムに関する。

背景技術

[0002] 人間の健康を管理する装置が提案されている。例えば、特許文献１には、対象者の運動時間と睡眠時間とから、一日の疲労度を算出する健康管理装置が開示されている。特許文献１の装置は、疲労度に対する運動時間及び睡眠時間の影響の度合に基づいて、運動又は睡眠を選択し、対象者にいずれかを改善するアドバイスを提供する。

先行技術文献

特許文献

[0003] 特許文献1：特開２００７－２２２２７６号公報

発明の概要

発明が解決しようとする課題

[0004] しかしながら、上記技術では、単に対象者の運動時間と睡眠時間とから、一日の疲労度を算出するだけであるため、対象者の保有する活動量（対象者が活動できる限界）を即時的に算出することができない。

[0005] 本発明の一実施形態は、このような実情を考慮してなされたものであり、その目的は、即時的に対象者の保有する活動量を算出することができる保有活動量算出装置、保有活動量算出方法及び保有活動量算出システムを提供することにある。

課題を解決するための手段

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[0006] 本発明の一実施形態は、対象者の活動量の基準となる基準活動量を設定する基準活動量設定ユニットと、対象者の生体情報を取得する生体情報取得ユニットと、生体情報取得ユニットにより取得された生体情報から対象者が消費した活動量である消費活動量を算出する消費活動量算出ユニットと、生体情報取得ユニットにより取得された生体情報から対象者が回復した活動量である回復量を算出する回復量算出ユニットと、基準活動量設定ユニットにより設定された基準活動量、消費活動量算出ユニットにより算出された消費活動量、及び回復量算出ユニットにより算出された回復量から、対象者が保有する活動量である保有活動量を算出する保有活動量算出ユニットとを備える保有活動量算出装置である。

[0007] この構成によれば、消費活動量算出ユニットは、生体情報取得ユニットにより取得された生体情報から対象者が消費した活動量である消費活動量を算出する。回復量算出ユニットは、生体情報取得ユニットにより取得された生体情報から対象者が回復した活動量である回復量を算出する。保有活動量算出ユニットは、基準活動量設定ユニットにより設定された基準活動量、消費活動量算出ユニットにより算出された消費活動量、及び回復量算出ユニットにより算出された回復量から、対象者が保有する活動量である保有活動量を算出する。このため、即時的に対象者の保有する活動量を算出することができる。

[0008] この場合、回復量算出ユニットは、生体情報取得ユニットにより取得された生体情報から対象者が睡眠状態であることを判別し、睡眠状態における生体情報に基づいて回復量を算出することができる。

[0009] この構成によれば、回復量算出ユニットは、生体情報取得ユニットにより取得された生体情報から対象者が睡眠状態であることを判別し、睡眠状態における生体情報に基づいて回復量を算出する。このため、対象者の活動量の回復に関連が深い睡眠状態の生体情報に基づいて回復量を算出することができる。

[0010] この場合、回復量算出ユニットは、睡眠状態における生体情報の脳波の睡

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眠紡錘波及びθ波のいずれかに基づいて回復量を算出することができる。

[0011] この構成によれば、回復量算出ユニットは、睡眠状態における生体情報の脳波の睡眠紡錘波及びθ波のいずれかに基づいて回復量を算出する。このため、眠りの深さから回復量を算出できない場合でも、回復量を算出することができる。

[0012] また、回復量算出ユニットは、睡眠状態における生体情報から推定される対象者の眠りの深さに基づいて回復量を算出することができる。

[0013] この構成によれば、回復量算出ユニットは、睡眠状態における生体情報から推定される対象者の眠りの深さに基づいて回復量を算出する。このため、対象者が年配者である場合のようにδ波の累積出現時間等では回復度を算出することができない場合でも、回復量を算出することができる。

[0014] また、基準活動量設定ユニットは、保有活動量算出ユニットが直前に算出した保有活動量を基準活動量として設定することができる。

[0015] この構成によれば、基準活動量設定ユニットは、保有活動量算出ユニットが直前に算出した保有活動量を基準活動量として設定する。このため、即時的に変動する対象者の保有活動量をより高精度で算出することができる。

[0016] また、保有活動量算出ユニットは、対象者の過去の消費活動量及び回復量の履歴に基づいて、保有活動量を算出するためのパラメータを補正することができる。

[0017] この構成によれば、保有活動量算出ユニットは、対象者の過去の消費活動量及び回復量の履歴に基づいて、保有活動量を算出するためのパラメータを補正する。このため、より対象者の実情に合った活動量の算出が可能となる。

[0018] また、保有活動量算出ユニットにより算出された保有活動量を表示する表示ユニットをさらに備えることができる。

[0019] この構成によれば、表示ユニットが、保有活動量算出ユニットにより算出された保有活動量を表示する。このため、即時的に対象者の保有する活動量を表示することができる。

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[0020] また、保有活動量算出ユニットにより算出された保有活動量が所定値以下になったときに、保有活動量が所定値以下となったことを通知する通知ユニットをさらに備えることができる。

[0021] この構成によれば、通知ユニットが、保有活動量算出ユニットにより算出された保有活動量が所定値以下になったときに、保有活動量が所定値以下となったことを通知する。このため、対象者の保有する活動量が低くなったことを即時的に知ることができる。

[0022] また、本発明の一実施形態は、対象者の活動量の基準となる基準活動量を設定する基準活動量設定工程と、対象者の生体情報を取得する生体情報取得工程と、生体情報取得工程で取得された生体情報から対象者が消費した活動量である消費活動量を算出する消費活動量算出工程と、生体情報取得工程で取得された生体情報から対象者が回復した活動量である回復量を算出する回復量算出工程と、基準活動量設定工程で設定された基準活動量、消費活動量算出工程で算出された消費活動量、及び回復量算出ユニットで算出された回復量から、対象者が保有する活動量である保有活動量を算出する保有活動量算出工程とを含む保有活動量算出方法である。

[0023] また、本発明の一実施形態は、対象者の活動量の基準となる基準活動量を設定する基準活動量設定ユニットと、対象者の生体情報を取得する生体情報取得ユニットと、生体情報取得ユニットにより取得された生体情報から対象者が消費した活動量である消費活動量を算出する消費活動量算出ユニットと、生体情報取得ユニットにより取得された生体情報から対象者が回復した活動量である回復量を算出する回復量算出ユニットと、基準活動量設定ユニットにより設定された基準活動量、消費活動量算出ユニットにより算出された消費活動量、及び回復量算出ユニットにより算出された回復量から、対象者が保有する活動量である保有活動量を算出する保有活動量算出ユニットとから構成される保有活動量算出システムである。

[0024] 本発明の一実施形態の保有活動量算出システムでは、基準活動量設定ユニット、生体情報取得ユニット、消費活動量算出ユニット、回復量算出ユニッ

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ト及び保有活動量算出ユニットそれぞれが必ずしも１つの装置ではなく、個別に存在しているシステムとすることができる。

発明の効果

[0025] 本発明の一実施形態の保有活動量算出装置、保有活動量算出方法及び保有活動量算出システムによれば、即時的に対象者の保有する活動量を算出することができる。

図面の簡単な説明

[0026] [図1]第１実施形態に係る生体活動量管理装置の構成を示すブロック図である。

[図2]第１実施形態に係る生体活動量管理装置の動作を示すフローチャートである。

[図3]集中度とθ波との関係を示すグラフ図である。

[図4]θ波と反応時間との関係を示すグラフ図である。

[図5]主観、脳波及び反応の互いの相関を示す図である。

[図6]一日の保有活動量の増減を示すグラフ図である。

[図7]１回目の睡眠周期における深い眠り（睡眠段階４）の割合及び４回目の睡眠周期におけるＲＥＭ睡眠の割合の積と、回復量との関係を示すグラフ図である。

[図8]２０分間仮眠、抑制された徐波活動及び徐波活動それぞれの条件に対するθ波又は睡眠紡錘波のパワースペクトル密度を示すグラフ図である。

[図9]抑制された徐波活動及び徐波活動それぞれの条件に対するθ波又は睡眠紡錘波数を示すグラフ図である。

[図10]θ波又は睡眠紡錘波数と回復量との関係を示すグラフ図である。

[図11]第２実施形態に係る生体活動量管理システムを示すブロック図である。

[図12]第２実施形態の表示装置に表示される表示画面を示す図である。

[図13]第３実施形態に係る生体活動量管理システムを示すブロック図である。

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発明を実施するための形態

[0027] 以下、添付図面を参照して本発明の実施の形態を説明する。図１に示すように、本発明の第１実施形態に係る生体活動量管理装置１０は、生体情報検出部１１、特徴量算出部１２、消費活動量算出部１３、回復量算出部１４、基準活動量設定部１５、保有活動量算出部１６、活動量予測算出部１７、刺激提示部１８及び情報表示部１９を備えている。本実施形態の生体活動量管理装置１０は、対象者が所持する携帯端末として構成される。あるいは、本実施形態の生体活動量管理装置１０は、自動車、宿泊施設、医療機関及び一般家庭等に設置された装置として構成される。

[0028] 生体情報取得部１１は、対象者の生体情報を取得する。生体情報取得部１１は、対象者の生体情報として、対象者の状態の推定に必要な心拍、脈波等の心拍動や、呼吸や、脳波や、加速度センサ等で計測された対象者の体動等の生理学的指標の内で少なくとも１以上を取得する。生体情報の取得方法は、接触あるいは非接触のいずれでも良い。例えば、生体情報取得部１１は、自動車の座席やステアリングホイールに設置された生理学的指標の検出装置や、圧電素子や、加速度センサ等とできる。生体情報取得部１１は、対象者の生体情報として、脳波を対象者の状態の推定の精度を向上させるために計測することができる。そのため、生体情報取得部１１は脳波を常時検出する必要はない。生体情報取得部１１は、対象者の脳波を１箇所以上で検出する。生体情報取得部１１は、対象者の運動による活動量の推定の精度を向上させるためや、心拍又は呼吸の計測のために、加速度を計測することができる。

[0029] 特徴量算出部１２は、生体情報取得部１１によって取得された生体情報から、対象者の活動量の推定に必要な特徴量を算出する。特徴量算出部１２は、特徴量として、加速度が所定の閾値を超えているか否かを算出し、消費活動量算出部１３は、当該特徴量により、対象者の移動状態及び運動状態を推定しても良い。特徴量算出部１２は、心拍ゆらぎの特徴量として、拍動間隔の分散、標準偏差、変動係数を算出しても良い。特徴量算出部１２は、単位

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時間当たりの拍動間隔を周波数変換して、心拍ゆらぎの特徴量を算出しても良い。特徴量算出部１２は、対象者の脳波又は心拍から対象者の集中度を特徴量として算出しても良い。

[0030] 消費活動量算出部１３は、特徴量算出部１２により算出された心拍の特徴量及び脳波の特徴量から、対象者の一日の各時刻に消費した活動量である消費活動量を算出する。消費活動量算出部１３は、上記特徴量をパラメータとする多項式からなる人間の状態推定式により、対象者の消費活動量を算出することができる。このため、消費活動量算出部１３は、連続的な値で対象者の消費活動量を算出することができる。また、消費活動量算出部１３は、心拍の特徴量及び脳波の特徴量を用いて消費活動量を算出することにより、対象者の精神的な負荷についても推定することができる。

[0031] 回復量算出部１４は、特徴量算出部１２により算出された心拍の特徴量及び脳波の特徴量から、対象者の一日の各時刻に回復した活動量である回復量を算出する。回復量算出部１４は、回復量をＲＥＭ睡眠の割合、δ波の累積出現時間、及び睡眠紡錘波又はθ波の数や密度から算出することができる。回復量算出部１４は、回復量を上記の複数の特徴量を四則演算することにより算出することができる。このため、回復量算出部１４は、対象者の年齢によらず、回復量を算出することができる。

[0032] 基準活動量算出部１５は、対象者の活動量の基準となる基準活動量を設定する。基準活動量設定部１５は、前日又は過去に対象者が保有し残存していた保有活動量を初期値である基準活動量として設定することができる。基準活動量設定部１５は、基準活動量を毎日再設定することができる。基準活動量設定部１５は、保有活動量算出部１６が現在算出した保有活動量を基準活動量として設定することができる。

[0033] 保有活動量算出部１６は、基準活動量設定部１５により設定された基準活動量、消費活動量算出部１３により算出された消費活動量、及び回復量算出部１４により算出された回復量から、対象者が保有し残存する活動量である保有活動量を算出する。

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[0034] 活動量予測算出部１７は、対象者の過去の消費活動量及び回復量に関する情報が保存されたデータベースを有する。活動量予測算出部１７は、対象者の過去の消費活動量及び回復量に関する情報から、対象者の一日の保有活動量の変化を算出する。このため、本実施形態では、個々の対象者について、状態の変化を捉え、対象者の活動の限界前に報知することが可能となる。

[0035] 刺激提示部１８は、保有活動量算出部１６が算出した保有活動量が所定の閾値以下となった場合や、保有活動量算出部１６が算出した保有活動量の変化量が所定の閾値以上となった場合や、特徴量算出部１２及び消費活動量算出部１３が算出した対象者の集中度又は消費活動量が所定の閾値以下となった場合や、特徴量算出部１２及び消費活動量算出部１３が算出した対象者の集中度又は消費活動量の変化量が所定の閾値以上となった場合に、対象者の集中を維持又は向上させるための刺激を提示する。刺激提示部１８は、対象者の状態それぞれに対応した刺激の提示の方法のマップを有していても良い。刺激提示部１８は、例えば、光、音、振動、温熱、冷風、匂い及び映像等の物理的な刺激を対象者に提示することができる。

[0036] 情報表示部１９は、保有活動量算出部１６が算出した保有活動量や、活動量予測算出部１７が算出した対象者の一日の保有活動量の推移を対象者に表示する。情報表示部１９は、対象者が保有し残存する保有活動量に合わせて休憩や作業の予定を提案することができる。

[0037] 以下、本実施形態の生体活動量管理装置１０の動作について説明する。図２に示すように、生体活動量管理装置１０の基準活動量設定部１５により、基準活動量の設定がされる（Ｓ１１）。生体活動量管理装置１０の生体情報取得部１１により、対象者の生体情報が取得される（Ｓ１２）。生体活動量管理装置１０の消費活動量算出部１３により対象者の消費活動量が算出され、生体活動量管理装置１０の回復量算出部１４により対象者の回復量が算出される（Ｓ１３）。生体活動量管理装置の保有活動量算出部１６により保有活動量が算出される（Ｓ１４）。算出された保有活動量に従い、保有活動量が所定値以下になったときに、刺激提示部１８は対象者に保有活動量が所定

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値以下になったことを刺激提示により提示する。情報表示部１９は即時的に対象者に現在の残存する保有活動量を表示する。なお、上記の基準活動量の設定（Ｓ１１）は、生体情報の取得（Ｓ１２）や、消費活動量、回復量の算出（Ｓ１３）の後に行われても良い。

[0038] 消費活動量算出部１３による対象者の消費活動量の算出について説明する。生体情報取得部１１は、対象者の脳波、心拍、呼吸あるいは他の行動指標といった生体情報を取得する。特徴量算出部１２は、生体情報取得部１１により取得された生体情報から特徴量を算出する。特徴量算出部１２により算出された特徴量に基づいて、消費活動量算出部１３は消費活動量を算出する。

[0039] 本実施形態では、消費活動量算出部１３は、対象者の集中度の低さから消費活動量を算出することができる。対象者の集中度は、例えば、対象者の光刺激への反応速度や、計算等の課題への解答結果や、遊戯等の結果より判断することができる。対象者の集中度の初期値は、対象者が夜間に７～８時間睡眠をとった後に、覚醒後の集中度を対象者の集中度の初期値に設定することができる。また、個々の対象者を特定する年齢、性別等の情報から所定のデータベースを参照することで対象者の集中度の初期値を決定することができる。また、対象者に規則的な生活を数日間過ごしてもらい、そのときの集中度の平均値を対象者の集中度の初期値に設定することができる。

[0040] 対象者の集中度は、必ずしも対象者に課題等を解答させることにより算出しなくとも良い。睡眠不足と光刺激等への反応時間とが線形関係であり、当該反応時間は対象者の疲労を反映していることは公知である。本発明者は、精神活動を示す脳活動と、消費活動量（疲労）に対する対象者の主観と、反応時間との間に相関があることを解明した。本発明者は、精神活動による消費活動量と睡眠による回復量について一元化できる可能性があると判断した。

[0041] 図３に示すように、対象者の集中度が増加するに伴い、脳波のα波に対するθ波の割合は線形的に増大する。なお、対象者ごとの差異を少なくするた

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め、図３のグラフでは、θ波の量をα波の量で除した値を縦軸としている。また、図４に示すように、脳波のα波に対するθ波の割合が増加するに伴い、対象者の光刺激等に対する反応時間は線形的に減少する。したがって、図５に示すように、主観的な対象者の集中度と脳波との間には相関があり、脳波と対象者の反応との間には相関があることから、主観的な対象者の集中度と反応との間には相関があると考えられる。よって、本実施形態では、脳波の特徴量に基づいて対象者の消費活動量、集中度あるいは対象者の精神的な負荷も算出することができる。

[0042] 本実施形態では、対象者の集中度の低さから消費活動量を算出することができるため、特許文献１のような運動時間だけでは算出することができない対象者に対する負荷の強度を算出することができる。本実施形態では、一日の人間の集中、弛緩、眠気、覚醒及び睡眠状態等から対象者の消費活動量及び保有活動量を算出することが可能となる。

[0043] このため、本実施形態では図６に示すように、対象者の保有活動量、消費活動量及び回復量を一元化して可視化し、保有活動量の増減を示すことが可能となる。そのため、集中作業により保有活動量が低下した場合に、対象者があとどの程度活動が可能かを示すことができる。あるいは、翌日にその日と同程度の消費活動量が見込まれる場合に、集中作業後の睡眠時にどの程度の睡眠時間によりどの程度の回復量が必要であるかを示すことができる。

[0044] 次に回復量算出部１４による対象者の回復量の算出について説明する。消費活動量算出部１３と同様に、特徴量算出部１２は、生体情報取得部１１により取得された生体情報から特徴量を算出し、特徴量算出部１２により算出された特徴量に基づいて、回復量算出部１４は回復量を算出する。

[0045] 本実施形態では、回復量算出部１４は、睡眠時の対象者の眠りの深さから回復量を算出することができる。対象者が睡眠状態にあるか否かや、対象者の眠りの深さは、心拍、呼吸のいずれの特徴量からも算出することができる。また、回復量算出部１４は、対象者の体動から生体リズムモデルの眠りの深さを算出することができる。

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［0046］　本実施形態では、回復量算出部１４は、算出された眠りの深さのうち、睡眠段階４に相当する深い眠りと、ＲＥＭ睡眠の割合又はＲＥＭ睡眠の累積時間との乗算から回復量を算出することができる。例えば、図７に示すように、１回目の睡眠周期における深い眠り（睡眠段階４）の割合と４回目の睡眠周期におけるＲＥＭ睡眠の割合との積が増大するほど、回復量も線形的に増大する。このため、回復量算出部１４は、１回目の睡眠周期における深い眠り（睡眠段階４）の割合と４回目の睡眠周期におけるＲＥＭ睡眠の割合との積から、回復量を算出することができる。

［0047］　ノンＲＥＭ睡眠が不足すると、反応時間が遅延することは公知である。しかし、対象者が４０歳を過ぎるとノンＲＥＭ睡眠の割合及びδ波は減少し、対象者が６０歳を過ぎるとδ波はほとんど出現しなくなる。したがって、対象者が年配者の場合は、δ波の累積量等だけでは、回復量を算出することはできない。しかしながら、本実施形態では、レム睡眠の割合により回復量を算出することができる。

［0048］　一方、本実施形態では、回復量算出部１４は、睡眠時の対象者の脳波から回復量を算出することができる。上述のように対象者の加齢に伴いノンＲＥＭ睡眠の割合が低下するため、上記の手法では対象者の加齢に伴い回復量の正確な算出が困難な場合がある。そこで、回復量算出部１４は、対象者の脳波の特徴量として例えば睡眠紡錘波又はθ波の数や密度から回復量を算出することができる。

［0049］　図８に示すように、抑制されていない睡眠の徐波活動における睡眠紡錘波又はθ波のパワースペクトル密度は、対象者に与えた刺激により抑制された徐波活動における睡眠紡錘波又はθ波のパワースペクトル密度や、２０分間の短い仮眠における睡眠紡錘波又はθ波のパワースペクトル密度に比べて大きいことが判る。一方、図９より、抑制された徐波活動におけるθ波又は睡眠紡錘波の数と、抑制されていない徐波活動におけるθ波又は睡眠紡錘波の数との間には有意差は見られないことがわかる。さらに、図１０に示すように、θ波又は睡眠紡錘波の数が多くなるほど、線形的に回復量も増大するこ

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とが判る。したがって、眠りの深さを検出することができない場合でも、回復量算出部１４は、θ波又は睡眠紡錘波の数により対象者の回復量を算出することができる。

[0050] 睡眠紡錘波又はθ波は対象者の脳波から直接算出することができる。睡眠紡錘波又はθ波は、周波数解析、ウェーブレット解析、波形認識法等のいずれかによって検出することができる。対象者の脳波を検出することができない場合は、対象者の睡眠段階２の経過時間から睡眠紡錘又はθ波を算出することができる。

[0051] 保有活動量算出部１６による対象者の保有活動量の算出は、例えば、（保有活動量＝a_1×基準活動量－a_2×消費活動量＋a_3×回復量）といった状態式に、測定で得られたパラメータを代入することにより行われる。a_1～a_3は任意の補正係数である。これらの補正係数は、過去における対象者の消費活動量及び回復量の履歴から設定及び変更されることができる。

[0052] 本実施形態によれば、消費活動量算出部１３は、生体情報取得部１１により取得された生体情報から対象者が消費した活動量である消費活動量を算出する。回復量算出部１４は、生体情報取得部１１により取得された生体情報から対象者が回復した活動量である回復量を算出する。保有活動量算出部１６は、基準活動量設定部１５により設定された基準活動量、消費活動量算出部１３により算出された消費活動量、及び回復量算出部１４により算出された回復量から、対象者が保有する活動量である保有活動量を算出する。このため、即時的に対象者の保有する活動量を算出することができる。

[0053] 本実施形態によれば、回復量算出部１４は、生体情報取得部１１により取得された生体情報から対象者が睡眠状態であることを判別し、睡眠状態における生体情報に基づいて回復量を算出する。このため、対象者の活動量の回復に関連が深い睡眠状態の生体情報に基づいて回復量を算出することができる。

[0054] 本実施形態によれば、回復量算出部１４は、睡眠状態における生体情報の脳波の睡眠紡錘波及びθ波のいずれかに基づいて回復量を算出する。このた

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め、眠りの深さから回復量を算出できない場合でも、回復量を算出することができる。

[0055] 本実施形態によれば、回復量算出部１４は、睡眠状態における生体情報から推定される対象者の眠りの深さに基づいて回復量を算出する。このため、対象者が年配者である場合のようにδ波の累積出現時間等では回復度を算出することができない場合でも、回復量を算出することができる。

[0056] 本実施形態によれば、基準活動量設定部１５は、保有活動量算出部１６が直前に算出した保有活動量を基準活動量として設定する。このため、即時的に変動する対象者の保有活動量をより高精度で算出することができる。

[0057] 本実施形態によれば、保有活動量算出部１６は、対象者の過去の消費活動量及び回復量の履歴に基づいて、保有活動量を算出するためのパラメータを補正する。このため、より対象者の実情に合った活動量の算出が可能となる。

[0058] 本実施形態によれば、情報表示部１９が、保有活動量算出部１６により算出された保有活動量を表示する。このため、即時的に対象者の保有する活動量を表示することができる。

[0059] 本実施形態によれば、情報表示部１９が、刺激提示部１８は、保有活動量算出部１６が算出した保有活動量が所定の閾値以下となった場合に、対象者の集中を維持又は向上させるための刺激を提示する。このため、対象者の集中を維持又は向上させるとともに、対象者の保有する活動量が低くなったことを即時的に報知することができる。

[0060] 以下、本発明の第２実施形態について説明する。上記第１実施形態では、対象者の保有活動量を算出するための各構成要素が一つの装置内に備えられていたが、本実施形態では、対象者の保有活動量を算出するための各構成要素が複数のユニットに分離されて備えられたシステムとして構成されている。図１１に示すように、本実施形態の保有活動量算出システム１００ａは、ワイヤレス心電センサ２１と携帯端末５０とを有する。

[0061] ワイヤレス心電センサ２１は、対象者の胸部にディスポ電極により取り付

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けられる。ワイヤレス心電センサ２１は、対象者の心電を計測し、計測結果を通常の無線通信やbruetooth（登録商標）等の近距離無線通信により携帯端末５０に送信する。

[0062] 携帯端末５０は、対象者や対象者の親族等の関係者が所持する携帯電話機や腕時計やモバイル型パーソナルコンピュータ等である。携帯端末５０は、上記第１実施形態の保有活動量算出装置１０の消費活動量算出部１３、回復量算出部１４、基準活動量設定部１５、保有活動量算出部１６、活動量予測算出部１７、刺激提示部１８及び情報表示部１９を備える他、心拍特徴量算出部２２及び脳波特徴量推定部２３を備える。

[0063] 心拍特徴量算出部２２は、ワイヤレス心電センサ２１が計測した対象者の心電に関する情報の内、Ｒ波の間隔（ＲＲＩ）から心拍数ＨＲを算出し、１分間のＲＲＩから分散ＲＲＶを算出する。

[0064] 脳波特徴量推定部２３は、心拍特徴量算出部２２が算出したＨＲ及びＲＲＶを説明変数とし、対象者の脳波のθ波のパワーを被説明変数とする線形回帰モデルを用いて対象者のθ波を推定する。これにより、本実施形態の保有活動量算出システム１００ａでは、実際に対象者の脳波を測定しなくとも、対象者のθ波の情報を得ることができる。脳波特徴量推定部２３は、上記方法に限定されず、対象者の脳波を様々な機械学習手法により推定することができる。

[0065] 消費活動量算出部１３は、上記第１実施形態と同様に、脳波特徴量推定部２３により推定されたθ波のパワーから対象者の消費活動量を算出する。消費活動量算出部１３は、対象者が運動を行った場合には、加速度センサ等により検出され最大加速度、加速度の累積値等から対象者の運動負荷を推定することができる。消費活動量算出部１３は、対象者が停止状態、歩行状態及び高負荷運動状態のいずれかの状態であるかを判定する。消費活動量算出部１３は、それらの状態の累積時間から対象者の疲労度（消費活動量）を算出する。保有活動量算出部１６は、基準活動量から消費活動量算出部１３が算出した消費活動量を減算して対象者の保有活動量を算出する。

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[0066] 情報表示部１９は具体的には、携帯端末や腕時計の液晶ディスプレイである。情報表示部１９には、例えば図１２に示すような表示画面２１０が表示される。表示画面２１０は、集中度表示枠２２０、歩行状態表示枠２３０及び保有活動量表示枠２４０を有する。集中度表示枠２２０は対象者の集中度を示す。歩行状態表示枠２３０は、対象者が停止状態、歩行状態及び高負荷運動状態のいずれかの状態であるかを表示する。保有活動量表示枠２４０は、対象者の集中度や保有活動量の増減をグラフとして表示する。

[0067] 刺激提示部１８は具体的には、音声スピーカやヴァイブレータであり、保有活動量算出部１６が算出した保有活動量が所定の閾値以下となった場合や、保有活動量算出部１６が算出した保有活動量の変化量が所定の閾値以上となった場合や、消費活動量算出部１３が算出した対象者の集中度又は消費活動量が所定の閾値以下となった場合や、消費活動量算出部１３が算出した対象者の集中度又は消費活動量の変化量が所定の閾値以上となった場合に、対象者の集中を維持又は向上させるための刺激を提示する。

[0068] 本実施形態では、例えば、対象者が朝に起床すると、腕時計の文字盤上に保有活動量が表示されるため、自己の保有活動量を把握することができる。また、前日の睡眠内容から自己の回復度合や眠りの質を把握し、振り返ることも可能となる。対象者は、情報表示部１９から保有活動量の履歴や運動又は休息についてのアドバイスを取得することができる。本実施形態では、時間が許せば情報表示部２０に表示される簡単な遊戯を行う。保有活動量算出部１６は、対象者の遊戯中の反応時間から現在の保有活動量を補正する。

[0069] 本実施形態では、刺激提示部１８が、保有活動量算出部１６により算出された保有活動量が所定値以下になったときに、保有活動量が所定値以下となったことを通知する。このため、対象者や対象者の親族等の関係者は、対象者の保有する活動量が低くなったことを即時的に知ることができる。

[0070] 本実施形態のシステムでは、システムの構成要素それぞれが必ずしも１つの装置ではなく、各構成要素が個別に存在しているシステムとすることができる。そのため、利便性が向上する。

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[0071] 以下、本発明の第３実施形態について説明する。本実施形態では、対象者の過去の活動量に関するデータがネットワークに接続されたサーバに保存され、当該データにより対象者の保有活動量を予測する。これにより、本実施形態では、対象者が活動限界に至る前に報知することができる可能性が増大する。

[0072] 図１３に示すように本実施形態の保有活動量算出システム１００ｂは、ワイヤレス心電センサ２１、携帯端末６０、ネットワーク１７０及びサーバ１８０を備える。また、本実施形態の保有活動量算出システム１００ｂは、選択的にワイヤレス脳波測定装置１１０、ワイヤレスカロリー算出装置１３０及びワイヤレス瞳孔観測装置１４０等を備える。ワイヤレス脳波測定装置１１０、ワイヤレスカロリー算出装置１３０及びワイヤレス瞳孔観測装置１４０等は、自動車、宿泊施設、医療機関及び一般家庭等に設置された装置とすることができ、携帯端末６０に内蔵された装置とすることもできる。

[0073] ワイヤレス脳波測定装置１１０は、脳波センサ１１２及び脳波特徴量算出部１１４を有する。脳波センサ１１２及び脳波特徴量算出部１１４は、上記第１実施形態の特徴量算出部１２と同様に対象者の脳波の特徴量を算出する。

[0074] ワイヤレスカロリー算出装置１３０は、カメラ入力装置１３２及びカロリー算出部１３４を有する。カメラ入力装置１３２は、対象者が摂取する食物を撮影する。カロリー算出部１３４は、カメラ入力装置１３２が撮影した食物の画像から対象者が摂取したカロリー量を算出する。

[0075] ワイヤレス瞳孔観測装置１４０は、瞳孔センサ１４２及び瞳孔特徴量算出部１４４を有する。瞳孔センサ１４２は、対象者の瞳孔の動きを検出する。瞳孔特徴量算出部１４４は、瞳孔センサ１４２が検出した瞳孔の動きの特徴量を算出する。

[0076] ワイヤレス脳波測定装置１１０、ワイヤレスカロリー算出装置１３０及びワイヤレス瞳孔観測装置１４０等は、自動車、宿泊施設、医療機関及び一般家庭等に設置された装置である場合は、携帯端末６０を所持した対象者がこ

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れらの装置が設置された場所に立ち寄った際に計測を行い、bruetooth（登録商標）等の近距離無線通信によって計測結果を携帯端末６０に送信する。

[0077] 携帯端末６０は、対象者や対象者の親族等の関係者が所持する携帯電話機や腕時計やモバイル型パーソナルコンピュータ等である。携帯端末６０は、上記第２実施形態の心拍特徴量算出部２２等を備える他、パラメータ同定部２４を備える。パラメータ同定部２４は、例えば、（保有活動量＝a_1×基準活動量－a_2×消費活動量＋a_3×回復量）といった保有活動量を算出するための状態式の補正係数a_1～a_3等のパラメータを補正する。

[0078] 活動量予測算出部１７は、対象者のスケジュール、消費活動量、回復量及び保有活動量等のデータを学習用のデータとしてネットワーク１７０を介してサーバ１８０に送信する。サーバ１８０には、対象者のスケジュール、消費活動量、回復量及び保有活動量等の学習データが蓄積され、一定量の学習データが蓄積されるとサーバ１８０は活動量予測算出部１７に学習データに基づいた補正係数a_1～a_3等のパラメータの補正値を送信する。パラメータ同定部２４は、活動量予測算出部１７を介して受信した補正値に基づいて保有活動量を算出するための状態式の補正係数a_1～a_3等のパラメータを補正する。

[0079] 情報表示部１９は、キーパネル等により対象者の一日のスケジュールを記載可能である。携帯端末６０は、bruetooth（登録商標）等の近距離無線通信によって、ネットワーク１７０に接続されたパーソナルコンピュータに接続される。対象者がワイヤレス心電センサ２１等により計測を開始すると、そのときの対象者の心拍特徴量から対象者の消費活動量が算出される。対象者のスケジュールにおける行動、消費活動量、回復量及び保有活動量等のデータは学習用のデータとしてネットワーク１７０を介してサーバ１８０に蓄積される。一定量の学習データが蓄積されると、パラメータ同定部２４は当該データを基に保有活動量を算出するための状態式のパラメータ同定を行う。保有活動量算出部１６は同定されたパラメータを基に対象者の保有活動量を算出する。

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[0080] 本実施形態によれば、パラメータ同定部２４は、対象者の過去の消費活動量及び回復量の履歴に基づいて、保有活動量を算出するためのパラメータを補正する。このため、より対象者の実情に合った活動量の算出が可能となる。

[0081] 本実施形態によれば、保有活動量算出システム１００ｂは、様々な装置から対象者の生体情報を取得できるため、対象者の活動量の算出の精度が向上する。

[0082] 尚、本発明は、上記した実施の形態に限定されるものではなく、本発明の要旨を逸脱しない範囲内において種々変更を加え得ることは勿論である。

産業上の利用可能性

[0083] 上記の本発明の一実施形態の保有活動量算出装置、保有活動量算出方法及び保有活動量算出システムによれば、即時的に対象者の保有する活動量を算出することができる。

符号の説明

[0084] １０ 生体活動管理装置
１１ 生体情報取得部
１２ 特徴量算出部
１３ 消費活動量算出部
１４ 回復量算出部
１５ 基準活動量設定部
１６ 保有活動量算出部
１７ 活動量予測算出部
１８ 刺激提示部
１９ 情報表示部
２１ ワイヤレス心電センサ
２２ 心拍特徴量算出部
２３ 脳波特徴量推定部
２４ パラメータ同定部

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５０，６０　携帯端末

１００ａ，１００ｂ…保有活動量算出システム

１１０…ワイヤレス脳波測定装置

１１２…脳波センサ

１１４…脳波特徴量算出部

１３０…ワイヤレスカロリー算出装置

１３２…カメラ入力装置

１３４…カロリー算出部

１４０…ワイヤレス瞳孔観測装置

１４２…瞳孔センサ

１４４…瞳孔特徴量算出部

１７０…ネットワーク

１８０…サーバ

２１０…表示画面

２２０…集中度表示枠

２３０…歩行状態表示枠

２４０…保有活動量表示枠

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請求の範囲

［請求項1］ 対象者の活動量の基準となる基準活動量を設定する基準活動量設定ユニットと、

前記対象者の生体情報を取得する生体情報取得ユニットと、

前記生体情報取得ユニットにより取得された前記生体情報から前記対象者が消費した前記活動量である消費活動量を算出する消費活動量算出ユニットと、

前記生体情報取得ユニットにより取得された前記生体情報から前記対象者が回復した前記活動量である回復量を算出する回復量算出ユニットと、

前記基準活動量設定ユニットにより設定された前記基準活動量、前記消費活動量算出ユニットにより算出された前記消費活動量、及び前記回復量算出ユニットにより算出された前記回復量から、前記対象者が保有する前記活動量である保有活動量を算出する保有活動量算出ユニットと、

を備える保有活動量算出装置。

［請求項2］ 前記回復量算出ユニットは、前記生体情報取得ユニットにより取得された前記生体情報から前記対象者が睡眠状態であることを判別し、前記睡眠状態における前記生体情報に基づいて前記回復量を算出する、請求項１に記載の保有活動量算出装置。

［請求項3］ 前記回復量算出ユニットは、前記睡眠状態における前記生体情報の脳波の睡眠紡錘波及びθ波のいずれかに基づいて前記回復量を算出する、請求項２に記載の保有活動量算出装置。

［請求項4］ 前記回復量算出ユニットは、前記睡眠状態における前記生体情報から推定される前記対象者の眠りの深さに基づいて前記回復量を算出する、請求項２に記載の保有活動量算出装置。

［請求項5］ 前記基準活動量設定ユニットは、前記保有活動量算出ユニットが直前に算出した前記保有活動量を前記基準活動量として設定する、請求

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項１～４のいずれか１項に記載の保有活動量算出装置。

［請求項6］ 前記保有活動量算出ユニットは、前記対象者の過去の前記消費活動量及び前記回復量の履歴に基づいて、前記保有活動量を算出するためのパラメータを補正する、請求項１～５のいずれか１項に記載の保有活動量算出装置。

［請求項7］ 前記保有活動量算出ユニットにより算出された前記保有活動量を表示する表示ユニットをさらに備える、請求項１～６のいずれか１項に記載の保有活動量算出装置。

［請求項8］ 前記保有活動量算出ユニットにより算出された前記保有活動量が所定値以下になったときに、前記保有活動量が前記所定値以下となったことを通知する通知ユニットをさらに備える、請求項１～７のいずれか１項に記載の保有活動量算出装置。

［請求項9］ 対象者の活動量の基準となる基準活動量を設定する基準活動量設定工程と、

前記対象者の生体情報を取得する生体情報取得工程と、

前記生体情報取得工程で取得された前記生体情報から前記対象者が消費した前記活動量である消費活動量を算出する消費活動量算出工程と、

前記生体情報取得工程で取得された前記生体情報から前記対象者が回復した前記活動量である回復量を算出する回復量算出工程と、

前記基準活動量設定工程で設定された前記基準活動量、前記消費活動量算出工程で算出された前記消費活動量、及び前記回復量算出ユニットで算出された前記回復量から、前記対象者が保有する前記活動量である保有活動量を算出する保有活動量算出工程と、

を含む保有活動量算出方法。

［請求項10］ 対象者の活動量の基準となる基準活動量を設定する基準活動量設定ユニットと、

前記対象者の生体情報を取得する生体情報取得ユニットと、

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前記生体情報取得ユニットにより取得された前記生体情報から前記対象者が消費した前記活動量である消費活動量を算出する消費活動量算出ユニットと、

前記生体情報取得ユニットにより取得された前記生体情報から前記対象者が回復した前記活動量である回復量を算出する回復量算出ユニットと、

前記基準活動量設定ユニットにより設定された前記基準活動量、前記消費活動量算出ユニットにより算出された前記消費活動量、及び前記回復量算出ユニットにより算出された前記回復量から、前記対象者が保有する前記活動量である保有活動量を算出する保有活動量算出ユニットと、

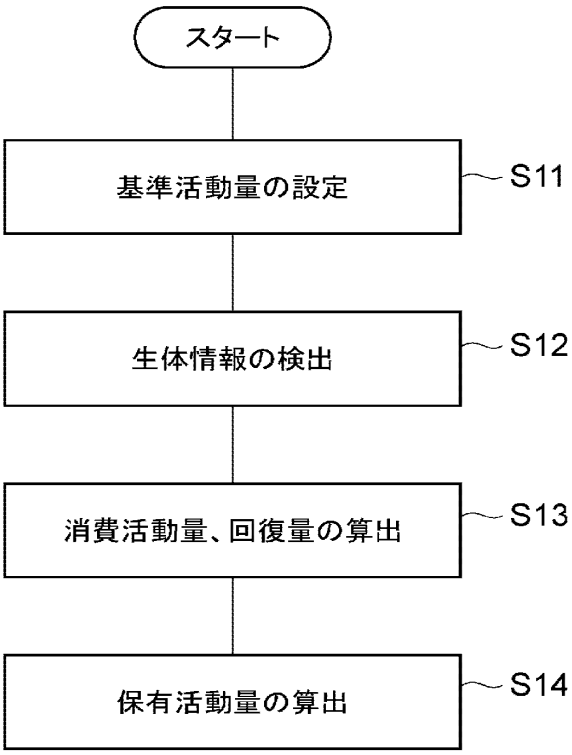
から構成される保有活動量算出システム。

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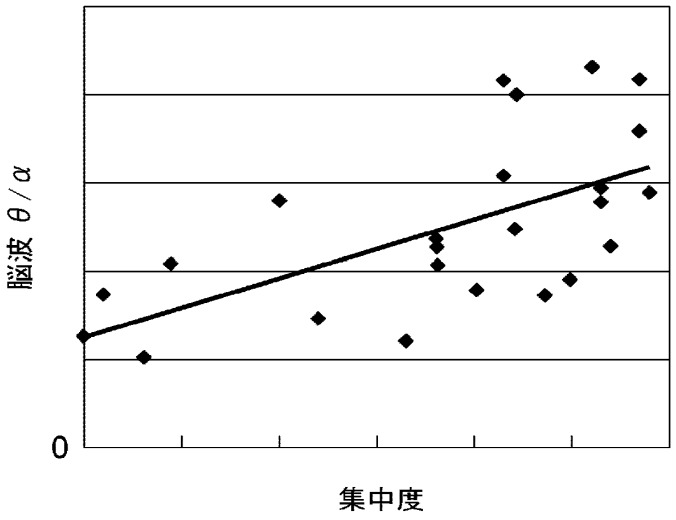
[図1]

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[図2]

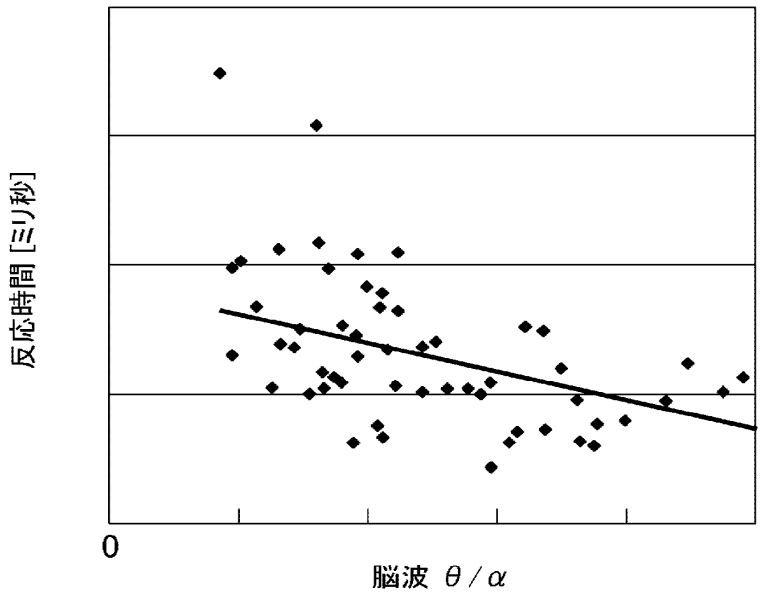

スタート
基準活動量の設定
S11
生体情報の検出
S12
消費活動量、回復量の算出
S13
保有活動量の算出
S14

[図3]



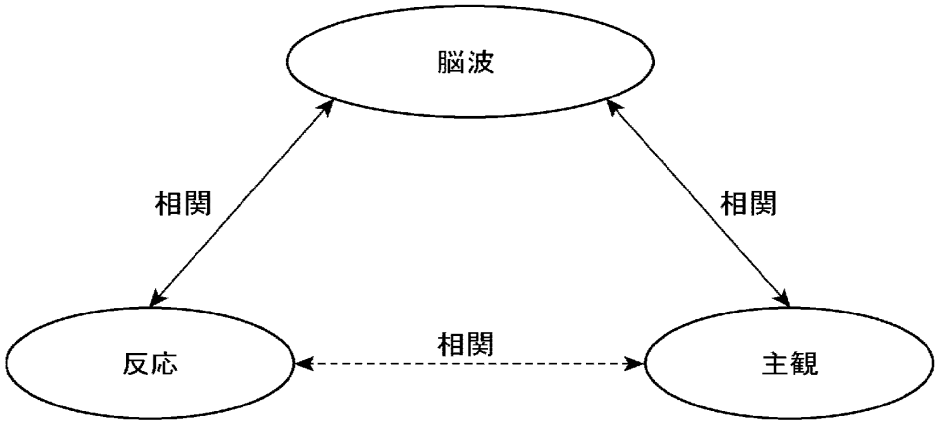
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[図4]

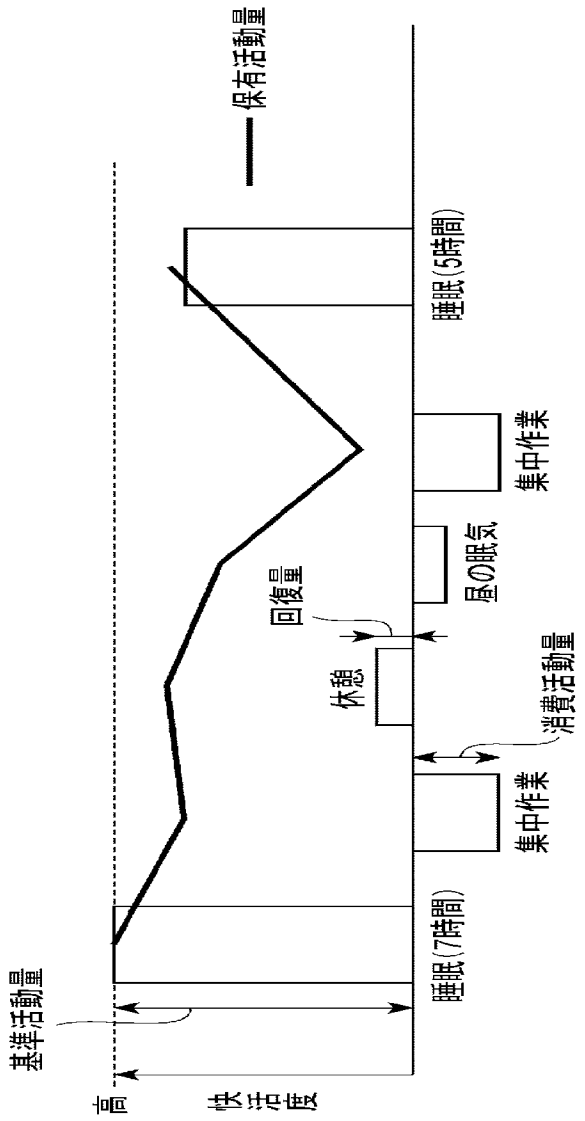


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［図5］

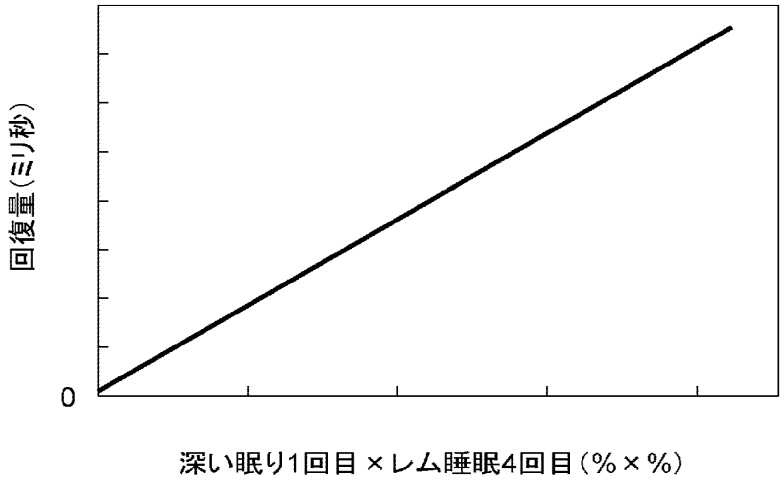


[図6]

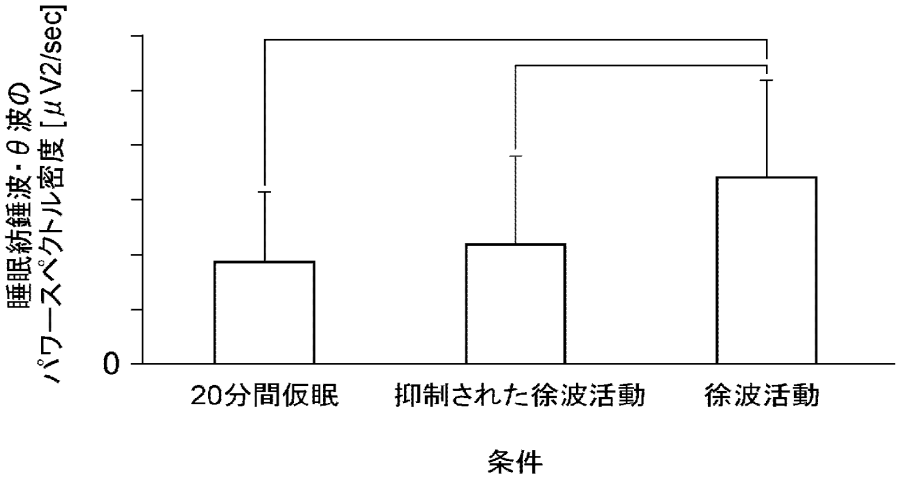


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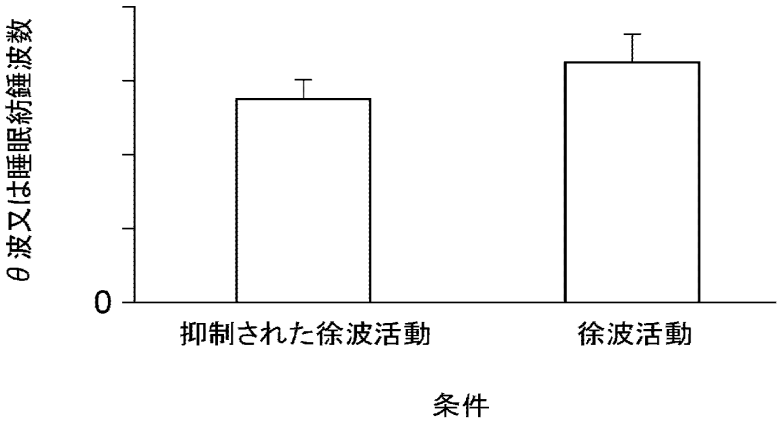
[図7]



[図8]

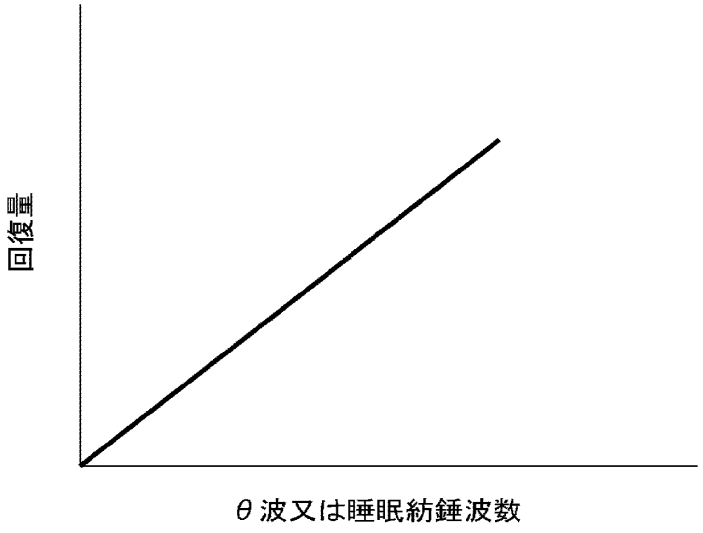


[図9]

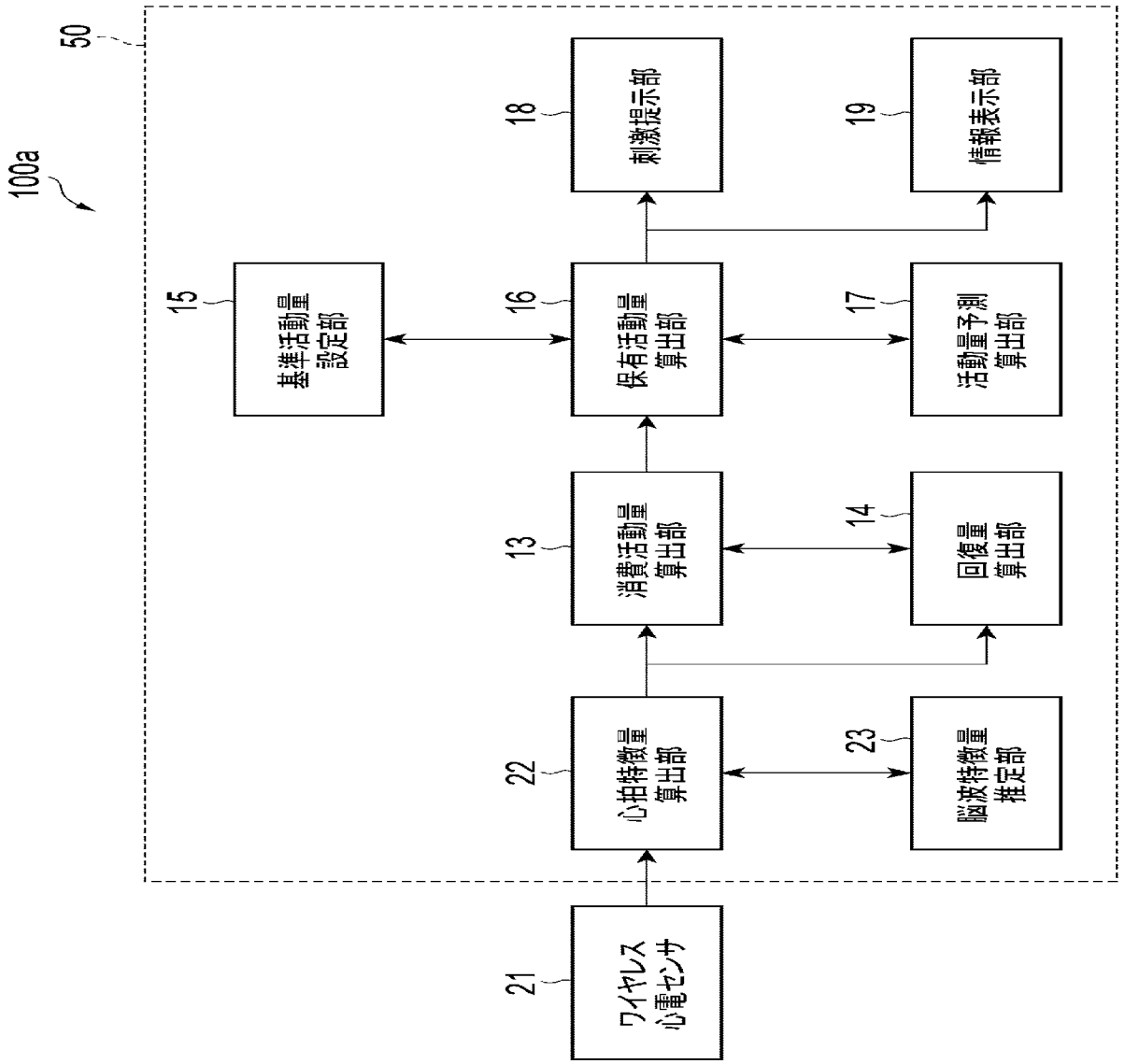


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[図10]

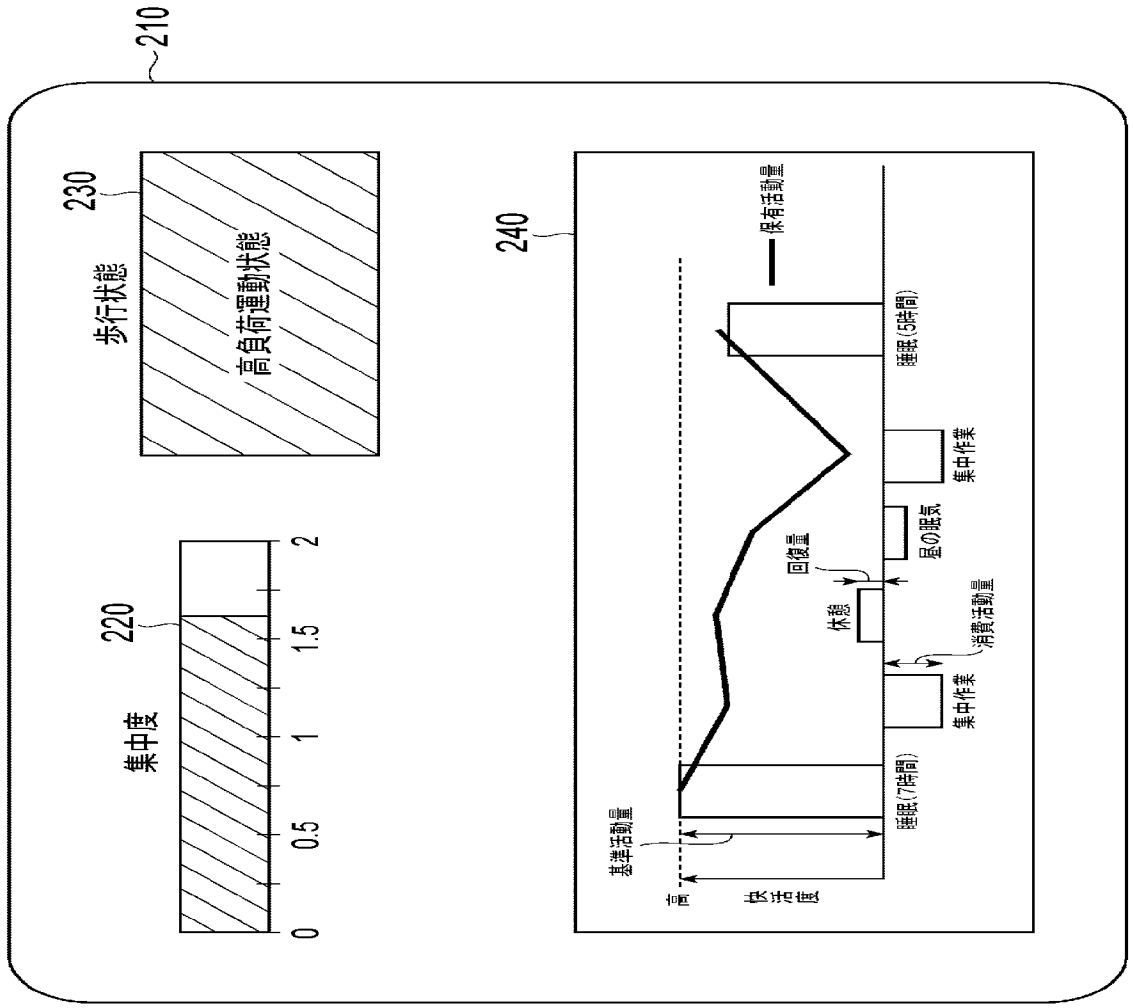


[図11]



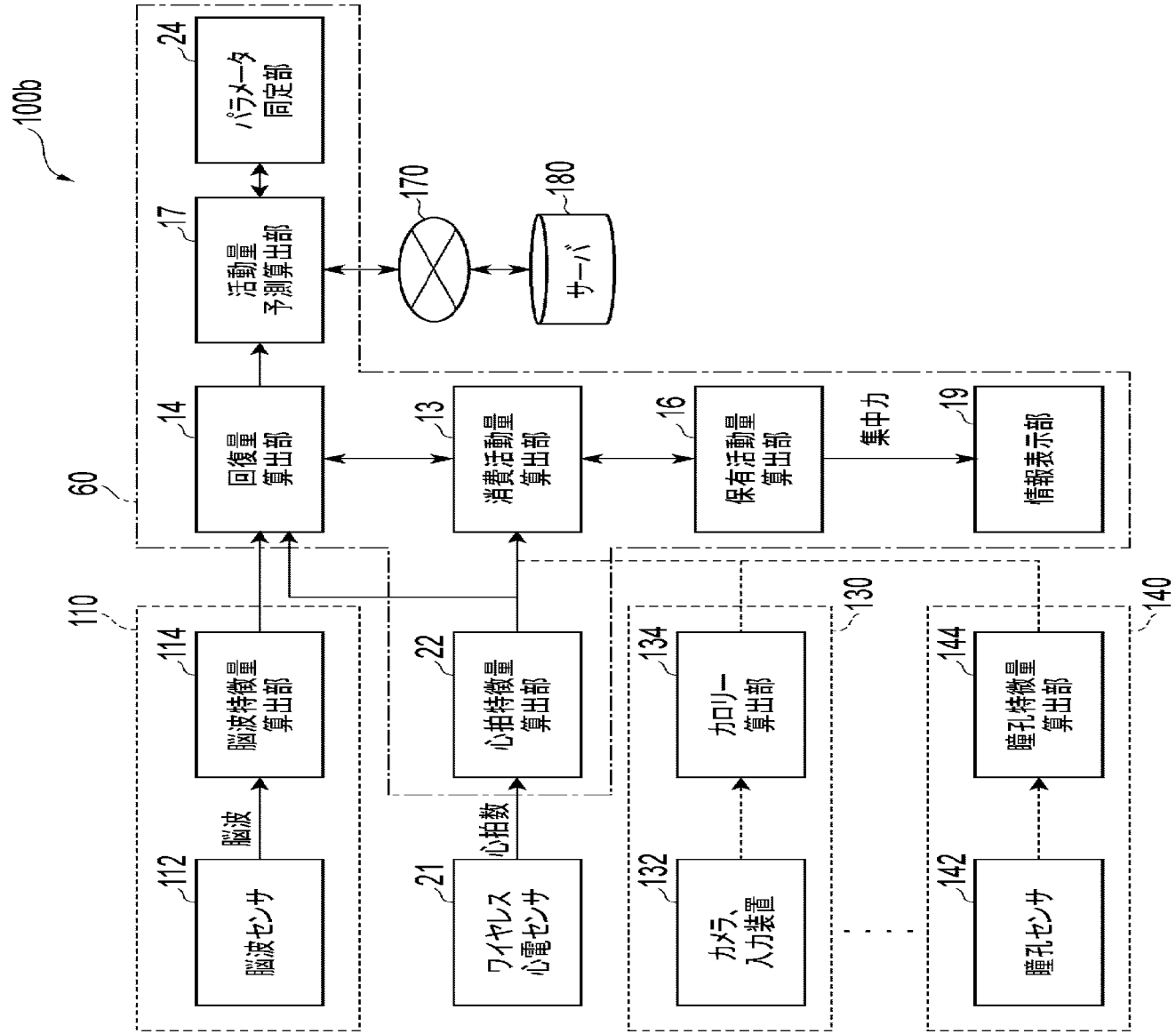
Petitioner Samsung Ex-1004, 0051

[図12]



Petitioner Samsung Ex-1004, 0052

[図13]



Petitioner Samsung Ex-1004, 0053

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2012/061428

A. CLASSIFICATION OF SUBJECT MATTER
A61B5/22(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A61B5/22

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho	1922-1996	Jitsuyo Shinan Toroku Koho	1996-2012
Kokai Jitsuyo Shinan Koho	1971-2012	Toroku Jitsuyo Shinan Koho	1994-2012

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2005-111160 A (Denso Corp.), 28 April 2005 (28.04.2005), & US 2005/0080344 A1	1-10
A	JP 2003-325489 A (Toyota Central Research and Development Laboratories, Inc.), 18 November 2003 (18.11.2003), (Family: none)	1-10

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
30 May, 2012 (30.05.12)	12 June, 2012 (12.06.12)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (July 2009)

Petitioner Samsung Ex-1004, 0054

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2012/061428

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2005-506601 A (Walter Reed Army Institute of Research), 03 March 2005 (03.03.2005), & US 2002/0005784 A1 & US 2003/0163028 A1 & US 6241686 B1 & EP 1365682 A & EP 1125237 A & WO 2002/073343 A2 & WO 2000/026841 A1 & DE 60237674 D & DE 69926904 D & DE 69926904 T & CA 2439942 A & BR 207959 A & AU 2002254130 B & AT 481030 T & AU 6134599 A & CA 2349561 A & AU 758024 B & AT 302976 T	1-10
A	JP 2001-216363 A (Fujitsu Ltd.), 10 August 2001 (10.08.2001), (Family: none)	1-10

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国際調査報告

国際出願番号　ＰＣＴ／ＪＰ２０１２／０６１４２８

Ａ．　発明の属する分野の分類（国際特許分類（ＩＰＣ））

Int.Cl.　A61B5/22(2006.01)i

Ｂ．　調査を行った分野

調査を行った最小限資料（国際特許分類（ＩＰＣ））

Int.Cl.　A61B5/22

最小限資料以外の資料で調査を行った分野に含まれるもの

日本国実用新案公報	１９２２－１９９６年
日本国公開実用新案公報	１９７１－２０１２年
日本国実用新案登録公報	１９９６－２０１２年
日本国登録実用新案公報	１９９４－２０１２年

国際調査で使用した電子データベース（データベースの名称、調査に使用した用語）

Ｃ．　関連すると認められる文献

引用文献のカテゴリー＊	引用文献名　及び一部の箇所が関連するときは、その関連する箇所の表示	関連する請求項の番号
A	JP 2005-111160 A (株式会社デンソー) 2005.04.28, & US 2005/0080344 A1	1-10
A	JP 2003-325489 A (株式会社豊田中央研究所) 2003.11.18, (ファミリーなし)	1-10

☑ Ｃ欄の続きにも文献が列挙されている。　　☐ パテントファミリーに関する別紙を参照。

＊　引用文献のカテゴリー
「Ａ」特に関連のある文献ではなく、一般的技術水準を示すもの
「Ｅ」国際出願日前の出願または特許であるが、国際出願日以後に公表されたもの
「Ｌ」優先権主張に疑義を提起する文献又は他の文献の発行日若しくは他の特別な理由を確立するために引用する文献（理由を付す）
「Ｏ」口頭による開示、使用、展示等に言及する文献
「Ｐ」国際出願日前で、かつ優先権の主張の基礎となる出願の日の後に公表された文献
「Ｔ」国際出願日又は優先日後に公表された文献であって出願と矛盾するものではなく、発明の原理又は理論の理解のために引用するもの
「Ｘ」特に関連のある文献であって、当該文献のみで発明の新規性又は進歩性がないと考えられるもの
「Ｙ」特に関連のある文献であって、当該文献と他の１以上の文献との、当業者にとって自明である組合せによって進歩性がないと考えられるもの
「＆」同一パテントファミリー文献

国際調査を完了した日 ３０．０５．２０１２	国際調査報告の発送日 １２．０６．２０１２
国際調査機関の名称及びあて先 日本国特許庁（ＩＳＡ／ＪＰ） 郵便番号１００－８９１５ 東京都千代田区霞が関三丁目４番３号	特許庁審査官（権限のある職員）　２Ｑ　９４０７ 宮澤　浩 電話番号　０３－３５８１－１１０１　内線　３２９２

Petitioner Samsung Ex-1004, 0056

Ｃ（続き）．　関連すると認められる文献

引用文献のカテゴリー＊	引用文献名　及び一部の箇所が関連するときは、その関連する箇所の表示	関連する請求項の番号
A	JP 2005-506601 A（ウォルター　リード　アーミー　インスティテュート　オブ　リサーチ）2005.03.03, & US 2002/0005784 A1 & US 2003/0163028 A1 & US 6241686 B1 & EP 1365682 A & EP 1125237 A & WO 2002/073343 A2 & WO 2000/026841 A1 & DE 60237674 D & DE 69926904 D & DE 69926904 T & CA 2439942 A & BR 207959 A & AU 2002254130 B & AT 481030 T & AU 6134599 A & CA 2349561 A & AU 758024 B & AT 302976 T	1-10
A	JP 2001-216363 A（富士通株式会社）2001.08.10,（ファミリーなし）	1-10

Petitioner Samsung Ex-1004, 0057

Espacenet

Bibliographic data: WO2013161072 (A1) — 2013-10-31

DEVICE FOR CALCULATING AMOUNT OF RETAINED PHYSICAL ACTIVITY, METHOD FOR CALCULATING AMOUNT OF RETAINED PHYSICAL ACTIVITY AND SYSTEM FOR CALCULATING AMOUNT OF RETAINED PHYSICAL ACTIVITY

Inventor(s): IIZUKA HISASHI [JP] ± (IIZUKA HISASHI)

Applicant(s): TOYOTA MOTOR CO LTD [JP]; IIZUKA HISASHI [JP] ± (TOYOTA JIDOSHA KABUSHIKI KAISHA, ; IIZUKA HISASHI)

Classification: **- international:** ***A61B5/22***
- cooperative: **A61B5/0022**; **A61B5/02405**; **A61B5/02438**; **A61B5/0476**; **A61B5/1118**; **A61B5/1123**; **A61B5/168**; **A61B5/22**; **A61B5/4812**; **A61B5/4866**; **A61B5/6898**; **A61B5/746**; **G06F19/3406**; **G06F19/3431**; **G06F19/3481**; A61B2562/0219; A61B5/0002; A61B5/0048; A61B5/024; A61B5/0245; A61B5/0816; A61B5/16; A61B5/162; A61B5/18; A61B5/4806; A61B5/6893; A61B5/7271; A61B5/7275; G06K9/0053; G06K9/00845

Application number: WO2012JP61428 20120427 Global Dossier

Priority number(s): WO2012JP61428 20120427

Also published as: CN104244825 (A) CN104244825 (B) EP2842491 (A1) EP2842491 (A4) JP5904275 (B2) more

Abstract of WO2013161072 (A1)

An expended physical activity amount-calculating unit calculates the amount of expended physical activity, which is the amount of physical activity expended by the subject calculated from bioinformation acquired by a bioinformation-acquiring unit. A recovery amount-calculating unit calculates the recovery amount, which is the amount of physical activity recovered by the subject calculated from bioinformation acquired by the bioinformation-acquiring unit. A retained physical activity amount-calculating unit calculates the retained physical activity amount, which is the amount of physical activity retained by the subject calculated from a reference physical activity amount set by a reference physical activity amount-setting unit, the expended physical activity amount calculated by the expended physical activity amount-calculating unit, and the recovery amount calculated by the recovery amount-calculating unit. The amount of physical

activity retained by the subject can thereby be calculated immediately.

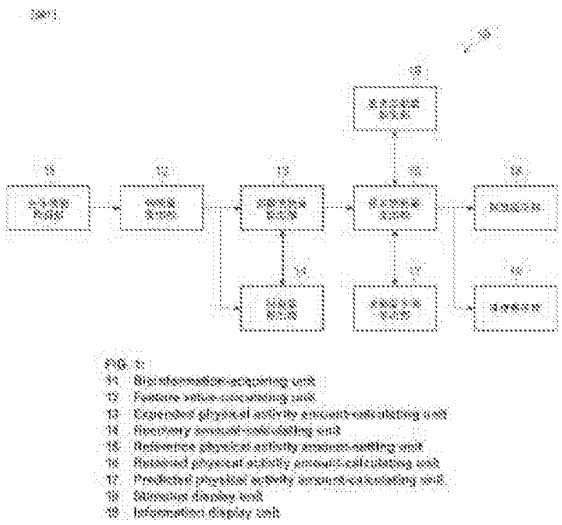


FIG. 1:
11 Bio-information-acquiring unit
12 Feature value-calculating unit
13 Expended physical activity amount-calculating unit
14 Recovery amount-calculating unit
15 Reference physical activity amount-setting unit
16 Retained physical activity amount-calculating unit
17 Predicted physical activity amount-calculating unit
18 Stimulus display unit
19 Information display unit

(19)日本国特許庁(JP)　(12)公開特許公報(A)　(11)特許出願公開番号
特開2007-222276
(P2007-222276A)
(43)公開日　平成19年9月6日(2007.9.6)

(51)Int.Cl.		F I			テーマコード（参考）
A61B 5/16	(2006.01)	A61B	5/16		4C038
A61B 5/22	(2006.01)	A61B	5/22	B	
A61B 10/00	(2006.01)	A61B	10/00	V	

審査請求 未請求　請求項の数 6　OL　（全 16 頁）

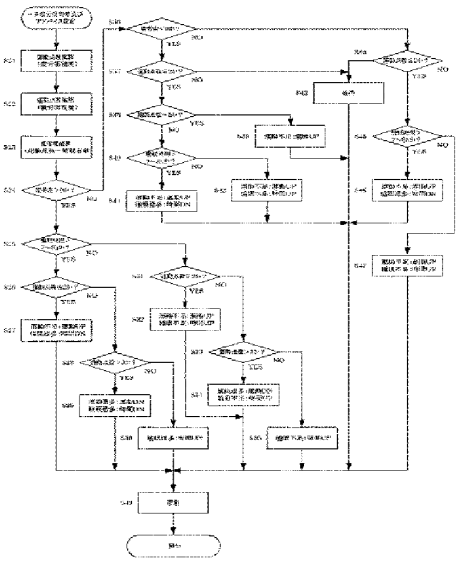
(21)出願番号　特願2006-45055(P2006-45055)
(22)出願日　平成18年2月22日(2006.2.22)

(71)出願人　000133179
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東京都板橋区前野町１丁目１４番２号
(72)発明者　佐々木　敏昭
東京都板橋区前野町１丁目１４番２号　株式会社タニタ内

Fターム(参考)　4C038 PP01　PQ06

(54)【発明の名称】健康管理装置

(57)【要約】
【課題】日中の活動データと睡眠中のデータとから一日の総合的な疲労度を判定し、前記疲労度に対する前記二つのデータの影響度合いに基づいて、少なくとも一方を選択して改善するアドバイスを提供する健康管理装置を提供する。
【解決手段】身体情報入力手段と、活動データ取得手段と、睡眠データ取得手段と、一日疲労度判定手段と、アドバイス設定手段とを備えることから、日中の活動データと睡眠中のデータとから一日の疲労度を総合的に評価することを可能とし、使用者は、一日の疲労度に対する日中の生活改善と睡眠の質的改善の内、どちらの改善が必要なのかが分かるため、無駄なく疲労回復を可能とするものである。
【選択図】　図6



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【特許請求の範囲】
【請求項1】
身体情報を入力する身体情報入力手段と、
日中の活動に関するデータを取得する活動データ取得手段と、
睡眠状態に関するデータを取得する睡眠データ取得手段と、
日中の活動データと睡眠中のデータとから一日の疲労度を演算し、前記一日の疲労度に対する日中の活動データと睡眠中のデータとの影響度合いを判定する一日疲労度判定手段と、
前記一日の疲労度に対する日中の活動データと睡眠中のデータとの影響度合いに基づいて、少なくとも影響度合いの高い一方を改善するためのアドバイスを設定するアドバイス設定手段とを備えることを特徴とする健康管理装置。
【請求項2】
前記疲労度に基づいて、経日的な累積疲労度を判定する累積疲労度判定手段を更に備えることを特徴とする請求項１記載の健康管理装置。
【請求項3】
前記活動データ取得手段は、少なくとも運動様式と運動時間とを測定する手段と、前記測定結果を運動強度に基づいて分類し、日中の活動を点数化して活動点数とする活動点数演算手段とを備えることを特徴とする請求項１又は２記載の健康管理装置。
【請求項4】
前記睡眠データ取得手段は、少なくとも睡眠時間と睡眠効率とを測定する手段と、前記測定結果を睡眠の質に基づいて分類し、睡眠を点数化して睡眠点数とする睡眠点数演算手段とを備えることを特徴とする請求項１乃至３記載の健康管理装置。
【請求項5】
前記一日疲労度判定手段は、前記活動点数から睡眠点数を引いた値を一日の疲労度として演算することを特徴とする請求項４記載の健康管理装置。
【請求項6】
前記アドバイス設定手段は、前記日中の活動データと睡眠中のデータとの内、時系列的に最新の何れか一方のデータに基づいて、次の行動に対するアドバイスを設定することを特徴とする請求項１記載の健康管理装置。

【発明の詳細な説明】
【技術分野】
【0001】
本発明は、日中の活動データと睡眠中のデータとから疲労度を回復するためのアドバイスを提供する健康管理装置に関する。
【背景技術】
【0002】
従来の睡眠中のデータを用いた健康管理装置として、睡眠中のバイタルサインを検知することによって睡眠段階を判定する装置があった（例えば、特許文献１参照）。
【0003】
また、同様に睡眠の質を評価する装置があった（例えば、特許文献２参照）。
【0004】
また、日中の活動データを用いた健康管理装置として、必要摂取カロリー及び必要消費カロリー、必要運動量又は運動強度などを算出することによって健康管理を行う装置があった（例えば、特許文献３参照）。
【0005】
更に、睡眠中のデータに基づいて日中の生活改善のためのアドバイスを提供したり、逆に、日中の活動データに基づいて睡眠の質的改善のためのアドバイスを提供する装置があった（例えば、特許文献４参照）。
【特許文献1】特開平８－１３１４０８号公報
【特許文献2】特開２００３－２１６７３４号公報

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【特許文献3】特開平１０－１１８０５２号公報
【特許文献4】特開２００４－１１３６１８号公報
【発明の開示】
【発明が解決しようとする課題】
【0006】
しかしながら、前記従来の技術は、日中の活動データと睡眠中のデータとから一日の疲労度を総合的に評価するものはなく、使用者は、一日の疲労度に対する日中の生活改善と睡眠の質的改善の内、どちらの改善が必要なのかが分からなかった。
【0007】
従って本発明は上述の問題点を解決し、日中の活動データと睡眠中のデータとから一日の総合的な疲労度を判定し、前記疲労度に対する前記二つのデータの影響度合いに基づいて、少なくとも一方を選択して改善するアドバイスを提供する健康管理装置を提供する。
【課題を解決するための手段】
【0008】
上記課題を解決するために本発明は、身体情報を入力する身体情報入力手段と、日中の活動に関するデータを取得する活動データ取得手段と、睡眠状態に関するデータを取得する睡眠データ取得手段と、日中の活動データと睡眠中のデータとから一日の疲労度を演算し、前記一日の疲労度に対する日中の活動データと睡眠中のデータとの影響度合いを判定する一日疲労度判定手段と、前記一日の疲労度に対する日中の活動データと睡眠中のデータとの影響度合いに基づいて、少なくとも影響度合いの高い一方を改善するためのアドバイスを設定するアドバイス設定手段とを備える健康管理装置を提供する。
【0009】
また、前記疲労度に基づいて、経日的な累積疲労度を判定する累積疲労度判定手段を更に備える。
【0010】
また、前記活動データ取得手段は、少なくとも運動様式と運動時間とを測定する手段と、前記測定結果を運動強度に基づいて分類し、日中の活動を点数化して活動点数とする活動点数演算手段とを備える。
【0011】
また、前記睡眠データ取得手段は、少なくとも睡眠時間と睡眠効率とを測定する手段と、前記測定結果を睡眠の質に基づいて分類し、睡眠を点数化して睡眠点数とする睡眠点数演算手段とを備える。
【0012】
また、前記一日疲労度判定手段は、前記活動点数から睡眠点数を引いた値を一日の疲労度として演算する。
【0013】
更に、前記アドバイス設定手段は、前記日中の活動データと睡眠中のデータとの内、時系列的に最新の何れか一方のデータに基づいて、次の行動に対するアドバイスを設定する。
【発明の効果】
【0014】
本発明の健康管理装置は、身体情報を入力する身体情報入力手段と、日中の活動に関するデータを取得する活動データ取得手段と、睡眠状態に関するデータを取得する睡眠データ取得手段と、日中の活動データと睡眠中のデータとから一日の疲労度を演算し、前記一日の疲労度に対する日中の活動データと睡眠中のデータとの影響度合いを判定する一日疲労度判定手段と、前記一日の疲労度に対する日中の活動データと睡眠中のデータとの影響度合いに基づいて、少なくとも影響度合いの高い一方を改善するためのアドバイスを設定するアドバイス設定手段とを備えることから、日中の活動データと睡眠中のデータとから一日の疲労度を総合的に評価することを可能とし、使用者は、一日の疲労度に対する日中

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の生活改善と睡眠の質的改善の内、どちらの改善が必要なのかが分かるため、無駄なく疲労回復を可能とするものである。

【0015】

また、前記疲労度に基づいて、経日的な累積疲労度を判定する累積疲労度判定手段を更に備えることから、日々の疲労を溜めることなく、疲労を回復することを可能とするものである。

【0016】

また、前記活動データ取得手段は、少なくとも運動様式と運動時間とを測定する手段と、前記測定結果を運動強度に基づいて分類し、日中の活動を点数化して活動点数とする活動点数演算手段とを備え、また、前記睡眠データ取得手段は、少なくとも睡眠時間と睡眠効率とを測定する手段と、前記測定結果を睡眠の質に基づいて分類し、睡眠を点数化して睡眠点数とする睡眠点数演算手段とを備え、更に、前記一日疲労度判定手段は、前記活動点数から睡眠点数を引いた値を一日の疲労度として演算することから、簡便に一日の疲労度を演算することを可能とする。

【0017】

更に、前記アドバイス設定手段は、前記日中の活動データと睡眠中のデータとの内、時系列的に最新の何れか一方のデータに基づいて、次の行動に対するアドバイスを設定することにより、前記最新データが睡眠中のデータであるならば、翌日の日中の活動に対して、また、前記最新のデータが日中の活動データであるならば、その日の睡眠に対して、各々アドバイスが設定され、使用者の生活に直ぐに反映されるアドバイスを提供することを可能とする。

【発明を実施するための最良の形態】

【0018】

本発明の健康管理装置は、身体情報を入力する身体情報入力手段と、日中の活動に関するデータを取得する活動データ取得手段と、睡眠状態に関するデータを取得する睡眠データ取得手段と、日中の活動データと睡眠中のデータとから一日の疲労度を演算し、前記一日の疲労度に対する日中の活動データと睡眠中のデータとの影響度合いを判定する一日疲労度判定手段と、前記一日の疲労度に対する日中の活動データと睡眠中のデータとの影響度合いに基づいて、少なくとも影響度合いの高い一方を改善するためのアドバイスを設定するアドバイス設定手段とを備えるものである。

【0019】

また、前記疲労度に基づいて、経日的な累積疲労度を判定する累積疲労度判定手段を更に備えるものである。

【0020】

また、前記活動データ取得手段は、少なくとも運動様式と運動時間とを測定する手段と、前記測定結果を運動強度に基づいて分類し、日中の活動を点数化して活動点数とする活動点数演算手段とを備え、また、前記睡眠データ取得手段は、少なくとも睡眠時間と睡眠効率とを測定する手段と、前記測定結果を睡眠の質に基づいて分類し、睡眠を点数化して睡眠点数とする睡眠点数演算手段とを備え、更に、前記一日疲労度判定手段は、前記活動点数から睡眠点数を引いた値を一日の疲労度として演算するものである。

【実施例】

【0021】

本発明の実施例１は、日中の活動データと睡眠中のデータとから、各データの影響度合いを含む一日の疲労度を判定し、少なくとも前記疲労度に対する影響度の大きい方を改善するアドバイスを提供する健康管理装置の一例を示す。

【0022】

まず、本実施例１の構成を図１乃至図４を用いて説明する。図１は、健康管理装置を構成する各端末と各端末間の関係とを示した構成図であり、図２、図３及び図４の各図は、各々終夜測定端末、携帯測定端末及びデータ管理端末のブロック図である。図１によると、本発明の健康管理装置１は、睡眠中のデータを取得する終夜測定端末２、日中の活動デ

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ータを取得する携帯測定端末３及び前記睡眠中のデータと日中の活動データとから、各データの影響度合いを含む一日の疲労度を判定し、前記疲労度に対する影響度の大きい方を改善するアドバイスを生成するデータ管理端末とから成り、終夜測定端末２及び携帯測定端末３とデータ管理端末４とは、各々データを送受信するための通信手段を備えて構成する。

【0023】

以下、図２、図３及び図４のブロック図を用いて、前記各端末２、３及び４の構成を詳述する。図２に示すように、前記終夜測定端末２は、生体信号測定部２ａとコントロール部２ｂとから成る。前記生体信号測定部２ａは、非圧縮性の流体を内封したマット２０と前記マット２０内部の圧力変動を検知する圧力検知部２１を備えて成り、前記コントロール部２ｂは、終夜測定端末２の動作を制御する制御部２２を備え、前記制御部２２が、測定オン／オフスイッチ等を含む端末操作用の操作部２３、前記圧力検知部２１で検知した圧力変動の信号から、呼吸（吸息・呼息に伴う胸部及び腹壁の動き）に由来する信号、脈拍（心臓の鼓動に伴う動き）に由来する信号及び体動（寝返り等による動き）に由来する信号を抽出して解析する信号解析部２４、前記解析結果に基づいて、睡眠段階・睡眠段階の周期・睡眠効率・睡眠時間・経日的な睡眠時間の周期等の睡眠状態を判定する睡眠状態判定部２５、前記各種信号や解析及び判定結果等のデータを記憶する記憶部２６、各種データや判定結果等を表示する表示部２７及び前記データ管理端末４との間でデータの送受信を行う通信部２８に各々接続されて構成する。

【0024】

また、図３に示すように、前記携帯測定端末３は、携帯測定端末３の動作を制御する制御部３０を備え、前記制御部３０が、端末の操作部と摂取カロリーを演算するための食物摂取量等を入力する入力部とを兼ねる操作兼入力部３１、日中活動時の人体の加速度変動を検出する加速度検出部３２、前記検出された加速度変動に基づいて運動情報（歩数・運動量・運動様式等）を取得する運動情報取得部３３、前記入力された食物摂取量に基づく摂取カロリーの演算、前記運動情報に基づく消費カロリーの演算及び前記演算された摂取カロリーと消費カロリーとの収支カロリーの演算を行うカロリー演算部３４、前記入力、演算及び取得されたデータを記憶する記憶部３５、各データを表示する表示部３６及び前記データ管理端末４との間でデータの送受信を行う通信部３７に各々接続されて構成する。ここで、前記カロリー演算部３４は、後述する前記データ管理端末４から送信される、使用者の身体情報に基づいて演算される、日中の活動として必要な運動量及び摂取カロリーと前記取得した運動量及び摂取カロリーとを各々比較して、前記必要な運動量及び摂取カロリーに達するまでの残りの運動量及び摂取カロリーを演算する。また、前記携帯測定端末３は、「歩く」や「走る」などの動作とは異なる運動様式、例えば「筋運動」などを区別するために使用者が筋運動の開始時と終了時に押すスイッチを前記操作兼入力部３１に設けて筋運動を認識するものであるとする。

【0025】

また、図４に示すように、前記データ管理端末４は、データ管理端末４の動作を制御する制御部４０を備え、前記制御部４０が、端末の操作部と別途測定した使用者の身体情報（年齢・性別・身長・体重・体脂肪率・筋肉量・基礎代謝量・内臓脂肪率）を入力する入力部とを兼ねる操作兼入力部４１、前記入力、終夜測定端末２及び携帯測定端末３から得られる各種データの管理、比較及び演算などを行う管理演算部４２、前記管理演算部４２において演算された結果に基づいて疲労改善のためのアドバイスデータを設定するアドバイス設定部４３、前記入力及び演算並びに前記終夜測定端末２及び携帯測定端末３から得られる各種データ並びにアドバイスデータを記憶する記憶部４４、それらを表示する表示部４５、前記終夜測定端末２及び携帯測定端末３の各々との間でデータの送受信を行う通信部４６に各々接続されて構成する。

【0026】

前記管理演算部４２は、以下の各演算部及び判定部を備えるものである。すなわち、前記入力された身体情報の内の年齢と性別とに基づく前記身体情報に係る標準値（例えば、

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肥満度並びに筋肉量及び基礎代謝量の標準値）と、前記身体情報に係る標準値に基づいて必要とされる標準的な運動量並びに消費カロリー及び摂取カロリー（以下、各々、必要運動量並びに必要消費カロリー及び必要摂取カロリーと言う。）とを演算する標準値演算部６０、前記携帯測定端末３で測定された日中の活動データの内の運動情報を、前記記憶部４４に予め記憶してある運動強度設定テーブルに当てはめて、該当する運動強度を運動点数として演算する運動点数演算部６１、前記終夜測定端末２で測定された睡眠状態の内、睡眠時間と睡眠効率判定結果と、前記記憶部４４に予め記憶してある標準的な睡眠時間とを比較して、その差分を睡眠点数として演算する睡眠点数演算部６２、前記演算された運動点数と睡眠点数とに基づいて一日の疲労度を判定し、過去の疲労度と現在の疲労度とに基づいて累積疲労度を判定する疲労度判定部６３を備える。

【0027】

次に、本実施例１の健康管理装置１の動作を図５乃至図１０を用いて説明する。図５は、健康管理装置１におけるデータ管理端末４のメインルーチンを示すフローチャートであり、図６は、一日の疲労度判定及びアドバイス設定の動作のサブルーチンを示すフローチャートであり、図７は、運動点数テーブルであり、図８は、睡眠点数テーブルであり、図９は、疲労度の判定結果として運動及び睡眠点数及び疲労度と日数との関係を示すグラフであり、図１０は、累積疲労度判定の動作のサブルーチンを示すフローチャートである。ここで、前記終夜測定端末２及び携帯測定端末３は、各々公知の測定装置に、前記データ管理端末４とデータ通信するための通信部２８及び３７を備えたものであるため、動作手順は省略する。

【0028】

図５によれば、前記データ管理端末４の電源をオンすると、ステップＳ１において、記憶部４４内に身体情報が記憶されてあり且つ変更がないかを自動で判断し、記憶されていない又は変更がある場合にはＮＯに進み、ステップＳ２において、操作兼入力部４１を用いて身体情報を入力するよう促すガイダンスを表示部４５に表示して使用者に身体情報を入力させる。身体情報が新規に入力又は変更されると、ステップＳ３において、前記管理演算部４２の標準値演算部６０で、前記身体情報の内の年齢と性別とに基づく前記身体情報に係る標準値と、前記身体情報に係る標準値に基づいて必要運動量並びに必要消費カロリー及び必要摂取カロリーとを演算してステップＳ４に移行する。また、前記ステップＳ１で身体情報が記憶されてあり且つ変更がなければＹＥＳに進み、ステップＳ４において、前記終夜測定端末２から通信部２８を介して送信される睡眠中のデータ又は携帯測定端末３の通信部３７を介して送信される日中の活動データ内、少なくとも一方のデータを、通信部４６により受信して記憶部４４に最新データとして記憶する。

【0029】

前記各データの受信及び記憶が完了すると、ステップＳ５において、疲労度を判定するための各データ、すなわち、睡眠中のデータ及び日中の活動データが記憶部４４に記憶されているか否か自動で判断され、いずれか一つでも記憶されていない場合にはＮＯに進み、ステップＳ６において、少なくとも身体情報を前記表示部４５に表示して、ステップＳ７において電源オフ操作がされたと判定されるまで表示し続け、電源オフ操作されるとＹＥＳに進み終了する。また、前記ステップＳ５において、睡眠中のデータ及び日中の活動データが記憶部４４に記憶されていると判断されるとＹＥＳに進み、ステップＳ８において、図６のフローチャートを用いて後述するが、管理演算部４２において各演算と一日の疲労度の判定とを行い、前記一日の疲労度の改善が必要な場合に、前記睡眠中のデータと日中の活動データとの前記一日の疲労度への影響度合いに基づいて、前記アドバイス設定部４３において、改善が必要な少なくとも一方へのアドバイス設定が成される。

【0030】

続くステップＳ９において、前記記憶部４４に過去に判定された疲労度が記憶されているか否か自動で判断され、記憶されていない場合にはＮＯに進み、ステップＳ１１において、前記ステップＳ３で演算された必要運動量並びに必要消費カロリー及び必要摂取カロリーや前記ステップＳ８において判定された一日の疲労度を改善するためのアドバイスを

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、前記終夜測定端末２又は携帯測定端末３の内、前記改善アドバイスを設定した少なくとも一方に通信部４６を介してアドバイスデータを送信する。また、過去の疲労度が記憶されている場合にはＹＥＳに進み、ステップＳ１０において、図１０のフローチャートを用いて後述するが、経日的な累積疲労度を判定し、ステップＳ１１において、必要に応じて終夜測定端末２又は携帯測定端末３へデータを送信する。

【0031】

各端末２又は３の内少なくとも一方への各種データの送信が完了すると、ステップＳ６において、前記演算及び判定結果やアドバイスデータを表示部４５に表示して、上述したのと同様にして、ステップＳ７において電源オフを判定し、電源オフされるまで表示を続ける。前記疲労度の判定結果の表示の一例としては、図９に示すような疲労点数及び疲労度と日数との関係をグラフ化して示すものである。

【0032】

ここで、前記図５のフローチャートのステップＳ８において、後述するとしていた一日疲労度判定及びアドバイス設定について、図６乃至図１０を含めて説明する。まず、図６のフローチャートのステップＳ２１において、一日の疲労度を判定するために必要な運動点数を管理演算部４２の運動点数演算部６１において演算する。本実施例１においては、携帯測定端末３から送信された運動情報の内、運動様式と運動時間とを、前記記憶部４４に予め記憶してある運動点数テーブルに当てはめて、該当する点数を導くものである。運動点数テーブルは、例えば、図７に示すように、一日の内で「歩く」、「走る」及び「筋運動」の各運動様式と運動した時間とによって分類されるものであり、２時間以上の「歩く」運動をし且つ１時間未満の「走る」運動をし且つ１時間未満の「筋運動」をした場合に、運動点数＝３点とするものである。ここでは、疲労の蓄積度合いが低い順に１から５までの運動点数として表し、運動点数＝３のときに一般的に標準的とされる運動をしていることを表す。

【0033】

続くステップＳ２２において、睡眠点数を管理演算部４２の睡眠点数演算部６２において演算する。本実施例１においては、終夜測定端末２から送信された睡眠情報の内、睡眠時間と睡眠効率との積で算出される実睡眠時間（以下、この実睡眠時間を睡眠時間と言う。）を、前記記憶部４４に予め記憶してある睡眠点数テーブルに当てはめて、該当する点数を導くものである。睡眠点数テーブルは、例えば、図８に示すように、一般的に人の睡眠時間は７～８時間程度が最適であるとされていることから、現実的な範囲で睡眠時間を分類したものであり、５時間以上６時間未満の睡眠又は９時間以上１０時間未満の睡眠の場合に、睡眠点数＝３点とするものである。ここでは、疲労の回復度合いが低い順に１から５までの睡眠点数として表す。

【0034】

更に、ステップＳ２３において、前記管理演算部４２の疲労度判定部６３で、前記演算した運動点数から睡眠点数を引いたものを疲労度として演算する。すなわち、前記疲労度は、－４～４までの範囲で、プラスになるほど疲労蓄積度合いが高く、マイナスになるほど疲労回復度合いが高いと判定されるものである。以降、ステップＳ２４からステップＳ４１までは、疲労度合いの判定と前記疲労度合いに対する疲労蓄積度（運動）と疲労回復度（睡眠）との影響度合いに応じて、前記アドバイス設定部４３においてアドバイスを設定する手順を示す。

【0035】

ステップＳ２４において、前記演算した疲労度（運動点数－睡眠点数）＞０か否か、すなわち、疲労回復度合いに比べて疲労蓄積度合いの方が大きいか否かを判定し、疲労度＞０であればＹＥＳに進み、ステップＳ２５において、前記睡眠点数に係る睡眠時間＞７～８ｈか否か、すなわち、睡眠点数が、最適を表す５でなく且つ睡眠時間が長いか否かを判定する。睡眠時間が長い場合にはＹＥＳに進み、続くステップＳ２６において運動点数≦２か否か、すなわち、一般的に標準とされる運動よりも運動していないか否かを判定する。運動点数≦２である場合にはＹＥＳに進み、ステップＳ２７において、疲労が解消でき

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なかった原因は、睡眠時間が最適な時間よりも長かったことと、日中のパフォーマンスが低下、すなわち運動不足により睡眠の質が低下したことも要因の一つであると判定し、前記アドバイス設定部４３において、運動量を増加すると共に睡眠時間を減らすようアドバイスを設定し、ステップＳ４９において、前記運動点数、睡眠点数及び疲労度並びにアドバイスを、制御部４０に備えた図示しない計時部から読み込んだ日時データと共に記憶部４４に記憶する。また、前記ステップＳ２６で運動点数≦２ではない場合にはＮＯに進み、ステップＳ２８において、運動点数>３か否か、すなわち、一般的に標準とされる運動よりも運動したか否かを更に判定する。運動点数>３である場合にはＹＥＳに進み、ステップＳ２９において、疲労が解消できなかった原因は、睡眠時間が最適な時間より長かったことと、運動過多により疲労が蓄積されているためと判定し、前記アドバイス設定部４３において、運動量を低減すると共に睡眠時間を減らすようアドバイスを設定し、ステップＳ４９において、前記運動点数、睡眠点数及び疲労度並びにアドバイスを、制御部４０に備えた図示しない計時部から読み込んだ日時データと共に記憶部４４に記憶する。また、前記ステップＳ２８で運動点数>３でない場合にはＮＯに進み、ステップＳ３０において、疲労を感じている原因は、睡眠時間が長すぎるためであると判定し、睡眠時間を減らすようアドバイスを設定して、前述と同様にしてデータを記憶する。

【0036】

また、前記ステップＳ２５において、睡眠時間>７～８ｈではない場合（ここでは、疲労度>０であるため、睡眠点数５となる７～８ｈの最適な睡眠時間は得られてなく、睡眠時間<７～８ｈである場合に該当する。）にはＮＯに進み、続くステップＳ３１において、前記運動点数≦２か否か、すなわち、一般的に標準とされる運動よりも運動していないか否かを更に判定する。運動点数≦２である場合にはＹＥＳに進み、ステップＳ３２において、疲労が解消できなかった原因は、睡眠時間が最適な時間より短かったことと、日中のパフォーマンスが低下、すなわち運動不足により睡眠の質が低下したことも要因の一つであると判定し、運動量を増加すると共に睡眠時間を増やすようアドバイスを設定してデータを記憶する。また、前記ステップＳ３１で運動点数≦２ではない場合にはＮＯに進み、続くステップＳ３３において、運動点数>３か否か、すなわち、一般的に標準とされる運動よりも運動したか否かを更に判定する。運動点数>３である場合にはＹＥＳに進み、ステップＳ３４において、疲労が解消できなかった原因は、睡眠時間が最適な時間より短かったことと、運動過多により疲労が蓄積されているためと判定し、運動量を低減すると共に睡眠時間を増やすようアドバイスを設定してデータを記憶する。また、前記ステップＳ３３で運動点数>３でない場合にはＮＯに進み、ステップＳ３５において、疲労を感じている原因は、睡眠時間が最適な時間より短く、睡眠不足であるためと判定し、睡眠時間を増やすようアドバイスを設定してデータを記憶する。

【0037】

また、前記ステップＳ２４において疲労度>０でない場合にはＮＯに進み、ステップＳ３６において疲労度<０か否か、すなわち、疲労蓄積度合いに比べて疲労回復度合いの方が大きいか否かを判定する。疲労度<０であればＹＥＳに進み、続くステップＳ３７において、運動点数≦２か否か、すなわち、一般的に標準とされる運動よりも運動していないか否かを更に判定し、運動点数≦２でない場合にはＮＯに進み、ステップＳ４３において、日中十分に活動し且つ睡眠により十分疲労が回復されていると判定して、現状の運動と睡眠との関係を維持するようアドバイスを設定してデータを記憶する。また、前記ステップＳ３７において、運動点数≦２である場合にはＹＥＳに進み、続くステップＳ３８において、睡眠時間＝７～８ｈか否か、すなわち、睡眠点数が、最適を表す５か否かを更に判定する。睡眠時間＝７～８ｈであった場合にはＹＥＳに進み、ステップＳ３９において、明らかに運動不足であると判定し、運動量を増加するようアドバイスを設定して記憶する。また、前記ステップＳ３８において、睡眠時間＝７～８ｈでない場合にはＮＯに進み、続くステップＳ４０において、睡眠時間>７～８ｈか否か、すなわち、睡眠点数が、最適を表す５でなく且つ睡眠時間が長いか否かを更に判定する。睡眠時間が長い場合にはＹＥＳに進み、ステップＳ４１において、明らかに運動不足であり、適度な疲労蓄積度合いが

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極端に少ないことから、相対的に疲労度がないように見えるだけであると判定し、運動量を増加すると共に睡眠時間を減らすようアドバイスを設定して記憶する。また、前記ステップＳ４０において、睡眠時間>７～８ｈでない場合にはＮＯに進み、ステップＳ４２において、明らかに運動不足であり、適度な疲労蓄積度合いが極端に少ないことから、相対的に疲労度がないように見えるだけであると判定し、運動量を増加すると共に睡眠時間を増やすようアドバイスを設定して記憶する。

【0038】

また、前記ステップＳ３６において、疲労度<０でない場合、すなわち疲労度＝０である場合にはＮＯに進み、ステップＳ４４において、運動点数≦２か否かを判定し、運動点数≦２でない場合にはＮＯに進み、ステップＳ４３において、日中十分に活動し且つ睡眠により十分疲労が回復されていると判定して、現状の運動と睡眠との関係を維持するようアドバイスを設定してデータを記憶する。また、前記ステップＳ４４において、運動点数≦２である場合にはＹＥＳに進み、続くステップＳ４５において、睡眠時間>７～８ｈか否か、すなわち、睡眠点数が、最適を表す５でなく且つ睡眠時間が長いか否かを更に判定する。睡眠時間が長い場合にはＹＥＳに進み、Ｓ４６において、明らかに運動不足であり、適度な疲労蓄積度合いが極端に少ないことから、相対的に疲労度がないように見えるだけであると判定し、運動量を増加すると共に睡眠時間を減らすようアドバイスを設定して記憶する。また、前記ステップＳ４５において、睡眠時間>７～８ｈでない場合にはＮＯに進み、Ｓ４７において、明らかに運動不足であり、適度な疲労蓄積度合いが極端に少ないことから、相対的に疲労度がないように見えるだけであると判定し、運動量を増加すると共に睡眠時間を増やすようアドバイスを設定して記憶する。

【0039】

また、前記図５のフローチャートのステップＳ１０において、後述するとしていた累積疲労度判定について、図１０のフローチャートを含めて説明する。まず、ステップＳ５１において、記憶部４４から過去の疲労度を読み込む。続くステップＳ５２において、前記管理演算部４２の疲労度判定部６３で、累積疲労度＝現在の疲労度－過去の疲労度を演算し、ステップＳ５３において、前記累積疲労度>０か否か、すなわち、疲労度の経日的な変化から疲労度が蓄積されているか否かを判定する。累積疲労度>０であった場合にはＹＥＳに進み、ステップＳ５４において、累積疲労度の上昇を抑えるために、図５のフローチャートのステップＳ３において、管理演算部４２の標準値演算部６０を用いて演算されたデータの内、必要運動量を低減するように補正し、合わせて、睡眠に関しても、必要に応じてより良い睡眠をとる必要がある等のアドバイスを設定し、ステップＳ５５において、前記演算した累積疲労度、補正した必要運動量及び睡眠に関するアドバイスを記憶部４４に記憶してから図５のメインフローチャートに戻る。また、前記ステップＳ５３において、累積疲労度>０でない場合にはＮＯに進み、前記ステップＳ５５において、前記累積疲労度を記憶して図５のメインフローチャートに戻る。

【実施例】

【0040】

本発明の実施例２を図１１及び図１２を含めて説明する。ただし、実施例２の構成は、実施例１と同じであるものとし、ここでは、健康管理装置１を健康管理装置１００として説明するものとする。図１１は、健康管理装置１００におけるデータ管理端末４のメインルーチンを示すフローチャートであり、図１２は、一日の疲労度判定及びアドバイス設定の動作のサブルーチンを示すフローチャートである。

【0041】

まず、図１１において、健康管理装置１００のデータ管理端末４の電源をオンすると、ステップＳ６１からステップＳ６４までは、実施例１で示した図５のステップＳ１からステップＳ４までと同様に動作し、続くステップＳ６５において、図１２を用いて後述するが、管理演算部４２において各演算と一日疲労度の判定とを行い、前記ステップＳ６４において記憶された睡眠中のデータ又は日中の活動データの内、時系列的に最新データとなる何れか一方のデータに基づいて最新の疲労度を判定し、前記アドバイス設定部４３にお

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いて、前記最新データ取得時点からの次の行動に対して、使用者にバランスの取れた生活が提供できるようにアドバイスが設定される。すなわち、前記最新データが睡眠中のデータであるならば、翌日の日中の活動に対して、また、前記最新のデータが日中の活動データであるならば、その日の睡眠に対して、各々アドバイスが設定されるものである。

【0042】

続くステップＳ６６において、実施例１と同様にして運動点数と睡眠点数とから演算された過去の疲労度のデータが、前記記憶部４４内に２つ以上あるか否かが自動で判断され、記憶されていない場合にはＮＯに進み、ステップＳ６８において、前記ステップＳ６３において実施例１と同様にして演算された必要運動量並びに消費カロリー及び摂取カロリーと前記ステップＳ６５において設定されたアドバイスとを、前記終夜測定端末２又は携帯測定端末３の内、前記改善アドバイスを設定した一方に通信部４６を介して送信する。また、過去の疲労度のデータが２つ以上記録されている場合にはＹＥＳに進み、ステップＳ６７において、前記図１０のフローチャートに従って、実施例１で前述したのと同様にして、経日的な累積疲労度を判定し、ステップＳ６８において、前述と同様にして終夜測定端末２及び携帯測定端末３へデータを送信する。

【0043】

各端末２又は３の内、少なくとも一方への各種データの送信が完了すると、ステップＳ６９からステップＳ７０までは、実施例１で示した図５のステップＳ６からステップＳ７までと同様に動作し、ステップＳ６９において表示する判定結果は、実施例１で図９に例示したような、疲労点数及び疲労度と日数との関係をグラフ化したものである。

【0044】

ここで、前記図１１のフローチャートのステップＳ６５において、後述するとしていた各演算と一日の疲労度の判定及びアドバイス設定について、図１２を含めて説明する。まず、図１２のフローチャートのステップＳ７１において、前記記憶部４４に記憶された各端末２又は３から受信した各データについて、時系列で最新のデータが日中の活動データであるか否かが自動で判断される。最新データが日中の活動データである場合にはＹＥＳに進み、ステップＳ７２において、実施例１で図６のステップＳ２１に示したのと同様にして、管理演算部４２の運動点数演算部６１において運動点数を演算する。すなわち、携帯測定端末３から送信された運動情報の内、運動様式と運動時間とを、前記記憶部４４に予め記憶してある運動点数テーブル、例えば図７に示すものに当てはめて、該当する点数を導くものである。

【0045】

続くステップＳ７３において、前記最新データとして運動点数を演算した日中の活動データに対して時系列的に連続した過去の睡眠データ、すなわち前日の睡眠データから演算された睡眠点数が、記憶部４４に記憶されているか否か自動で判断される。記憶されている場合にはＹＥＳに進み、ステップＳ７４において、前記管理演算部４２の疲労度判定部６３で、前記演算した運動点数から、上述の記憶されていた睡眠点数を引いたものを疲労度として演算してステップＳ７５に移行する。また、前記ステップＳ７３において前記睡眠点数が記憶されてない場合にはＮＯに進み、ステップＳ７５において、運動点数>３か否か、すなわち、一般的に標準とされる運動よりも運動したか否かを判定する。運動点数>３である場合にはＹＥＳに進み、ステップＳ７６において、前記最新データを取得した時点においては、運動過多により疲労が蓄積されている状態にあると判定し、前記アドバイス設定部４３において、蓄積された疲労を改善するために、次の睡眠時には、７～８ｈの最適な睡眠時間を確保するようにアドバイスを設定して、ステップＳ８６において、制御部４０に備えた図示しない計時部から読み込んだ日時データと共に前記記憶部４４に記憶する。また、前記ステップＳ７５において、運動点数>３でない場合にはＮＯに進み、ステップＳ７７において、一般的に標準以下の運動しかしておらず、疲労は蓄積されていない状態であると判定して、前記アドバイス設定部４３において、疲労は蓄積されていないが、次の睡眠時には、一般的に最適な睡眠になるように心がけるようにアドバイスを設定して、ステップＳ８６において前述と同様にしてデータを記憶する。

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【0046】
　また、前記ステップＳ７１において、最新データが日中の活動データでなく睡眠中のデータである場合にはＮＯに進み、ステップＳ７８において、実施例１で図６のステップＳ２２に示したのと同様にして、管理演算部４２の睡眠点数演算部６２において睡眠点数を演算する。すなわち、終夜測定端末２から送信された睡眠情報より算出される睡眠時間を、前記記憶部４４に予め記憶してある睡眠点数テーブル、例えば図８に示すものに当てはめて、該当する点数を導くものである。
【0047】
　続くステップＳ７９において、前記最新データとして睡眠点数を演算した睡眠データに対して時系列的に連続した過去の日中の活動データ、すなわち睡眠データを測定する直前までの日中の活動データから演算された運動点数が、記憶部４４に記憶されているか否か自動で判断される。記憶されている場合にはＹＥＳに進み、ステップＳ８０において、前記管理演算部４２の疲労度判定部６３で、上述の記憶されていた運動点数から、前記演算した睡眠点数を引いたものを疲労度として演算してステップＳ８１に移行する。ここで、前述したように、疲労度は、疲労蓄積度合いを示す運動点数から疲労回復度合いを示す睡眠点数を引いたものであることから、前記アドバイス設定部４３は、前記演算された疲労度が０であれば、疲労の蓄積と回復とのバランスが取れているものとして、例えば、運動点数３で示した標準的な運動によって蓄積された疲労は、睡眠点数３以上で示される睡眠によって回復されるものとして、翌日の日中の活動に対するアドバイスを行うものである。
【0048】
　前記ステップＳ７９において、前記運動点数が記憶されてない場合にはＮＯに進み、ステップＳ８１において、睡眠点数>３か否か、すなわち、運動点数３で示される一般的に標準とされる運動による疲労蓄積を回復できる睡眠であったか否かを判定する。睡眠点数>３である場合にはＹＥＳに進み、ステップＳ８２において、日中の活動として標準以上の運動に対応できる程度の睡眠が得られたと判定し、翌日の日中活動時には、標準以上の運動を行うようにアドバイスを設定して、ステップＳ８６において、制御部４０に備えた図示しない計時部から読み込んだ日時データと共に前記記憶部４４にデータを記憶する。また、睡眠点数>３でない場合にはＮＯに進み、ステップＳ８３において、睡眠点数≦２か否か、すなわち、運動点数３で示される一般的に標準とされる運動による疲労蓄積を回復できる睡眠でないか否かを判定し、睡眠点数≦２である場合はＹＥＳに進み、ステップＳ８４において、日中の活動として標準以上の運動に対応できる程度の睡眠が得られてなく、疲労の回復が困難な状態であると判定して、翌日の日中活動時には、標準以上の運動をしないようアドバイスを設定して、ステップＳ８６において、前述と同様にしてデータを記憶する。また、前記ステップＳ８３において、睡眠点数≦２でない場合、すなわち、睡眠点数＝３である場合にはＮＯに進み、ステップＳ８５において、一般に標準とされる運動に対して丁度良い睡眠状態が得られていると判定して、翌日の日中活動時には、運動点数３となる標準的な運動を行うようにアドバイスを設定し、ステップＳ８６においてデータを記憶する。
【0049】
　なお、実施例１及び２では、図７のフローチャートのステップＳ２２において、睡眠点数を睡眠時間に基づいて演算したが、終夜計測端末２の睡眠状態判定部２５で判定されるその他の睡眠状態、例えば、睡眠段階・睡眠段階の周期・経日的な睡眠時間の周期等を用いて、より睡眠の質を詳細に表す睡眠点数を設定しても良い。また、運動点数を運動様式と時間とに基づいて演算したが、その他の運動情報を含めても良いし、運動情報だけでなく摂取カロリーを含めて日中の活動全体を表す活動点数として設定しても良い。
【0050】
　また、図１０に示した累積疲労度判定においては、疲労回復度合いの高いマイナスの状態で経日的に推移している場合は、データ管理端末４の管理演算部４２の疲労度判定部６３において、疲労度が十分に解消されていると判定し、このマイナスの推移状態において

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は、身体が十分な睡眠を得ていれば、多少の激しい運動にも十分に対応できるという常識的な考えに基づいて、より身体を鍛えることができると判定して、アドバイス設定部４３において、例えば、身体情報の内の基礎代謝量や筋肉量を向上させるような運動や、体脂肪率を減少させるような運動をするようにアドバイスを設定しても良い。

【0051】

また、データ管理端末４のアドバイス設定部４３は、食物摂取量や食品分のバランス等に関するアドバイスを提供するものであっても良い。例えば、疲労度判定部６３において、高い疲労度を示している原因として睡眠不足の影響が大きいと判定された場合には、睡眠不足の解消に効果があるとされる食品、例えば、ＭｇやＦｅやＣｕなどを多く含む、大豆食品やほうれん草や乳製品等を摂取するようにアドバイスしたり、携帯測定端末３から送信される摂取に関する情報の中で、疲労回復や睡眠の妨げになるような食品、例えば、アルコールやタバコやコーヒー等を摂取しているような場合には、警告となるアドバイスを提供するものである。

【0052】

また、終夜測定端末２とデータ管理端末４とは、各通信部２８及び４６を介してデータを送受信する構成としたが、前記終夜測定端末２の記憶部２６は、コントロール２ｂから着脱可能に構成し、データ管理端末４に、前記記憶部２６を接続する接続部を設けることにより、データを直接移動させる構成としても良い。また、コントロール部２ｂは、データ管理端末４と一体に構成しても良い。また、携帯測定端末３は、終夜測定端末２及びデータ管理端末４の記憶装置として用いても良く、各端末２及び４に各々携帯測定端末３を接続する接続部を設け、携帯測定端末３を介してデータを移動させる構成としても良い。また、データ管理端末４は、携帯測定端末３に含まれて一体で構成されても良い。

【0053】

更に、実施例に記載はないが、本健康管理装置１に、データ管理端末４のアドバイス設定部４３のアドバイスを受けて睡眠環境を調整する環境調整部を設けても良い。前記環境調整部は、例えば、エアコン、電気毛布、ヒーター等を制御して温度環境を調整するものや、照明機器、音響機器、芳香機器又は目覚まし時計等を制御して部屋の環境を調整するもの等である。

【0054】

また、前記データ管理端末４の標準値演算部６０においては身体情報に係る標準値に基づいて、必要運動量並びに必要消費カロリー及び必要摂取カロリーを演算したが、前記入力された身体情報（例えば、体脂肪率）と前記身体情報に係る標準値との差分を演算し、前記アドバイス設定部４３において、前記実施例で例示したアドバイスに加えて、前記差分を標準値に近づけるようにアドバイスを設定することによって、より使用者個人の状態に適したアドバイスを提供することができる。また、前記データ管理端末４の記憶部４４に、厚生労働省から「日本人の食事摂取基準について」にて発表されている食事摂取基準の各指標（推定平均必要量、推奨量、目安量、目標量、上限量）を予め記憶しておき、前記データ管理端末４において前記携帯測定端末３で入力された食物摂取量を受信し、前記標準値演算部６０において前記食事摂取基準の各指標とを比較演算して、前記アドバイス設定部４３において、前記実施例したアドバイスに加えて、食事摂取量を前記目標量に近づけるようにアドバイスを設定することによって、より使用者個人の状態に適したアドバイスを提供することができる。

【0055】

また、記憶部４４に予め記憶してある標準的な睡眠時間について、睡眠点数が５となる最適な睡眠時間を７～８ｈとしているが、終夜測定端末２による１週間又は１ヶ月などの長期間の測定結果から、その使用者の平均的な睡眠時間を算出して記憶することで、前記記憶部４４に予め記憶してある睡眠点数テーブルの標準的な睡眠時間を、前記平均的な睡眠時間に変更した構成としても良く、これにより睡眠点数テーブルの各々の睡眠時間に対する睡眠点数が変更され、睡眠点数の評価を一般的なものから、より使用者個人に適したものとする効果がある。

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【0056】
　また、終夜測定端末２により測定した睡眠データの長期的な測定結果から、その使用者の睡眠スケジュールを算出する構成としても良く、前記使用者の睡眠スケジュールと前記使用者の平均的な睡眠時間と組み合わせて睡眠の質を判定することで、どのタイミングで就寝及び起床をするのが良いかというアドバイスを提供でき、結果として使用者に適合した睡眠習慣を使用者に把握させる効果があり、機器の制御として、例えば時計などとの組み合わせで睡眠に最適な就寝及び起床時刻の報知が可能になる。また、長期的な測定結果より算出されたその使用者の睡眠スケジュール及び平均的な睡眠時間に対して、使用者が、例えばデータ管理端末４の操作兼入力部３１から主観的な評価を、例えば「１：短い<２：丁度良い<３：長い」などの３段階評価で入力する構成とすることで、算出された睡眠スケジュール及び平均的な睡眠時間を、使用者が習慣的にどのように感じているかという意見を反映させても良く、これにより算出された睡眠スケジュール及び平均的な睡眠時間が、真に使用者に適合しているかを判定することが可能となり、この主観的な評価結果を用いて、算出された睡眠スケジュール及び平均的な睡眠時間を補正して、より使用者に睡眠に最適な睡眠スケジュールや睡眠時間を提供することが可能となる。更に、使用者が、例えばデータ管理端末４の操作兼入力部４１などから直接データを入力することによって、記憶部４４に予め記憶してある睡眠点数テーブルの標準的な睡眠時間や算出された睡眠スケジュール及び平均的な睡眠時間を設定し直せる構成としても良く、これによっても使用者に適した条件を提供することができる。

【図面の簡単な説明】

【0057】
【図1】実施例１の健康管理装置の構成図である。
【図2】終夜測定端末のブロック図である。
【図3】携帯測定端末のブロック図である。
【図4】データ管理端末のブロック図である。
【図5】データ管理端末４の実施例１の動作のメインルーチンを示すフローチャートである。
【図6】実施例１の一日疲労度判定及びアドバイス設定のサブルーチンのフローチャートである。
【図7】運動点数テーブルである。
【図8】睡眠点数テーブルである。
【図9】運動及び睡眠点数及び疲労度と日数との関係を示すグラフである。
【図10】累積疲労度判定のサブルーチンを示すフローである。
【図11】データ管理端末４の実施例２の動作のメインルーチンを示すフローチャートである。
【図12】実施例２の一日疲労度判定及びアドバイス設定のサブルーチンのフローチャートである。

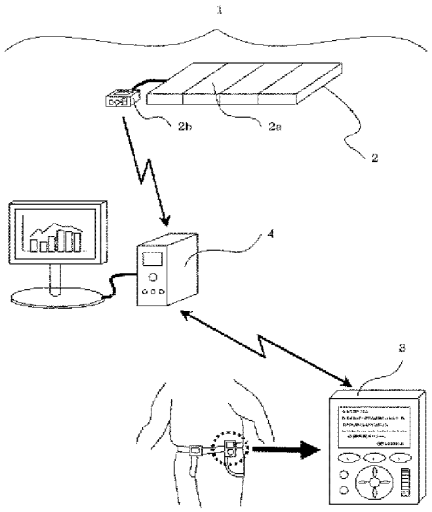
【符号の説明】

【0058】
１　健康管理装置
２　終夜測定端末
２ａ　生体信号測定部
２ｂ　コントロール部
３　携帯測定端末
４　データ管理部
２０　マット
２１　圧力検知部
２２　制御部
２３　操作部
２４　信号解析部

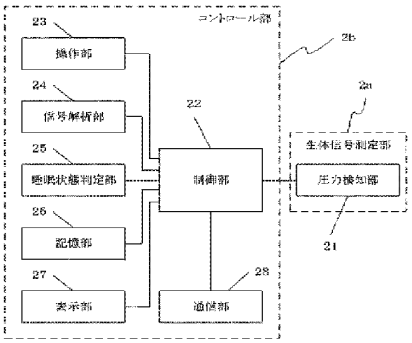
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２５　睡眠状態判定部
２６　記憶部
２７　表示部
２８　通信部
３０　制御部
３１　操作兼入力部
３２　加速度検出部
３３　運動情報取得部
３４　カロリー演算部
３５　記憶部
３６　表示部
３７　通信部
４０　制御部
４１　操作兼入力部
４２　管理演算部
４３　アドバイス設定部
４４　記憶部
４５　表示部
４６　通信部
６０　標準値演算部
６１　運動点数演算部
６２　睡眠点数演算部
６３　疲労度判定部

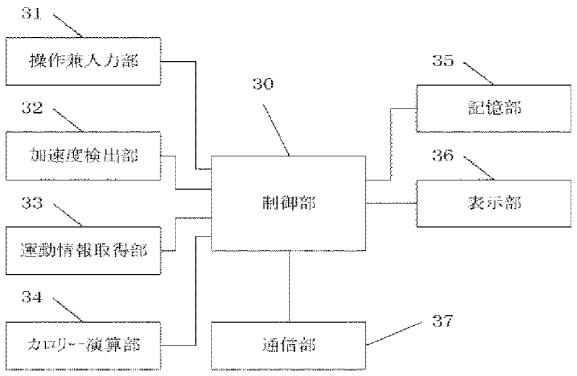
【図1】



【図2】

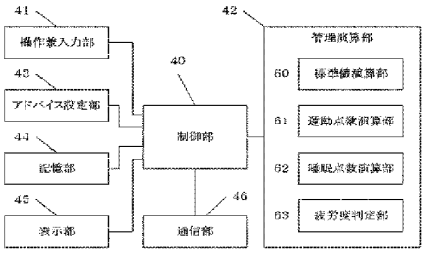


【図3】

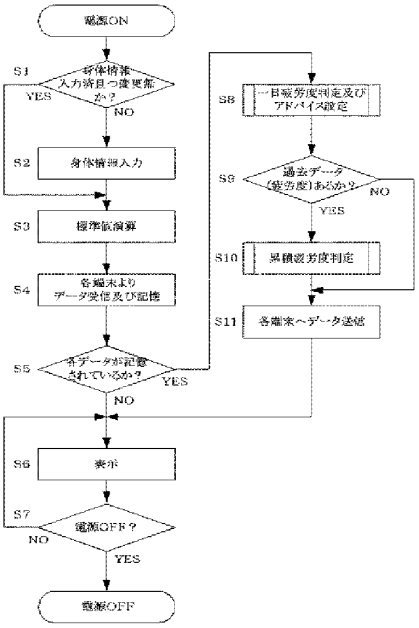


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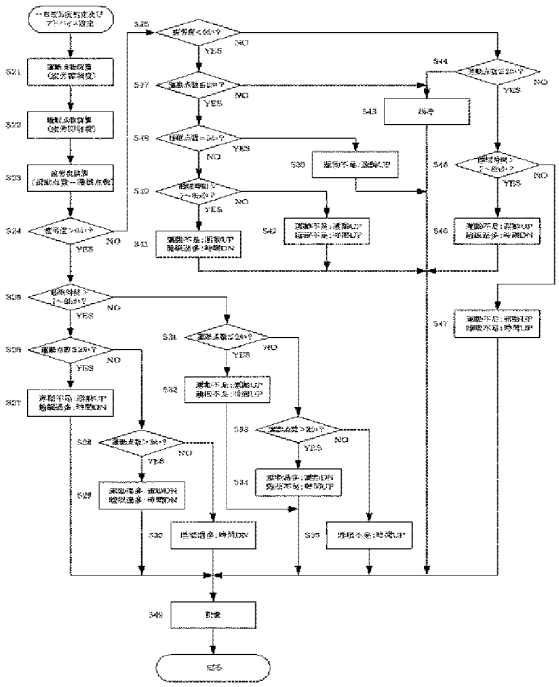
【図4】



【図5】



【図6】



【図7】

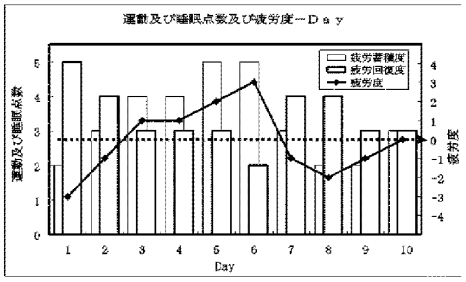
運動点数	運動様式	運動時間
5	歩く	２ｈ以上
	走る	１ｈ以上
	筋運動	１ｈ以上
4	歩く	２ｈ以上
	走る	１ｈ以上
	筋運動	１ｈ未満
3	歩く	２ｈ以上
	走る	１ｈ未満
	筋運動	１ｈ未満
2	歩く	１ｈ以上～２ｈ未満
	走る	１ｈ未満
	筋運動	１ｈ未満
1	歩く	１ｈ未満
	走る	１ｈ未満
	筋運動	１ｈ未満

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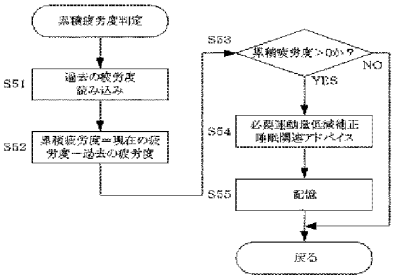
【図8】

睡眠点数	睡眠時間
5	７ｈ以上～８未満
4	６ｈ以上～７ｈ未満 ｏｒ ８ｈ以上～９ｈ未満
3	５ｈ以上～６ｈ未満 ｏｒ ９ｈ以上～１０ｈ未満
2	４ｈ以上～５ｈ未満 ｏｒ １０ｈ以上～１１ｈ未満
1	３ｈ以上～４ｈ未満 ｏｒ １１ｈ以上～１２ｈ未満

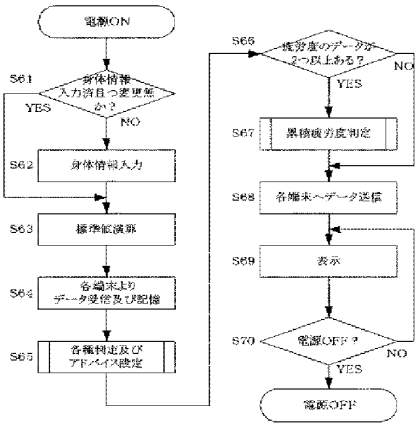
【図9】



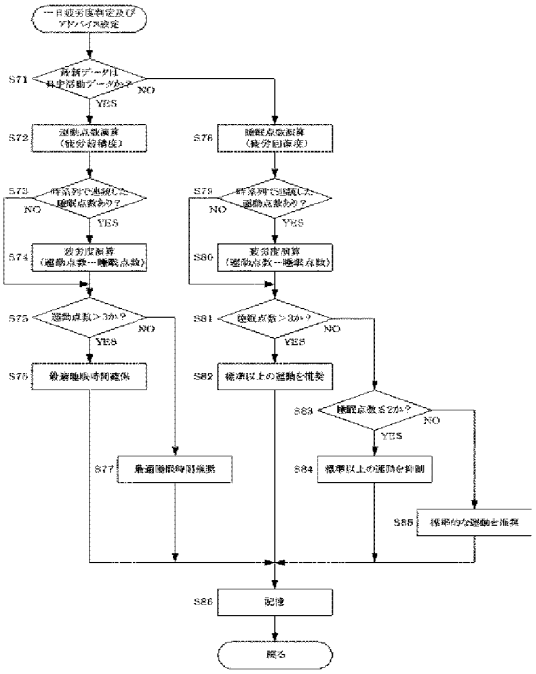
【図10】



【図11】



【図12】



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Petitioner Samsung Ex-1004, 0076

Espacenet

Bibliographic data: JP2007222276 (A) — 2007-09-06

HEALTH MANAGEMENT SYSTEM

Inventor(s): SASAKI TOSHIAKI ± (SASAKI TOSHIAKI)

Applicant(s): TANITA SEISAKUSHO KK ± (TANITA CORP)

Classification: **- international:** ***A61B10/00; A61B5/16; A61B5/22***
- cooperative:

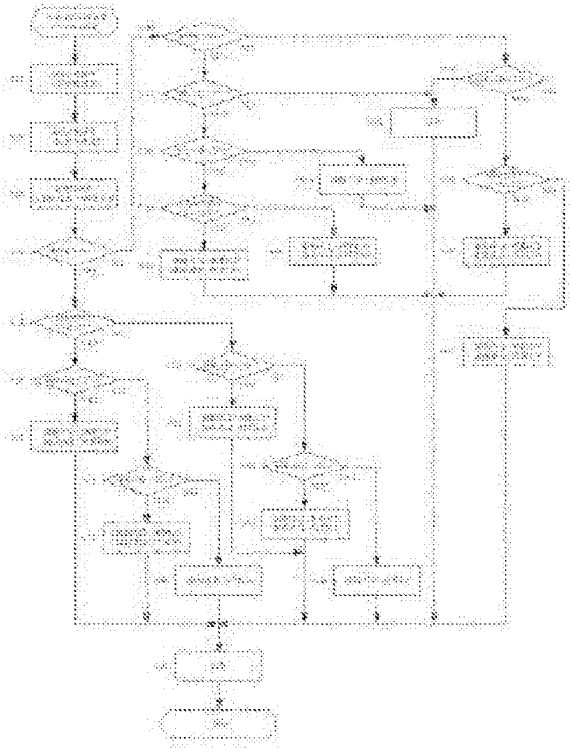
Application number: JP20060045055 20060222 Global Dossier

Priority number(s): JP20060045055 20060222

Also published as: JP4905918 (B2)

Abstract of JP2007222276 (A)

PROBLEM TO BE SOLVED: To provide a health management system which determines a degree of overall fatigue of a day from daytime activity data and data during sleep and gives advice to make an improvement by selecting at least one from degrees of influences of two data on the degree of fatigue. ;SOLUTION: Since the device is equipped with a body information entering means, an activity data acquiring means, a sleep data acquiring means, a means for determining a degree of fatigue of a day, and an advice setting means, the degree of fatigue of a day is evaluated from the daytime activity data and the data during sleep in a comprehensive manner. Since a user knows which improvement is necessary between the improvement in living during the daytime and the improvement in the quality of sleep, the user relieves fatigue in an unwasted manner. ;COPYRIGHT: (C)2007,JPO&INPIT



Petitioner Samsung Ex-1004, 0077

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (03-15)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	
	Filing Date	
	First Named Inventor	Hannu KINNUNEN
	Art Unit	
	Examiner Name	
	Attorney Docket Number	MDOA.4026.USN1_Jouzen003

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Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20100168531	A1	2010-07-01	Shaltis et al.	
	2	20140073486	A1	2014-03-13	Ahmed et al.	

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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	2013161072	WO	A1	2013-10-31	TOYOTA MOTOR CO LTD		☒
	2	2007222276	JP	A	2007-09-06	TANITA SEISAKUSHO KK		☒

EFS Web 2.1.17

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	
	Filing Date	
	First Named Inventor	Hannu KINNUNEN
	Art Unit	
	Examiner Name	
	Attorney Docket Number	MDOA.4026.USN1_Jouzen003

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NON-PATENT LITERATURE DOCUMENTS Remove

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	JONES A Y ME ET AL: "Activity Levels and Resting Energy Expenditure in an Elderly Population: A Pilot Study", Hong Kong Physiotherapy Journal, Elsevier, Amsterdam, NL, vol. 22, no. 1, 1 January 2004, ISSN: 1013-7025(09)70047-8, 4 pages.	
	2	RENNIE K ET AL: "A Combined Heart Rate and Movemetn Sensor: Proof of Concept and Preliminary Testing Study", European Journal of Clinical Nutirition, vol. 54, no 5, 1 May 2000, DOI: 10.1038/SJ.EJCN.1600973, 6 pages.	
	3	International Search Report, Application Number PCT/FI2016/050113, mailed 26 May 2016, 3 pages.	

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Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

Petitioner Samsung Ex-1004, 0080

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	
	Filing Date	
	First Named Inventor	Hannu KINNUNEN
	Art Unit	
	Examiner Name	
	Attorney Docket Number	MDOA.4026.USN1_Jouzen003

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/gcz44004/	Date (YYYY-MM-DD)	2017-08-17
Name/Print	Geza C. Ziegler	Registration Number	44004

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Petitioner Samsung Ex-1004, 0081

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The information provided by you in this form will be subject to the following routine uses:

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3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

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6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

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9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Petitioner Samsung Ex-1004, 0082

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER
First Named Inventor/Applicant Name:	Hannu KINNUNEN
Filer:	GEZA C ZIEGLER JR/Ruth DeSabia
Attorney Docket Number:	MDOA.4026.USN1

Filed as Small Entity

Filing Fees for U.S. National Stage under 35 USC 371

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
BASIC NATIONAL STAGE FEE	2631	1	140	140
NATL STAGE SEARCH FEE - REPORT PROVIDED	2642	1	240	240
NATL STAGE EXAM FEE - ALL OTHER CASES	2633	1	360	360
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**740**

Electronic Acknowledgement Receipt

EFS ID:	30104639
Application Number:	15551632
International Application Number:	PCT/FI2016/050113
Confirmation Number:	1733
Title of Invention:	METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER
First Named Inventor/Applicant Name:	Hannu KINNUNEN
Customer Number:	93582
Filer:	GEZA C ZIEGLER JR/Ruth DeSabia
Filer Authorized By:	GEZA C ZIEGLER JR
Attorney Docket Number:	MDOA.4026.USN1
Receipt Date:	17-AUG-2017
Filing Date:	
Time Stamp:	11:00:14
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$740
RAM confirmation Number	081717INTEFSW11010801
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	170725_4026_ADS.pdf	1823576 9de3e9e3fc3f93382403e66041ec7cd95862fe79	no	11
Warnings:					
Information:					
2	Documents submitted with 371 Applications	WO2016135382A1_publication.pdf	2649310 b9907da4238388f7b5c22faf50c40d6c201cd41b	no	59
Warnings:					
Information:					
3	Transmittal of New Application	pto1390_1.pdf	322650 78a22b3e6444d4ef68afefd16dfbd5ebf00f1ae7	no	4
Warnings:					
Information:					
4		4026_PrelimAMD.pdf	34699 d9ad7f5ad79cf4f58bf48a0ee7198fad8f3bd6b3	yes	6

Multipart Description/PDF files in .zip description

Document Description	Start	End
Preliminary Amendment	1	1
Claims	2	4
Abstract	5	5
Applicant Arguments/Remarks Made in an Amendment	6	6

Warnings:

Information:

5	Oath or Declaration filed	170817_4026_DAsign.pdf	834387 2a14b2f4317d9e35eb676dfda5bd2dac90299617	no	3
Warnings:					
Information:					
6	Power of Attorney	POA_OURA.pdf	1475872 1c73fad3d59cf101a20940ea8c72a2842309 0354	no	2
Warnings:					
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7	Miscellaneous Incoming Letter	Jouzen003PCT_IB306Notification_of_Recording_of_Change.pdf	35756 e885c9d09dab43e0f9922e1fc37095cd7662040f	no	1
Warnings:					
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8	Foreign Reference	WO2013161072A1.pdf	1290480 a895a7bfa4f5c360e4e5fa08e3ea85293f51247f	no	41
Warnings:					
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9	Foreign Reference	WO2013161072ENGAbs.pdf	300987 3b5b9499dad5b416942ae4716daa4ebfe67641ad	no	2
Warnings:					
Information:					
10	Foreign Reference	JP2007222276A.pdf	804314 caf027de41784ab92c6f2e2667cfa9e40f31c737	no	17
Warnings:					
Information:					
11	Foreign Reference	JP2007222276AENGAbs.pdf	223159 92cd1e0e676eeefd763c2e9a54638a6a6def1620	no	2
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Warnings:					
Information:					
13	Non Patent Literature	Jonesetal.pdf	2282399 c87d915869ba7b9386a49f945795bc5c2be8e571	no	4
Warnings:					
Information:					
14	Non Patent Literature	Rennieetal.pdf	4617979 a8f1581cf1f109d8a23f6ac8457a537b6b5f12f2	no	6
Warnings:					
Information:					
15	Fee Worksheet (SB06)	fee-info.pdf	34793 70e2e67308964022ab8ac648fd85524de51ff840	no	2
Warnings:					
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		Total Files Size (in bytes):	17765816		

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	MDOA.4026.USN1_Jouzen003
	Application Number	
Title of Invention	METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2:

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Hannu		KINNUNEN	

Residence Information (Select One) US Residency ● Non US Residency Active US Military Service

City	Oulu	Country of Residence [i]	FI

Mailing Address of Inventor:

Address 1	Piimäperäntie 2
Address 2	

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Postal Code	90800	Country [i]	FI

Inventor 2 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Harri		LAAKKONEN	

Residence Information (Select One) US Residency ◉ Non US Residency Active US Military Service

City	Oulu	Country of Residence [i]	FI

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Postal Code	90550	Country [i]	FI

Inventor 3 Remove

Legal Name

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	MDOA.4026.USN1_Jouzen003
	Application Number	
Title of Invention	METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER	

Prefix	Given Name	Middle Name	Family Name	Suffix
	Kari		KIVELÄ	

Residence Information (Select One) US Residency ◉ Non US Residency Active US Military Service

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Mailing Address of Inventor:

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Address 2			
City	Helsinki	State/Province	
Postal Code	00150	Country [i]	FI

Inventor 4 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Ashley		COLLEY	

Residence Information (Select One) US Residency ◉ Non US Residency Active US Military Service

City	Rovaniemi	Country of Residence [i]	FI

Mailing Address of Inventor:

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Address 2			
City	Rovaniemi	State/Province	
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Inventor 5 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Petteri		LAHTELA	

Residence Information (Select One) US Residency ◉ Non US Residency Active US Military Service

City	Jääli	Country of Residence [i]	FI

Mailing Address of Inventor:

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Address 2			
City	Jääli	State/Province	
Postal Code	90940	Country [i]	FI

Petitioner Samsung Ex-1004, 0090

PTO/AIA/14 (11-15)
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	MDOA.4026.USN1_Jouzen003
	Application Number	
Title of Invention	METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER	

Inventor 6 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Markku		KOSKELA	

Residence Information (Select One) US Residency ◉ Non US Residency Active US Military Service

City	Oulu	Country of Residence [i]	FI

Mailing Address of Inventor:

Address 1	Pateniementie 68 A 1
Address 2	

City	Oulu	State/Province	
Postal Code	90800	Country [i]	FI

Inventor 7 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Heidi		JURVELIN	

Residence Information (Select One) US Residency ◉ Non US Residency Active US Military Service

City	Oulu	Country of Residence [i]	FI

Mailing Address of Inventor:

Address 1	Hippiäiskuja 6 C
Address 2	

City	Oulu	State/Province	
Postal Code	90420	Country [i]	FI

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	93582		
Email Address	ptomail@gziplaw.com	Add Email	Remove Email

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	MDOA.4026.USN1_Jouzen003
	Application Number	
Title of Invention	METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER	

Application Information:

Title of the Invention	METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER		
Attorney Docket Number	MDOA.4026.USN1_Jouzen003	**Small Entity Status Claimed**	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	14	**Suggested Figure for Publication (if any)**	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	● Customer Number	US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	93582		

Petitioner Samsung Ex-1004, 0092

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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	MDOA.4026.USN1_Jouzen003
	Application Number	
Title of Invention	METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER	

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	a 371 of international	PCT/FI2016/050113	2016-02-23
Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
PCT/FI2016/050113	Claims benefit of provisional	62121425	2015-02-26
Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
PCT/FI2016/050113	Claims benefit of provisional	62205114	2015-08-14
Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
PCT/FI2016/050113	Claims benefit of provisional	62260760	2015-11-30
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button.			Add

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)[i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

			Remove
Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[i] (if applicable)
Additional Foreign Priority Data may be generated within this form by selecting the **Add** button.			Add

Petitioner Samsung Ex-1004, 0093

PTO/AIA/14 (11-15)
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	MDOA.4026.USN1_Jouzen003
	Application Number	
Title of Invention	METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER	

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

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Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

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If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

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This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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(54) Title: METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER

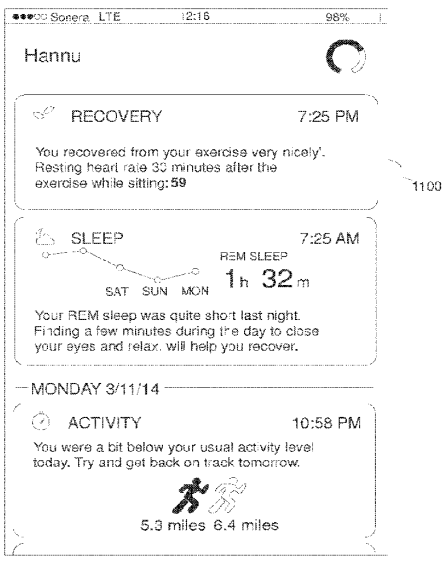


FIG. 11

(57) Abstract: A method for assessing readiness of a user comprises obtaining the user's movements; using the obtained user's movements to determine a nature of the period, wherein the nature of the period is selected from an activity period and a rest period; measuring at least one biosignal of the user during the rest period; determining a rest summary for the rest period, based on the measured at least one biosignal and at least one biosignal of a previous rest period; determining an activity summary for the activity period, based on the obtained movements of an activity period and obtained movements of at least one previous activity period; determining a body response summary based on the rest summary and the activity summary; and calculating a readiness score based on the body response summary and a previous body response summary, whereby the readiness score indicates a level of readiness of the user. The method is implemented in a system using a ring worn by the user.

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METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER

TECHNICAL FIELD

[0001] The present disclosure generally relates to analysing and processing data related to physical activities and biological signals of an individual, and, more specifically, to a method and a system for assessing readiness score of a user.

BACKGROUND

[0002] An individual is subjected to various kinds of mental and physical loads in a day to day life. For example, an individual may be subjected to physical loads (such as physical exercise, walking, driving, playing and the like) and mental loads (such as inappropriate sleep, inappropriate rest, stress and the like). Further, if such mental and physical loads are not managed or handled efficiently, it may induce mental and physical stresses. For example, the physical stress may cause health issues such as backache, spine problems and the like, and the mental stress may cause reduction in sleep, hinder concentration and impair motivation. Therefore, it is important to analyse how an individual manages or handles such mental and physical loads for maintaining a good physical and mental health and what is the readiness of the individual to face further challenges.

[0003] Conventionally, there are devices that may calculate biological signals of an individual and monitor physical activities of the individual. However, such devices do not provide any information which relates to recovery of the individual from mental or physical loads that the individual is subjected to, neither do they provide any information related to a readiness score of the individual. Further, such devices do not analyse data, associated with health parameters of the individual, in detail. For example, such devices do not consider the individuals' historical data. Also, such devices are not capable of providing appropriate suggestions or recommendations that may help the individual to efficiently recover from such mental and/or physical load and to increase the readiness score.

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[0004] Therefore, in light of the foregoing discussion, there exists a need to overcome the aforementioned drawbacks of assessing readiness score of the user.

SUMMARY

[0005] The present disclosure seeks to provide a method for assessing readiness score of a user.

[0006] The present disclosure also seeks to provide a system for assessing readiness score of a user.

[0007] In one aspect, an embodiment of the present disclosure provides a method for assessing readiness score of a user. The method comprises:

- obtaining the user's movements;
- using the obtained user's movements to determine a nature of the period, wherein the nature of the period is selected from an activity period and a rest period;
- measuring at least one biosignal of the user during the rest period;
- determining a rest summary for the rest period, based on the measured at least one biosignal and at least one biosignal of a previous rest period;
- determining an activity summary for the activity period, based on the obtained movements of an activity period and obtained movements of at least one previous activity period;
- determining a body response summary based on the rest summary and the activity summary; and
- calculating a readiness score based on the body response summary and a previous body response summary, whereby the readiness score indicates a level of readiness of the user.

[0008] In another aspect, an embodiment of the present disclosure provides a system for assessing readiness score of a user. The system comprises

- a ring configured to be worn by the user and comprising means for measuring at least one biosignal of the user during a rest period,
- a mobile communication device configured to communicate with the ring,
- means for measuring user's movements during an activity period and the rest period, and
- a server configured to communicate with the mobile communication device, the server being operable to

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- use the measured user's movements to determine a nature of the period, wherein the nature of the period is selected from the activity period and the rest period,
- determine a rest summary for the rest period, based on the measured at least one biosignal and at least one biosignal of a previous rest period,
- determine an activity summary for the activity period, based on the measured movements and measured movements of at least one previous activity period,
- determine a body response summary based on the rest summary and the activity summary; and
- calculate a readiness score based on the body response summary and a previous body response summary, whereby the readiness score indicates a level of readiness of the user.

[0009] Embodiments of the present disclosure substantially eliminate or at least partially address the aforementioned problems in the prior art, by calculating a readiness score of a user and by providing appropriate instructions to improve the readiness score.

[0010] Additional aspects, advantages, features and objects of the present disclosure would be made apparent from the drawings and the detailed description of the illustrative embodiments construed in conjunction with the appended claims that follow.

[0011] It will be appreciated that features of the present disclosure are susceptible to being combined in various combinations without departing from the scope of the present disclosure as defined by the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] The summary above, as well as the following detailed description of illustrative embodiments, is better understood when read in conjunction with the appended drawings. For the purpose of illustrating the present disclosure, exemplary constructions of the disclosure are shown in the drawings. However, the present disclosure is not limited to specific methods and instrumentalities disclosed herein. Moreover, those skilled in the art will understand that the drawings are not to scale. Wherever possible, like elements have been indicated by identical numbers.

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[0013] Embodiments of the present disclosure will now be described, by way of example only, with reference to the following diagrams wherein:

FIG. 1 is a schematic illustration of a system for assessing readiness score of a user, in accordance with an embodiment of the present disclosure;

FIG. 2 is schematic illustration of a ring worn at a finger of the user for collecting a heart rate of the user, in accordance with an embodiment of the present disclosure;

FIG. 3 is a schematic illustration of a graph showing physical activity data of the user for a week, in accordance with an embodiment of the present disclosure;

FIG. 4 is a schematic illustration of a hypnogram of the user, in accordance with an embodiment of the present disclosure;

FIG. 5 is a schematic illustration of a graph showing collected heart rate of the user for two nights, in accordance with an embodiment of the present disclosure;

FIG. 6 is a schematic illustration of a graph showing provocation measurement of the user, in accordance with an embodiment of the present disclosure;

FIG. 7 is a schematic illustration of various stages involved in calculating a readiness score by the system of FIG. 1, in accordance with an embodiment of the present disclosure;

FIG. 8 is an illustration of steps of a method for calculating a readiness score by the system of FIG. 1, in accordance with an embodiment of the present disclosure;

FIGS. 9-12 are schematic illustration of user interfaces rendered at a mobile communication device, in accordance with various embodiments of the present disclosure;

FIG. 13 is an illustration of steps of a method for assessing readiness of a user, in accordance with an embodiment of the present disclosure;

FIG. 14 is a further schematic illustration of a user interface in accordance with an embodiment of the present disclosure; and

Fig. 15 is an illustration of steps of a method in accordance with a further embodiment of the present disclosure;

FIG. 16 is an illustration of steps of a method in accordance with a further embodiment of the present disclosure;

FIG. 17 is an illustration of an exemplary user interface; and

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FIG 18A, 18B, 18C are illustrations of exemplary user interfaces according to embodiments of the present disclosure.

[0014] In the accompanying drawings, an underlined number is employed to represent an item over which the underlined number is positioned or an item to which the underlined number is adjacent. A non-underlined number relates to an item identified by a line linking the non-underlined number to the item. When a number is non-underlined and accompanied by an associated arrow, the non-underlined number is used to identify a general item at which the arrow is pointing.

DETAILED DESCRIPTION OF EMBODIMENTS

[0015] The following detailed description illustrates embodiments of the present disclosure and ways in which they can be implemented. Although some modes of carrying out the present disclosure have been disclosed, those skilled in the art would recognize that other embodiments for carrying out or practicing the present disclosure are also possible.

[0016] In one aspect, an embodiment of the present disclosure provides a method for assessing readiness score of a user. The method comprises:

- obtaining the user's movements;
- using the obtained user's movements to determine a nature of the period, wherein the nature of the period is selected from an activity period and a rest period;
- measuring at least one biosignal of the user during the rest period;
- determining a rest summary for the rest period, based on the measured at least one biosignal and at least one biosignal of a previous rest period;
- determining an activity summary for the activity period, based on the obtained movements of an activity period and obtained movements of at least one previous activity period;
- determining a body response summary based on the rest summary and the activity summary; and
- calculating a readiness score based on the body response summary and a previous body response summary, whereby the readiness score indicates a level of readiness of the user.

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[0017] In another aspect, an embodiment of the present disclosure provides a system for assessing readiness score of a user. The system comprises:

- a ring configured to be worn by the user and comprising means for measuring at least one biosignal of the user during a rest period,
- a mobile communication device configured to communicate with the ring,
- means for measuring user's movements during an activity period and the rest period, and
- a server configured to communicate with the mobile communication device, the server being operable to

  - use the measured user's movements to determine a nature of the period, wherein the nature of the period is selected from the activity period and the rest period,
  - determine a rest summary for the rest period, based on the measured at least one biosignal and at least one biosignal of a previous rest period,
  - determine an activity summary for the activity period, based on the measured movements and measured movements of at least one previous activity period,
  - determine a body response summary based on the rest summary and the activity summary; and
  - calculate a readiness score based on the body response summary and a previous body response summary, whereby the readiness score indicates a level of readiness of the user.

[0018] The term readiness in this description encompasses not only alertness or readiness of the user, or the lack of alertness or readiness of the user, but also physical and mental recovery from various kinds of stress. The readiness score is an estimated readiness of the user to perform well at a given day. It summarizes both physical and mental prerequisites for a good day. In essence, it covers the effects of earlier physical activity, previous night's sleep, and body responses measured lately. Body responses can mean for instance temperature, resting heart rates relative to user's own normative values, or how much they have changed as a response to previous day's physical activity. The terms recovery, alertness and readiness can be used interchangeably in this description and are meant to be understood as stated above.

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[0019] The present method may use different calculation parameters and it is preferably designed to learn from previous measurements. For example, the method and device may take into account the data from previous week, two weeks, a month or two months (or any other time lapse), in order to set personalized calibrations, averages and/or limits, that are typical to the user. The device may also comprise a means for resetting all measurements and calculations. Such personalized settings can be used to give further instructions to the user, to improve the user's life balance. Indeed, different users may have different reactions to stress and illnesses, as well as different means to cope and recover from stress. Furthermore, the gathered data could be used for varying the weight that is given to different aspects measured or obtained by the user, in order to further personalize the device.

[0020] In an embodiment, the ring of the system is configured to be suitably worn at a finger, such as an index finger, of the user. However, it may be evident to those skilled in the art that the system may be associated with other wearable devices, such as a device adapted to be worn at a wrist of the user. For example, the device may have the form of a ring and may be configured to have a size that is large enough to be suitably worn at the wrist of the user. According to a further embodiment, the ring is as described in PCT/FI2014/000043, which application is hereby incorporated by reference.

[0021] The ring or other device is configured to measure at least one biosignal of the user, and optionally the user's movements, which may be referred to as 'raw data' associated with the user. Further, the measured data is associated with the activity period and the rest period, as may be relevant. The term 'activity period' used herein refers to those periods of a day when the user is subjected to any physical activity, such as when the user is exercising, walking, playing or attending to normal day to day tasks. Further, the term 'rest period' used herein primarily relates to a sleeping period of the user in a day. However, the rest period may also include time period when the user is sitting or lying down to relax. The movements of the user are measured or obtained from a separate device, and used to determine whether the user is active or resting, i.e. to select the nature of the period.

[0022] In the present description, the step of measuring or obtaining the user's movements provides movement data and the measuring of at least one biosignal provides biosignal or biosignal

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data (which terms can be used interchangeably). The obtained movement data of the user during the rest period can be used for various purposes. For example, it is typically used to determine whether a moment of time belongs to the activity period or the rest period or possibly a further type of period if one or more such further types of period(s) have been defined. Further, it can be used as part of the starting data for determining the rest summary. A biosignal or several biosignals is determined during a rest period, but may be also determined during an activity period. For example, in case the temperature of the user is elevated during a rest period, it may be continued to be monitored during a following activity period, in order to ensure whether the increase was due to fever or another reason. Furthermore, elevated temperature readings such as fever can be programmed to adjust the readiness over an extended period of time, i.e. not only the following day. In practice, after being sick one or more days it will be beneficial to take additional easy days proportional to the length of the sickness.

[0023] According to an embodiment, the step of obtaining the user's movements is performed by measuring the user's movements or by retrieving the user's movement data from a separate device. The user's movements can comprise for example actual movements such as raising an arm or a hand, walking, running etc, or accumulated steps, an active time or a distance covered by the user.

[0024] Typically, the movements are measured by means for measuring the user's movements. These means can be arranged on the ring or other similar device to be worn, or in a mobile communication device or in a separate device destined to measure a user's movements, such as a pedometer. In one embodiment, the means for measuring user's movements is selected from the group consisting of an accelerometer, a gyroscope and a magnetic field sensor. It is further to be noted that the means for measuring the user's movements during the rest period can be the same means or different means from those used for measuring the user's movements during the activity period. For example, it is possible to use the measured biosignal for determining the movement data for the rest period.

[0025] According to an embodiment, the method further comprises measuring at least one biosignal during the activity period. According to another embodiment, the at least one biosignal (for either the rest period or the activity period) is selected from the group consisting of an

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electrocardiogram (EKG or ECG), a photoplethysmogram (PPG), an electromyogram (EMG), an electroocylogram (EOG), a heart rate, a heart rate variability, body temperature, a resting heart rate, an average heart rate and signals related to breathing. When a biosignal is measured both during activity and rest, it can be the same or different.

[0026] According to a further embodiment, determining the rest summary comprises at least one of determining a hypnogram, determining a sleep balance, determining lowest body temperature during rest and determining a resting heart rate. A hypnogram can be determined up to a certain accuracy with only motion data, although REM-sleep is rather difficult to differentiate from light sleep without a biosignal such as breathing rate and its dynamics, heart beat intervals or amplitude variation in ECG or PPG signal. Other possibilities are EMG, EEG or EOG that are part of polysomnographic measurement used in clinical sleep tests. On the other hand, it is also possible to use only PPG data to derive much of the same movement information than is needed regarding motion data, thus an accelerometer or other movement sensor is not mandatory. A movement sensor can be used to measure some additional information about the posture of the user, for example, but a PPG is typically sufficient to detect most of the movements. Regarding rest time related factors behind recovery/readiness, an alternative of a hypnogram would also be to determine parameters that are associated with deep sleep (for physical recovery) and REM sleep (for mental or cognitive recovery). This means determining how mentally rewarding the sleep was, and how physically rewarding the sleep was without use of a hypnogram. Use of a hypnogram could be beneficial in validating the determination, but there are alternative intermediate parameters that could also be used, such as breathing inconsistency, respiratory effort related parameters calculated from heart beat intervals or PPG pulse amplitude parameters, heart rate dynamics or stability of the parameters, eye motions, and so on. In the following, the general term "sleep factor" is used to encompass hypnograms as well as its alternatives as mentioned above.

[0027] Heart rate is one possible biosignal measured by the device in question. The heart rate is thus one optional, additional feature derivable from a PPG signal or an ECG signal. Further on, changes around the local mean or difference from whole night mean are more sensitive to sleep phases than the heart rate or the heart beat interval itself. The dynamics of PPG signal amplitude

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(e.g. difference between local max and local min around each heart beat pulse) or R peak amplitude (from ECG) provide approximately the same information as heart beat interval dynamics.

[0028] In a further embodiment, the heart rate is measured by means for measuring a heart rate, which comprise a photon source arranged on the inner surface of the ring and a photon detector arranged on the inner surface of the ring. In yet another embodiment, the ring further comprises a first electrode and a second electrode adapted to measure an electrocardiogram.

[0029] In one embodiment, the ring thus includes at least one motion sensor, such an accelerometer, a gyroscope, a magnetic field sensor or a combination thereof, to measure user's movement. The motion sensor is configured to generate motion data that is indicative of the movements of the user. For example, the motion sensor may be configured to determine linear motion information, rotational motion information, and the like. Further, such information (linear motion or rotational motion) may be combined or correlated to generate the motion data that is indicative of the user's movement. As mentioned above, the movement data can also be generated by a separate device and retrieved or obtained by the ring or the server.

[0030] In one embodiment, the heart rate is measured by measuring blood volume pulse. Specifically, the heart rate is determined by measuring PPG (photoplethysmogram) from the blood volume pulse. The PPG can be measured using optical electronics, particularity using the principle of transmittance or reflectance of light. For example, the ring includes optical electronics, i.e. at least one photon source and at least one photon detector positioned on an inner surface of the ring. The at least one photon source is infrared light (IR) emitting diode and the at least one photon detector is IR receiving diode (such as photon diode or photon transistor).

[0031] In an embodiment, when the ring is worn at the user's finger the optical electronics thereof acquire appropriate measurement data or biosignal data (i.e. blood volume pulse). Specifically, an IR light pulse is sent from the at least one photon source and thereafter the reflected IR light is received by the at least one photon detector. Further, the variations in volume of the blood vessels (during the flow of blood) result in variation in the measured transmission (i.e. IR light intensity) which is measured and processed to generate the PPG. Further, from a PPG waveform an inter-beat-interval i.e. a heart rate (time between two beats) is determined. Body temperature of the user

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is typically measured using a sensor for measuring temperature comprised in the device, for example a thermometer included in the ring.

[0032] The ring may also include other electronic components apart from the motion sensor and the optical electronics. Specifically, the ring is configured to collect and analyse the raw data (i.e. data of the motion sensor and the optical electronics). For example, the ring may include other electronic components which may include but not limited to a controller, a microprocessor, a memory and a communication module. The controller is operable to control operation of the motion sensor and the optical electronics for generating data related to the user's movement and the heart rate. The microprocessor may be operable to process or analyse the raw data generated by the motion sensor and the optical electronics. Further, the memory is used for storing the analysed or processed data. Moreover, the communication module is configured to establish a communication between the ring and the mobile communication device.

[0033] In an embodiment, the mobile communication device is connected to a communication network through a communication module. For example, the mobile communication device may be wirelessly connected to the ring by a wireless connection such as a WiFi, Bluetooth and the like.

[0034] The mobile communication device is associated with the user wearing the ring. In an embodiment, the mobile communication device includes a computing device which incudes but not limited to a smartphone, a tablet computer, a phablet and a laptop.

[0035] In an embodiment, the mobile communication device is configured to collect the analysed raw data from the ring. Further, the mobile communication device is operable to perform deep data analysis of such raw data. It is to be understood that the mobile communication device includes required electronic elements, such as a processor, and algorithms to perform such deep data analysis.

[0036] In an example, the mobile communication device is operable to perform the deep data analysis of such raw data for example to determine a heart-rate-variability (HRV) from the inter-beat-interval. Also, a respiration rate (a signal related to breathing) can be determined from the PPG wave by analysing peak values thereof.

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[0037] In another example, the deep data analysis includes determining a sleeping pattern of the user. Specifically, the data from the motion sensor may be processed by the mobile communication device to determine the sleeping pattern of the user. For example, based on the data from the motion sensor when the user went to bed and woke up can be identified. Also, based on the data from the motion sensor how long the user slept can be determined. Therefore, the data (i.e. when the user went to bed, when the user woke up and how long the user slept) enables in defining the sleeping pattern of the user.

[0038] In another example, the deep data analysis includes determining a sleep factor, such as a hypnogram for the rest period, for example when the user is sleeping. Specifically, the hypnogram is determined based on the measured motion data, photoplethysmogram waveform dynamics and heart rate dynamics using a classification algorithm, a decision tree, a neural network or equivalent. For a certain value of the hypnogram (e.g. with a resolution between 30 s and 10 min), a measurement period that is longer than the resolution of the hypnogram can be used (e.g. data from 10-20 minutes). This is because some characteristic features in the measured data appear more rarely than what is the aimed resolution of the hypnogram. Further, it gives an advantage to use more data from the history than from the future in certain features (e.g. deep sleep may start only after a certain duration of rest time but may stop when the rest time stops) in the determination of the hypnogram for a given time point. The hypnogram is used for analysing a sleep quality and various stages of sleep associated with a particular night. Similarly, the various other factors and parameters qualifying sleep may be used instead of a hypnogram. For example, the various sleep stages may include deep sleep, light sleep and rapid eye movement (REM) stage. Further, based on the absolute time at each stage and the percentage of various sleep stages the quality of sleep can be determined. Also, some or all of the following, i.e. how much the user typically accumulates on each stage, how much the user typically accumulates when weighted against the previous day's activity and what kind of feedback the user has given earlier in respect of nights that have properties similar enough to the night in question (the current night), may be also taken into consideration for determining the quality of the sleep.

[0039] In yet another example, the deep data analysis includes comparing sleep quality of the user for different nights. For example, the sleep quality may be compared by collecting various data of

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the user for those nights. Further, based on the comparison the sleep quality may be categorized into a good sleep, a bad sleep or an average sleep.

[0040] In an example, the categorization of the sleep quality may be determined with the amplitude of heart rates, duration of sleep and measured percentage of various sleep stages (i.e. deep sleep, light sleep and rapid eye movement stages). For example, the sleep quality may be said to be good if the heart rates is between 70-40 beats per minutes, the duration of sleep is about 7 hours and the percentage of the deep sleep is around 1 to 2 hours (10-20 %) among the various sleep stages. Further, the user's feedback is taken to validate the sleep quality.

[0041] In an embodiment, the deep data analysis also includes measuring various physical provocations or non-provocations, as well as strength of such physical provocations or non-provocations. The physical provocations may be referred to as change in the physical activity level, i.e. when the user changes or attains a physical activity level from another physical activity level. For example, the physical provocations can be when the user stands up form a lying position, when the user starts walking form a sitting position, and the like. Further, the non-provocation may relate to situations when the user is subjected to no physical activity, i.e. when the user is sitting, lying down and the like.

[0042] In an embodiment, the various physical provocations or non-provocations may be measured by correlating the measured user's movement data and the heart rate. Specifically, the transitional changes in the activity of a person (i.e. standing up, sitting down, climbing stairs etc.) and the strength of provocation is measured. For example, the bodily reaction to provocation happens after a delay, therefore measurement of HR/HRV (where HR stands for heart rate) can be initiated only when such provocation is detected and the whole phenomena and bodily reactions during each phase (before, during and after transition/provocation) are measured.

[0043] In another example, the deep data analysis includes determining the user's stress level. Specifically, the user's stress level is determined by calculating the heart rate variability (HRV) for the activity period and the rest period, based on the measured heart rate. For example, the user's stress level may be determined based on the HR and/or the HRV, and/or the activity level and/or other sympato-vagal provocation, loading or a withdrawal of provocation. The HR, the HRV, and the activity level or provocation, the withdrawal of provocation, the load of a user are

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recorded at various times during the day and the values are correlated to arrive at a stress level of the user. The stress level is estimated based on a predetermined set of algorithms and analysis methods. Further, the physical disposition or sympato-vagal provocation and the activity levels of the user are automatically detected and the vital parameters, i.e., the HR and/or the HRV are recorded at different times.

[0044] For example, if there is no activity, i.e. no physical provocation but HR is high, the user may potentially be acutely suffering e.g. from a mental, psychological or emotional stress or is having a physiological stress reaction related to breathing (e.g. holding the breath) or other physiological stimulus like contraction, or a physiological stress reaction due to drinking or eating something that raises the pulse rate. Similarly, if there is any physical activity such as when the user is doing some physical exercise (walking, jogging or running), the bodily reactions are measured during the exercise period to detect the stress level.

[0045] In an embodiment, the mobile communication device is configured to calculate a readiness score for assessing readiness of the user. Specifically, based on long data, trends, cross-correlation analysis of the deep data analysis (i.e. heart rate variability, hypnogram, stress level and the like) the readiness score is calculated. Further, the long data, trends, cross-correlation analysis may be associated with a time period (for example a day, a week or a month) for which the deep data analysis is performed. Therefore, the measured user movements, and biosignals such as heart rate, sleep factor, heart rate variability and stress level for such time period are correlated to calculate the readiness score and thereby assessing readiness of the user.

[0046] The readiness score indicates a level of readiness of the user as well as the recovery of the user from the mental and physical load. The term 'readiness' used herein means also a return to a normal state of mental and physical strength (or energy level) after the mental and physical load. In an example, if the physical load is associated with an activity period (such as physical exercise), the readiness score may be based on the heart rate, heart rate variability and stress level of the user. For example, the readiness score may be good or high (such as about 90 %), if the heart rate, heart rate variability and stress level of the user have returned to the normal state after the exercise. It is to be understood that the readiness score may be measured after a certain time period (for example half an hour) of the activity period. Similarly, if the mental load is associated with a rest

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period (such as sleep), the readiness score may be based on the movements, heart rate and sleep factor of the user. For example, the readiness score may be good or high (such as about 90 %), if the user moves less, the heart rate is within a desired level (70-40 beats per minutes) and the sleep factor shows a good amount of deep sleep.

[0047] In one embodiment, historical data of the user is also used for calculating the readiness score. For example, the historical data may include information related to a medical history of the user, but also on historical data collected by the system itself. For example, the historical data may comprise data showing how the user typically recovers from a load. Otherwise, the historical data may include information related to past professional life, food habits, and the like. Therefore, it may be evident to those skilled in the art that the historical data may have substantial influence on measurement of the readiness score of the user.

[0048] In one embodiment, the method comprises providing the user with appropriate instructions, related to at least one of physical activity and mental activity, for improving the user's readiness score. That is, based on the readiness score, the user may be provided with appropriate instructions related to at least one of physical and mental load. Specifically, the appropriate instructions are provided to the user for improving the user's readiness score against such physical and mental load. For example, if the readiness score of the user is poor or low (such as about 40 %) after doing exercise, the user may be instructed to take more rest such that the heart rate, heart rate variability and stress level return to normal state. This in turn may improve the readiness score related to the physical load. Similarly, if the readiness score of the user is poor or low (such as about 40 %) after a sleep, the user may be instructed to sleep longer or to do mild exercise to have good quality sleep, which in turn may improve the readiness score related to the mental load.

[0049] In an embodiment, the mobile communication device is configured to visually present the readiness score to the user. For example, the mobile communication device is rendered with various user interfaces based on the readiness score. Specifically, the user interfaces are based on (or include) information related to the readiness score and the instructions for improving such readiness score. For example, the user interfaces may include a readiness score (shown with percentage i.e. 80 - 90 %) and an instruction (such as 'sleep longer" or "do mild exercise'). Also, the user interface may include information related to the user's movement, heart rate, hypnogram,

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heart rate variability, body temperature, stress level and other data measured or obtained by the method and system. For example, the interface may show user's movement (i.e. number of miles the user has walked), heart rate (i.e. a digital representation of current beats per minute), duration of sleep, sleeping pattern, sleep factor such as hypnogram (various sleeping stages and their percentages) and the like.

[0050] According to another embodiment, the user interface is configured to also show separately the different elements which contribute to the readiness score. According to yet another embodiment the user interface also shows their effect on the readiness score (such as with signs + or -) and optionally also the history and/or estimate for following days. This embodiment allows the user to see in which direction the readiness score is evolving and at which rate it is changing. Moreover, the user interface may include a possibility for the user to enter data, such as an estimate of length of the following night's sleep and the interface would then be able to show a prediction of readiness score for the following day. Furthermore, the user may be given an estimate of time it takes to recover from one short night, for example.

[0051] Some possible elements to be shown according to this embodiment include (but are not limited to) activity of the previous day, heart rate at rest, sleep of the previous night, sleep debt (i.e. if the user did not sleep enough, the difference between the user's optimal amount of sleep and the amount of sleep the previous night or nights), activity of the day and body temperature.

[0052] The server is operable to calculate the readiness score and provide appropriate instructions to improve the user's readiness score. Specifically, the server of the system is operable to do the required analysis or processing of data (i.e. the deep data analysis and long data, trends, cross-correlation analysis of the deep data analysis) for rending the user interface on the mobile communication device. For example, the deep data analysis may be partly performed in the server and partly performed in the mobile communication device; otherwise the deep data analysis may be completely performed in the server. Similarly, the long data, trends, cross-correlation analysis of the deep data analysis may be partly or completely performed by the server. Further, the server may be configured to collect the raw data from the ring directly or may be configured to collect the raw data indirectly through the mobile communication device. Therefore, the server may perform the required analysis for rending the user interface related to the readiness score and the

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instruction (i.e. various aspects subjected to assessing readiness and recovery of the user from mental and physical load). It is to be understood that the server includes required electronic elements, such as a processor, and algorithms to perform such analysis.

[0053] In an embodiment, the server is communicatively coupled to the user terminal through a communication network which can be wired, wireless or a combination thereof. For example, the communication network includes, but are not limited to, Local Area Networks (LANs), Wide Area Networks (WANs), Metropolitan Area Networks (MANs), Wireless LANs (WLANs), Wireless WANs (WWANs), Wireless MANs (WMANs), the Internet, second generation (2G) telecommunication networks, third generation (3G) telecommunication networks, fourth generation (4G) telecommunication networks, and Worldwide Interoperability for Microwave Access (WiMAX) networks.

[0054] Some examples of concrete parameters that may be defined and monitored in respect to daily readiness to perform, as well as their effect on readiness, are listed below.

- Previous or last night; the quantity and quality of sleep; getting enough sleep improves daily readiness.
- Sleep balance (sleep debt); the sum of how much accumulated sleep over past 1-3 weeks differs from individual sleep needs; insufficient sleep results in sleep debt that reduces daily readiness.
- Previous day (physical activity); excess sedentary time, excess vigorous intensity and excess total volume of physical activity reduces daily readiness, but also lack of sedentary time, exercise and physical activity reduce daily readiness.
- Activity balance (cumulative level compared to user's own history); the activity balance is calculated over a period of for example 1-3 weeks and compared to the user's long term activity (e.g. 1-12 months average or typical level changes, best readiness is achieved during easy periods when activity levels are somewhat below average (i.e. not excess of activity, but not zero activity levels either).
- Body temperature; changes in maximal nightly skin temperature can be markers of sickness and clear deviation from user's norm reduces readiness; body temperature may also be an indication of the menstrual cycle for pre-menopausal women.

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- Resting heart rate; changes in minimum nightly heart rate are markers of stress that usually reduces readiness; a user's resting heart rate may change for various reasons and thus maximum readiness is typically encountered when resting heart rate is somewhat below user's norm (but not too much below as that could be associated with excess fatigue).
- Resting heart rate-based recovery index; how long restorative sleep the user reached after his/her hear rate had stabilized to the proximity of the resting heart rate; longer accumulated bedtime/sleep/deep sleep/deep+REM after heart rate has stabilized predicts improved readiness; this contributor will react also to alcohol consumption and late exercise, among other things, both challenging the user's readiness.

[0055] The various data or parameters may be weighted, based on how each contributes to the readiness score. Some principles used in the weighting may be for example as follows. Some of the parameters have monotonously decreasing contribution, while some others have monotonously increasing contribution. Some of the parameters have an optimal area and the readiness decreases in both directions (i.e. below and above the optimal area). Furthermore, the device and method may be configured to take the body temperature in account when weighting the data, i.e. the weighing may be performed continuously. For example, if the user's temperature is within a pre-defined, normal scale, its weight can be minimal and a "normal" weighting is used for the other parameters or data. However, if the user's temperature is elevated (i.e. above a pre-determined limit), its weight can be big and optimal activity levels can be lowered accordingly. Again, the device may be set such that it is able to define the normal scale of temperature for the user.

[0056] Still further, the method and device may be configured to take into account the calendar. For example, the device may be able to recognise the time of the year (such as winter, spring, summer or autumn) or weekdays from weekends. This information may be taken into account in the need of sleep, for example, as typically persons sleep more in the winter than in the summer. This information may also be taken into account in the history data. For example, the device may recognise that the current month is January, and also compare current data to data from a previous year's January.

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[0057] According to a preferred embodiment, the output in the device (i.e. on its user interface) is a percentage as a readiness score. It may also show the main contributors for example as a graphical element (for example showing a bar for each contributor). One example of a simple interpretation of single readiness contributors is the following.

- < 35 % means that the user needs to take actions with this contributor in order to improve the readiness;
- 35-70 % means that the user could pay attention to this contributor in order to improve the readiness;
- 70-85 % means that this particular contributor is below recommended levels - apparently helping the user to manage his/her daily requirements; and
- 85-100 % means that this particular contributor is within general recommendations and also good at the user's individual level, i.e. to the level that it boosts the user's readiness to perform the given day.

[0058] The user interface may also comprise a means for warning if one or more contributors are above a pre-defined maximum level. It is evident that the combination of challenging and boosting contributors can be displayed and mathematically presented in many different ways. However, the presented example calculations give one example on the solution to the problem how one could combine the complex and occasionally contradictory contributions of sleep, activity and body responses to the readiness of the user (body responses for example due to sickness or environmental factors). It may be useful to show the combination of factors for several reasons. For example, not everybody can similarly adjust every parameter (shift work, other responsibilities or preferences or life habits or temperament) so it is necessary to leave the freedom and possible choice to the user. Moreover, each factor may be important on different times (holiday, weekday/weekend day, depending on family situations or training phase etc.).

[0059] The readiness score can be scaled on many different ways. One example is a scale between 0 and 100, where 85 means sufficient or normal or adequate readiness for the current day. This value is intended to correspond with the user's average condition, provided the user has been living his/her normal life. In addtion, the device and method may comprise certain means to recognize abnormal life, as is explained below.

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[0060] One example of possible calculations and effects of the different variables and parameters in the present method and device is given below.

1. Sleep1_previous_night_quality
   a. Device calculates a sleep score for each night (0-100).

      Alternative could be e.g. total sleep time / 9 hours (the latter is the maximum sleep need that can be expected for a normal individual), or deep+REM / 4.5 hours.

   b. Device calculates user spesific average and deviation from earlier sleep scores from the same user

      Alternative can be human specific norm that is especially practical in the beginning when individual data is not available. A human specific norm can also be used at later stages as a comparison to the user specific average.

   c. Device calculates how much and in which direction current Sleep1_previous_night_quality differs from what is an adequate level for user (named as Average)

      Z_index = (Current value – Average) / Deviation

      Z_index is 1 when your value is 1 deviation higher than your average.

   d. Device controls that user's average is good enough to be regarded as a reference for "sufficient" or "adequate" sleep score - if not, the device selects a predetermined minimum/maximum sleep score (for example 85/95) that can be regarded as sufficient or adequate for reference and uses that value instead of user's own Average value.

   e. Device also controls that user's deviation is within sensible range (e.g. 5-10) – otherwise the measurement can become too sensitive or insensitive to changes.

   f. Device estimates the contribution of previous night's sleep to the Readiness to perform the following day so that it gives a higher contribution the better the sleep score was the previous night

      ReadinessContributors(1) = 85 + 12.5 * Z_index_1;

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In practical terms, maximal contribution to the daily readiness, by Sleep1_previous_night_quality, is achieved for example when sleep score is both minimum 90 % and higher than user's long term average sleep score by a margin that depends on sleep score variability.

2. Sleep2_Balance

g. The user is supposed to be have higher readiness the more he/she has slept during preceding 2 weeks.

h. Device registers total sleep time on several nights

S(0) =7.5 h, S(1) = 8.0 h, S(2) = 7.8 h, S(3) = 6.0 h, S(4) = 5.8 h, S(5) = 7.2 h, ...

i. Device estimates what is user's individual sleep need

Device calculates user's long term average, and controls that it is between normative range (7-9 hours, in a preferred embodiment the acceptable range can also be age dependent).

j. Device calculates how much sleep time differs from individual estimated sleep need

D(0) =7.5 h - Avg, D(1) = 8.0 h - Avg, D(2) = 7.8 h - Avg, D(3) = 6.0 h - Avg, and so on.

k. Device also calculates how much user's sleep durations typically vary between nights (SleepDeviation), and checks that the deviation is not too small or too high to represent user's sensitivity to changes (acceptable deviation range can be e.g. 25-45 minutes).

l. Device calculates a weighted mean of the differences (weighing is needed for smoothing the effect on the edge of the window)

SleepBalance = W(0)*D(0) + W(1)*D(1) + W(2)*D(2) + and so on (exponentially decreasing weight as time elapses).

m. The user is supposed to have the higher readiness the more he/she has slept during preceding 2 weeks

ReadinessContributors(2) = 85 + 30 * (SleepBalance / SleepDeviation));

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In practical terms, maximal contribution to the daily readiness, by Sleep2_Balance, is achieved for example when average two week sleep time is both 7-9 hours and exceeds long term average sleep time by 15-20 minutes, depending on that average.

3. Activity1_Last_day

n. Z-index is calculated for total daily movement Z_index_3a (from distance, steps, kcal and/or equivalent kilometers etc.) in a similar way as presented above for the sleep score when estimating the contribution of Sleep1_previous_night_quality (i.e. utilizing user spesific average and deviation, and controlling if user spesific average is a good value to be the proxy for a normative reference point (acceptable limits e.g. 4-20 km/day). Correspondingly, Z-index is calculated separately for vigorous intensity activity Z_index_3b (from time or METmins or kcals accumulated at high intensity exercise) and sedentary behaviour Z_index_3c (e.g. accumulated daily sedentary time or number of inactive periods that last longer than a pre-determined threshold period of e.g. 30 minutes, or their combination).

o. The user's readiness is the lower the higher his/her total daily movement has been (in kcal, distance, steps, eq.km, etc.), the more vigorous and more sedentary activity he/she had during the previous day. In a preferred embodiment more value is given to vigorous/intensive physical activity. In our example vigorous intensity accumulates also total activity, this arrangement leads to pronounced effect of vigorous intensity. More sedentary day also decreases the readiness.

ReadinessContributors(3) = 85 - 6*(Z_index_3a + Z_index_3b + Z_index_3c;
In practical terms maximal contriburion to the daily readiness, with regards to the physical activity of the last day, is achieved after a day which has about one third less of total activity, vigorous activity, AND sedentary time compared to long term averages. The contribution is weaker both with very little activity, or excess of activity.

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4. Activity2_balance

p. A weighted 2-week measure of user's daily activity is calculated in an analogue way to sleep balance above including the checks. Total activity can be expressed in eq. km, kcal or kcal/body weight, steps and so on.

q. ReadinessContributors(4) = 100 - 60 * abs(0.25 + (ActivityBalance / ActivityDeviation)); In practical terms maximal contribution to the daily readiness, with regards to the physical activity of the last day, is achieved when average two week total activity is 10-60 % less than long term average total activity (the margin depends on user's long term average and daily variability in long term activity). Increasing distance from that level in either way decreases the contribution to the readiness.

5. Body_Response1_Temperature

r. The wearable device, such as the ring, can be programmed to record user's maximal stable temperature during the night, or during certain time of the night when ring measured distal body temperature best matches with the body temperature. It may be favorable to make the measurement when core body temperature is the lowest in circadian variation i.e. typically between 2 and 5 a.m.

s. In an analogue way to parameters1 (last night's sleep) and parameter 3 (previous day's activity), Z-index_5 is calculated for nightly temperature reading. The user has the lower readiness the more his/her night_time temperature deviates from his/her long term mean, taking his/her normal variation into account.

t. It is more certain that an elevated temperature is causing decreased readiness compared to a lowered temperature, as the latter can sometimes be a measurement error: if Z_index_5 > 0.15, ReadinessContributors(5) = 105 - 25 * Z_index_5; elseif Z_index_5 < -0.50, ReadinessContributors(5) = 105 + 10 * Z_index_5; else ReadinessContributors_5 = 100; end.

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u. In favorable solution women's period / menstrual cycle is taken into account so that the biphasic temperature (rise in the middle of the period and fall in the end) is taken into account so that sensitivity to a sickness, for example, is not lost.

In practical terms the highest contribution to readiness by body temperature reading is achieved when the filetered body temperature that was determined during the night differs from long term average by less than 0.4C, the exact number also depending on the normal variability of the user's temperature.

6. Body_Response2_Resting HR

v. User's readiness is the lower the more his/her resting HR deviates from his/her norm – in a favorable solution there is some asymmetry, as it seems to be a sign of good recocery and a positive physical training effect to have resting heart rate little below norm.

w. In an analogue way to parameters1 (last night's sleep) and parameter 3 (previous day's activity) and parameter5 (body temperature), Z-index_6 is calculated for nightly resting HR reading.

x. if Z_index_6 > -1, ReadinessContributors(6) = 87.5 - 30 * Z_index_6; else ReadinessContributors(6) = 116 + 16 * Z_index_6;

In practical terms, the highest contribution to readiness regarding this parameter is reached when resting heart rate is 2-5 bpm below long term average (margin depends on variability and average value of the long term HR). Strongly negative values indicate only slightly decreased readiness, while elevated HR is a clear indicator of negative contribution.

7. Body_Response3, Bedtime or sleep accumulated after HR has stabilized

y. One body response parameter within the readiness score is the amount of rest after reaching resting zone of heart rate. This is influenced by for example alcohol consumption, heavy eating or a too intense sport late in the evening.

z. The user has the higher readiness the more bedtime he/she has accumulated after he/she has got within 1-3 bpm to his/her HR minimum.

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æ. Z_index_7 is calculated in an analogue way to Z_indexes explained above. The acceptable range for normative user reference can be for example 4-7 hours.

ø. ReadinessContributors(7) = 85 + 15 * Z_index_7;

In practical terms the highest contribution to readiness regarding this parameter is reached if user has accumulated 5-7 hours of bedtime, preferably sleep, after the lowest heart rate period of the night has been reached (margin depending on long term average and deviation of that time)

All ReadinessContributors have been scaled between 0...100. Finally it is useful to check that the scale is maintained as some of the equations presented above may result in numbers that fall outside this scale.

for i = 1:size(ReadinessContributors), if ReadinessContributors(i) < 0, ReadinessContributors(i) = 0; elseif ReadinessContributors(i) > 100, ReadinessContributors(i) = 100; end

[0061] The present disclosure further relates to a user interface comprising an area indicating a readiness score of the user, an area indicating parameters affecting the readiness score and an area indicating change of at least one of said parameters with respect to an earlier point of time. Some examples of suitable user interfaces are given below in connection with the drawings. The user interface may for example include indications on readiness score on a three-level scale, such as bad, average, good. Different components of the readiness score may also be shown, as well as their influence on the readiness score. The user interface may also include a possibility for the user to simulate different ways of improving the readiness score, for example when the ideal way to improve readiness score would be to do a physical exercise for an hour, but the user only has a half an hour available. The user could then for example choose between different sports available to him/her (such as gym, running or swimming), and choose the one having the most positive effect on the readiness score. Users that are for example travelling and busy with business meetings etc, could thus optimise their use of free time. The user interface may also show past readiness scores as well as what has influenced them.

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[0062] There are a number of advantages for using a ring device instead of a wrist device. For example, many persons prefer to wear a bracelet or wristlet on his/her wrist rather than a measuring device. Furthermore, a ring is optimal for measuring HR/HRV optically, as in a finger, two arteries are close to the skin. These arteries are on the palm side of the hand and covered by soft tissue, the wearable ring does thus not need to be tightened to ensure a good contact to the skin. Thus the position of the ring in relation to the finger and arteries typically stays very stable although the palm is turned up and down and in consequence, the ring does not move in relation to the arteries. Furthermore, in a wrist there are two bones and turning the palm up and down means that the bones are twisted which then causes the wrist device to move with respect to the skin underneath the device and thus also with respect to the arteries in the wrist. A yet further advantage is that if the user wants to change the measurement position due to inconvenience in one finger (for example abrasion, rubbing, scar), he/she can change the ring easily from one finger to another, whereas the choice of measurement position is more limited for wrist-worn devices. In case of swelling, the ring can also be changed to a smaller finger. A ring is also a much lighter device to carry than a wrist device.

[0063] The present disclosure provides a method and a system for assessing readiness of a user. Specifically, the method and the system are configured to calculate the readiness score and provide appropriate instructions to improve the readiness score against such mental and physical load the user is subjected to. Further, the readiness score is based on real time, exhaustive and comprehensive analysis of data (i.e. the user's movement, biological signals and the like) which makes the method and the system of the present disclosure to provide appropriate instructions to the user. Therefore, the appropriate instructions enable the user to manage his or her health related aspects (for example sleep, stress level and physical activity).

DETAILED DESCRIPTION OF THE DRAWINGS

[0064] Referring now to the drawings, particularly by their reference numbers, FIG. 1 is a schematic illustration of a system **100** for assessing readiness of a user, in accordance with an embodiment of the present disclosure. The system **100** includes a ring **102**, a mobile communication device **104** and a server **106**. The ring **102** is communicably coupled to the mobile

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communication device **104** by a communication network **120** and the mobile communication device **104** is communicably coupled to the server **106** by communication network **122**.

[0065] The ring **102** is associated with a user (not shown) and configured to measure user's movements and a heart rate associated with the user. Specifically, the ring **102** includes optical electronics **130** (such as at least one photon source and at least one photon detector) and at least one motion sensor **132** (such as an accelerometer, a gyroscope, a magnetic field sensor or a combination thereof). The ring also includes other electronic **134** configured to collect and analyse raw data (i.e. data of the motion sensor and the optical electronics). The other electronic components **134** include but is not limited to a controller, a microprocessor, a memory and a communication module.

[0066] The mobile communication device **104** and the server **106** are configured to collect the raw data generated by the ring **102**. Further, the server **106** are configured to perform a deep data analysis of the raw data in order to find heart rate variability, hypnogram, stress level and the like. It is also possible that part or all of the analysis is performed by the mobile communication device, in which case the server is incorporated in the mobile communication device. Also, the mobile communication device **104** and the server **106** are configured to perform long data, trends and cross-correlation analysis of the deep data analysis in order to calculate a readiness score (i.e. based on the user's movements, heart rate, heart rate variability, hypnogram and stress level). Moreover, based on the readiness score the user is provided with appropriate instructions to improve the readiness score against the mental and physical load the user is subjected to. Specifically, the mobile communication device **104** is configured to visually present the readiness score to the user with the help of various user interfaces (or a single interface incorporating all the information). The user interfaces are based on (or include) information related to the readiness score, the instructions and data associated with user's movement, heart rate, hypnogram, heart rate variability and stress level. The raw data analysis may also be used to determine another sleep factor than hypnogram, as explained above.

[0067] Referring now to FIG. 2, shown is a schematic illustration of a ring **200** worn on a finger **202** for collecting a heart rate of the user, in accordance with an embodiment of the present disclosure. Specifcally, the ring **200** is configured to collect the heart rate of the user (during both

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an activity period and a rest period) using the optical electronics **130** (shown in FIG. 1). As shown, a measured graph includes a heart rate pulse wave form **210** as function of time. The measurement is done by measuring a change of blood volume using PPG of blood vessels **220**. Further, from the wave form **210** an inter beat interval (IBI) is determined. The IBI is the time between two beats such as time t1 and t2, and is also referred to as the heart rate.

[0068] Moreover, from the wave form **210** a heart rate variability (HRV) can be determined by subtracting inter beat intervals, for example t1-t2. Also, a respiration rate can be determined from the wave form **210** by analyzing peak values. As shown, a respiration curve **230** is based on the peak values, which correspond to a rate of breathing of the user. The respiration curve **230** is used to analyze exercise impact and recovery of the user together with other heart rate related indications (IBI, heart rate, heart rate variability). It to be understood that the heart rate variability and the rate of breathing may be calculated by the mobile communication device **104** and/or the server **106** (shown in FIG. 1), as a part of the deep data analysis. The ring **200** is also configured to measure user's movement, which is explained in conjunction with FIG. 3.

[0069] Referring now to FIG. 3, shown is a schematic illustration of a graph **300** related to physical activity data of the user for a week, in accordance with an embodiment of the present disclosure. Specifically, the graph **300** shows data collected from the motion sensor **132** (shown in FIG. 1) for a week (i.e. Mon-Sun) for both the activity period and the rest period. As shown, the data shows more movement on the time when the user is awake (i.e. during the activity period) than when the user is sleeping (i.e. during the rest period). Based on such data a sleeping pattern (when the user went to bed and when woke up) can be determined. Also, a total number of hours the user slept on a particular night can be determined. For example, as shown, on Mon the user slept form about 9 pm to 6 am (i.e total of 9 hours sleep), whereas on Tus the user slept form about 12 am to 6 am (i.e total of 6 hours sleep).

[0070] Referring now to FIG. 4, shown is a schematic illustration of a hypnogram **400** of the user, in accordance with an embodiment of the present disclosure. The hypnogram **400** depicts a quality of sleep the user had on a particular night. Specifically, the hypnogram **400** is determined using a heart rate wave form of the user for that particular night. The hypnogram **400** is used to analyze sleep quality and stages (i.e. deep, light, REM (Rapid eye movement)). As shown, the hypnogram

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400 includes various stages of sleep i.e. REM **402**, light sleep **404** and deep sleep **406**. Also, the hypnogram **400** includes indications **408** when the user is awake (i.e. before attaining sleep and after getting up from the sleep).

[0071] Referring now to FIG. 5, shown is a schematic illustration of a graph **500** related to collected heart rate of the user for two nights, in accordance with an embodiment of the present disclosure. The graph **500** shows the collected heart rate of the user for two different nights, for example last two nights. As shown, a heart rate wave form **502** depicts an example of a 'good night sleep' associated with one particular night. The determination of the good night sleep is based on the wave form **502** (which may be associated with a 'normal day' of the user) having a measurement i.e. lowest HR 41 bpm (beats per minute) at about 5:15 (6 hours 15 min of sleep). Also, determination of good sleep is substantiated with the user's feedback.

[0072] The graph **500** also shows a heart rate wave form **504** depicting an example of a 'bad night sleep' associated with another night. The determination of the bad night sleep is based on the wave form **504** (which may be associated with a day when the user did too much exercise just before sleeping). For example, the wave form **504** includes a measurement i.e. lowest HR is 47 bpm at 7:30 AM which is 8 hours 15 min after bedtime, showing dramatic change between the two days. Therefore, the wave form **504** shows that the heart rate decreases slowly down to normal resting pulse and thus disturbs the sleep. Based on such measurements the user may be instructed to ease up for example 2 hours before predicted sleeping time to make sure that the heart rate is not too high during the sleep period.

[0073] Referring now to FIG. 6, shown is a schematic illustration of a provocation measurement of the user, in accordance with an embodiment of the present disclosure. Specifically, the FIG. 6 illustrates a graph **600** with a heart rate wave form **602** associated with a provocation measurement (i.e. when the user stands from a lying position). For example, while the user lies in bed in the morning after a night of sleep, the heart rate measurement begins at time T0. Thereafter, when the user stands up, the heart rate measurement begins at time T1. The user stands still and pulse data is measured for subsequent times T2-T7. Further, the strength of physiological provocation/activity is measured during each phase with an accelerometer.

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[0074] Referring now to FIG. 7, shown is a schematic illustration of various stages involved in calculating a readiness score by the system **100**, in accordance with an embodiment of the present disclosure. As shown in FIG. 7, the calculation of the readiness score includes the following stages, for example, a first stage **702** which relates to measuring raw data and basic analysis of the raw data.. Further, a second stage **704** is related to the deep data analysis, i.e. when the mobile communication device **104** and the server **106** (shown in FIG. 1) are configured to perform the deep data analysis of the raw data in order find various health related aspects of the user. As shown, the second stage **704** includes determining the hypnogram **400**, the determining of heart rate variability to compare sleep quality (shown with the graph **500**) and the provocation measurement (shown with the graph **600**).

[0075] It may be evident to those skilled in the that the second stage **704** also includes various other kinds of measurements such as the respiration rate, the stress level measurement and the like. Moreover, FIG. 7 also illustrates a third stage **706** which includes long data, trends and cross-correlation analysis of the deep data analysis (i.e. heart rate variability, sleep factor, stress level and the like measurement performed in the second stage **704**). Based on the measurement associated with the third stage **706**, a readiness score is calculated, which is an indication of a level of readiness of the user. Further, appropriate instructions are provided to the user for improving the user's readiness score. As shown, an appropriate instruction **710** includes "You recovered from your exercise very nicely. Resting heart rate 30 minutes after the exercise while sitting is 59".

[0076] Referring now to FIG. 8, shown are steps of a method **800** for calculating a readiness score by the system **100**, in accordance with an embodiment of the present disclosure. Specifically, the method **800** depicts the various stages involved in the measurement of the readiness score, as explained in conjunction with FIG. 7.

[0077] At stage **802**, raw data is collected and analysed by a wearable device (such as the ring **200**). The raw data is associated with the user's movements and the heart rate.

[0078] At stage **802**, deep data analysis is performed on the raw data using algorithms in a user communication device or a server. Specifically, the deep data analysis is performed in at least one of the user communication device and/or the server. The deep data analysis provides various health

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related aspects associated with the user such as the heart rate variability, respiration rate, sleep factor, stress level, provocation measurement and the like.

[0079] At stage **806**, instructions are provided to the user based on long data, trends and/or cross-correlation analysis of the deep data analysis. Specifically, a readiness score is calculated from the various data, such as the heart rate variability, respiration rate, sleep factor, stress level, provocation measurement and the like. Thereafter, appropriate instructions are provided to the user for improving the user's readiness score against the mental and physical load.

[0080] Referring now to FIGS. 9-12, shown are schematic illustrations of user interfaces rendered on a mobile communication device, in accordance with various embodiments of the present disclosure.

[0081] FIG. 9 shows a user interface (UI) **900** rendered on the mobile communication device (such as the mobile communication device **104** of FIG. 1). As shown, the UI **900** provides statistical information related to a particular night's sleep (for example last night's sleep). For example, the UI **900** provides information about the various stages of sleep (i.e. the REM, the light sleep and the deep sleep) for a particular night. Further, the UI **900** provides information related to weekday and date, such as 'Tuesday Night-11/4/14'. Also, the UI **900** provides information how well the user slept (for example 'You slept well last night'). Moreover, the UI **900** provides information when the user went to sleep, when the user woke up and how long the user slept (for example the user went to sleep at 10:12 pm, woke up at 6:27 am and slept for 8 hr 15 min). Also, the UI **900** provides information about Resting HR and sleep quality (for example 58 bpm and 90 % respectively). Furthermore, the UI **900** provides information related to measurement of the various stages of sleep (for example, deep sleep 1 hr 54 min, REM 2 hr 15 min, awake 2 min and light sleep 2 hr 45 min).

[0082] FIG. 10 shows another user interface **1000** rendered on the mobile communication device. Specifically, the UI **1000** shows a summary report for a user (for example Hannu) for both mental and physical changes as trends. The UI **1000** provides correlation of physiology, behavior and subjective feedback on feelings. For example, the UI **1000** provides trend of feelings (i.e. how the user has been feeling since last couple of days - Mon, Tue and today). Also, the UI **1000** provides information about performance against and recovery from prolonged stress. As shown, the UI

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1000 provides a current readiness score (i.e. "Readiness -10 %") and an instruction "Your readiness is a little low today. Moderate intensity exercise could improve your readiness and mood". The UI **1000** also provides a readiness score trend based on past days. Further, the UI **1000** provides a sleeping trend (current and past sleeping data) and a comment based on the sleeping trend. For example, the UI **1000** shows that the user slept for 8 hr 4 min on Tuesday night and the comment "You slept well last night, but you still have some sleep debt form previous nights".

[0083] FIG. 11 shows yet another user interface **1100** rendered on the mobile communication device. Specifically, the UI **1100** is associated with proposals for the user, which can help the user to understand what affects physiology and feelings of the user and what the user can do to improve them. As shown, the UI **1100** provides an appropriate instruction (or proposal) associated with recovery of the user that may be after physical exercise, i.e. "You recovered from your exercise very nicely. Resting heart rate 30 minutes after the exercise while sitting: 59". Also, the UI **1100** provides an appropriate instruction associated with sleep of the user, i.e. "Your REM sleep was quite short last night. Finding a few minutes during the day to close your eyes and relax, will help you recover". Further, the UI **1100** provides an appropriate instruction associated with physical activity of the user, i.e. "You were a bit below your usual activity level today. Try and get back on track tomorrow".

[0084] FIG. 12 shows another user interface **1200** rendered on the mobile communication device. Specifically, the UI **1200** is associated with updates of a particular day for a user (Anthony). As shown, the UI **1200** provides a latest update (just now) about physical activity, i.e. "GREAT JOB! 1 hr 24 min of light activity". Also, the UI **1200** provides a past update (4 m before) about the physical activity, i.e. "KEEP PUSHING - Only 0.5 miles more needed to reach your goal. You can do it!". The UI **1200** also include past update (4 m before) about user's feedback regarding the physical activity, i.e. "Started a new schedule this week, 1 hour ago". The UI **1200** also includes an old update (at 8:45 am) about the user sleep, i.e. "Last night you slept 30 min more than normal Sleep duration 7 hr 45 min. Additionally, the user interface **1200** depicts the readiness score of the user, i.e. about 90 %.

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[0085] Referring now to FIG. 13, illustrated are steps of a method **1300** for assessing readiness of a user, in accordance with an embodiment of the present disclosure. Specifically, the method **1300** illustrates the steps for assessing readiness of a user using the system **100**, explained in conjunction with the FIGS. 1-12.

[0086] At step **1302**, the user's movements is measured during an activity period and a rest period.

[0087] At step **1304**, the user's biosignal (at least one) is measured during a rest period. The biosignal may be for example derived as explained below in connection with Figure 15. At an optional step **1306**, the user's biosignal (at least one) is measured during an activity period. It is to be understood that step **1302** and the optional step **1306** are typically performed simultaneously.

[0088] The method may also comprise a step where various features are generated based on the measured biosignals. The features include for example IBI and heart rate and their distribution, zero crossing parameters and their distribution, autocorrelation parameters, amplitude variation and its distribution, and so on.

[0089] At step **1308**, a summary for the activity period is determined, based on the measured movements.

[0090] At step **1310**, a summary for the rest period is determined, based on the measured biosignal. Thereafter, in step **1312**, a body response summary is determined, based on steps **1308** and **1310**. . It is to be understood that steps **1308** and **1310** can be performed in either order or simultaneously.

[0091] At step **1314**, a readiness score is calculated based on the measured movements, and body response parameters based on steps **1308-1312**, whereby the readiness score indicates a level of readiness of the user.

[0092] The steps **1302** to **1314** are only illustrative and other alternatives can also be provided where one or more steps are added, one or more steps are removed, or one or more steps are provided in a different sequence without departing from the scope of the claims herein. For example, the method **1300** may further include providing the user with appropriate instructions, related to at least one of physical activity and mental activity, for improving the user's readiness score. Also, the method **1300** may include using also historical data of the user to calculate the readiness score.

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[0093] FIG. 14 is a further schematic illustration of a user interface in accordance with an embodiment of the present disclosure. The user interface **1400** is rendered on a mobile communication device. Specifically, the upper part of the UI **1400** is associated with a readiness of the user summarizing data over several days. The readiness graph **1406** may also be compared to subjective feelings **1408** that are collected based on user input. Readiness is a sum of the measured or estimated physical and mental resources that are in ideal case scaled according to the user's own norms. As shown, the UI **1410** may also express the readiness of each day as a main proposal associated with it, e.g. "Take it easier today to recover" given on Saturday 7/4/14. The lower part of the UI displays graphically the negative **1402** and positive **1404** contributors for readiness on each day. The size of the graphical obstacles represents their significance (magnitude or severity), and the color (intensity) represents positive or negative sign. Negative contributors can be e.g. sleep debt assessed over several nights **1402**, sleep disturbance of previous night or abnormal body responses e.g. higher than typical night time heart rate. Importantly, on each day there can be both positive and negative contributors that may at least partially compensate for each other. Positive contributors can be e.g. optimal physical activity on the previous days **1404**.

[0094] Fig. 15 is an illustration of steps of a method in accordance with a further embodiment of the present disclosure. In step **1500**, movement data is measured during an activity period (in practice with an accelerometer, gyroscope, etc. or alternatively from a motion artifact of a biosignal such as an electrocardiogram (EKG), a PPG, an electromyogram (EMG), or data from global positioning system (GPS)). In an alternative step 1502, movement data is measured during a rest period (in practice with an accelerometer, gyroscope, etc. or alternatively from a motion artifact of a biosignal such as EKG, PPG, EMG). In a yet alternative step **1504**, corresponding to a preferred case, also a biosignal (EKG, PPG, EMG, an electrodermal activity (EDA)) or another measurement associated with breathing (for example a breathing rate with impedance measurement or termistor, sensor attached to bed, microphone, video recording) is measured. In a still further alternative step **1506**, which is also preferred, the user's subjective input on prevailing feelings is requested via a series of questions. The questionnaire may be synched to watch-time, rise-time, or start or end times of certain activity or rest parameters as determined based on steps

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1500-1504. All of these steps can be performed either simultaneously or in sequence, as the case may be.

[0095] In step **1508**, based on the results of step **1500**, an activity summary for the day is determined, including one or more of the following: active time, steps, distance, energy expenditure, training impact/load, distribution of intensity/speed/step rate, time of activity in respect to bedtime, etc. If need be, results from any of the other steps can also be used for this determination. In step **1510**, based on the steps **1502-1504**, a rest summary for the night is determined, including one or more of the following: bedtime, rise time, total sleep duration, sleep disturbances, hypnogram, lowest hear rate, average heart rate, biosignal amplitude variation, heart rate variability, restlessness etc.

[0096] In step **1512** and based on steps **1508-1510**, a body response summary for day to night, or activity period to rest period, is determined. The body response parameters may be e.g. training impact vs. heart rate recovery speed, daily physical activity parameter vs. amount of deep sleep or lowest heart rate of the night. The body response may also be changes in body signal as a response from rest to stand-up at rise time as determined based on steps **1500-1504**.

[0097] In step **1514** and based on the user's history, a distribution of parameter in activity and rest summary is calculated, in order to use them as user dependent reference values (e.g. mean, standard deviation, percentiles). In step **1516**, subjective feelings are correlated with activity and rest summary parameters over different time constants and delays in order to find user dependent reference values that can be described e.g. with words as sub-optimal or optimal. In a further step **1518**, based on the user's own data (history database) activity or rest parameters are correlated with the following days' activity or rest parameters or readiness scores in order to provide supportive feedback how user has earlier managed to recover from challenging situations.

[0098] In step **1520** and based on steps **1506-1518**, the relevance/significance for each activity and rest parameter is correlated in respect to estimated readiness using the user-independent and user-dependent scales. Finally, in step **1522** and based on steps **1506-1518**, the relevance of a number of pre-determined textual advice is computed, and the most relevant of them is selected.

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[0099] Fig. 16 is an illustration of steps for calculating readiness score 1650 for a user. In a first step set of parameters is measured with a ring 1600. The ring is configured to measure heart rate (HR) 1602, body temperature 1604 and activity 1606. Accelerometer is used to measure the activity 1606. IR is used to measure heart rate (HR) 1062. Temperature 1604 is measured with temperature sensor. The temperature 1604 refers to body temperature of the user.

[00100] Sub parameters 1610 are calculated using the measured parameters using algorithm 1630. Sub parameters 1610 include sleeping times of previous three nights. Sleeping time of last night is 1612, sleeping time of night before last night is 1614 and sleeping time of two nights before last night is 1616. Sub parameters further include activity level parameter 1 1618 and activity level parameter 2 1620. Further sub parameters include first heart rate parameter 1622 and second heart rate parameter 1624. The sub parameters 1610 are used by second algorithm to determine readiness score 1650.

[00101] Fig. 17 is an illustration of user interface view 1730. The view 1730 has indication 1750 for indicating neutral value. Values left from the neutral value are considered as negative values and values from right are considered as positive values. According embodiments user view 1730 can be configured also to show negative values can be in right and positive in left. Readiness score is rendered to user in area 1710. The value of the readiness score is indicated with a graphical element 1740. Sub parameter values related to sleep of previous nights, heart rate, activity, temperature are rendered in the areas 1710, 1712, 1714, 1716, 1718, 1720, 1722, 1724. Value is indicated with slider bar 1742.

[00102] Based on embodiment user can use pointer such as finger to move slider bar 1742 to simulate readiness score value 1740 as shown in user view 1732. In an example user has selected to drag slider bar 1742 of areas 1718 and 1720 (in present example activity 1 and activity 2) to direction indicated with arrow to simulate effect of adding more activities to the day. The user can see in the user view 1732 that the recover index shows more positive sign if the user adds activities (such as moving).

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[00103] Figures Fig 18A, Fig. 18B and Fig. 18C are illustrations of alternative user interface views 1800, 1802, 1804 respectively. The user interfaces show readiness value 1810 and positively affecting sub parameters 1830 and negatively affecting sub parameters 1820. User interface can be further configured to indicate trend of the readiness by animations or arrows or similar. The user interface can be in addition configured to enable user to test impact of each sub parameters for the readiness value.

[00104] Further different colors can be used for differentiating "plus or minus" values. For example green has a positive meaning and red a negative one. Colors and left-right bars can be used also together to visualize and emphasize different parameter values and their contribution. Also different shades of colors can be used. The shade can be darker or lighter if a parameter value is higher or lower.

[00105] Modifications to embodiments of the present disclosure described in the foregoing are possible without departing from the scope of the present disclosure as defined by the accompanying claims. Expressions such as "including", "comprising", "incorporating", "have", "is" used to describe and claim the present disclosure are intended to be construed in a non-exclusive manner, namely allowing for items, components or elements not explicitly described also to be present. Reference to the singular is also to be construed to relate to the plural.

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CLAIMS

1. A method for assessing readiness of a user, the method comprising:
- obtaining the user's movements;
- using the obtained user's movements to determine a nature of the period, wherein the nature of the period is selected from an activity period and a rest period;
- measuring at least one biosignal of the user during the rest period;
- determining a rest summary for the rest period, based on the measured at least one biosignal and at least one biosignal of a previous rest period;
- determining an activity summary for the activity period, based on the obtained movements of an activity period and obtained movements of at least one previous activity period;
- determining a body response summary based on the rest summary and the activity summary; and
- calculating a readiness score based on the body response summary and a previous body response summary, whereby the readiness score indicates a level of readiness of the user.

2. A method according to claim 1, wherein obtaining the user's movements is performed by measuring the user's movements or by retrieving the user's movement data from a separate device.

3. A method according to claim 1 or 2, further comprising measuring at least one biosignal during the activity period.

4. A method according to any of the preceding claims, wherein the at least one biosignal is selected from the group consisting of an electrocardiogram, a photoplethysmogram, an electromyogram, an electroocylogram, a heart rate, a heart rate variability, a body temperature, a resting heart rate, an average heart rate and signals related to breathing.

5. A method according to any of the preceding claims, wherein determining the rest summary comprises at least one of determining a sleep factor, determining a sleep balance, determining lowest body temperature during rest and determining a resting heart rate.

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6. A method according to any of the preceding claims, further comprising providing the user with appropriate instructions, related to at least one of physical activity, mental activity and rest, for improving the user's readiness score.

7. A method according to any of the preceding claims, further comprising using historical data of the user to calculate the readiness score.

8. A method according to any of the preceding claims, further comprising using at least one of target information provided by the user, personal characteristics provided by the user and personal characteristics previously determined by the method.

9. A system for assessing readiness of a user, the system comprising:

- a ring configured to be worn by the user and comprising means for measuring at least one biosignal of the user during a rest period,
- a mobile communication device configured to communicate with the ring,
- means for measuring user's movements during an activity period and the rest period, and
- a server configured to communicate with the mobile communication device, the server being operable to
  - use the measured user's movements to determine a nature of the period, wherein the nature of the period is selected from the activity period and the rest period,
  - determine a rest summary for the rest period, based on the measured at least one biosignal and at least one biosignal of a previous rest period,
  - determine an activity summary for the activity period, based on the measured movements and measured movements of at least one previous activity period,
  - determine a body response summary based on the rest summary and the activity summary; and
  - calculate a readiness score based on the body response summary and a previous body response summary, whereby the readiness score indicates a level of readiness of the user.

10. A system according to claim 9, wherein the means for measuring user's movements are arranged on the ring, in the mobile communication device or in an activity determination device.

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11. A system according to claim 9 or 10, wherein the mobile communication device is configured to visually present the readiness score to the user.

12. A system according to any of the claims 9-11, wherein the means for measuring user's movements is selected from the group consisting of an accelerometer, a gyroscope and a magnetic field sensor.

13. A system according to any of the claims 9-12, wherein the means for measuring a heart rate comprises a photon source arranged on the inner surface of the ring and a photon detector arranged on the inner surface of the ring.

14. A system according to any of the claims 9-13, wherein the ring further comprises a first electrode and a second electrode adapted to measure an electrocardiogram.

15. A user interface comprising an area indicating a readiness score of the user, an area indicating parameters affecting the readiness score and an area indicating change of at least one of said parameters with respect to an earlier point of time.

Petitioner Samsung Ex-1004, 0141

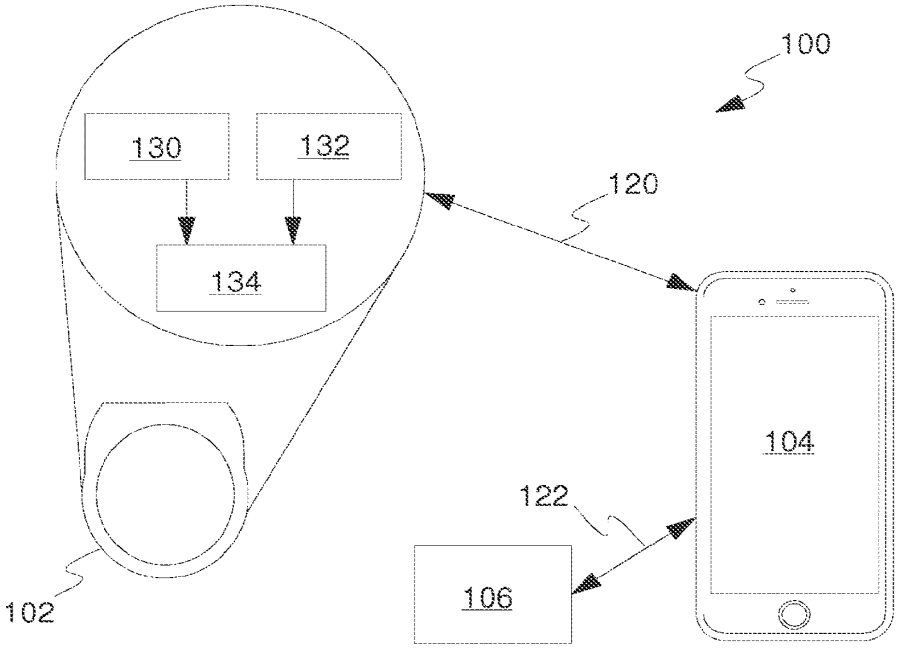


FIG. 1

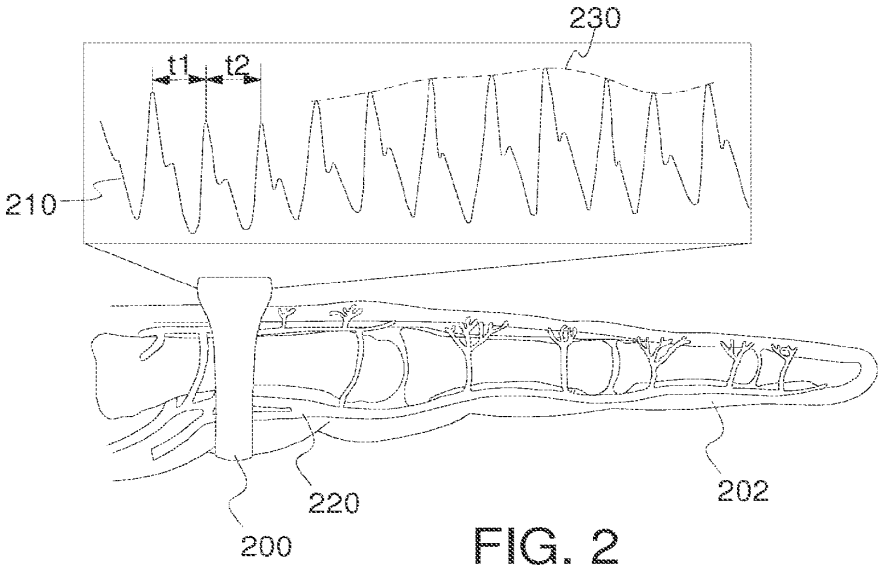


FIG. 2

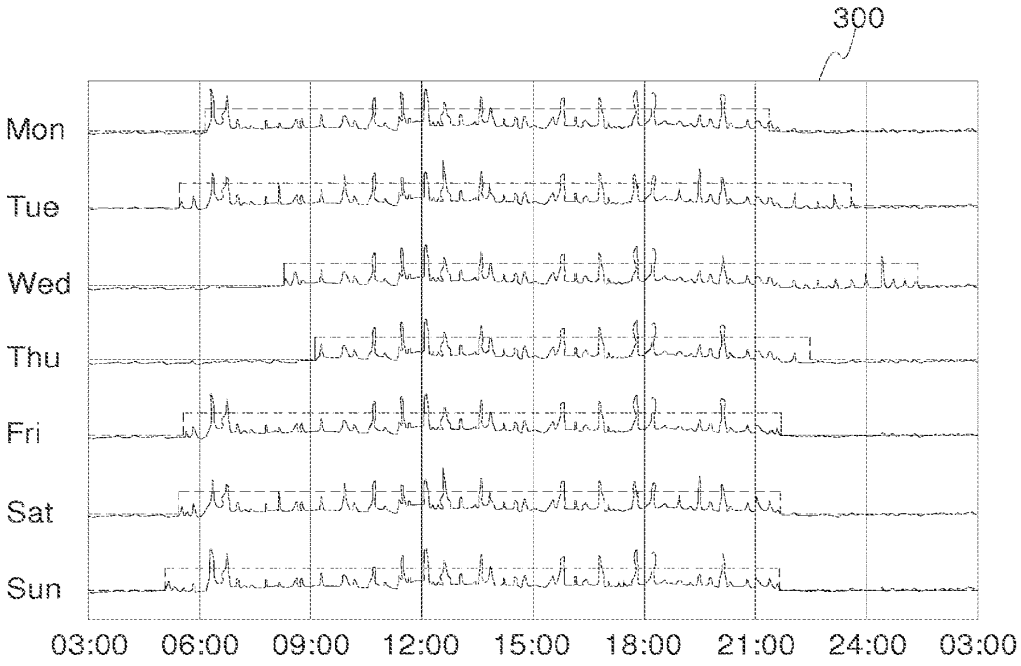


FIG. 3

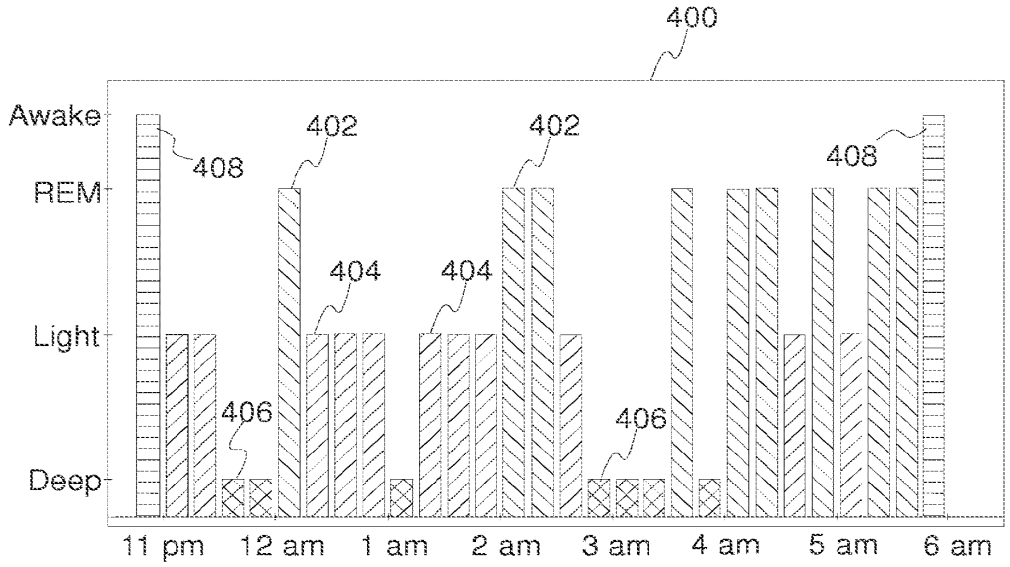


FIG. 4

Petitioner Samsung Ex-1004, 0143

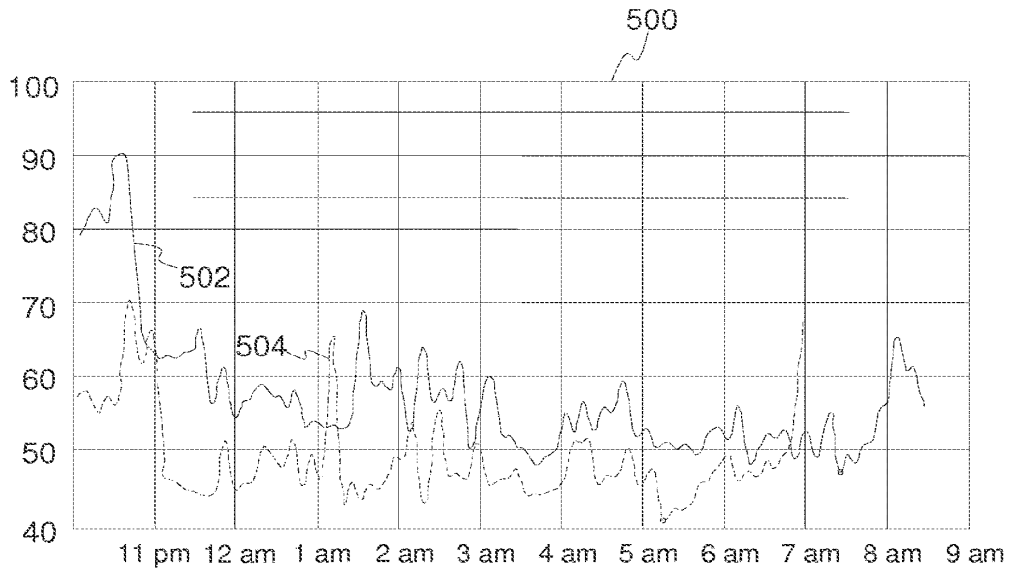


FIG. 5

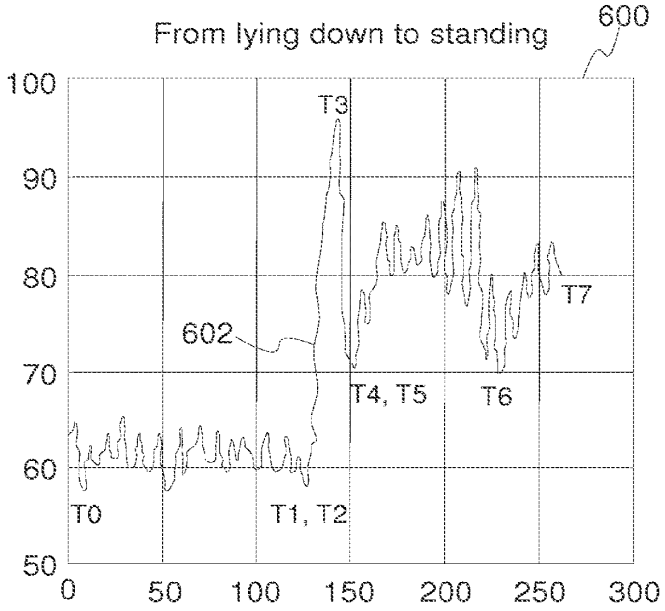


FIG. 6

Petitioner Samsung Ex-1004, 0144

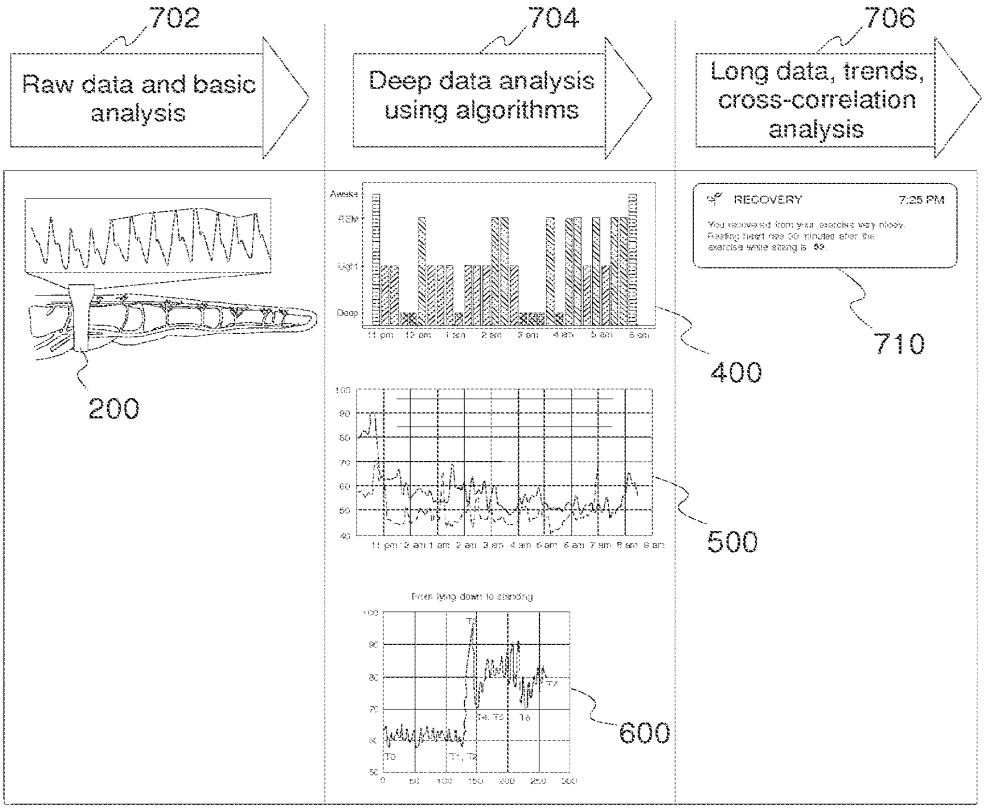


FIG. 7

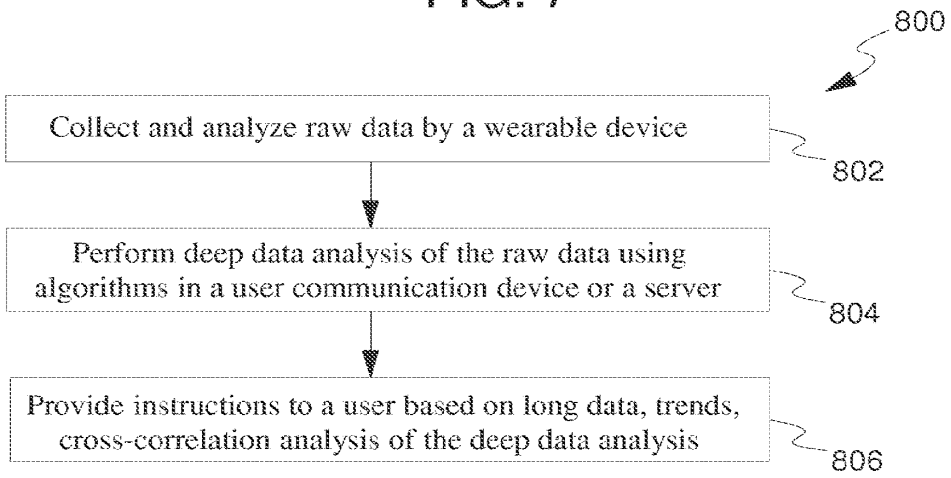


FIG. 8

Petitioner Samsung Ex-1004, 0145

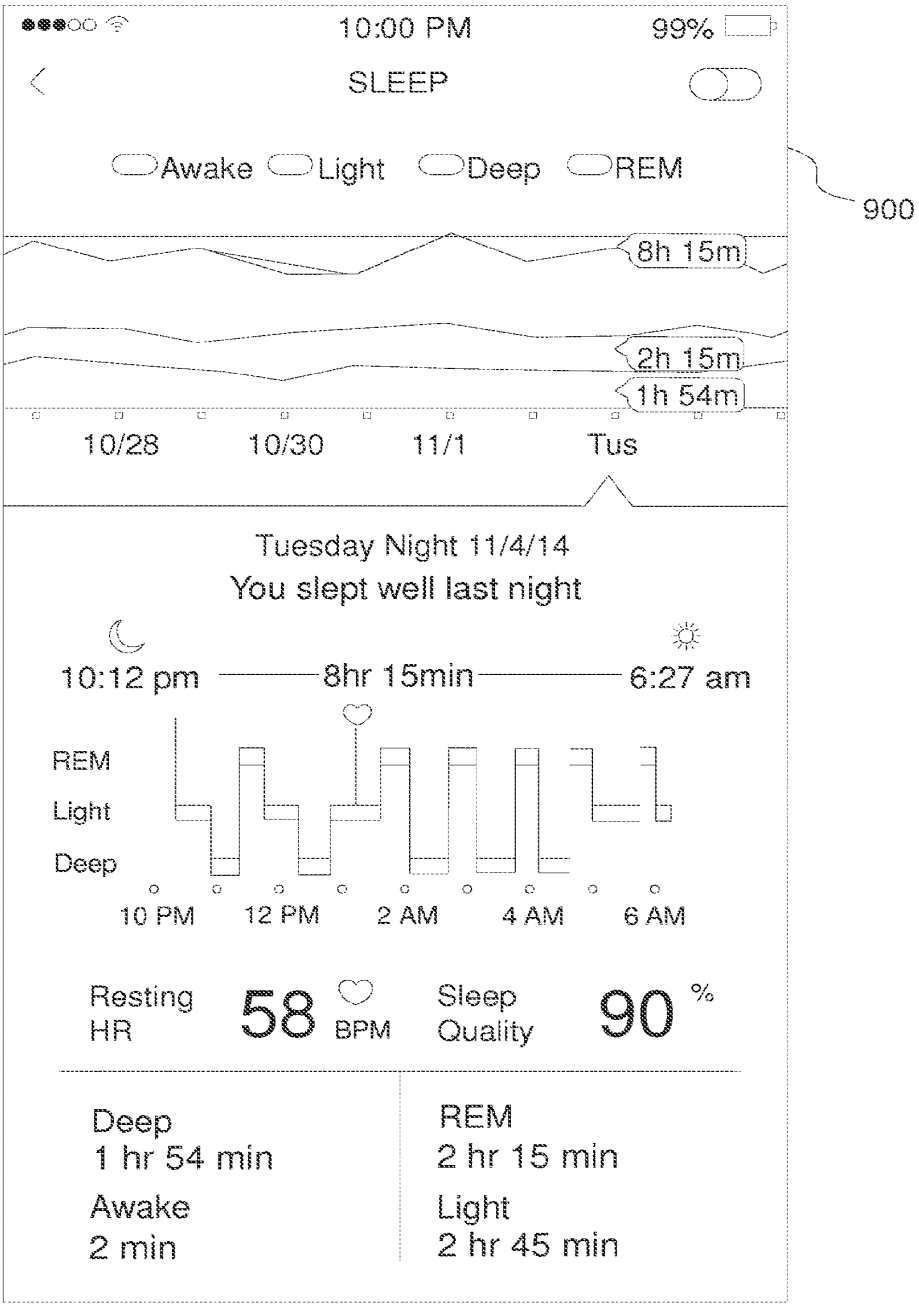

10:00 PM
99%
SLEEP
Awake
Light
Deep
REM
900
8h 15m
2h 15m
1h 54m
10/28
10/30
11/1
Tus
Tuesday Night 11/4/14
You slept well last night
10:12 pm
8hr 15min
6:27 am
REM
Light
Deep
10 PM
12 PM
2 AM
4 AM
6 AM
Resting HR
58
BPM
Sleep Quality
90
%
Deep
1 hr 54 min
REM
2 hr 15 min
Awake
2 min
Light
2 hr 45 min

FIG. 9



FIG. 10

Petitioner Samsung Ex-1004, 0147

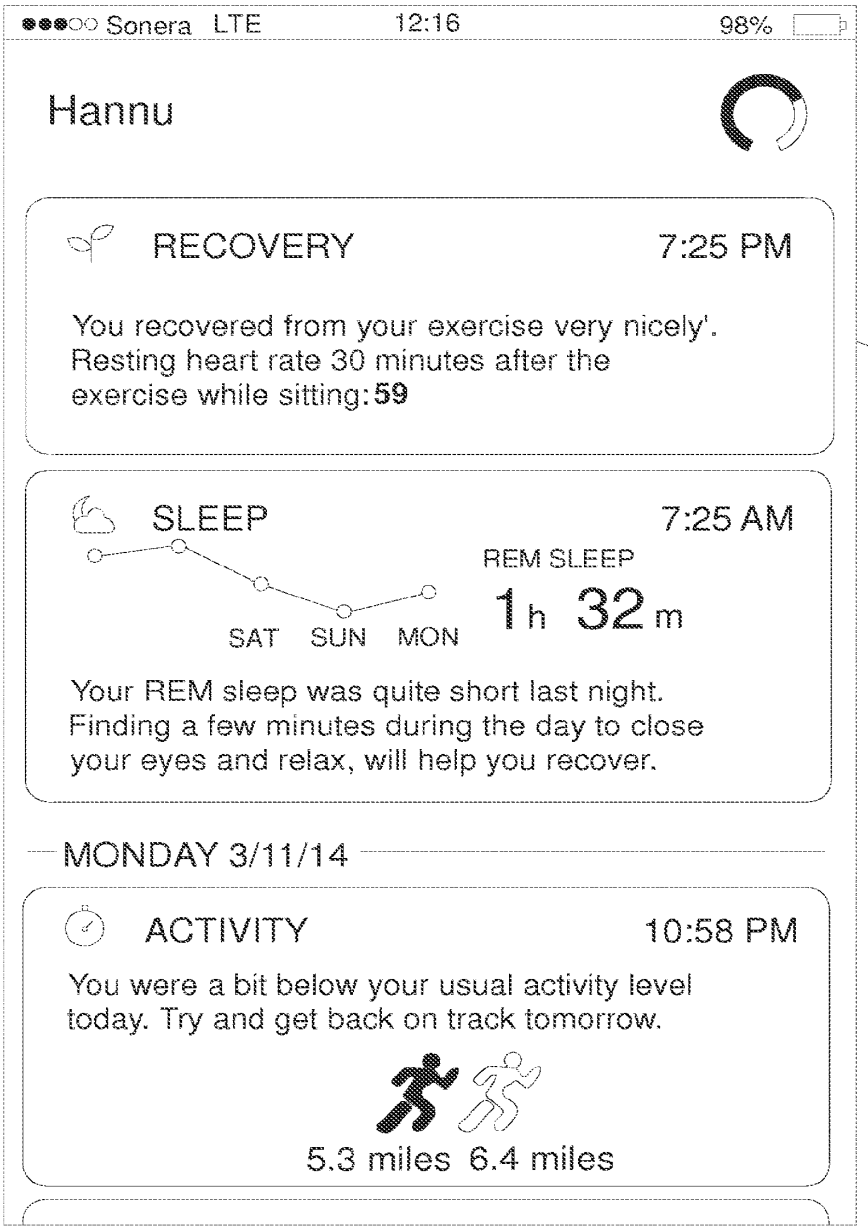

Sonera LTE
12:16
98%
Hannu
RECOVERY
7:25 PM
You recovered from your exercise very nicely'. Resting heart rate 30 minutes after the exercise while sitting: 59
1100
SLEEP
7:25 AM
REM SLEEP
1h 32m
SAT SUN MON
Your REM sleep was quite short last night. Finding a few minutes during the day to close your eyes and relax, will help you recover.
MONDAY 3/11/14
ACTIVITY
10:58 PM
You were a bit below your usual activity level today. Try and get back on track tomorrow.
5.3 miles 6.4 miles

FIG. 11

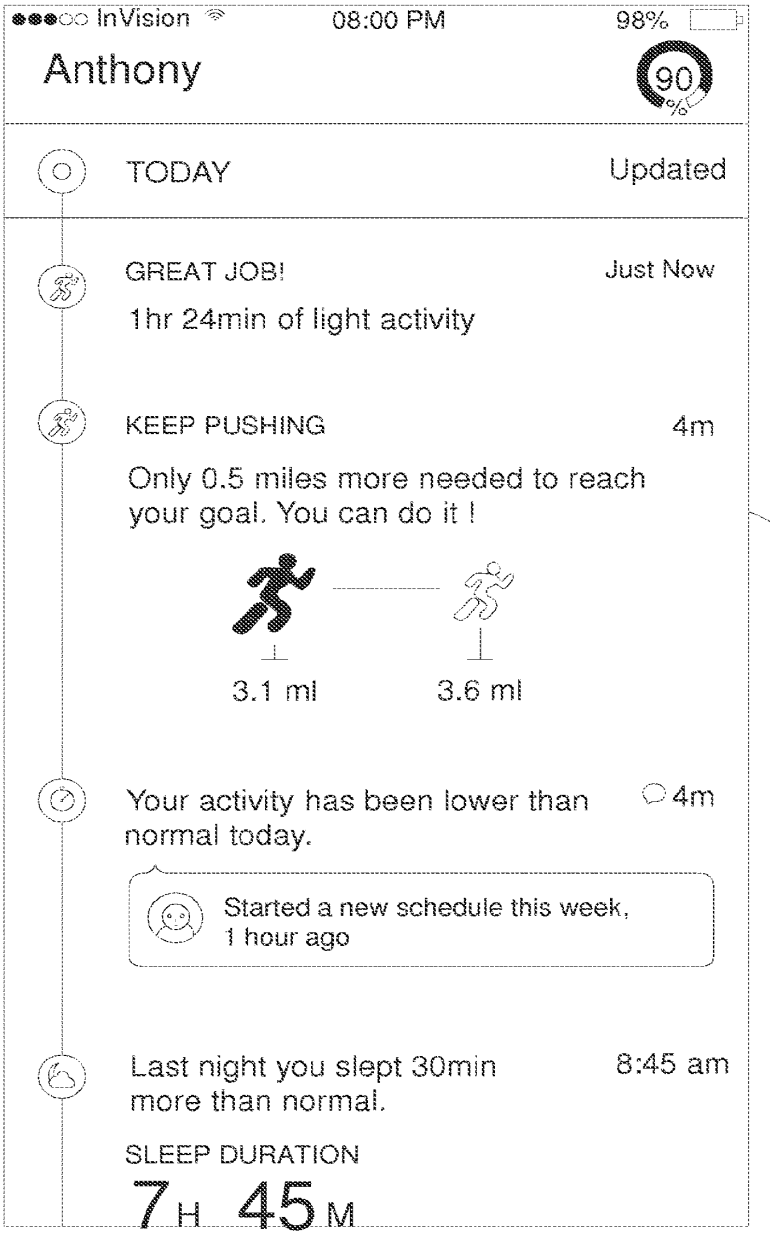

InVision
08:00 PM
98%
Anthony
90
%
TODAY
Updated
GREAT JOB!
Just Now
1hr 24min of light activity
KEEP PUSHING
4m
Only 0.5 miles more needed to reach your goal. You can do it !
3.1 ml
3.6 ml
1200
Your activity has been lower than normal today.
4m
Started a new schedule this week, 1 hour ago
Last night you slept 30min more than normal.
8:45 am
SLEEP DURATION
7 H 45 M

FIG. 12

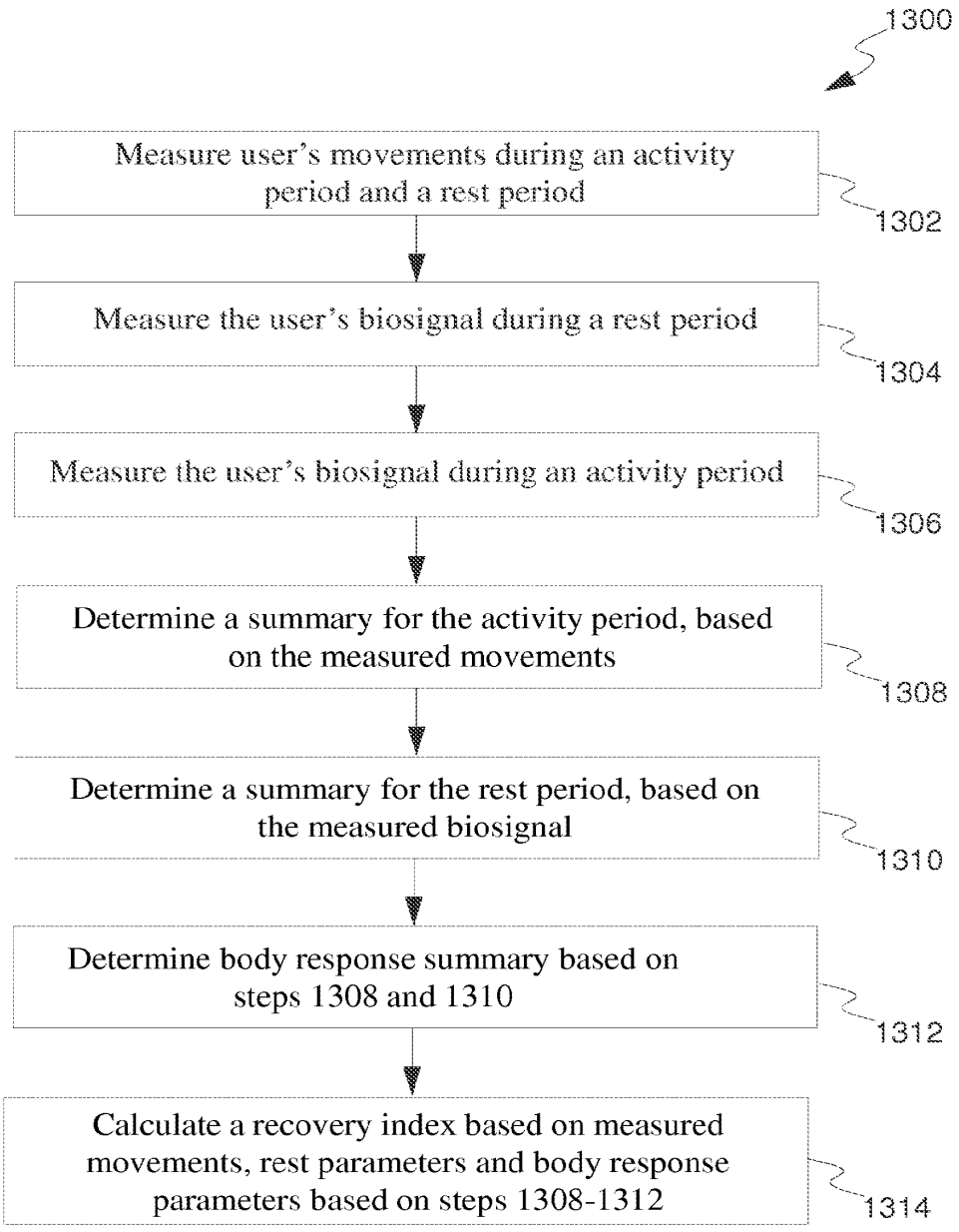


FIG. 13

Petitioner Samsung Ex-1004, 0150

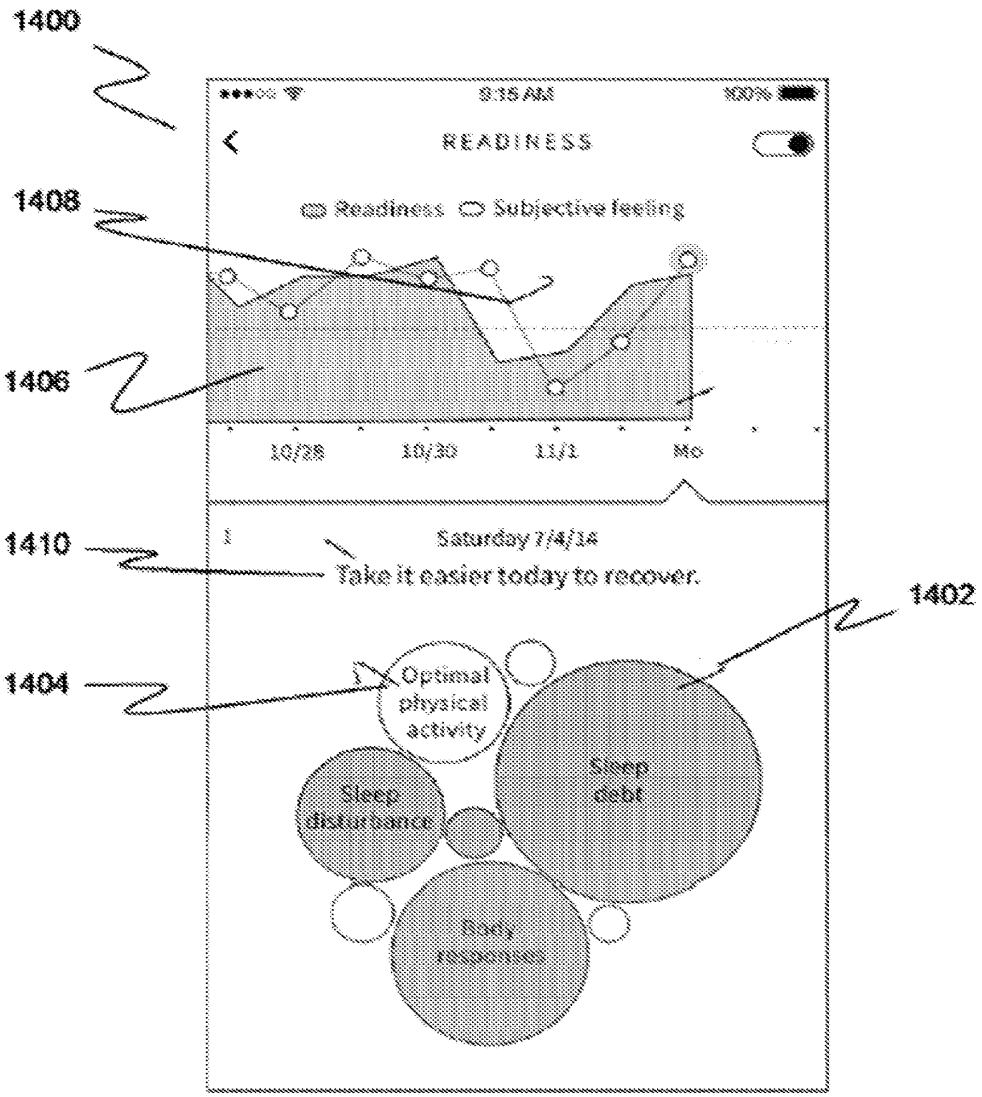

1400
1408
1406
1410
1404
1402
9:15 AM
100%
READINESS
Readiness
Subjective feeling
10/28
10/30
11/1
Mo
Saturday 7/4/14
Take it easier today to recover.
Optimal physical activity
Sleep debt
Sleep disturbance
Body response

FIG. 14

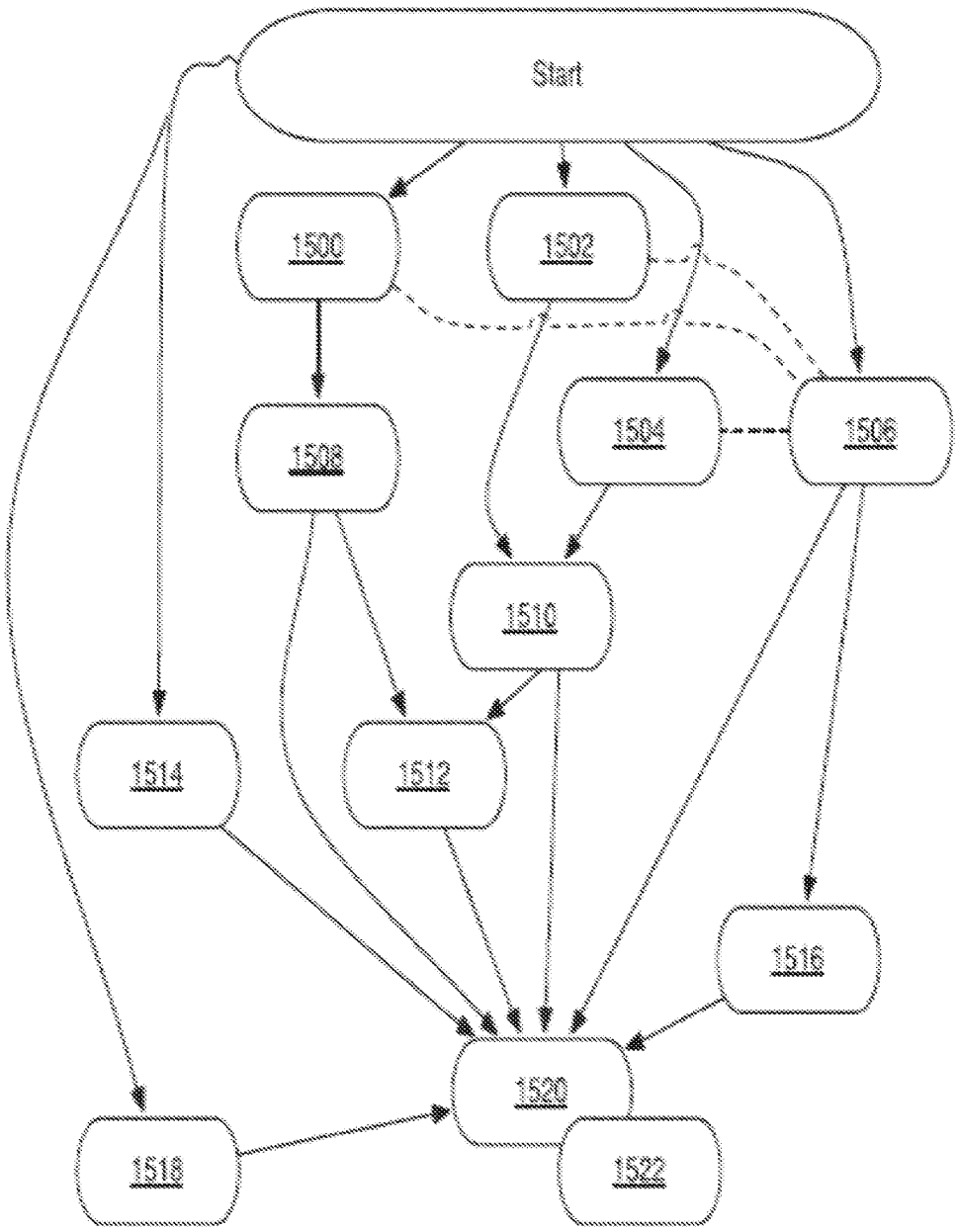


FIG. 15

Petitioner Samsung Ex-1004, 0152

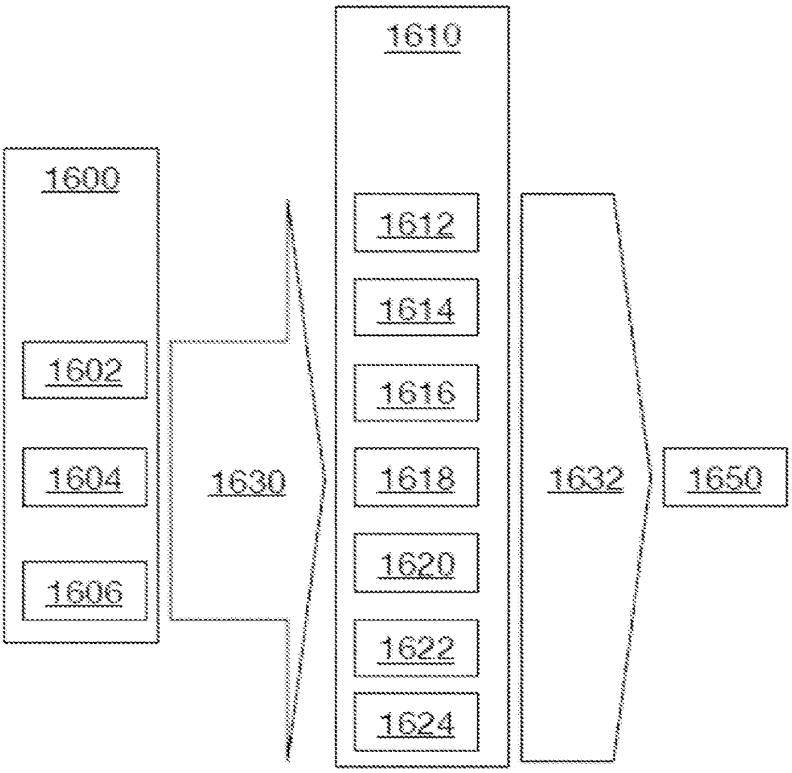

1610
1600
1612
1614
1602
1616
1604
1630
1618
1632
1650
1620
1606
1622
1624

FIG. 16

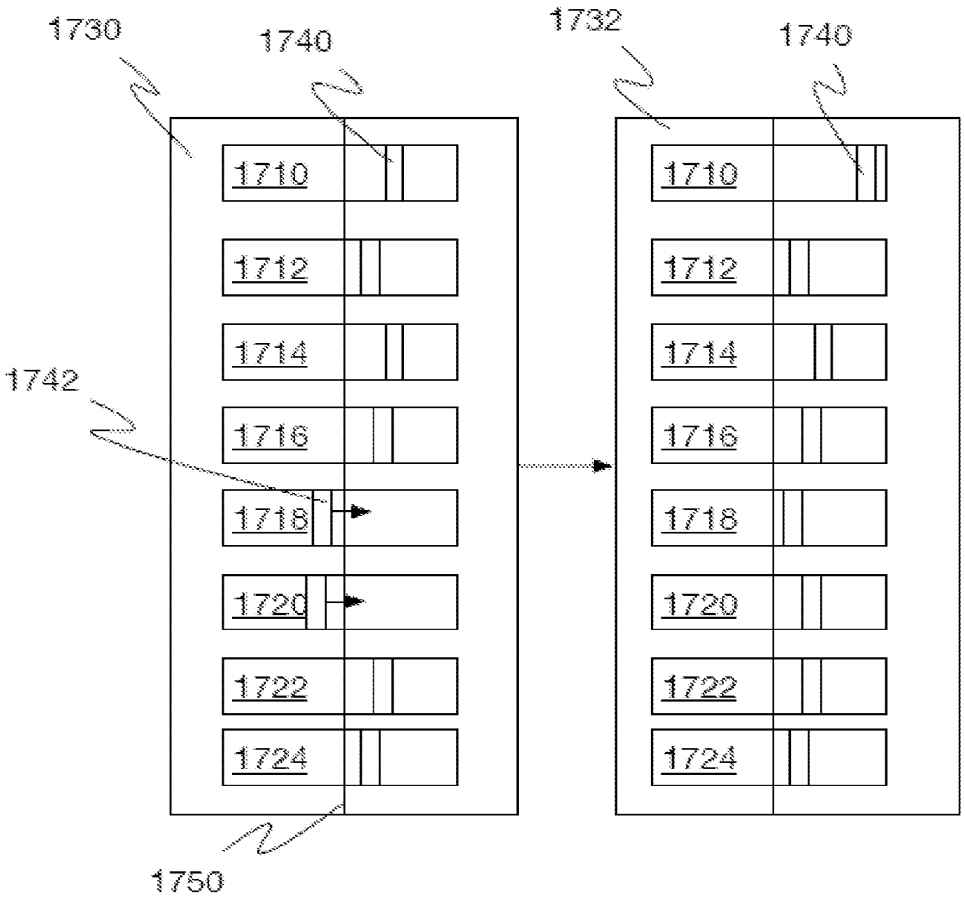

1730
1740
1732
1740
1710
1712
1714
1716
1718
1720
1722
1724
1742
1710
1712
1714
1716
1718
1720
1722
1724
1750

FIG. 17

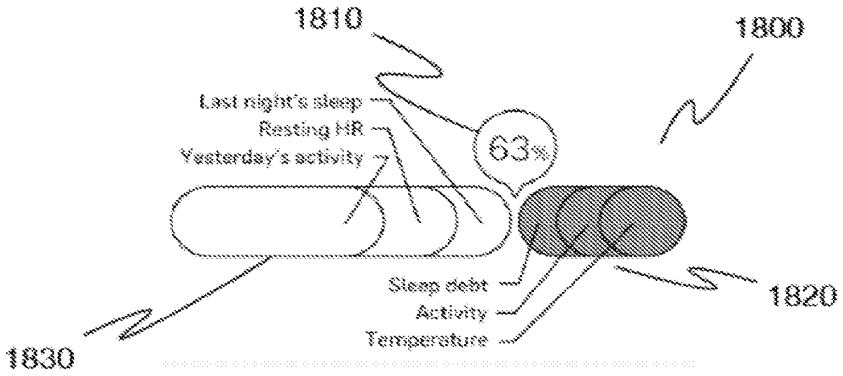


FIG. 18A

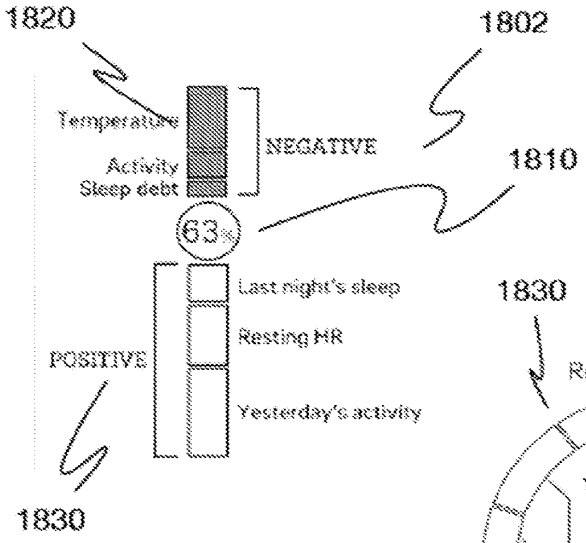


FIG. 18B

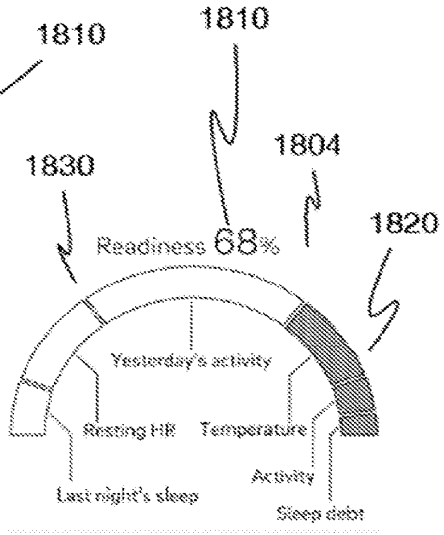


FIG. 18C

Petitioner Samsung Ex-1004, 0155

INTERNATIONAL SEARCH REPORT

International application No
PCT/FI2016/050113

A. CLASSIFICATION OF SUBJECT MATTER
INV. G06F19/00 A61B5/01 A61B5/024 A61B5/0404 A61B5/11 A61B5/00
ADD. A61B5/0488 A61B5/0496 A61B5/16
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A61B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 2013/161072 A1 (TOYOTA MOTOR CO LTD [JP]; IIZUKA HISASHI [JP]) 31 October 2013 (2013-10-31) paragraphs [0028] - [0034], [0036], [0080] & EP 2 842 491 A1 (TOYOTA MOTOR CO LTD [JP]) 4 March 2015 (2015-03-04)	1-14
Y	JP 2007 222276 A (TANITA SEISAKUSHO KK) 6 September 2007 (2007-09-06) paragraphs [0022] - [0026], [0029] - [0034]	1-14

-/--

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
26 May 2016	09/06/2016

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Albrecht, Ronald

1

Form PCT/ISA/210 (second sheet) (April 2005)

Petitioner Samsung Ex-1004, 0156

INTERNATIONAL SEARCH REPORT

International application No
PCT/FI2016/050113

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JONES A Y M ET AL: "Activity Levels and Resting Energy Expenditure in an Elderly Population: A Pilot Study", HONG KONG PHYSIOTHERAPY JOURNAL, ELSEVIER, AMSTERDAM, NL, vol. 22, no. 1, 1 January 2004 (2004-01-01), pages 29-32, XP026251662, ISSN: 1013-7025, DOI: 10.1016/S1013-7025(09)70047-8 [retrieved on 2004-01-01] section "Method"	1,9
A	RENNIE K ET AL: "A COMBINED HEART RATE AND MOVEMENT SENSOR: PROOF OF CONCEPT AND PRELIMINARY TESTING STUDY", EUROPEAN JOURNAL OF CLINICAL NUTRITION, XX, XX, vol. 54, no. 5, 1 May 2000 (2000-05-01), pages 409-414, XP008034744, DOI: 10.1038/SJ.EJCN.1600973 section "Method"	1,9
A	US 2010/168531 A1 (SHALTIS PHILLIP ANDREW [US] ET AL) 1 July 2010 (2010-07-01) figure 5 paragraph [0035]	9,13
X	US 2014/073486 A1 (AHMED WILLIAM [US] ET AL) 13 March 2014 (2014-03-13)	15
A	figures 15-18	11

1

Petitioner Samsung Ex-1004, 0157

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/FI2016/050113

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2013161072 A1	31-10-2013	CN 104244825 A	24-12-2014
		EP 2842491 A1	04-03-2015
		JP 5904275 B2	13-04-2016
		JP WO2013161072 A1	21-12-2015
		US 2015127265 A1	07-05-2015
		WO 2013161072 A1	31-10-2013
JP 2007222276 A	06-09-2007	JP 4905918 B2	28-03-2012
		JP 2007222276 A	06-09-2007
US 2010168531 A1	01-07-2010	NONE	
US 2014073486 A1	13-03-2014	CA 2883852 A1	13-03-2014
		EP 2892421 A1	15-07-2015
		US 2014073486 A1	13-03-2014
		US 2014309542 A1	16-10-2014
		US 2014323827 A1	30-10-2014
		US 2014323828 A1	30-10-2014
		US 2014323880 A1	30-10-2014
		US 2014343372 A1	20-11-2014
		US 2014350356 A1	27-11-2014
		US 2016129310 A1	12-05-2016
		WO 2014039567 A1	13-03-2014

Petitioner Samsung Ex-1004, 0158

ADVANCE E-MAIL

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF THE RECORDING OF A CHANGE

(PCT Rule 92*bis*.1 and Administrative Instructions, Section 422)

To:

MOOSEDOG OY
Rykmentintie 2B
20810 Turku
FINLANDE

Date of mailing *(day/month/year)*
17 May 2017 (17.05.2017)

Applicant's or agent's file reference
Jouzen003PCT

IMPORTANT NOTIFICATION

International application No.
PCT/FI2016/050113

International filing date *(day/month/year)*
23 February 2016 (23.02.2016)

1. The following indications appeared on record concerning:

☒ the applicant ☐ the inventor ☐ the agent ☐ the common representative

Name and Address
JOUZEN OY
Elektroniikkatie 3
90590 Oulu
Finland

State of Nationality: FI
State of Residence: FI
Telephone No.
Facsimile No.
E-mail address

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

☐ the person ☒ the name ☐ the address ☐ the nationality ☐ the residence

Name and Address
OURA HEALTH OY
Elektroniikkatie 3
90590 Oulu
Finland

State of Nationality: FI
State of Residence: FI
Telephone No.
Facsimile No.
E-mail address
☐ Notifications by e-mail authorized

3. Further observations, if necessary:

4. A copy of this notification has been sent to:

☒ the receiving Office
☐ the International Searching Authority
☐ the Authority(ies) specified for supplementary search
☐ the International Preliminary Examining Authority
☒ the designated Offices concerned
☐ the elected Offices concerned
☐ other:

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. +41 22 338 82 70

Authorized officer
Durand Evelyne
e-mail pct.team9@wipo.int
Telephone No. +41 22 338 74 09

Petitioner Samsung Ex-1004, 0159

PCT REQUEST

Print Out (Original in Electronic Form)

0	**For receiving Office use only**	
0-1	International Application No.	PCT/FI2016/050113
0-2	International Filing Date	23 February 2016 (23.02.2016)
0-3	Name of receiving Office and "PCT International Application"	RO/FI

0-4	**Form PCT/RO/101 PCT Request**	
0-4-1	Prepared Using	PCT Online Filing Version 3.5.000.244e MT/FOP 20141031/0.20.5.20
0-5	**Petition** The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty	
0-6	**Receiving Office (specified by the applicant)**	Finnish Patent and Registration Office (PRH) (RO/FI)
0-7	**Applicant's or agent's file reference**	Jouzen003PCT
I	**Title of Invention**	METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER
II	**Applicant**	
II-1	This person is	Applicant only
II-2	Applicant for	All designated States
II-4	Name	JouZen Oy
II-5	Address	Elektroniikkatie 3 90590 Oulu Finland
II-6	State of nationality	FI
II-7	State of residence	FI
III-1	**Applicant and/or inventor**	
III-1-1	This person is	Inventor only
III-1-3	Inventor for	All designated States
III-1-4	Name (LAST, First)	KINNUNEN, Hannu
III-1-5	Address	Piimäperäntie 2 90800 Oulu Finland
III-2	**Applicant and/or inventor**	
III-2-1	This person is	Inventor only
III-2-3	Inventor for	All designated States
III-2-4	Name (LAST, First)	LAAKKONEN, Harri
III-2-5	Address	Pasuritie 6 90550 Oulu Finland

PCT REQUEST

Print Out (Original in Electronic Form)

III-3	**Applicant and/or inventor**	
III-3-1	This person is	Inventor only
III-3-3	Inventor for	All designated States
III-3-4	Name (LAST, First)	KIVELÄ, Kari
III-3-5	Address	Pursimiehenkatu 21 A 3 00150 Helsinki Finland
III-4	**Applicant and/or inventor**	
III-4-1	This person is	Inventor only
III-4-3	Inventor for	All designated States
III-4-4	Name (LAST, First)	COLLEY, Ashley
III-4-5	Address	Louhikkotie 18 A 1 96500 Rovaniemi Finland
III-5	**Applicant and/or inventor**	
III-5-1	This person is	Inventor only
III-5-3	Inventor for	All designated States
III-5-4	Name (LAST, First)	LAHTELA, Petteri
III-5-5	Address	Heikkisentie 85 90940 Jääli Finland
III-6	**Applicant and/or inventor**	
III-6-1	This person is	Inventor only
III-6-3	Inventor for	All designated States
III-6-4	Name (LAST, First)	KOSKELA, Markku
III-6-5	Address	Pateniementie 68 A 1 90800 Oulu Finland
III-7	**Applicant and/or inventor**	
III-7-1	This person is	Inventor only
III-7-3	Inventor for	All designated States
III-7-4	Name (LAST, First)	JURVELIN, Heidi
III-7-5	Address	Hippiäiskuja 6 C 90420 Oulu Finland

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IV-1	**Agent or common representative; or address for correspondence**	
	The person identified below is hereby/ has been appointed to act on behalf of the applicant(s) before the competent International Authorities as:	Agent
IV-1-1	Name	Moosedog Oy
IV-1-2	Address	Rykmentintie 2B 20810 Turku Finland
IV-1-5	e-mail	moosedog@moosedog.fi
IV-1-5(a)	E-mail authorization The receiving Office, the International Searching Authority, the International Bureau and the International Preliminary Examining Authority are authorized to use this e-mail address, if the Office or Authority so wishes, to send notifications issued in respect of this international application:	as advance copies followed by paper notifications
V	**DESIGNATIONS**	
V-1	**The filing of this request constitutes under Rule 4.9(a), the designation of all Contracting States bound by the PCT on the international filing date, for the grant of every kind of protection available and, where applicable, for the grant of both regional and national patents.**	
VI-1	**Priority claim of earlier national application**	
VI-1-1	Filing date	26 February 2015 (26.02.2015)
VI-1-2	Number	62/121,425
VI-1-3	Country or Member of WTO	US
VI-2	**Priority claim of earlier national application**	
VI-2-1	Filing date	14 August 2015 (14.08.2015)
VI-2-2	Number	62/205,114
VI-2-3	Country or Member of WTO	US
VI-3	**Priority claim of earlier national application**	
VI-3-1	Filing date	30 November 2015 (30.11.2015)
VI-3-2	Number	62/260,760
VI-3-3	Country or Member of WTO	US
VI-4	**Priority document request**	
	The International Bureau is requested to obtain from a digital library a certified copy of the earlier application(s) identified above as item(s), using, where applicable, the access code(s) indicated:	VI-1 Access code: 2646 VI-2 Access code: 7031 VI-3 Access code: 3554

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VI-5	**Incorporation by reference :** where an element of the international application referred to in Article 11(1)(iii)(d) or (e) or a part of the description, claims or drawings referred to in Rule 20.5(a) is not otherwise contained in this international application but is completely contained in an earlier application whose priority is claimed on the date on which one or more elements referred to in Article 11(1)(iii) were first received by the receiving Office, that element or part is, subject to confirmation under Rule 20.6, incorporated by reference in this international application for the purposes of Rule 20.6.		
VII-1	**International Searching Authority Chosen**	European Patent Office (EPO) (ISA/EP)	
VIII	**Declarations**	Number of declarations	
VIII-1	Declaration as to the identity of the inventor	–	
VIII-2	Declaration as to the applicant's entitlement, as at the international filing date, to apply for and be granted a patent	–	
VIII-3	Declaration as to the applicant's entitlement, as at the international filing date, to claim the priority of the earlier application	–	
VIII-4	Declaration of inventorship (only for the purposes of the designation of the United States of America)	–	
VIII-5	Declaration as to non-prejudicial disclosures or exceptions to lack of novelty	–	
IX	**Check list**	Number of sheets	Electronic file(s) attached
IX-1	Request (including declaration sheets)	5	✓
IX-2	Description	37	✓
IX-3	Claims	3	✓
IX-4	Abstract	1	✓
IX-5	Drawings	14	✓
IX-7	TOTAL	60	
	Accompanying Items	Paper document(s) attached	Electronic file(s) attached
IX-8	Fee calculation sheet	–	✓
IX-19	Other	Pre-conversion archive	✓
IX-20	**Figure of the drawings which should accompany the abstract**	1	
IX-21	**Language of filing of the international application**	English	

PCT REQUEST

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X-1	**Signature of applicant, agent or common representative**	(PKCS7 Digital Signature)
X-1-1	Name	Moosedog Oy
X-1-2	Name of signatory	Kaisa Suominen 40421
X-1-3	Capacity (if such capacity is not obvious from reading the request)	(Representative)

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10-1	**Date of actual receipt of the purported international application**	23 February 2016 (23.02.2016)
10-2	**Drawings:**	
10-2-1	Received	
10-2-2	Not received	
10-3	**Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application**	
10-4	**Date of timely receipt of the required corrections under PCT Article 11(2)**	
10-5	**International Searching Authority**	ISA/EP
10-6	**Transmittal of search copy delayed until search fee is paid**	

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11-1	**Date of receipt of the record copy by the International Bureau**	

Information on Search Strategy - Pilot phase (see OJ 2015, A86)
The type of information contained in this sheet may change during the pilot for improving the usefulness of this new service.

Application Number
PCT/FI2016/050113

TITLE: METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER

APPLICANT: JOUZEN OY

IPC CLASSIFICATION: G06F19/00, A61B5/01, A61B5/024, A61B5/0404, A61B5/11, A61B5/00, A61B5/0488, A61B5/0496, A61B5/16

EXAMINER: Albrecht, Ronald

CONSULTED DATABASES: DOSYS, FULLTEXT DATABASES, SEARCHNPL, GOOGLE SCHOLAR, YOUTUBE, GOOGLE, GOOGLE+, GADGET SHOPS, BLOGS, ETC.

CLASSIFICATION SYMBOLS DEFINING EXTENT OF THE SEARCH:

IPC:

CPC: A61B5 (CPC, IPC, FI), A61B5/11/LOW, A61B5/4806/LOW, A61B5/0402/LOW, A61B5/02416/LOW, A61B5/02405, A61B5/0488/LOW, A61B5/0496

FI/F-TERMS:

KEYWORDS OR OTHER ELEMENTS FEATURING THE INVENTION:
activity sensor calculating a score for "potential energy" of a user accumulated during rest (including sleep analysis; using physiological sensors like PPG and motion sensors, e.g. accelerometers), a score for "used energy" spent during activities (measured using motion sensors, e.g. an accelerometer), and a score indicating "remaining energy" (called a readiness score)

EPO FORM P04A42

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

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1 September 2016 (01.09.2016)

WIPO | PCT

(10) International Publication Number
WO 2016/135382 A1

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G06F 19/00 (2011.01) *A61B 5/00* (2006.01)
A61B 5/01 (2006.01) *A61B 5/0488* (2006.01)
A61B 5/024 (2006.01) *A61B 5/0496* (2006.01)
A61B 5/0404 (2006.01) *A61B 5/16* (2006.01)
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62/121,425 26 February 2015 (26.02.2015) US
62/205,114 14 August 2015 (14.08.2015) US
62/260,760 30 November 2015 (30.11.2015) US

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(72) Inventors: **KINNUNEN, Hannu**; Piimäperäntie 2, 90800 Oulu (FI). **LAAKKONEN, Harri**; Pasuritie 6, 90550 Oulu (FI). **KIVELÄ, Kari**; Pursimiehenkatu 21 A 3, 00150 Helsinki (FI). **COLLEY, Ashley**; Louhikkotie 18 A 1, 96500 Rovaniemi (FI). **LAHTELA, Petteri**; Heikkisentie 85, 90940 Jääli (FI). **KOSKELA, Markku**; Pateniementie 68 A 1, 90800 Oulu (FI). **JURVELIN, Heidi**; Hippiäiskuja 6 C, 90420 Oulu (FI).

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(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ,

[Continued on next page]

(54) Title: METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER

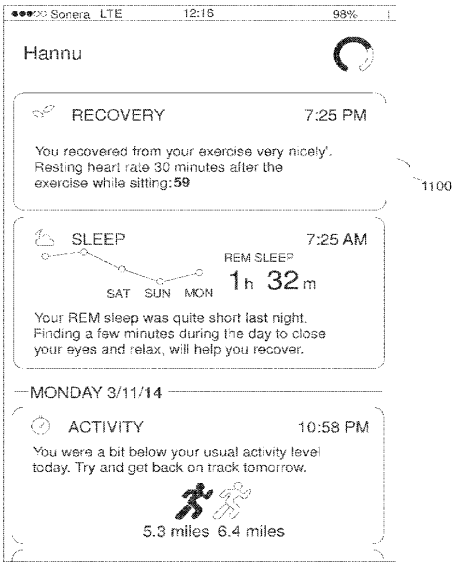


FIG. 11

(57) Abstract: A method for assessing readiness of a user comprises obtaining the user's movements; using the obtained user's movements to determine a nature of the period, wherein the nature of the period is selected from an activity period and a rest period; measuring at least one biosignal of the user during the rest period; determining a rest summary for the rest period, based on the measured at least one biosignal and at least one biosignal of a previous rest period; determining an activity summary for the activity period, based on the obtained movements of an activity period and obtained movements of at least one previous activity period; determining a body response summary based on the rest summary and the activity summary; and calculating a readiness score based on the body response summary and a previous body response summary, whereby the readiness score indicates a level of readiness of the user. The method is implemented in a system using a ring worn by the user.

WO 2016/135382 A1

Petitioner Samsung Ex-1004, 0166

TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report (Art. 21(3))*

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Application number: 62260760

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UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

February 25, 2016

THIS IS TO CERTIFY THAT ANNEXED HERETO IS A TRUE COPY FROM THE RECORDS OF THE UNITED STATES PATENT AND TRADEMARK OFFICE OF THOSE PAPERS OF THE BELOW IDENTIFIED PATENT APPLICATION THAT MET THE REQUIREMENTS TO BE GRANTED A FILING DATE UNDER 35 USC 111.

APPLICATION NUMBER: *62/260,760*
FILING DATE: *November 30, 2015*

THE COUNTRY CODE AND NUMBER OF YOUR PRIORITY APPLICATION, TO BE USED FOR FILING ABROAD UNDER THE PARIS CONVENTION, IS *US62/260,760*

Certified by

Michelle K. Lee

Under Secretary of Commerce
for Intellectual Property
and Director of the United States
Patent and Trademark Office

Doc Code: **TR.PROV**
Document Description: Provisional Cover Sheet (SB16)

PTO/SB/16 (11-08)
Approved for use through 05/31/2015. OMB 0651-0032
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
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Provisional Application for Patent Cover Sheet

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c)

Inventor(s)

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Inventor 2 — Remove

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Harri		Laakkonen	Oulu		FI

Inventor 3 — Remove

Given Name	Middle Name	Family Name	City	State	Country
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Inventor 4 — Remove

Given Name	Middle Name	Family Name	City	State	Country
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Inventor 5 — Remove

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Marko	Petteri	Lahtela	Jääli		FI

Inventor 6 — Remove

Given Name	Middle Name	Family Name	City	State	Country
Markku	Olavi	Koskela	Oulu		FI

Inventor 7 — Remove

Given Name	Middle Name	Family Name	City	State	Country
Heidi		Jurvelin	Oulu		FI

All Inventors Must Be Listed – Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. — Add

Doc Code: **TR.PROV**
Document Description: Provisional Cover Sheet (SB16)

PTO/SB/16 (11-08)
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U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
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Title of Invention	METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER
Attorney Docket Number (if applicable)	MDJN.3376.USP1

Correspondence Address

Direct all correspondence to (select one):

◉ The address corresponding to Customer Number	○ Firm or Individual Name
Customer Number	93582

The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.

- ● No.
- Yes, the invention was made by an agency of the United States Government. The U.S. Government agency name is:
- Yes, the invention was under a contract with an agency of the United States Government. The name of the U.S. Government agency and Government contract number are:

Petitioner Samsung Ex-1004, 0171

Doc Code: **TR.PROV**
Document Description: Provisional Cover Sheet (SB16)

PTO/SB/16 (11-08)
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Entity Status
Applicant asserts small entity status under 37 CFR 1.27 or applicant certifies micro entity status under 37 CFR 1.29

◉	Applicant asserts small entity status under 37 CFR 1.27
○	Applicant certifies micro entity status under 37 CFR 1.29. Applicant must attach form PTO/SB/15A or B or equivalent.
○	No

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Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

Signature

Please see 37 CFR 1.4(d) for the form of the signature.

Signature	/gcz44004/			Date (YYYY-MM-DD)	2015-11-30
First Name	Geza	Last Name	Ziegler	Registration Number (If appropriate)	44004

This collection of information is required by 37 CFR 1.51. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 8 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **This form can only be used when in conjunction with EFS-Web. If this form is mailed to the USPTO, it may cause delays in handling the provisional application.**

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7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	MDJN.3376.USP1-Jouzen010
	Application Number	
Title of Invention	METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2:

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
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Petitioner Samsung Ex-1004, 0174

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	MDJN.3376.USP1-Jouzen010
	Application Number	
Title of Invention	METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER	

Prefix	Given Name	Middle Name	Family Name	Suffix
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Postal Code	96500	Country [i]	FI

Inventor 5 Remove

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	Marko	Petteri	Lahtela	

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City	Jääli	State/Province	
Postal Code	90940	Country [i]	FI

Petitioner Samsung Ex-1004, 0175

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	MDJN.3376.USP1-Jouzen010
	Application Number	
Title of Invention	METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER	

Inventor 6 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Markku	Olavi	Koskela	

Residence Information (Select One) US Residency ◉ Non US Residency Active US Military Service

City	Oulu	Country of Residence [i]	FI

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Address 2			
City	Oulu	**State/Province**	
Postal Code	90800	**Country** [i]	FI

Inventor 7 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Heidi		Jurvelin	

Residence Information (Select One) US Residency ◉ Non US Residency Active US Military Service

City	Oulu	Country of Residence [i]	FI

Mailing Address of Inventor:

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Address 2			
City	Oulu	**State/Province**	
Postal Code	FI-90420	**Country** [i]	FI

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
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☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	93582		
Email Address	ptomail@gziplaw.com	Add Email	Remove Email

Petitioner Samsung Ex-1004, 0176

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	MDJN.3376.USP1-Jouzen010
	Application Number	
Title of Invention	METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER	

Application Information:

Title of the Invention	METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER		
Attorney Docket Number	MDJN.3376.USP1-Jouzen010	**Small Entity Status Claimed**	☒
Application Type	Provisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	14	**Suggested Figure for Publication (if any)**	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	● Customer Number	US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	93582		

Petitioner Samsung Ex-1004, 0177

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Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status			Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button. Add

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)[i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Remove

Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[i] (if applicable)

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button. Add

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

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Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

Petitioner Samsung Ex-1004, 0179

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Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1 — Remove

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

● Assignee	Legal Representative under 35 U.S.C. 117	Joint Inventor
Person to whom the inventor is obligated to assign.	Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here. ☒

Organization Name	JouZen Oy		
Mailing Address Information For Applicant:			
Address 1	Elektroniikkatie 3		
Address 2			
City	Oulu	**State/Province**	
Country	FI	Postal Code	90590
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button. Add

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Petitioner Samsung Ex-1004, 0180

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	MDJN.3376.USP1-Jouzen010
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Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

Remove

If the Assignee or Non-Applicant Assignee is an Organization check here. ☐

Prefix	**Given Name**	Middle Name	**Family Name**	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1			
Address 2			
City		**State/Province**	
Country i		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button. Add

Signature:

Remove

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). **However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).**

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/gcz44004/			Date (YYYY-MM-DD)	2015-11-30
First Name	Geza	Last Name	Ziegler	Registration Number	44004

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	MDJN.3376.USP1-Jouzen010
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This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1 The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3 A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent CooperationTreaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Petitioner Samsung Ex-1004, 0183

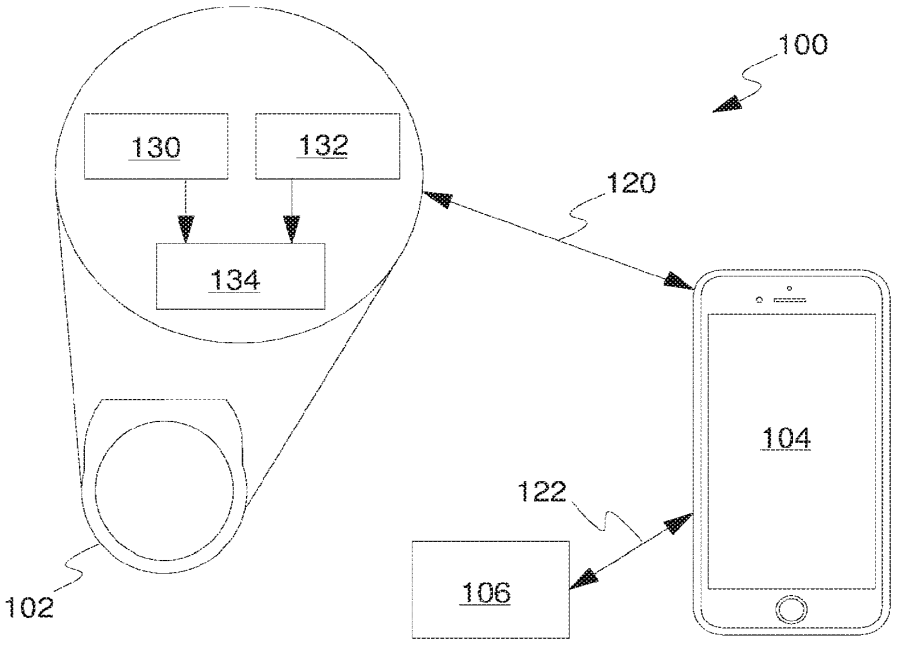


FIG. 1

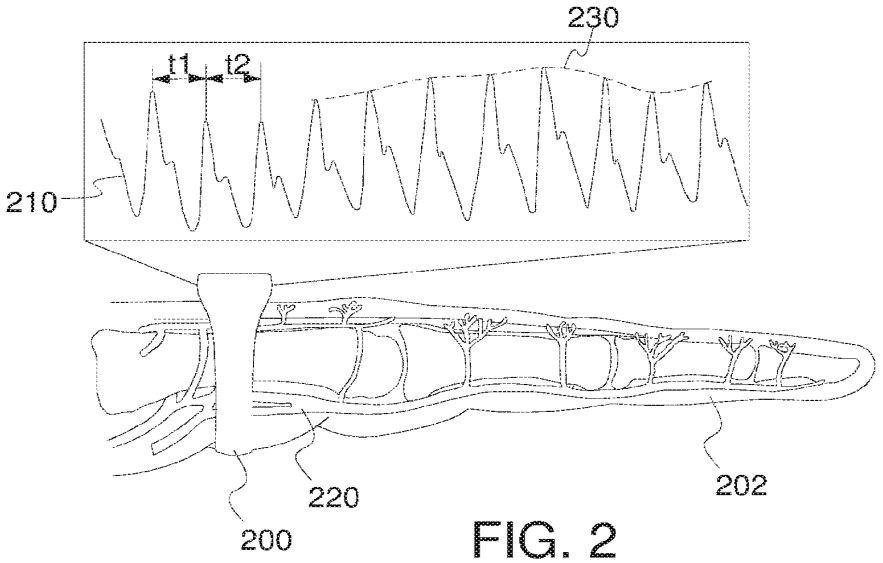


FIG. 2

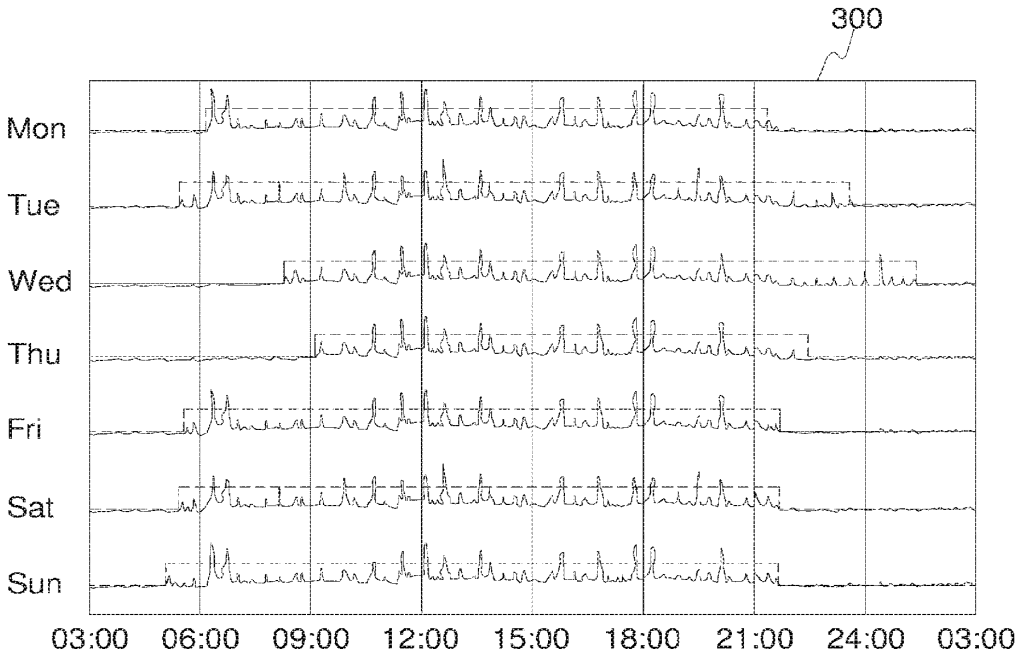

300
Mon
Tue
Wed
Thu
Fri
Sat
Sun
03:00
06:00
09:00
12:00
15:00
18:00
21:00
24:00
03:00

FIG. 3

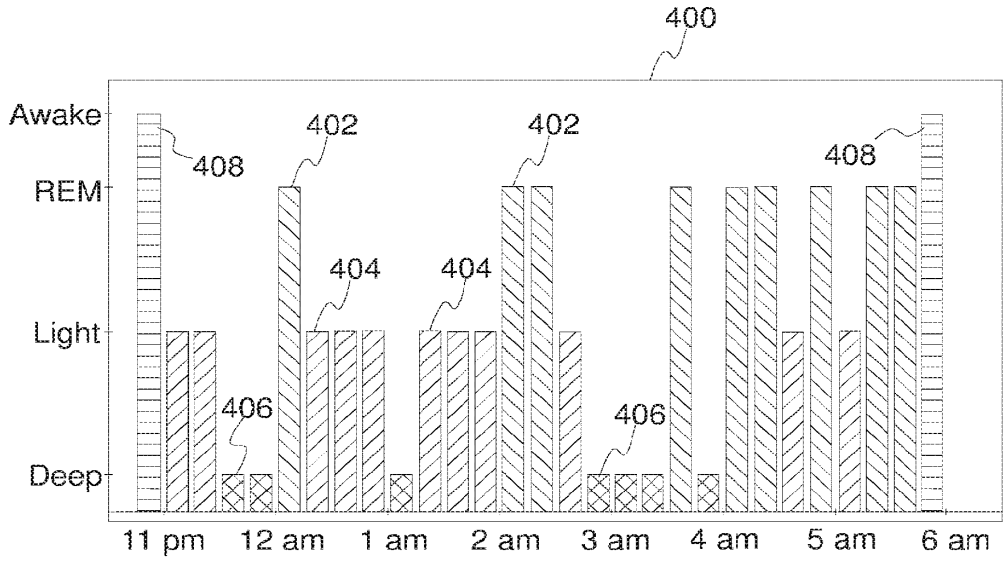

400
Awake
REM
Light
Deep
408
402
402
408
404
404
406
406
11 pm
12 am
1 am
2 am
3 am
4 am
5 am
6 am

FIG. 4

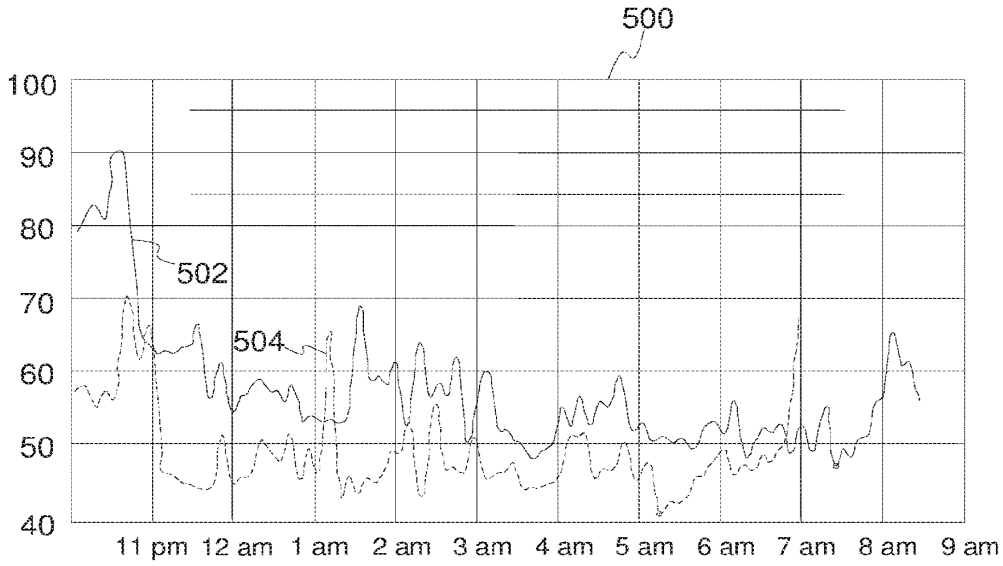

500
100
90
80
70
60
50
40
502
504
11 pm
12 am
1 am
2 am
3 am
4 am
5 am
6 am
7 am
8 am
9 am

FIG. 5

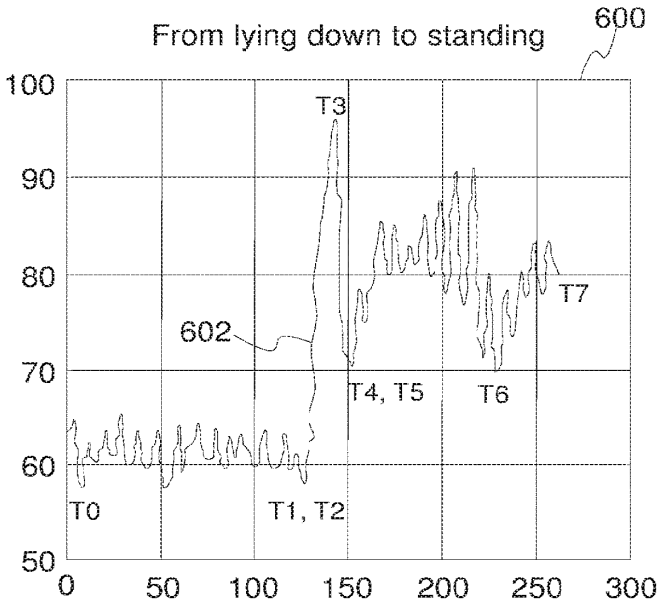

From lying down to standing
600
100
90
80
70
60
50
T3
602
T7
T4, T5
T6
T0
T1, T2
0
50
100
150
200
250
300

FIG. 6

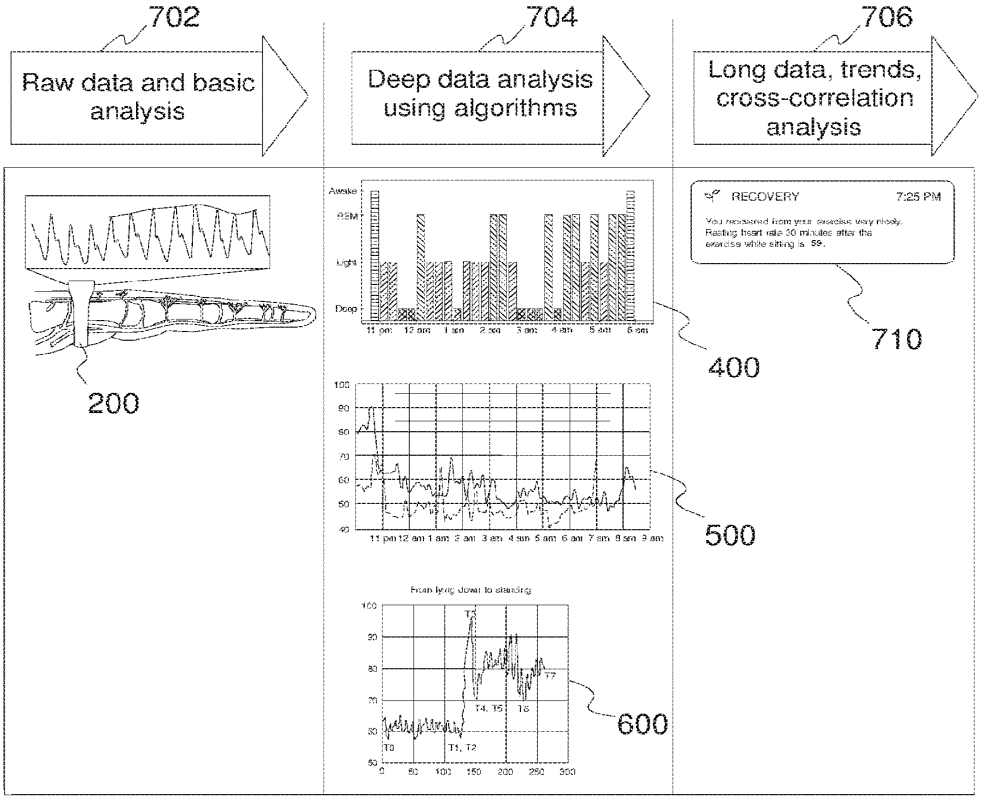

702
Raw data and basic analysis
704
Deep data analysis using algorithms
706
Long data, trends, cross-correlation analysis
RECOVERY
7:25 PM
200
400
500
600
710

FIG. 7

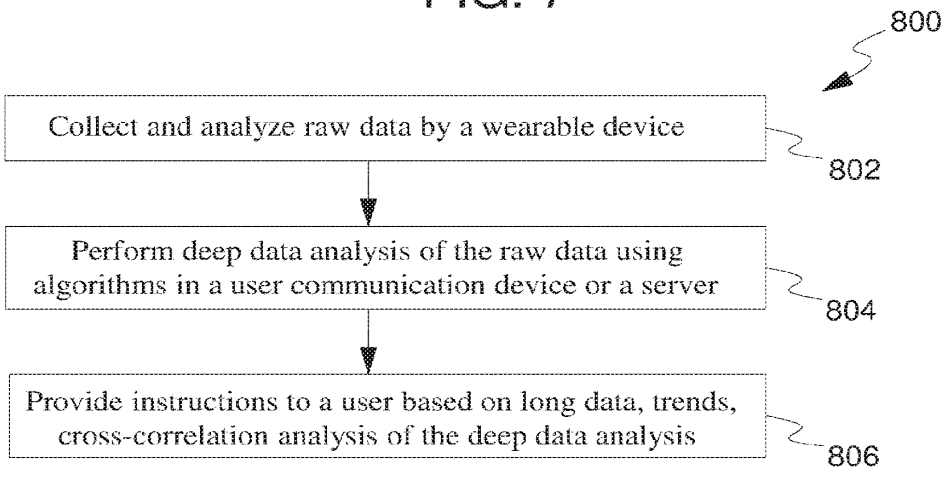

800
Collect and analyze raw data by a wearable device
802
Perform deep data analysis of the raw data using algorithms in a user communication device or a server
804
Provide instructions to a user based on long data, trends, cross-correlation analysis of the deep data analysis
806

FIG. 8

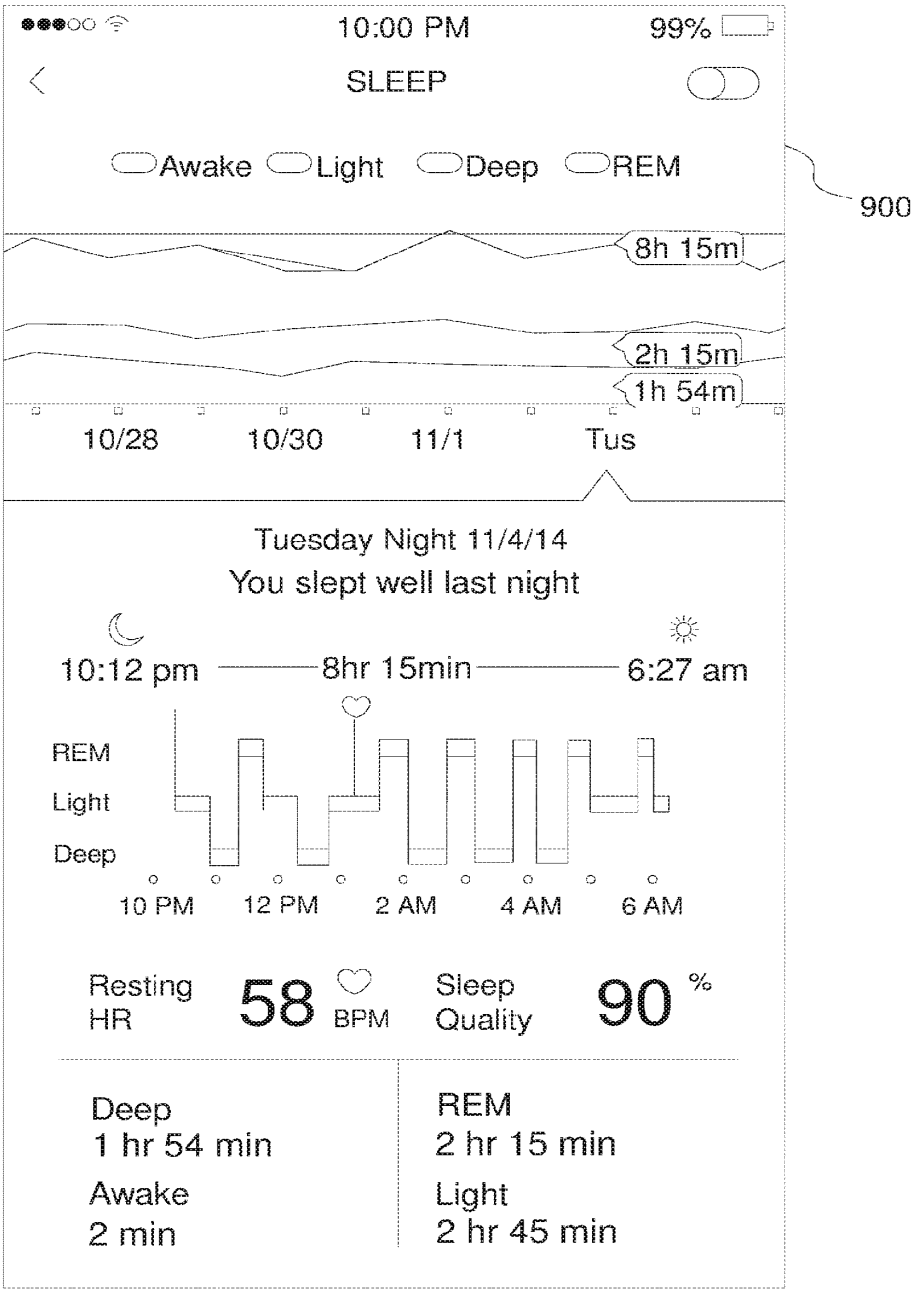

10:00 PM
99%
SLEEP
Awake
Light
Deep
REM
900
8h 15m
2h 15m
1h 54m
10/28
10/30
11/1
Tus
Tuesday Night 11/4/14
You slept well last night
10:12 pm
8hr 15min
6:27 am
REM
Light
Deep
10 PM
12 PM
2 AM
4 AM
6 AM
Resting HR
58
BPM
Sleep Quality
90
%
Deep
1 hr 54 min
Awake
2 min
REM
2 hr 15 min
Light
2 hr 45 min

FIG. 9

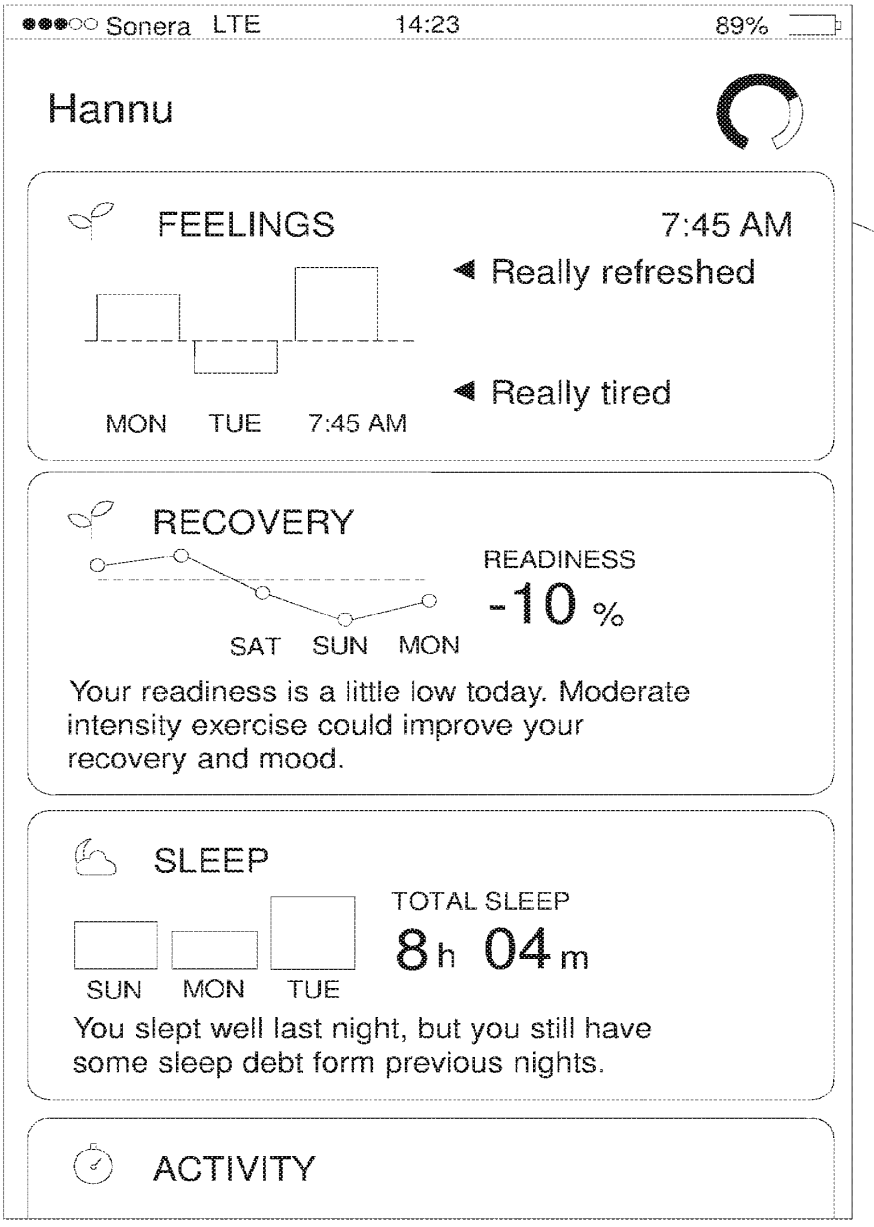

Sonera LTE
14:23
89%
Hannu
FEELINGS
7:45 AM
Really refreshed
Really tired
MON
TUE
7:45 AM
1000
RECOVERY
READINESS
-10 %
SAT
SUN
MON
Your readiness is a little low today. Moderate intensity exercise could improve your recovery and mood.
SLEEP
TOTAL SLEEP
8h 04m
SUN
MON
TUE
You slept well last night, but you still have some sleep debt form previous nights.
ACTIVITY

FIG. 10

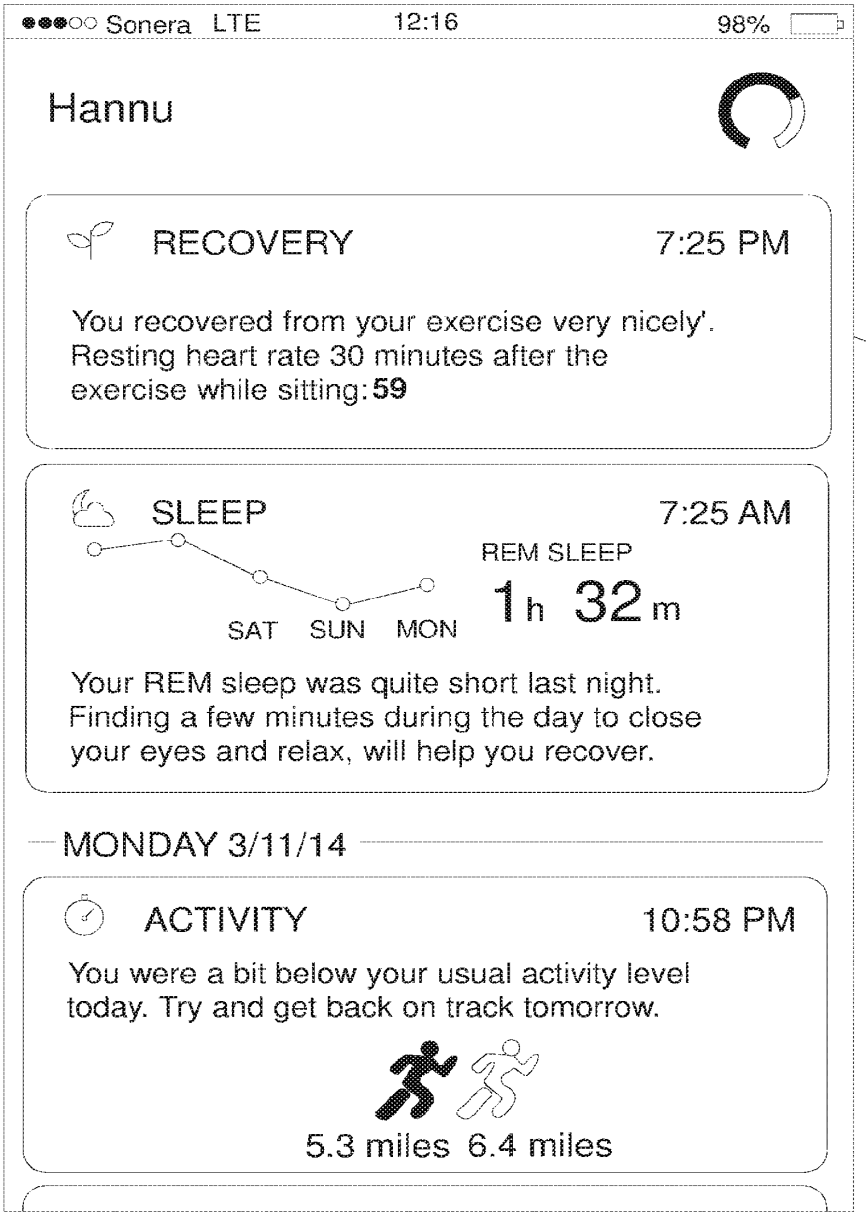

Sonera LTE
12:16
98%
Hannu
RECOVERY
7:25 PM
You recovered from your exercise very nicely'. Resting heart rate 30 minutes after the exercise while sitting: 59
1100
SLEEP
7:25 AM
REM SLEEP
1h 32m
SAT SUN MON
Your REM sleep was quite short last night. Finding a few minutes during the day to close your eyes and relax, will help you recover.
MONDAY 3/11/14
ACTIVITY
10:58 PM
You were a bit below your usual activity level today. Try and get back on track tomorrow.
5.3 miles 6.4 miles

FIG. 11

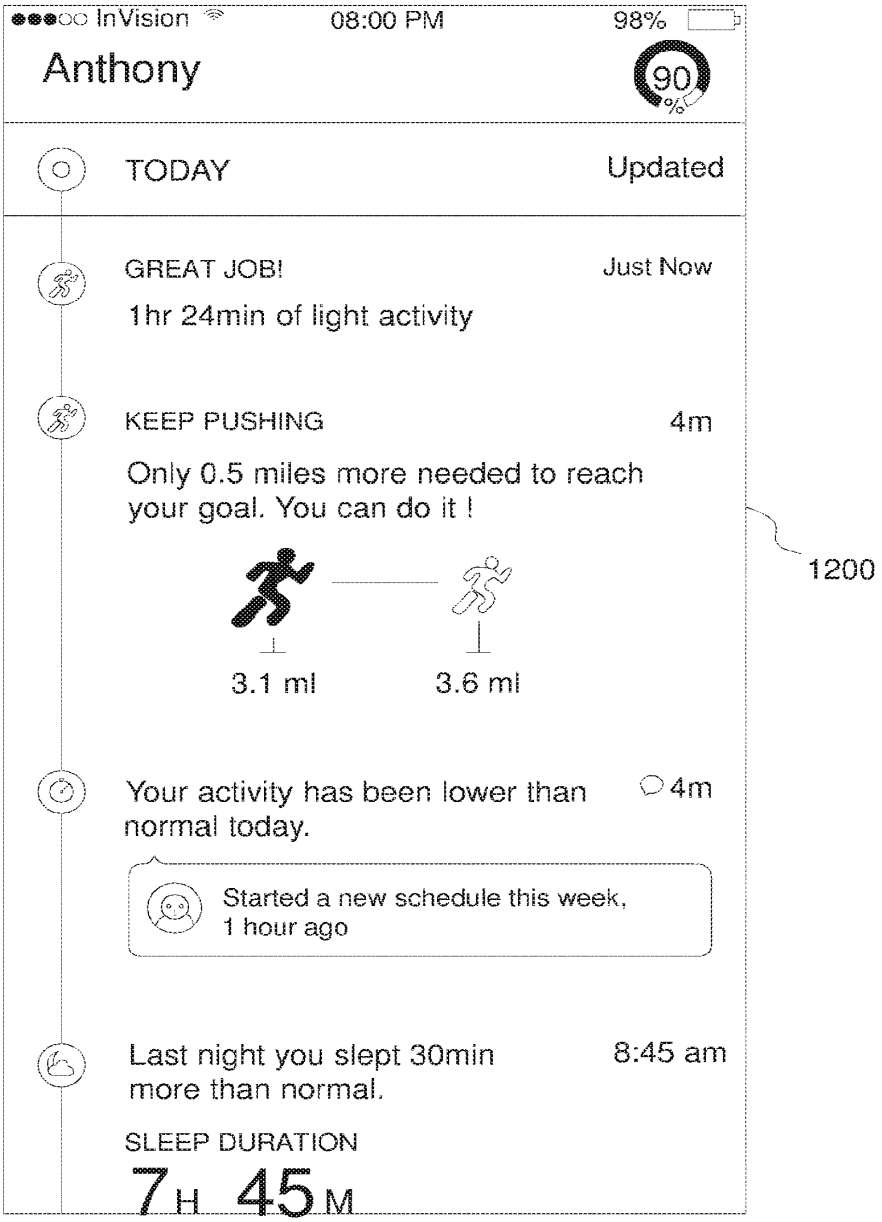

InVision
08:00 PM
98%
Anthony
90
%
TODAY
Updated
GREAT JOB!
Just Now
1hr 24min of light activity
KEEP PUSHING
4m
Only 0.5 miles more needed to reach your goal. You can do it !
3.1 ml
3.6 ml
1200
Your activity has been lower than normal today.
4m
Started a new schedule this week, 1 hour ago
Last night you slept 30min more than normal.
8:45 am
SLEEP DURATION
7H 45M

FIG. 12

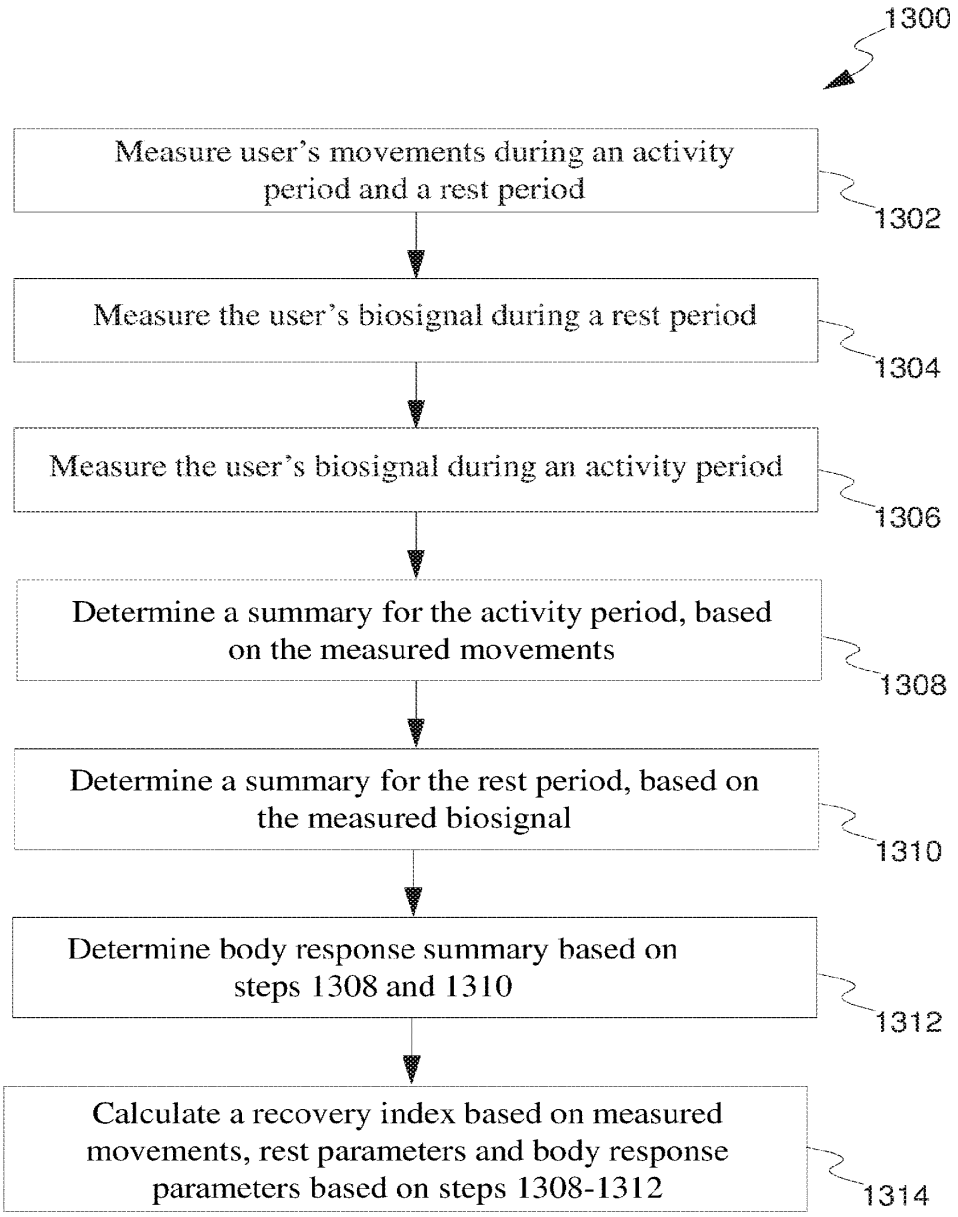

1300
Measure user's movements during an activity period and a rest period
1302
Measure the user's biosignal during a rest period
1304
Measure the user's biosignal during an activity period
1306
Determine a summary for the activity period, based on the measured movements
1308
Determine a summary for the rest period, based on the measured biosignal
1310
Determine body response summary based on steps 1308 and 1310
1312
Calculate a recovery index based on measured movements, rest parameters and body response parameters based on steps 1308-1312
1314

FIG. 13

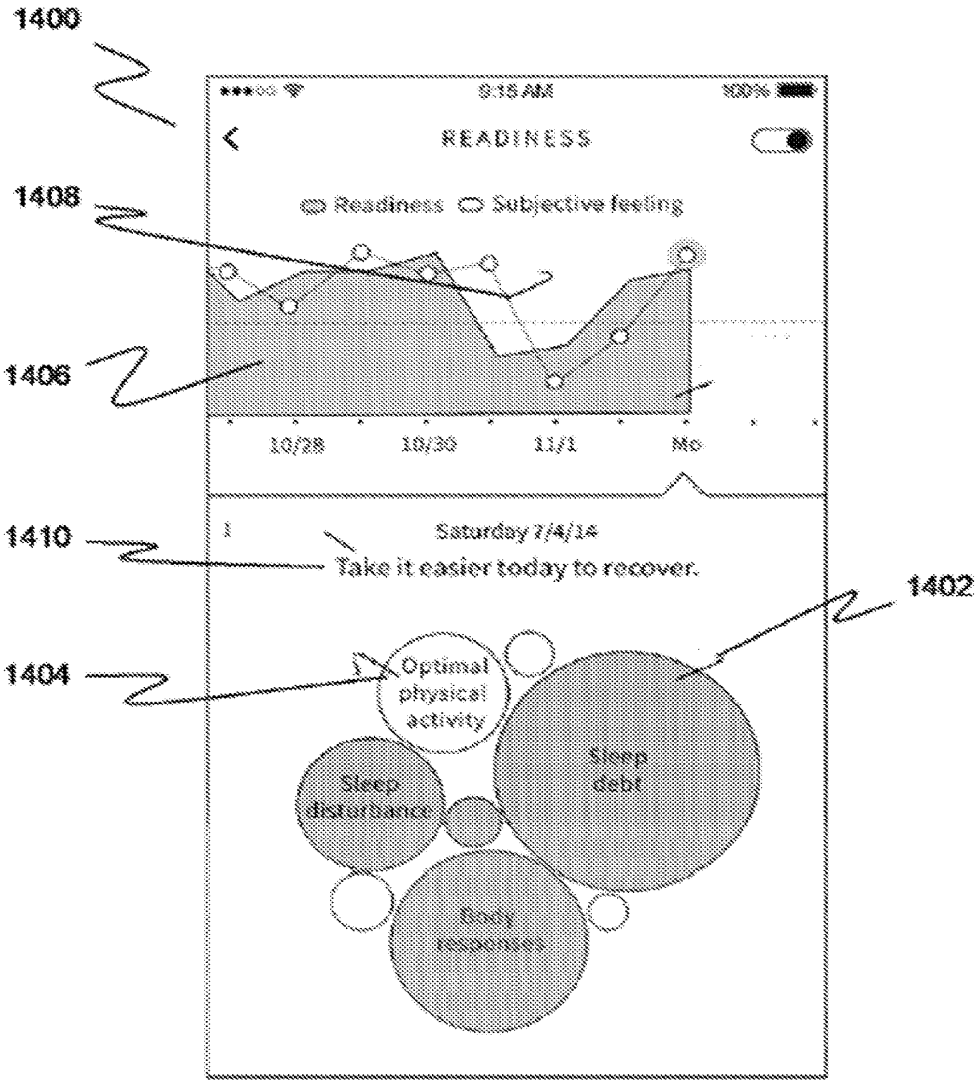

1400
1408
1406
1410
1404
1402
9:15 AM
100%
READINESS
Readiness
Subjective feeling
10/28
10/30
11/1
Mo
Saturday 7/4/14
Take it easier today to recover.
Optimal physical activity
Sleep debt
Sleep disturbance
Body temperature

FIG. 14

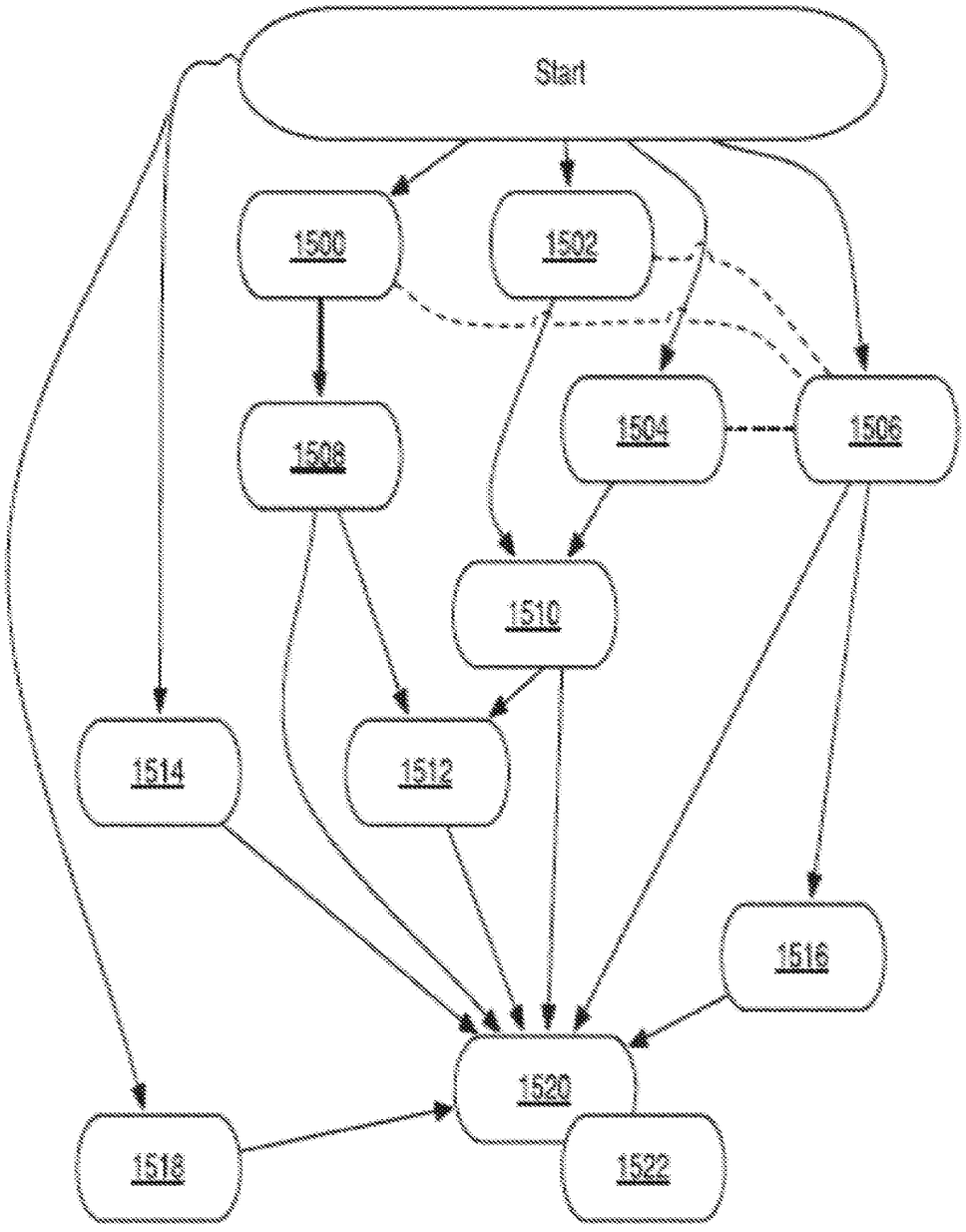

Start
1500
1502
1504
1506
1508
1510
1512
1514
1516
1518
1520
1522

FIG. 15

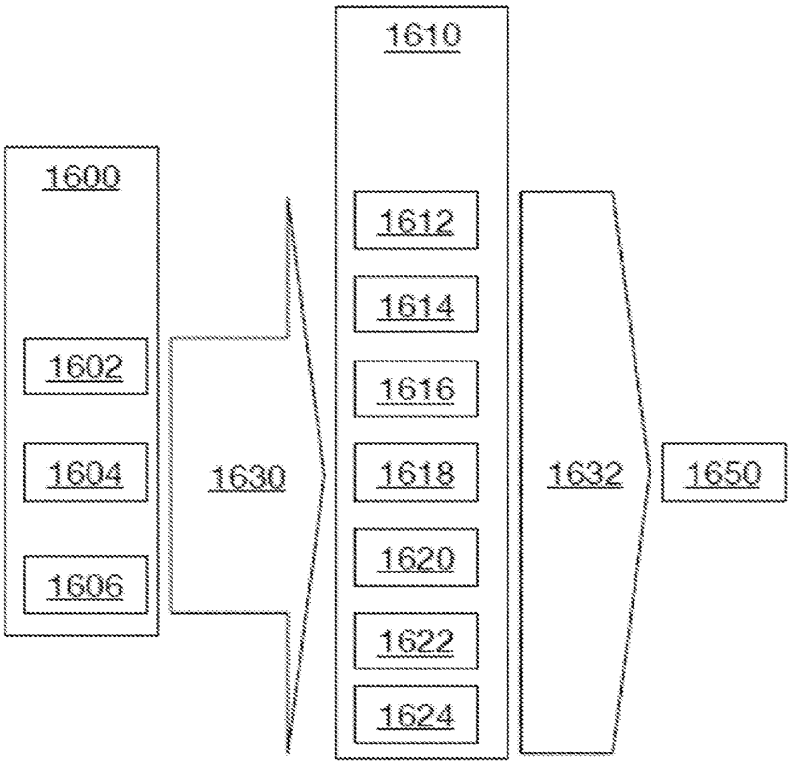

1610
1600
1612
1614
1602
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1632
1650
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1606
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1624

FIG. 16

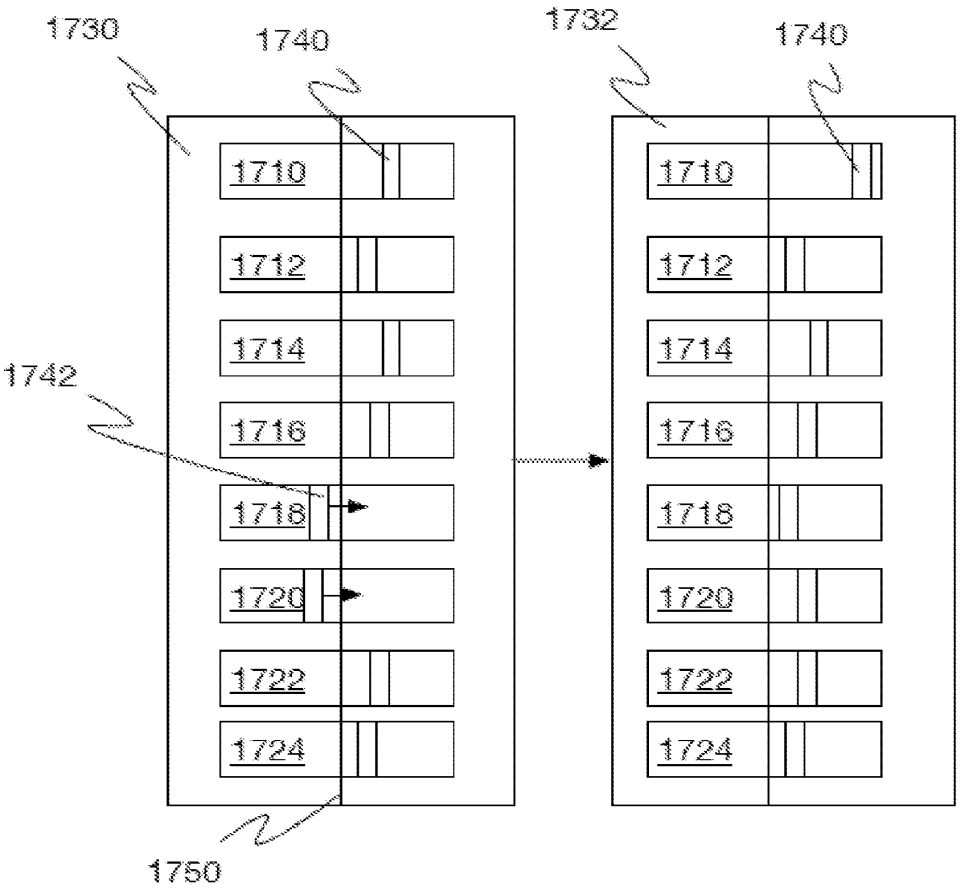

1730
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1712
1714
1716
1718
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1750

FIG. 17

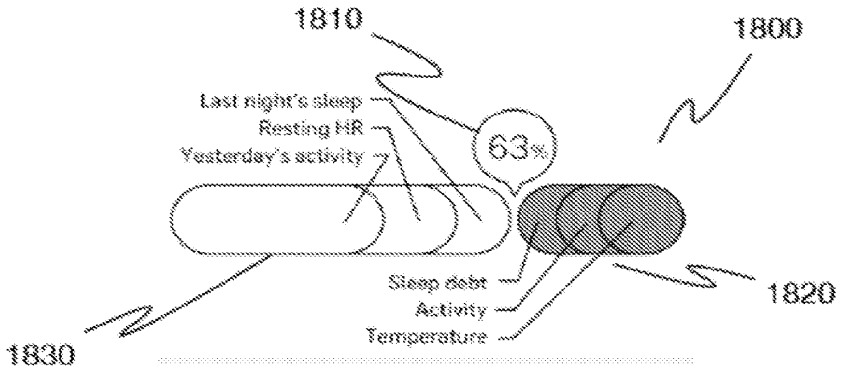


FIG. 18A

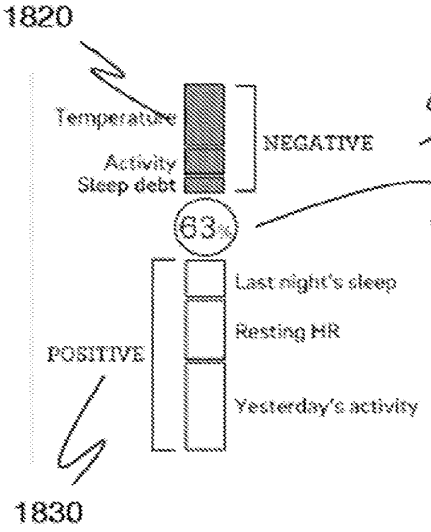


FIG. 18B

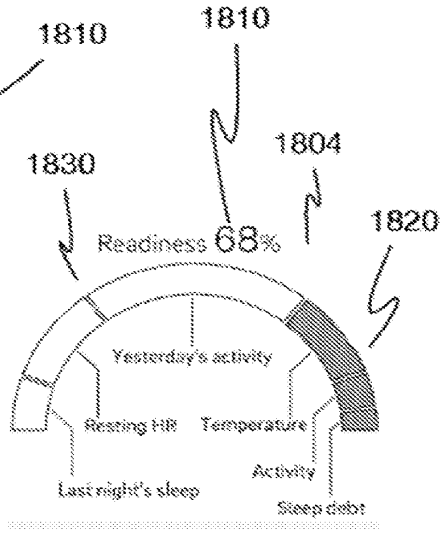


FIG. 18C

METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER

TECHNICAL FIELD

[0001] The present disclosure generally relates to analysing and processing data related to physical activities and biological signals of an individual, and, more specifically, to a method and a system for assessing readiness score of a user.

BACKGROUND

[0002] An individual is subjected to various kinds of mental and physical loads in a day to day life. For example, an individual may be subjected to physical loads (such as physical exercise, walking, driving, playing and the like) and mental loads (such as inappropriate sleep, inappropriate rest, stress and the like). Further, if such mental and physical loads are not managed or handled efficiently, it may induce mental and physical stresses. For example, the physical stress may cause health issues such as backache, spine problems and the like, and the mental stress may cause reduction in sleep, hinder concentration and impair motivation. Therefore, it is important to analyse how an individual manages or handles such mental and physical loads for maintaining a good physical and mental health and what is the readiness of the individual to face further challenges.

[0003] Conventionally, there are devices that may calculate biological signals of an individual and monitor physical activities of the individual. However, such devices do not provide any information which relates to recovery of the individual from mental or physical loads that the individual is subjected to, neither do they provide any information related to a readiness score of the individual. Further, such devices do not analyse data, associated with health parameters of the individual, in detail. For example, such devices do not consider the individuals' historical data. Also, such devices are not capable of providing appropriate suggestions or recommendations that may help the individual to efficiently recover from such mental and/or physical load and to increase the readiness score.

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[0004] Therefore, in light of the foregoing discussion, there exists a need to overcome the aforementioned drawbacks of assessing readiness score of the user.

SUMMARY

[0005] The present disclosure seeks to provide a method for assessing readiness score of a user.

[0006] The present disclosure also seeks to provide a system for assessing readiness score of a user.

[0007] In one aspect, an embodiment of the present disclosure provides a method for assessing readiness score of a user. The method comprises:

- obtaining the user's movements;
- using the obtained user's movements to determine a nature of the period, wherein the nature of the period is selected from an activity period and a rest period;
- measuring at least one biosignal of the user during the rest period;
- determining a rest summary for the rest period, based on the measured at least one biosignal and at least one biosignal of a previous rest period;
- determining an activity summary for the activity period, based on the obtained movements of an activity period and obtained movements of at least one previous activity period;
- determining a body response summary based on the rest summary and the activity summary; and
- calculating a readiness score based on the body response summary and a previous body response summary, whereby the readiness score indicates a level of readiness of the user.

[0008] In another aspect, an embodiment of the present disclosure provides a system for assessing readiness score of a user. The system comprises

- a ring configured to be worn by the user and comprising means for measuring at least one biosignal of the user during a rest period,
- a mobile communication device configured to communicate with the ring,
- means for measuring user's movements during an activity period and the rest period, and
- a server configured to communicate with the mobile communication device, the server being operable to

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- use the measured user's movements to determine a nature of the period, wherein the nature of the period is selected from the activity period and the rest period,
- determine a rest summary for the rest period, based on the measured at least one biosignal and at least one biosignal of a previous rest period,
- determine an activity summary for the activity period, based on the measured movements and measured movements of at least one previous activity period,
- determine a body response summary based on the rest summary and the activity summary; and
- calculate a readiness score based on the body response summary and a previous body response summary, whereby the readiness score indicates a level of readiness of the user.

[0009] Embodiments of the present disclosure substantially eliminate or at least partially address the aforementioned problems in the prior art, by calculating a readiness score of a user and by providing appropriate instructions to improve the readiness score.

[0010] Additional aspects, advantages, features and objects of the present disclosure would be made apparent from the drawings and the detailed description of the illustrative embodiments construed in conjunction with the appended claims that follow.

[0011] It will be appreciated that features of the present disclosure are susceptible to being combined in various combinations without departing from the scope of the present disclosure as defined by the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] The summary above, as well as the following detailed description of illustrative embodiments, is better understood when read in conjunction with the appended drawings. For the purpose of illustrating the present disclosure, exemplary constructions of the disclosure are shown in the drawings. However, the present disclosure is not limited to specific methods and instrumentalities disclosed herein. Moreover, those skilled in the art will understand that the drawings are not to scale. Wherever possible, like elements have been indicated by identical numbers.

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[0013] Embodiments of the present disclosure will now be described, by way of example only, with reference to the following diagrams wherein:

FIG. 1 is a schematic illustration of a system for assessing readiness score of a user, in accordance with an embodiment of the present disclosure;

FIG. 2 is schematic illustration of a ring worn at a finger of the user for collecting a heart rate of the user, in accordance with an embodiment of the present disclosure;

FIG. 3 is a schematic illustration of a graph showing physical activity data of the user for a week, in accordance with an embodiment of the present disclosure;

FIG. 4 is a schematic illustration of a hypnogram of the user, in accordance with an embodiment of the present disclosure;

FIG. 5 is a schematic illustration of a graph showing collected heart rate of the user for two nights, in accordance with an embodiment of the present disclosure;

FIG. 6 is a schematic illustration of a graph showing provocation measurement of the user, in accordance with an embodiment of the present disclosure;

FIG. 7 is a schematic illustration of various stages involved in calculating a readiness score by the system of FIG. 1, in accordance with an embodiment of the present disclosure;

FIG. 8 is an illustration of steps of a method for calculating a readiness score by the system of FIG. 1, in accordance with an embodiment of the present disclosure;

FIGS. 9-12 are schematic illustration of user interfaces rendered at a mobile communication device, in accordance with various embodiments of the present disclosure;

FIG. 13 is an illustration of steps of a method for assessing readiness of a user, in accordance with an embodiment of the present disclosure;

FIG. 14 is a further schematic illustration of a user interface in accordance with an embodiment of the present disclosure; and

Fig. 15 is an illustration of steps of a method in accordance with a further embodiment of the present disclosure;

FIG. 16 is an illustration of steps of a method in accordance with a further embodiment of the present disclosure;

FIG. 17 is an illustration of an exemplary user interface; and

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FIG 18A, 18B, 18C are illustrations of exemplary user interfaces according to embodiments of the present disclosure.

[0014] In the accompanying drawings, an underlined number is employed to represent an item over which the underlined number is positioned or an item to which the underlined number is adjacent. A non-underlined number relates to an item identified by a line linking the non-underlined number to the item. When a number is non-underlined and accompanied by an associated arrow, the non-underlined number is used to identify a general item at which the arrow is pointing.

DETAILED DESCRIPTION OF EMBODIMENTS

[0015] The following detailed description illustrates embodiments of the present disclosure and ways in which they can be implemented. Although some modes of carrying out the present disclosure have been disclosed, those skilled in the art would recognize that other embodiments for carrying out or practicing the present disclosure are also possible.

[0016] In one aspect, an embodiment of the present disclosure provides a method for assessing readiness score of a user. The method comprises:

- obtaining the user's movements;
- using the obtained user's movements to determine a nature of the period, wherein the nature of the period is selected from an activity period and a rest period;
- measuring at least one biosignal of the user during the rest period;
- determining a rest summary for the rest period, based on the measured at least one biosignal and at least one biosignal of a previous rest period;
- determining an activity summary for the activity period, based on the obtained movements of an activity period and obtained movements of at least one previous activity period;
- determining a body response summary based on the rest summary and the activity summary; and
- calculating a readiness score based on the body response summary and a previous body response summary, whereby the readiness score indicates a level of readiness of the user.

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[0017] In another aspect, an embodiment of the present disclosure provides a system for assessing readiness score of a user. The system comprises:

- a ring configured to be worn by the user and comprising means for measuring at least one biosignal of the user during a rest period,
- a mobile communication device configured to communicate with the ring,
- means for measuring user's movements during an activity period and the rest period, and
- a server configured to communicate with the mobile communication device, the server being operable to

    - use the measured user's movements to determine a nature of the period, wherein the nature of the period is selected from the activity period and the rest period,
    - determine a rest summary for the rest period, based on the measured at least one biosignal and at least one biosignal of a previous rest period,
    - determine an activity summary for the activity period, based on the measured movements and measured movements of at least one previous activity period,
    - determine a body response summary based on the rest summary and the activity summary; and
    - calculate a readiness score based on the body response summary and a previous body response summary, whereby the readiness score indicates a level of readiness of the user.

[0018] The term readiness in this description encompasses not only alertness or readiness of the user, or the lack of alertness or readiness of the user, but also physical and mental recovery from various kinds of stress. The readiness score is an estimated readiness of the user to perform well at a given day. It summarizes both physical and mental prerequisites for a good day. In essence, it covers the effects of earlier physical activity, previous night's sleep, and body responses measured lately. Body responses can mean for instance temperature, resting heart rates relative to user's own normative values, or how much they have changed as a response to previous day's physical activity. The terms recovery, alertness and readiness can be used interchangeably in this description and are meant to be understood as stated above.

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[0019] The present method may use different calculation parameters and it is preferably designed to learn from previous measurements. For example, the method and device may take into account the data from previous week, two weeks, a month or two months (or any other time lapse), in order to set personalized calibrations, averages and/or limits, that are typical to the user. The device may also comprise a means for resetting all measurements and calculations. Such personalized settings can be used to give further instructions to the user, to improve the user's life balance. Indeed, different users may have different reactions to stress and illnesses, as well as different means to cope and recover from stress. Furthermore, the gathered data could be used for varying the weight that is given to different aspects measured or obtained by the user, in order to further personalize the device.

[0020] In an embodiment, the ring of the system is configured to be suitably worn at a finger, such as an index finger, of the user. However, it may be evident to those skilled in the art that the system may be associated with other wearable devices, such as a device adapted to be worn at a wrist of the user. For example, the device may have the form of a ring and may be configured to have a size that is large enough to be suitably worn at the wrist of the user. According to a further embodiment, the ring is as described in PCT/FI2014/000043, which application is hereby incorporated by reference.

[0021] The ring or other device is configured to measure at least one biosignal of the user, and optionally the user's movements, which may be referred to as 'raw data' associated with the user. Further, the measured data is associated with the activity period and the rest period, as may be relevant. The term 'activity period' used herein refers to those periods of a day when the user is subjected to any physical activity, such as when the user is exercising, walking, playing or attending to normal day to day tasks. Further, the term 'rest period' used herein primarily relates to a sleeping period of the user in a day. However, the rest period may also include time period when the user is sitting or lying down to relax. The movements of the user are measured or obtained from a separate device, and used to determine whether the user is active or resting, i.e. to select the nature of the period.

[0022] In the present description, the step of measuring or obtaining the user's movements provides movement data and the measuring of at least one biosignal provides biosignal or biosignal

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data (which terms can be used interchangeably). The obtained movement data of the user during the rest period can be used for various purposes. For example, it is typically used to determine whether a moment of time belongs to the activity period or the rest period or possibly a further type of period if one or more such further types of period(s) have been defined. Further, it can be used as part of the starting data for determining the rest summary. A biosignal or several biosignals is determined during a rest period, but may be also determined during an activity period. For example, in case the temperature of the user is elevated during a rest period, it may be continued to be monitored during a following activity period, in order to ensure whether the increase was due to fever or another reason. Furthermore, elevated temperature readings such as fever can be programmed to adjust the readiness over an extended period of time, i.e. not only the following day. In practice, after being sick one or more days it will be beneficial to take additional easy days proportional to the length of the sickness.

[0023] According to an embodiment, the step of obtaining the user's movements is performed by measuring the user's movements or by retrieving the user's movement data from a separate device. The user's movements can comprise for example actual movements such as raising an arm or a hand, walking, running etc, or accumulated steps, an active time or a distance covered by the user.

[0024] Typically, the movements are measured by means for measuring the user's movements. These means can be arranged on the ring or other similar device to be worn, or in a mobile communication device or in a separate device destined to measure a user's movements, such as a pedometer. In one embodiment, the means for measuring user's movements is selected from the group consisting of an accelerometer, a gyroscope and a magnetic field sensor. It is further to be noted that the means for measuring the user's movements during the rest period can be the same means or different means from those used for measuring the user's movements during the activity period. For example, it is possible to use the measured biosignal for determining the movement data for the rest period.

[0025] According to an embodiment, the method further comprises measuring at least one biosignal during the activity period. According to another embodiment, the at least one biosignal (for either the rest period or the activity period) is selected from the group consisting of an

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electrocardiogram (EKG or ECG), a photoplethysmogram (PPG), an electromyogram (EMG), an electroocylogram (EOG), a heart rate, a heart rate variability, body temperature, a resting heart rate, an average heart rate and signals related to breathing. When a biosignal is measured both during activity and rest, it can be the same or different.

[0026] According to a further embodiment, determining the rest summary comprises at least one of determining a hypnogram, determining a sleep balance, determining lowest body temperature during rest and determining a resting heart rate. A hypnogram can be determined up to a certain accuracy with only motion data, although REM-sleep is rather difficult to differentiate from light sleep without a biosignal such as breathing rate and its dynamics, heart beat intervals or amplitude variation in ECG or PPG signal. Other possibilities are EMG, EEG or EOG that are part of polysomnographic measurement used in clinical sleep tests. On the other hand, it is also possible to use only PPG data to derive much of the same movement information than is needed regarding motion data, thus an accelerometer or other movement sensor is not mandatory. A movement sensor can be used to measure some additional information about the posture of the user, for example, but a PPG is typically sufficient to detect most of the movements. Regarding rest time related factors behind recovery/readiness, an alternative of a hypnogram would also be to determine parameters that are associated with deep sleep (for physical recovery) and REM sleep (for mental or cognitive recovery). This means determining how mentally rewarding the sleep was, and how physically rewarding the sleep was without use of a hypnogram. Use of a hypnogram could be beneficial in validating the determination, but there are alternative intermediate parameters that could also be used

[0027] Heart rate is one possible biosignal measured by the device in question. The heart rate is thus one optional, additional feature derivable from a PPG signal or an ECG signal. Further on, changes around the local mean or difference from whole night mean are more sensitive to sleep phases than the heart rate or the heart beat interval itself. The dynamics of PPG signal amplitude (e.g. difference between local max and local min around each heart beat pulse) or R peak amplitude (from ECG) provide approximately the same information as heart beat interval dynamics.

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[0028] In a further embodiment, the heart rate is measured by means for measuring a heart rate, which comprise a photon source arranged on the inner surface of the ring and a photon detector arranged on the inner surface of the ring. In yet another embodiment, the ring further comprises a first electrode and a second electrode adapted to measure an electrocardiogram.

[0029] In one embodiment, the ring thus includes at least one motion sensor, such an accelerometer, a gyroscope, a magnetic field sensor or a combination thereof, to measure user's movement. The motion sensor is configured to generate motion data that is indicative of the movements of the user. For example, the motion sensor may be configured to determine linear motion information, rotational motion information, and the like. Further, such information (linear motion or rotational motion) may be combined or correlated to generate the motion data that is indicative of the user's movement. As mentioned above, the movement data can also be generated by a separate device and retrieved or obtained by the ring or the server.

[0030] In one embodiment, the heart rate is measured by measuring blood volume pulse. Specifically, the heart rate is determined by measuring PPG (photoplethysmogram) from the blood volume pulse. The PPG can be measured using optical electronics, particularity using the principle of transmittance or reflectance of light. For example, the ring includes optical electronics, i.e. at least one photon source and at least one photon detector positioned on an inner surface of the ring. The at least one photon source is infrared light (IR) emitting diode and the at least one photon detector is IR receiving diode (such as photon diode or photon transistor).

[0031] In an embodiment, when the ring is worn at the user's finger the optical electronics thereof acquire appropriate measurement data or biosignal data (i.e. blood volume pulse). Specifically, an IR light pulse is sent from the at least one photon source and thereafter the reflected IR light is received by the at least one photon detector. Further, the variations in volume of the blood vessels (during the flow of blood) result in variation in the measured transmission (i.e. IR light intensity) which is measured and processed to generate the PPG. Further, from a PPG waveform an inter-beat-interval i.e. a heart rate (time between two beats) is determined. Body temperature of the user is typically measured using a sensor for measuring temperature comprised in the device, for example a thermometer included in the ring.

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[0032] The ring may also include other electronic components apart from the motion sensor and the optical electronics. Specifically, the ring is configured to collect and analyse the raw data (i.e. data of the motion sensor and the optical electronics). For example, the ring may include other electronic components which may include but not limited to a controller, a microprocessor, a memory and a communication module. The controller is operable to control operation of the motion sensor and the optical electronics for generating data related to the user's movement and the heart rate. The microprocessor may be operable to process or analyse the raw data generated by the motion sensor and the optical electronics. Further, the memory is used for storing the analysed or processed data. Moreover, the communication module is configured to establish a communication between the ring and the mobile communication device.

[0033] In an embodiment, the mobile communication device is connected to a communication network through a communication module. For example, the mobile communication device may be wirelessly connected to the ring by a wireless connection such as a WiFi, Bluetooth and the like.

[0034] The mobile communication device is associated with the user wearing the ring. In an embodiment, the mobile communication device includes a computing device which incudes but not limited to a smartphone, a tablet computer, a phablet and a laptop.

[0035] In an embodiment, the mobile communication device is configured to collect the analysed raw data from the ring. Further, the mobile communication device is operable to perform deep data analysis of such raw data. It is to be understood that the mobile communication device includes required electronic elements, such as a processor, and algorithms to perform such deep data analysis.

[0036] In an example, the mobile communication device is operable to perform the deep data analysis of such raw data for example to determine a heart-rate-variability (HRV) from the inter-beat-interval. Also, a respiration rate (a signal related to breathing) can be determined from the PPG wave by analyzing peak values thereof.

[0037] In another example, the deep data analysis includes determining a sleeping pattern of the user. Specifically, the data from the motion sensor may be processed by the mobile

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communication device to determine the sleeping pattern of the user. For example, based on the data from the motion sensor when the user went to bed and woke up can be identified. Also, based on the data from the motion sensor how long the user slept can be determined. Therefore, the data (i.e. when the user went to bed, when the user woke up and how long the user slept) enables in defining the sleeping pattern of the user.

[0038] In another example, the deep data analysis includes determining a hypnogram for the rest period, for example when the user is sleeping. Specifically, the hypnogram is determined based on the measured motion data, photoplethysmogram waveform dynamics and heart rate dynamics using a classification algorithm, a decision tree, a neural network or equivalent. For a certain value of the hypnogram (e.g. with a resolution between 30 s and 10 min), a measurement period that is longer than the resolution of the hypnogram can be used (e.g. data from 10-20 minutes). This is because some characteristic features in the measured data appear more rarely than what is the aimed resolution of the hypnogram. Further, it give an advantage to use more data from the history than from the future in certain features (e.g. deep sleep may start only after a certain duration of rest time but may stop when the rest time stops) in the determination of the hypnogram for a given time point. The hypnogram is used for analysing a sleep quality and various stages of sleep associated with a particular night. For example, the various sleep stages may include deep sleep, light sleep and rapid eye movement (REM) stage. Further, based on the absolute time at each stage and the percentage of various sleep stages the quality of sleep can be determined. Also, some or all of the following, i.e. how much the user typically accumulates on each stage, how much the user typically accumulates when weighted against the previous day's activity and what kind of feedback the user has given earlier in respect of nights that have properties similar enough to the night in question (the current night), may be also taken into consideration for determining the quality of the sleep.

[0039] In yet another example, the deep data analysis includes comparing sleep quality of the user for different nights. For example, the sleep quality may be compared by collecting various data of the user for those nights. Further, based on the comparison the sleep quality may be categorized into a good sleep, a bad sleep or an average sleep.

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[0040] In an example, the categorization of the sleep quality may be determined with the amplitude of heart rates, duration of sleep and measured percentage of various sleep stages (i.e. deep sleep, light sleep and rapid eye movement stages). For example, the sleep quality may be said to be good if the heart rates is between 70-40 beats per minutes, the duration of sleep is about 7 hours and the percentage of the deep sleep is the highest among the various sleep stages. Further, the user's feedback is taken to validate the sleep quality.

[0041] In an embodiment, the deep data analysis also includes measuring various physical provocations or non-provocations, as well as strength of such physical provocations or non-provocations. The physical provocations may be referred to as change in the physical activity level, i.e. when the user changes or attains a physical activity level from another physical activity level. For example, the physical provocations can be when the user stands up form a lying position, when the user starts walking form a sitting position, and the like. Further, the non-provocation may relate to situations when the user is subjected to no physical activity, i.e. when the user is sitting, lying down and the like.

[0042] In an embodiment, the various physical provocations or non-provocations may be measured by correlating the measured user's movement data and the heart rate. Specifically, the transitional changes in the activity of a person (i.e. standing up, sitting down, climbing stairs etc.) and the strength of provocation is measured. For example, the bodily reaction to provocation happens after a delay, therefore measurement of HR/HRV (where HR stands for heart rate) can be initiated only when such provocation is detected and the whole phenomena and bodily reactions during each phase (before, during and after transition/provocation) are measured.

[0043] In another example, the deep data analysis includes determining the user's stress level. Specifically, the user's stress level is determined by calculating the heart rate variability (HRV) for the activity period and the rest period, based on the measured heart rate. For example, the user's stress level may be determined based on the HR and/or the HRV, and/or the activity level and/or other sympato-vagal provocation, loading or a withdrawal of provocation. The HR, the HRV, and the activity level or provocation, the withdrawal of provocation, the load of a user are recorded at various times during the day and the values are correlated to arrive at a stress level of the user. The stress level is estimated based on a predetermined set of algorithms and analysis

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methods. Further, the physical disposition or sympato-vagal provocation and the activity levels of the user are automatically detected and the vital parameters, i.e., the HR and/or the HRV are recorded at different times.

[0044] For example, if there is no activity, i.e. no physical provocation but HR is high, the user may potentially be acutely suffering e.g. from a mental, psychological or emotional stress or is having a physiological stress reaction related to breathing (e.g. holding the breath) or other physiological stimulus like contraction, or a physiological stress reaction due to drinking or eating something that raises the pulse rate. Similarly, if there is any physical activity such as when the user is doing some physical exercise (walking, jogging or running), the bodily reactions are measured during the exercise period to detect the stress level.

[0045] In an embodiment, the mobile communication device is configured to calculate a readiness score for assessing readiness of the user. Specifically, based on long data, trends, cross-correlation analysis of the deep data analysis (i.e. heart rate variability, hypnogram, stress level and the like) the readiness score is calculated. Further, the long data, trends, cross-correlation analysis may be associated with a time period (for example a day, a week or a month) for which the deep data analysis is performed. Therefore, the measured user movements, and biosignals such as heart rate, hypnogram, heart rate variability and stress level for such time period are correlated to calculate the readiness score and thereby assessing readiness of the user.

[0046] The readiness score indicates a level of readiness of the user as well as the recovery of the user from the mental and physical load. The term 'readiness' used herein means also a return to a normal state of mental and physical strength (or energy level) after the mental and physical load. In an example, if the physical load is associated with an activity period (such as physical exercise), the readiness score may be based on the heart rate, heart rate variability and stress level of the user. For example, the readiness score may be good or high (such as about 90 %), if the heart rate, heart rate variability and stress level of the user have returned to the normal state after the exercise. It is to be understood that the readiness score may be measured after a certain time period (for example half an hour) of the activity period. Similarly, if the mental load is associated with a rest period (such as sleep), the readiness score may be based on the movements, heart rate and hypnogram of the user. For example, the readiness score may be good or high (such as about 90

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%), if the user moves less, the heart rate is within a desired level (70-40 beats per minutes) and the hypnogram shows a good amount of deep sleep.

[0047] In one embodiment, historical data of the user is also used for calculating the readiness score. For example, the historical data may include information related to a medical history of the user, but also on historical data collected by the system itself. For example, the historical data may comprise data showing how the user typically recovers from a load. Otherwise, the historical data may include information related to past professional life, food habits, and the like. Therefore, it may be evident to those skilled in the art that the historical data may have substantial influence on measurement of the readiness score of the user.

[0048] In one embodiment, the method comprises providing the user with appropriate instructions, related to at least one of physical activity and mental activity, for improving the user's readiness score. That is, based on the readiness score, the user may be provided with appropriate instructions related to at least one of physical and mental load. Specifically, the appropriate instructions are provided to the user for improving the user's readiness score against such physical and mental load. For example, if the readiness score of the user is poor or low (such as about 40 %) after doing exercise, the user may be instructed to take more rest such that the heart rate, heart rate variability and stress level return to normal state. This in turn may improve the readiness score related to the physical load. Similarly, if the readiness score of the user is poor or low (such as about 40 %) after a sleep, the user may be instructed to sleep longer or to do mild exercise to have good quality sleep, which in turn may improve the readiness score related to the mental load.

[0049] In an embodiment, the mobile communication device is configured to visually present the readiness score to the user. For example, the mobile communication device is rendered with various user interfaces based on the readiness score. Specifically, the user interfaces are based on (or include) information related to the readiness score and the instructions for improving such readiness score. For example, the user interfaces may include a readiness score (shown with percentage i.e. 80 - 90 %) and an instruction (such as 'sleep longer" or "do mild exercise'). Also, the user interface may include information related to the user's movement, heart rate, hypnogram, heart rate variability, body temperature, stress level and other data measured or obtained by the method and system. For example, the interface may show user's movement (i.e. number of miles

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the user has walked), heart rate (i.e. a digital representation of current beats per minute), duration of sleep, sleeping pattern, hypnogram (various sleeping stages and their percentages) and the like.

[0050] According to another embodiment, the user interface is configured to also show separately the different elements which contribute to the readiness score. According to yet another embodiment the user interface also shows their effect on the readiness score (such as with signs + or -) and optionally also the history and/or estimate for following days. This embodiment allows the user to see in which direction the readiness score is evolving and at which rate it is changing. Moreover, the user interface may include a possibility for the user to enter data, such as an estimate of length of the following night's sleep and the interface would then be able to show a prediction of readiness score for the following day. Furthermore, the user may be given an estimate of time it takes to recover from one short night, for example.

[0051] Some possible elements to be shown according to this embodiment include (but are not limited to) activity of the previous day, heart rate at rest, sleep of the previous night, sleep debt (i.e. if the user did not sleep enough, the difference between the user's optimal amount of sleep and the amount of sleep the previous night or nights), activity of the day and body temperature.

[0052] The server is operable to calculate the readiness score and provide appropriate instructions to improve the user's readiness score. Specifically, the server of the system is operable to do the required analysis or processing of data (i.e. the deep data analysis and long data, trends, cross-correlation analysis of the deep data analysis) for rending the user interface on the mobile communication device. For example, the deep data analysis may be partly performed in the server and partly performed in the mobile communication device; otherwise the deep data analysis may be completely performed in the server. Similarly, the long data, trends, cross-correlation analysis of the deep data analysis may be partly or completely performed by the server. Further, the server may be configured to collect the raw data from the ring directly or may be configured to collect the raw data indirectly through the mobile communication device. Therefore, the server may perform the required analysis for rending the user interface related to the readiness score and the instruction (i.e. various aspects subjected to assessing readiness and recovery of the user from mental and physical load). It is to be understood that the server includes required electronic elements, such as a processor, and algorithms to perform such analysis.

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[0053] In an embodiment, the server is communicatively coupled to the user terminal through a communication network which can be wired, wireless or a combination thereof. For example, the communication network includes, but are not limited to, Local Area Networks (LANs), Wide Area Networks (WANs), Metropolitan Area Networks (MANs), Wireless LANs (WLANs), Wireless WANs (WWANs), Wireless MANs (WMANs), the Internet, second generation (2G) telecommunication networks, third generation (3G) telecommunication networks, fourth generation (4G) telecommunication networks, and Worldwide Interoperability for Microwave Access (WiMAX) networks.

[0054] Some examples of concrete parameters that may be defined and monitored in respect to daily readiness to perform, as well as their effect on readiness, are listed below.

- Previous or last night; the quantity and quality of sleep; getting enough sleep improves daily readiness.
- Sleep balance (sleep debt); the sum of how much accumulated sleep over past 1-3 weeks differs from individual sleep needs; insufficient sleep results in sleep debt that reduces daily readiness.
- Previous day (physical activity); excess sedentary time, excess vigorous intensity and excess total volume of physical activity reduces daily readiness, but also lack of sedentary time, exercise and physical activity reduce daily readiness.
- Activity balance (cumulative level compared to user's own history); as a user's long term activity (e.g. 1-3 week sum) changes, best readiness is achieved during easy periods when activity levels are somewhat below average (i.e. not excess of activity, but not zero activity levels either).
- Body temperature; changes in maximal nightly skin temperature can be markers of sickness and clear deviation from user's norm reduces readiness; body temperature may also be an indication of the menstrual cycle for pre-menopausal women.
- Resting heart rate; changes in minimum nightly heart rate are markers of stress that usually reduces readiness; a user's resting heart rate may change for various reasons and thus maximum readiness is typically encountered when resting heart rate is somewhat below user's norm (but not too much below as that could be associated with excess fatigue).

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- Resting heart rate-based recovery index; how long restorative sleep the user reached after his/her hear rate had stabilized to the proximity of the resting heart rate; longer accumulated bedtime/sleep/deep sleep/deep+REM after heart rate has stabilized predicts improved readiness; this contributor will react also to alcohol consumption and late exercise, among other things, both challenging the user's readiness.

[0055] The various data or parameters may be weighted, based on how each contributes to the readiness score. Some principles used in the weighting may be for example as follows. Some of the parameters have monotonously decreasing contribution, while some others have monotonously increasing contribution. Some of the parameters have an optimal area and the readiness decreases in both directions (i.e. below and above the optimal area). Furthermore, the device and method may be configured to take the body temperature in account when weighting the data, i.e. the weighing may be performed continuously. For example, if the user's temperature is within a pre-defined, normal scale, its weight can be minimal and a "normal" weighting is used for the other parameters or data. However, if the user's temperature is elevated (i.e. above a pre-determined limit), its weight can be big and optimal activity levels can be lowered accordingly. Again, the device may be set such that it is able to define the normal scale of temperature for the user.

[0056] Still further, the method and device may be configured to take into account the calendar. For example, the device may be able to recognise the time of the year (such as winter, spring, summer or autumn) or weekdays from weekends. This information may be taken into account in the need of sleep, for example, as typically persons sleep more in the winter than in the summer. This information may also be taken into account in the history data. For example, the device may recognise that the current month is January, and also compare current data to data from a previous year's January.

[0057] According to a preferred embodiment, the output in the device (i.e. on its user interface) is a percentage as a readiness score. It may also show the main contributors for example as a graphical element (for example showing a bar for each contributor). One example of a simple interpretation of single readiness contributors is the following.

- < 35 % means that the user needs to take actions with this contributor in order to improve the readiness;

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- 35-70 % means that the user could pay attention to this contributor in order to improve the readiness;
- 70-85 % means that this particular contributor is below recommended levels - apparently helping the user to manage his/her daily requirements; and
- 85-100 % means that this particular contributor is within general recommendations and also good at the user's individual level, i.e. to the level that it boosts the user's readiness to perform the given day.

[0058] The user interface may also comprise a means for warning if one or more contributors are above a pre-defined maximum level. It is evident that the combination of challenging and boosting contributors can be displayed and mathematically presented in many different ways. However, the presented example calculations give one example on the solution to the problem how one could combine the complex and occasionally contradictory contributions of sleep, activity and body responses to the readiness of the user (body responses for example due to sickness or environmental factors). It may be useful to show the combination of factors for several reasons. For example, not everybody can similarly adjust every parameter (shift work, other responsibilities or preferences or life habits or temperament) so it is necessary to leave the freedom and possible choice to the user. Moreover, each factor may be important on different times (holiday, weekday/weekend day, depending on family situations or training phase etc.).

[0059] The readiness score can be scaled on many different ways. One example is a scale between 0 and 100, where 85 means sufficient or normal or adequate readiness for the current day. This value is intended to correspond with the user's average condition, provided the user has been living his/her normal life. In addtion, the device and method may comprise certain means to recognize abnormal life, as is explained below.

[0060] One example of possible calculations and effects of the different variables and parameters in the present method and device is given below.

1. Sleep1_previous_night_quality
    a. Device calculates a sleep score for each night (0-100).

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i. Alternative could be e.g. total sleep time / 9 hours (the latter is the maximum sleep need that can be expected for a normal individual), or deep+REM / 4.5 hours.

b. Device calculates user spesific average and deviation from earlier sleep scores from the same user

i. Alternative can be human specific norm in the beginning when individual data is not available

c. Device calculates how much and in which direction current Sleep1_previous_night_quality differs from what is an adequate level for user (named as Average)

i. Z_index = (Current value – Average) / Deviation

ii. Z_index is 1 when your value is 1 deviation higher than your average

d. Device controls that user's average is good enough to be regarded as a reference for "sufficient" or "adequate" sleep score - if not, the device selects a predetermined minimum/maximum sleep score (for example 85/95) that can be regarded as sufficient or adequate for reference and uses that value instead of user's own Average value

e. Device also controls that user's deviation is within sensible range (e.g. 5-10) – otherwise the measurement can become too sensitive or insensitive to changes.

f. Device estimates the contribution of previous night's sleep to the Readiness to perform the following day so that it gives a higher contribution the better the sleep score was the previous night

i. ReadinessContributors(1) = 85 + 12.5 * Z_index(1);

2. Sleep2_Balance

g. The user is supposed to be more recovered, the more he/she has slept during preceding 2 weeks

h. Device registers total sleep time on several nights

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i. S(0) =7.5 h, S(1) = 8.0 h, S(2) = 7.8 h, S(3) = 6.0 h, S(4) = 5.8 h, S(5) = 7.2 h, ...

i. Device estimates what is user's individual sleep need

i. Device calculates user's long term average, and controls that it is between normative range (7-9 hours, the acceptable range can also be age dependent)

j. Device calculates how much sleep time differs from individual estimated sleep need

i. D(0) =7.5 h - Avg, D(1) = 8.0 h - Avg, D(2) = 7.8 h - Avg, D(3) = 6.0 h - Avg, and so on

k. Device also calculates how much user's sleep durations typically vary between nights (SleepDeviation), and checks that the deviation is not too small or too high to represent user's sensitivity to changes (acceptable deviation range can be e.g. 25-45 minutes)

l. Device calculates a weighted mean of the differences (weighing is needed for smoothing the effect on the edge of the window)

SleepBalance = W(0)*D(0) + W(1)*D(1) + W(2)*D(2) + and so on (exponentially decreasing weight as time elapses)

m. The user is supposed to be more recovered, the more he/she has slept during preceding 2 weeks

ReadinessContributors(2) = 85 + 30 * (SleepBalance / SleepDeviation));

% 3. Last day's activity

n. % The user is less recovered the higher eq.km, more vigorous and more sedentary activity he/she had % In this way more value is given to vigorous/intensive physical activity while also more sedentary (e.g. traveling) is also decreasing the readiness ReadinessContributors(day,3) = 85 - 6*(Z_index(5) + Z_index(6) + Z_index(7));

% 4. Activity balance / Cumulative Activity

o. %Act_14days(1:13) = Act_14days(2:14); Act_14days(14) = input(5); % A weighted 2-week measure of user's daily activity is calculated (in % this case total

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activity expressed in eq.km, could be kcal or kcal/body weight and so on... ActivityBalance = sum(WeightFactors (Act_14days-lt_mean(5))) / sum(WeightFactors); SaveActBalance(day) = ActivityBalance; % Optimum activity level, in respect to readiness, is determined to be located 25% below personal average, % and increasing distance from that level in either way decreases readiness % ReadinessContributors(day,4) = 0.25-abs(-0.25- (ActivityBalance / lt_dev(5))); % ReadinessContributors(day,4) = 0.25-abs(-0.25- (ActivityBalance / lt_mean(5))); %Update by HKi 25.8.2015 ReadinessContributors(day,4) = 100 - 60 * abs(0.25 + (ActivityBalance / lt_mean(5))); %Update by HKi 08.09.2015 %

% 5 (%7 in Matlab code). Temperature Analysis,

p. % The user is less recovered, the more his/her night_time filtered_max temperature deviates from his/her long term mean if Z_index(8)> 0.15, ReadinessContributors(day,7) = 105 - 25 * Z_index(8); elseif Z_index(8) < -0.50, ReadinessContributors(day,7) = 105 + 10 * Z_index(8); else ReadinessContributors(day,7) = 100; end % ReadinessContributors have been scaled between 0...100. % ReadinessContributors(day,:) = round(25*ReadinessContributors(day,:)); for i = 1:size(ReadinessContributors,2), if ReadinessContributors(day,i) < 0, ReadinessContributors(day,i) = 0; elseif ReadinessContributors(day,i) > 100, ReadinessContributors(day,i) = 100; end

% 6 (%5 in Matlab code) 5. Resting HR

q. % The user is less recovered the more his/her resting HR deviates from his/her norm (asymmetry: ok to have little below norm) % ReadinessContributors(day,5) = 100 - 20 * abs(0.25+Z_index(3)); % 10.11. An elevated rest heart rate has a greated influence than before, low rest heart rate does no longer lower (except for a very low that can get slightly lower) if Z_index(3) > -1, ReadinessContributors(day,5) = 87.5 - 30 * Z_index(3); % Positive values indicate decreased readiness. Optimum is little below user's own norm. else ReadinessContributors(day,5) = 116 + 16 * Z_index(3); % Strongly negative values indicate only slightly decreased readiness end

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% 7 (% 6 in Matlab code) . Bedtime accumulated after HR has stabilized,

r. One body response parameter within the readiness score is "amount of rest after reaching rest zone of heart rate". This is influenced by for example alcohol consumption, heavy eating or a too intense sport late in the evening.

s. % The user is the more recoverd the more bedtime he/she has accumulated after he/she has got within 1-3 bpm to his/her HRminimum ReadinessContributors(day,6) = 85 + 15 * Z_index(4);

[0061] The present disclosure further relates to a user interface comprising an area indicating a readiness score of the user, an area indicating parameters affecting the readiness score and an area indicating change of at least one of said parameters with respect to an earlier point of time. Some examples of suitable user interfaces are given below in connection with the drawings. The user interface may for example include indications on readiness score on a three-level scale, such as bad, average, good. Different components of the readiness score may also be shown, as well as their influence on the readiness score. The user interface may also include a possibility for the user to simulate different ways of improving the readiness score, for example when the ideal way to improve readiness score would be to do a physical exercise for an hour, but the user only has a half an hour available. The user could then for example choose between different sports available to him/her (such as gym, running or swimming), and choose the one having the most positive effect on the readiness score. Users that are for example travelling and busy with business meetings etc, could thus optimise their use of free time. The user interface may also show past readiness scores as well as what has influenced them.

[0062] There are a number of advantages for using a ring device instead of a wrist device. For example, many persons prefer to wear a bracelet or wristlet on his/her wrist rather than a measuring device. Furthermore, a ring is optimal for measuring HR/HRV optically, as in a finger, two arteries are close to the skin. These arteries are on the palm side of the hand and covered by soft tissue, the wearable ring does thus not need to be tightened to ensure a good contact to the skin. Thus the position of the ring in relation to the finger and arteries typically stays very stable although the palm is turned up and down and in consequence, the ring does not move in relation to the arteries. Furthermore, in a wrist there are two bones and turning the palm up and down means that the bones

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are twisted which then causes the wrist device to move with respect to the skin underneath the device and thus also with respect to the arteries in the wrist. A yet further advantage is that if the user wants to change the measurement position due to inconvenience in one finger (for example abrasion, rubbing, scar), he/she can change the ring easily from one finger to another, whereas the choice of measurement position is more limited for wrist-worn devices. In case of swelling, the ring can also be changed to a smaller finger. A ring is also a much lighter device to carry than a wrist device.

[0063] The present disclosure provides a method and a system for assessing readinessy of a user. Specifically, the method and the system are configured to calculate the readiness score and provide appropriate instructions to improve the readiness score against such mental and physical load the user is subjected to. Further, the readiness score is based on real time, exhaustive and comprehensive analysis of data (i.e. the user's movement, biological signals and the like) which makes the method and the system of the present disclosure to provide appropriate instructions to the user. Therefore, the appropriate instructions enable the user to manage his or her health related aspects (for example sleep, stress level and physical activity).

DETAILED DESCRIPTION OF THE DRAWINGS

[0064] Referring now to the drawings, particularly by their reference numbers, FIG. 1 is a schematic illustration of a system **100** for assessing readiness of a user, in accordance with an embodiment of the present disclosure. The system **100** includes a ring **102**, a mobile communication device **104** and a server **106**. The ring **102** is communicably coupled to the mobile communication device **104** by a communication network **120** and the mobile communication device **104** is communicably coupled to the server **106** by communication network **122**.

[0065] The ring **102** is associated with a user (not shown) and configured to measure user's movements and a heart rate associated with the user. Specifically, the ring **102** includes optical electronics **130** (such as at least one photon source and at least one photon detector) and at least one motion sensor **132** (such as an accelerometer, a gyroscope, a magnetic field sensor or a combination thereof). The ring also includes other electronic **134** configured to collect and analyse raw data (i.e. data of the motion sensor and the optical electronics). The other electronic

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components **134** include but is not limited to a controller, a microprocessor, a memory and a communication module.

[0066] The mobile communication device **104** and the server **106** are configured to collect the raw data generated by the ring **102**. Further, the server **106** are configured to perform a deep data analysis of the raw data in order to find heart rate variability, hypnogram, stress level and the like. It is also possible that part or all of the analysis is performed by the mobile communication device, in which case the server is incorporated in the mobile communication device. Also, the mobile communication device **104** and the server **106** are configured to perform long data, trends and cross-correlation analysis of the deep data analysis in order to calculate a readiness score (i.e. based on the user's movements, heart rate, heart rate variability, hypnogram and stress level). Moreover, based on the readiness score the user is provided with appropriate instructions to improve the readiness score against the mental and physical load the user is subjected to. Specifically, the mobile communication device **104** is configured to visually present the readiness score to the user with the help of various user interfaces (or a single interface incorporating all the information). The user interfaces are based on (or include) information related to the readiness score, the instructions and data associated with user's movement, heart rate, hypnogram, heart rate variability and stress level.

[0067] Referring now to FIG. 2, shown is a schematic illustration of a ring **200** worn on a finger **202** for collecting a heart rate of the user, in accordance with an embodiment of the present disclosure. Specifcally, the ring **200** is configured to collect the heart rate of the user (during both an activity period and a rest period) using the optical electronics **130** (shown in FIG. 1). As shown, a measured graph includes a heart rate pulse wave form **210** as function of time. The measurement is done by measuring a change of blood volume using PPG of blood vessels **220**. Further, from the wave form **210** an inter beat interval (IBI) is determined. The IBI is the time between two beats such as time t1 and t2, and is also referred to as the heart rate.

[0068] Moreover, from the wave form **210** a heart rate variability (HRV) can be determined by subtracting inter beat intervals, for example t1-t2. Also, a respiration rate can be determined from the wave form **210** by analyzing peak values. As shown, a respiration curve **230** is based on the peak values, which correspond to a rate of breathing of the user. The respiration curve **230** is used

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to analyze exercise impact and recovery of the user together with other heart rate related indications (IBI, heart rate, heart rate variability). It to be understood that the heart rate variability and the rate of breathing may be calculated by the mobile communication device **104** and/or the server **106** (shown in FIG. 1), as a part of the deep data analysis. The ring **200** is also configured to measure user's movement, which is explained in conjunction with FIG. 3.

[0069] Referring now to FIG. 3, shown is a schematic illustration of a graph **300** related to physical activity data of the user for a week, in accordance with an embodiment of the present disclosure. Specifically, the graph **300** shows data collected from the motion sensor **132** (shown in FIG. 1) for a week (i.e. Mon-Sun) for both the activity period and the rest period. As shown, the data shows more movement on the time when the user is awake (i.e. during the activity period) than when the user is sleeping (i.e. during the rest period). Based on such data a sleeping pattern (when the user went to bed and when woke up) can be determined. Also, a total number of hours the user slept on a particular night can be determined. For example, as shown, on Mon the user slept form about 9 pm to 6 am (i.e total of 9 hours sleep), whereas on Tus the user slept form about 12 am to 6 am (i.e total of 6 hours sleep).

[0070] Referring now to FIG. 4, shown is a schematic illustration of a hypnogram **400** of the user, in accordance with an embodiment of the present disclosure. The hypnogram **400** depicts a quality of sleep the user had on a particular night. Specifically, the hypnogram **400** is determined using a heart rate wave form of the user for that particular night. The hypnogram **400** is used to analyze sleep quality and stages (i.e. deep, light, REM (Rapid eye movement)). As shown, the hypnogram **400** includes various stages of sleep i.e. REM **402**, light sleep **404** and deep sleep **406**. Also, the hypnogram **400** includes indications **408** when the user is awake (i.e. before attaining sleep and after getting up from the sleep).

[0071] Referring now to FIG. 5, shown is a schematic illustration of a graph **500** related to collected heart rate of the user for two nights, in accordance with an embodiment of the present disclosure. The graph **500** shows the collected heart rate of the user for two different nights, for example last two nights. As shown, a heart rate wave form **502** depicts an example of a 'good night sleep' associated with one particular night. The determination of the good night sleep is based on the wave form **502** (which may be associated with a 'normal day' of the user) having a

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measurement i.e. lowest HR 41 bpm (beats per minute) at about 5:15 (6 hours 15 min of sleep). Also, determination of good sleep is substantiated with the user's feedback.

[0072] The graph **500** also shows a heart rate wave form **504** depicting an example of a 'bad night sleep' associated with another night. The determination of the bad night sleep is based on the wave form **504** (which may be associated with a day when the user did too much exercise just before sleeping). For example, the wave form **504** includes a measurement i.e. lowest HR is 47 bpm at 7:30 AM which is 8 hours 15 min after bedtime, showing dramatic change between the two days. Therefore, the wave form **504** shows that the heart rate decreases slowly down to normal resting pulse and thus disturbs the sleep. Based on such measurements the user may be instructed to ease up for example 2 hours before predicted sleeping time to make sure that the heart rate is not too high during the sleep period.

[0073] Referring now to FIG. 6, shown is a schematic illustration of a provocation measurement of the user, in accordance with an embodiment of the present disclosure. Specifically, the FIG. 6 illustrates a graph **600** with a heart rate wave form **602** associated with a provocation measurement (i.e. when the user stands from a lying position). For example, while the user lies in bed in the morning after a night of sleep, the heart rate measurement begins at time T0. Thereafter, when the user stands up, the heart rate measurement begins at time T1. The user stands still and pulse data is measured for subsequent times T2-T7. Further, the strength of physiological provocation/activity is measured during each phase with an accelerometer.

[0074] Referring now to FIG. 7, shown is a schematic illustration of various stages involved in calculating a readiness score by the system **100**, in accordance with an embodiment of the present disclosure. As shown in FIG. 7, the calculation of the readiness score includes the following stages, for example, a first stage **702** which relates to measuring raw data and basic analysis of the raw data.. Further, a second stage **704** is related to the deep data analysis, i.e. when the mobile communication device **104** and the server **106** (shown in FIG. 1) are configured to perform the deep data analysis of the raw data in order find various health related aspects of the user. As shown, the second stage **704** includes determining the hypnogram **400**, the determining of heart rate variability to compare sleep quality (shown with the graph **500**) and the provocation measurement (shown with the graph **600**).

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[0075] It may be evident to those skilled in the that the second stage **704** also includes various other kinds of measurements such as the respiration rate, the stress level measurement and the like. Moreover, FIG. 7 also illustrates a third stage **706** which includes long data, trends and cross-correlation analysis of the deep data analysis (i.e. heart rate variability, hypnogram, stress level and the like measurement performed in the second stage **704**). Based on the measurement associated with the third stage **706**, a readiness score is calculated, which is an indication of a level of readiness of the user. Further, appropriate instructions are provided to the user for improving the user's readiness score. As shown, an appropriate instruction **710** includes "You recovered from your exercise very nicely. Resting heart rate 30 minutes after the exercise while sitting is 59".

[0076] Referring now to FIG. 8, shown are steps of a method **800** for calculating a readiness score by the system **100**, in accordance with an embodiment of the present disclosure. Specifically, the method **800** depicts the various stages involved in the measurement of the readiness score, as explained in conjunction with FIG. 7.

[0077] At stage **802**, raw data is collected and analysed by a wearable device (such as the ring **200**). The raw data is associated with the user's movements and the heart rate.

[0078] At stage **802**, deep data analysis is performed on the raw data using algorithms in a user communication device or a server. Specifically, the deep data analysis is performed in at least one of the user communication device and/or the server. The deep data analysis provides various health related aspects associated with the user such as the heart rate variability, respiration rate, hypnogram, stress level, provocation measurement and the like.

[0079] At stage **806**, instructions are provided to the user based on long data, trends and/or cross-correlation analysis of the deep data analysis. Specifically, a readiness score is calculated from the various data, such as the heart rate variability, respiration rate, hypnogram, stress level, provocation measurement and the like. Thereafter, appropriate instructions are provided to the user for improving the user's readiness score against the mental and physical load.

[0080] Referring now to FIGS. 9-12, shown are schematic illustrations of user interfaces rendered on a mobile communication device, in accordance with various embodiments of the present disclosure.

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[0081] FIG. 9 shows a user interface (UI) **900** rendered on the mobile communication device (such as the mobile communication device **104** of FIG. 1). As shown, the UI **900** provides statistical information related to a particular night's sleep (for example last night's sleep). For example, the UI **900** provides information about the various stages of sleep (i.e. the REM, the light sleep and the deep sleep) for a particular night. Further, the UI **900** provides information related to weekday and date, such as 'Tuesday Night-11/4/14'. Also, the UI **900** provides information how well the user slept (for example 'You slept well last night'). Moreover, the UI **900** provides information when the user went to sleep, when the user woke up and how long the user slept (for example the user went to sleep at 10:12 pm, woke up at 6:27 am and slept for 8 hr 15 min). Also, the UI **900** provides information about Resting HR and sleep quality (for example 58 bpm and 90 % respectively). Furthermore, the UI **900** provides information related to measurement of the various stages of sleep (for example, deep sleep 1 hr 54 min, REM 2 hr 15 min, awake 2 min and light sleep 2 hr 45 min).

[0082] FIG. 10 shows another user interface **1000** rendered on the mobile communication device. Specifically, the UI **1000** shows a summary report for a user (for example Hannu) for both mental and physical changes as trends. The UI **1000** provides correlation of physiology, behavior and subjective feedback on feelings. For example, the UI **1000** provides trend of feelings (i.e. how the user has been feeling since last couple of days - Mon, Tue and today). Also, the UI **1000** provides information about performance against and recovery from prolonged stress. As shown, the UI **1000** provides a current readiness score (i.e. "Readiness -10 %") and an instruction "Your readiness is a little low today. Moderate intensity exercise could improve your readiness and mood". The UI **1000** also provides a readiness score trend based on past days. Further, the UI **1000** provides a sleeping trend (current and past sleeping data) and a comment based on the sleeping trend. For example, the UI **1000** shows that the user slept for 8 hr 4 min on Tuesday night and the comment "You slept well last night, but you still have some sleep debt form previous nights".

[0083] FIG. 11 shows yet another user interface **1100** rendered on the mobile communication device. Specifically, the UI **1100** is associated with proposals for the user, which can help the user to understand what affects physiology and feelings of the user and what the user can do to improve them. As shown, the UI **1100** provides an appropriate instruction (or proposal) associated with

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recovery of the user that may be after physical exercise, i.e. "You recovered from your exercise very nicely. Resting heart rate 30 minutes after the exercise while sitting: 59". Also, the UI **1100** provides an appropriate instruction associated with sleep of the user, i.e. "Your REM sleep was quite short last night. Finding a few minutes during the day to close your eyes and relax, will help you recover". Further, the UI **1100** provides an appropriate instruction associated with physical activity of the user, i.e. "You were a bit below your usual activity level today. Try and get back on track tomorrow".

[0084] FIG. 12 shows another user interface **1200** rendered on the mobile communication device. Specifically, the UI **1200** is associated with updates of a particular day for a user (Anthony). As shown, the UI **1200** provides a latest update (just now) about physical activity, i.e. "GREAT JOB! 1 hr 24 min of light activity". Also, the UI **1200** provides a past update (4 m before) about the physical activity, i.e. "KEEP PUSHING - Only 0.5 miles more needed to reach your goal. You can do it!". The UI **1200** also include past update (4 m before) about user's feedback regarding the physical activity, i.e. "Started a new schedule this week, 1 hour ago". The UI **1200** also includes an old update (at 8:45 am) about the user sleep, i.e. "Last night you slept 30 min more than normal Sleep duration 7 hr 45 min. Additionally, the user interface **1200** depicts the readiness score of the user, i.e. about 90 %.

[0085] Referring now to FIG. 13, illustrated are steps of a method **1300** for assessing readiness of a user, in accordance with an embodiment of the present disclosure. Specifically, the method **1300** illustrates the steps for assessing readiness of a user using the system **100**, explained in conjunction with the FIGS. 1-12.

[0086] At step **1302**, the user's movements is measured during an activity period and a rest period.

[0087] At step **1304**, the user's biosignal (at least one) is measured during a rest period. The biosignal may be for example derived as explained below in connection with Figure 15. At an optional step **1306**, the user's biosignal (at least one) is measured during an activity period. It is to be understood that step **1302** and the optional step **1306** are typically performed simultaneously.

[0088] The method may also comprise a step where various features are generated based on the measured biosignals. The features include for example IBI and heart rate and their distribution,

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zero crossing parameters and their distribution, autocorrelation parameters, amplitude variation and its distribution, and so on.

[0089] At step **1308**, a summary for the activity period is determined, based on the measured movements.

[0090] At step **1310**, a summary for the rest period is determined, based on the measured biosignal. Thereafter, in step **1312**, a body response summary is determined, based on steps **1308** and **1310**. . It is to be understood that steps **1308** and **1310** can be performed in either order or simultaneously.

[0091] At step **1314**, a readiness score is calculated based on the measured movements, and body response parameters based on steps **1308-1312**, whereby the readiness score indicates a level of readiness of the user.

[0092] The steps **1302** to **1314** are only illustrative and other alternatives can also be provided where one or more steps are added, one or more steps are removed, or one or more steps are provided in a different sequence without departing from the scope of the claims herein. For example, the method **1300** may further include providing the user with appropriate instructions, related to at least one of physical activity and mental activity, for improving the user's readiness score. Also, the method **1300** may include using also historical data of the user to calculate the readiness score.

[0093] FIG. 14 is a further schematic illustration of a user interface in accordance with an embodiment of the present disclosure. The user interface **1400** is rendered on a mobile communication device. Specifically, the upper part of the UI **1400** is associated with a readiness of the user summarizing data over several days. The readiness graph **1406** may also be compared to subjective feelings **1408** that are collected based on user input. Readiness is a sum of the measured or estimated physical and mental resources that are in ideal case scaled according to the user's own norms. As shown, the UI **1410** may also express the readiness of each day as a main proposal associated with it, e.g. "Take it easier today to recover" given on Saturday 7/4/14. The lower part of the UI displays graphically the negative **1402** and positive **1404** contributors for readiness on each day. The size of the graphical obstacles represents their significance (magnitude or severity), and the color (intensity) represents positive or negative sign. Negative contributors

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can be e.g. sleep debt assessed over several nights **1402**, sleep disturbance of previous night or abnormal body responses e.g. higher than typical night time heart rate. Importantly, on each day there can be both positive and negative contributors that may at least partially compensate for each other. Positive contributors can be e.g. optimal physical activity on the previous days **1404**.

[0094] Fig. 15 is an illustration of steps of a method in accordance with a further embodiment of the present disclosure. In step **1500**, movement data is measured during an activity period (in practice with an accelerometer, gyroscope, etc. or alternatively from a motion artifact of a biosignal such as an electrocardiogram (EKG), a PPG, an electromyogram (EMG), or data from global positioning system (GPS)). In an alternative step 1502, movement data is measured during a rest period (in practice with an accelerometer, gyroscope, etc. or alternatively from a motion artifact of a biosignal such as EKG, PPG, EMG). In a yet alternative step **1504**, corresponding to a preferred case, also a biosignal (EKG, PPG, EMG, an electrodermal activity (EDA)) or another measurement associated with breathing (for example a breathing rate with impedance measurement or termistor, sensor attached to bed, microphone, video recording) is measured. In a still further alternative step **1506**, which is also preferred, the user's subjective input on prevailing feelings is requested via a series of questions. The questionnaire may be synched to watch-time, rise-time, or start or end times of certain activity or rest parameters as determined based on steps **1500**-**1504**. All of these steps can be performed either simultaneously or in sequence, as the case may be.

[0095] In step **1508**, based on the results of step **1500**, an activity summary for the day is determined, including one or more of the following: active time, steps, distance, energy expenditure, training impact/load, distribution of intensity/speed/step rate, time of activity in respect to bedtime, etc. If need be, results from any of the other steps can also be used for this determination. In step **1510**, based on the steps **1502**-**1504**, a rest summary for the night is determined, including one or more of the following: bedtime, rise time, total sleep duration, sleep disturbances, hypnogram, lowest hear rate, average heart rate, biosignal amplitude variation, heart rate variability, restlessness etc.

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[0096] In step **1512** and based on steps **1508-1510**, a body response summary for day to night, or activity period to rest period, is determined. The body response parameters may be e.g. training impact vs. heart rate recovery speed, daily physical activity parameter vs. amount of deep sleep or lowest heart rate of the night. The body response may also be changes in body signal as a response from rest to stand-up at rise time as determined based on steps **1500-1504**.

[0097] In step **1514** and based on the user's history, a distribution of parameter in activity and rest summary is calculated, in order to use them as user dependent reference values (e.g. mean, standard deviation, percentiles). In step **1516**, subjective feelings are correlated with activity and rest summary parameters over different time constants and delays in order to find user dependent reference values that can be described e.g. with words as sub-optimal or optimal. In a further step **1518**, based on the user's own data (history database) activity or rest parameters are correlated with the following days' activity or rest parameters or readiness scores in order to provide supportive feedback how user has earlier managed to recover from challenging situations.

[0098] In step **1520** and based on steps **1506-1518**, the relevance/significance for each activity and rest parameter is correlated in respect to estimated readiness using the user-independent and user-dependent scales. Finally, in step **1522** and based on steps **1506-1518**, the relevance of a number of pre-determined textual advice is computed, and the most relevant of them is selected.

[0099] Fig. 16 is an illustration of steps for calculating readiness score 1650 for a user. In a first step set of parameters is measured with a ring 1600. The ring is configured to measure heart rate (HR) 1602, body temperature 1604 and activity 1606. Accelerometer is used to measure the activity 1606. IR is used to measure heart rate (HR) 1062. Temperature 1604 is measured with temperature sensor. The temperature 1604 refers to body temperature of the user.

[00100] Sub parameters 1610 are calculated using the measured parameters using algorithm 1630. Sub parameters 1610 include sleeping times of previous three nights. Sleeping time of last night is 1612, sleeping time of night before last night is 1614 and sleeping time of two nights before last night is 1616. Sub parameters further include activity level parameter 1 1618 and activity level parameter 2 1620. Further sub parameters include first heart rate parameter 1622 and

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second heart rate parameter 1624. The sub parameters 1610 are used by second algorithm to determine readiness score 1650.

[00101] Fig. 17 is an illustration of user interface view 1730. The view 1730 has indication 1750 for indicating neutral value. Values left from the neutral value are considered as negative values and values from right are considered as positive values. According embodiments user view 1730 can be configured also to show negative values can be in right and positive in left. Readiness score is rendered to user in area 1710. The value of the readiness score is indicated with a graphical element 1740. Sub parameter values related to sleep of previous nights, heart rate, activity, temperature are rendered in the areas 1710, 1712, 1714, 1716, 1718, 1720, 1722, 1724. Value is indicated with slider bar 1742.

[00102] Based on embodiment user can use pointer such as finger to move slider bar 1742 to simulate readiness score value 1740 as shown in user view 1732. In an example user has selected to drag slider bar 1742 of areas 1718 and 1720 (in present example activity 1 and activity 2) to direction indicated with arrow to simulate effect of adding more activities to the day. The user can see in the user view 1732 that the recover index shows more positive sign if the user adds activities (such as moving).

[00103] Figures Fig 18A, Fig. 18B and Fig. 18C are illustrations of alternative user interface views 1800, 1802, 1804 respectively. The user interfaces show readiness value 1810 and positively affecting sub parameters 1830 and negatively affecting sub parameters 1820. User interface can be further configured to indicate trend of the readiness by animations or arrows or similar. The user interface can be in addition configured to enable user to test impact of each sub parameters for the readiness value.

[00104] Further different colors can be used for differentiating "plus or minus" values. For example green has a positive meaning and red a negative one. Colors and left-right bars can be used also together to visualize and emphasize different parameter values and their contribution. Also different shades of colors can be used. The shade can be darker or lighter if a parameter value is higher or lower.

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[00105] Modifications to embodiments of the present disclosure described in the foregoing are possible without departing from the scope of the present disclosure as defined by the accompanying claims. Expressions such as "including", "comprising", "incorporating", "have", "is" used to describe and claim the present disclosure are intended to be construed in a non-exclusive manner, namely allowing for items, components or elements not explicitly described also to be present. Reference to the singular is also to be construed to relate to the plural.

ABSTRACT

Disclosed is a method and a system for assessing readiness score of a user. The method comprises obtaining the user's movements; using the obtained user's movements to determine a nature of the period, wherein the nature of the period is selected from an activity period and a rest period; measuring at least one biosignal of the user during the rest period; determining a rest summary for the rest period, based on the measured at least one biosignal and at least one biosignal of a previous rest period; determining an activity summary for the activity period, based on the obtained movements of an activity period and obtained movements of at least one previous activity period; determining a body response summary based on the rest summary and the activity summary; and calculating a readiness score based on the body response summary and a previous body response summary, whereby the readiness score indicates a level of readiness of the user.

FIG. 1

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1	Provisional Cover Sheet (SB16)	151130_3376_PCS.pdf	1477367 682f669bd8541a246fc1c667bf708908aea9966a	no	4
Warnings:					
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2	Application Data Sheet	151130_3376_ADS_1.pdf	1823321 0ecf0916bb97cb1524490d56b276c43cad88b68b	no	10
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CLAIMS

1. A method for assessing readiness of a user, the method comprising:
- obtaining the user's movements;
- using the obtained user's movements to determine a nature of the period, wherein the nature of the period is selected from an activity period and a rest period;
- measuring at least one biosignal of the user during the rest period;
- determining a rest summary for the rest period, based on the measured at least one biosignal and at least one biosignal of a previous rest period;
- determining an activity summary for the activity period, based on the obtained movements of an activity period and obtained movements of at least one previous activity period;
- determining a body response summary based on the rest summary and the activity summary; and
- calculating a readiness score based on the body response summary and a previous body response summary, whereby the readiness score indicates a level of readiness of the user.

2. A method according to claim 1, wherein obtaining the user's movements is performed by measuring the user's movements or by retrieving the user's movement data from a separate device.

3. A method according to claim 1 or 2, further comprising measuring at least one biosignal during the activity period.

4. A method according to any of the preceding claims, wherein the at least one biosignal is selected from the group consisting of an electrocardiogram, a photoplethysmogram, an electromyogram, an electroocylogram, a heart rate, a heart rate variability, a body temperature, a resting heart rate, an average heart rate and signals related to breathing.

5. A method according to any of the preceding claims, wherein determining the rest summary comprises at least one of determining a hypnogram, determining a sleep balance, determining lowest body temperature during rest and determining a resting heart rate.

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6. A method according to any of the preceding claims, further comprising providing the user with appropriate instructions, related to at least one of physical activity, mental activity and rest, for improving the user's readiness score.

7. A method according to any of the preceding claims, further comprising using historical data of the user to calculate the readiness score.

8. A method according to any of the preceding claims, further comprising using at least one of target information provided by the user, personal characteristics provided by the user and personal characteristics previously determined by the method.

9. A system for assessing readiness of a user, the system comprising:

- a ring configured to be worn by the user and comprising means for measuring at least one biosignal of the user during a rest period,
- a mobile communication device configured to communicate with the ring,
- means for measuring user's movements during an activity period and the rest period, and
- a server configured to communicate with the mobile communication device, the server being operable to
    - use the measured user's movements to determine a nature of the period, wherein the nature of the period is selected from the activity period and the rest period,
    - determine a rest summary for the rest period, based on the measured at least one biosignal and at least one biosignal of a previous rest period,
    - determine an activity summary for the activity period, based on the measured movements and measured movements of at least one previous activity period,
    - determine a body response summary based on the rest summary and the activity summary; and
    - calculate a readiness score based on the body response summary and a previous body response summary, whereby the readiness score indicates a level of readiness of the user.

10. A system according to claim 9, wherein the means for measuring user's movements are arranged on the ring, in the mobile communication device or in an activity determination device.

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11. A system according to claim 9 or 10, wherein the mobile communication device is configured to visually present the readiness score to the user.

12. A system according to any of the claims 9-11, wherein the means for measuring user's movements is selected from the group consisting of an accelerometer, a gyroscope and a magnetic field sensor.

13. A system according to any of the claims 9-12, wherein the means for measuring a heart rate comprises a photon source arranged on the inner surface of the ring and a photon detector arranged on the inner surface of the ring.

14. A system according to any of the claims 9-13, wherein the ring further comprises a first electrode and a second electrode adapted to measure an electrocardiogram.

15. A user interface comprising an area indicating a readiness score of the user, an area indicating parameters affecting the readiness score and an area indicating change of at least one of said parameters with respect to an earlier point of time.

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METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER

TECHNICAL FIELD

[0001] The present disclosure generally relates to analysing and processing data related to physical activities and biological signals of an individual, and, more specifically, to a method and a system for assessing readiness score of a user.

BACKGROUND

[0002] An individual is subjected to various kinds of mental and physical loads in a day to day life. For example, an individual may be subjected to physical loads (such as physical exercise, walking, driving, playing and the like) and mental loads (such as inappropriate sleep, inappropriate rest, stress and the like). Further, if such mental and physical loads are not managed or handled efficiently, it may induce mental and physical stresses. For example, the physical stress may cause health issues such as backache, spine problems and the like, and the mental stress may cause reduction in sleep, hinder concentration and impair motivation. Therefore, it is important to analyse how an individual manages or handles such mental and physical loads for maintaining a good physical and mental health and what is the readiness of the individual to face further challenges.

[0003] Conventionally, there are devices that may calculate biological signals of an individual and monitor physical activities of the individual. However, such devices do not provide any information which relates to recovery of the individual from mental or physical loads that the individual is subjected to, neither do they provide any information related to a readiness score of the individual. Further, such devices do not analyse data, associated with health parameters of the individual, in detail. For example, such devices do not consider the individuals' historical data. Also, such devices are not capable of providing appropriate suggestions or recommendations that may help the individual to efficiently recover from such mental and/or physical load and to increase the readiness score.

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[0004] Therefore, in light of the foregoing discussion, there exists a need to overcome the aforementioned drawbacks of assessing readiness score of the user.

SUMMARY

[0005] The present disclosure seeks to provide a method for assessing readiness score of a user.

[0006] The present disclosure also seeks to provide a system for assessing readiness score of a user.

[0007] In one aspect, an embodiment of the present disclosure provides a method for assessing readiness score of a user. The method comprises:

- obtaining the user's movements;
- using the obtained user's movements to determine a nature of the period, wherein the nature of the period is selected from an activity period and a rest period;
- measuring at least one biosignal of the user during the rest period;
- determining a rest summary for the rest period, based on the measured at least one biosignal and at least one biosignal of a previous rest period;
- determining an activity summary for the activity period, based on the obtained movements of an activity period and obtained movements of at least one previous activity period;
- determining a body response summary based on the rest summary and the activity summary; and
- calculating a readiness score based on the body response summary and a previous body response summary, whereby the readiness score indicates a level of readiness of the user.

[0008] In another aspect, an embodiment of the present disclosure provides a system for assessing readiness score of a user. The system comprises

- a ring configured to be worn by the user and comprising means for measuring at least one biosignal of the user during a rest period,
- a mobile communication device configured to communicate with the ring,
- means for measuring user's movements during an activity period and the rest period, and
- a server configured to communicate with the mobile communication device, the server being operable to

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- use the measured user's movements to determine a nature of the period, wherein the nature of the period is selected from the activity period and the rest period,
- determine a rest summary for the rest period, based on the measured at least one biosignal and at least one biosignal of a previous rest period,
- determine an activity summary for the activity period, based on the measured movements and measured movements of at least one previous activity period,
- determine a body response summary based on the rest summary and the activity summary; and
- calculate a readiness score based on the body response summary and a previous body response summary, whereby the readiness score indicates a level of readiness of the user.

[0009] Embodiments of the present disclosure substantially eliminate or at least partially address the aforementioned problems in the prior art, by calculating a readiness score of a user and by providing appropriate instructions to improve the readiness score.

[0010] Additional aspects, advantages, features and objects of the present disclosure would be made apparent from the drawings and the detailed description of the illustrative embodiments construed in conjunction with the appended claims that follow.

[0011] It will be appreciated that features of the present disclosure are susceptible to being combined in various combinations without departing from the scope of the present disclosure as defined by the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] The summary above, as well as the following detailed description of illustrative embodiments, is better understood when read in conjunction with the appended drawings. For the purpose of illustrating the present disclosure, exemplary constructions of the disclosure are shown in the drawings. However, the present disclosure is not limited to specific methods and instrumentalities disclosed herein. Moreover, those skilled in the art will understand that the drawings are not to scale. Wherever possible, like elements have been indicated by identical numbers.

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[0013] Embodiments of the present disclosure will now be described, by way of example only, with reference to the following diagrams wherein:

FIG. 1 is a schematic illustration of a system for assessing readiness score of a user, in accordance with an embodiment of the present disclosure;

FIG. 2 is schematic illustration of a ring worn at a finger of the user for collecting a heart rate of the user, in accordance with an embodiment of the present disclosure;

FIG. 3 is a schematic illustration of a graph showing physical activity data of the user for a week, in accordance with an embodiment of the present disclosure;

FIG. 4 is a schematic illustration of a hypnogram of the user, in accordance with an embodiment of the present disclosure;

FIG. 5 is a schematic illustration of a graph showing collected heart rate of the user for two nights, in accordance with an embodiment of the present disclosure;

FIG. 6 is a schematic illustration of a graph showing provocation measurement of the user, in accordance with an embodiment of the present disclosure;

FIG. 7 is a schematic illustration of various stages involved in calculating a readiness score by the system of FIG. 1, in accordance with an embodiment of the present disclosure;

FIG. 8 is an illustration of steps of a method for calculating a readiness score by the system of FIG. 1, in accordance with an embodiment of the present disclosure;

FIGS. 9-12 are schematic illustration of user interfaces rendered at a mobile communication device, in accordance with various embodiments of the present disclosure;

FIG. 13 is an illustration of steps of a method for assessing readiness of a user, in accordance with an embodiment of the present disclosure;

FIG. 14 is a further schematic illustration of a user interface in accordance with an embodiment of the present disclosure; and

Fig. 15 is an illustration of steps of a method in accordance with a further embodiment of the present disclosure;

FIG. 16 is an illustration of steps of a method in accordance with a further embodiment of the present disclosure;

FIG. 17 is an illustration of an exemplary user interface; and

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FIG 18A, 18B, 18C are illustrations of exemplary user interfaces according to embodiments of the present disclosure.

[0014] In the accompanying drawings, an underlined number is employed to represent an item over which the underlined number is positioned or an item to which the underlined number is adjacent. A non-underlined number relates to an item identified by a line linking the non-underlined number to the item. When a number is non-underlined and accompanied by an associated arrow, the non-underlined number is used to identify a general item at which the arrow is pointing.

DETAILED DESCRIPTION OF EMBODIMENTS

[0015] The following detailed description illustrates embodiments of the present disclosure and ways in which they can be implemented. Although some modes of carrying out the present disclosure have been disclosed, those skilled in the art would recognize that other embodiments for carrying out or practicing the present disclosure are also possible.

[0016] In one aspect, an embodiment of the present disclosure provides a method for assessing readiness score of a user. The method comprises:

- obtaining the user's movements;
- using the obtained user's movements to determine a nature of the period, wherein the nature of the period is selected from an activity period and a rest period;
- measuring at least one biosignal of the user during the rest period;
- determining a rest summary for the rest period, based on the measured at least one biosignal and at least one biosignal of a previous rest period;
- determining an activity summary for the activity period, based on the obtained movements of an activity period and obtained movements of at least one previous activity period;
- determining a body response summary based on the rest summary and the activity summary; and
- calculating a readiness score based on the body response summary and a previous body response summary, whereby the readiness score indicates a level of readiness of the user.

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[0017] In another aspect, an embodiment of the present disclosure provides a system for assessing readiness score of a user. The system comprises:

- a ring configured to be worn by the user and comprising means for measuring at least one biosignal of the user during a rest period,
- a mobile communication device configured to communicate with the ring,
- means for measuring user's movements during an activity period and the rest period, and
- a server configured to communicate with the mobile communication device, the server being operable to

  - use the measured user's movements to determine a nature of the period, wherein the nature of the period is selected from the activity period and the rest period,
  - determine a rest summary for the rest period, based on the measured at least one biosignal and at least one biosignal of a previous rest period,
  - determine an activity summary for the activity period, based on the measured movements and measured movements of at least one previous activity period,
  - determine a body response summary based on the rest summary and the activity summary; and
  - calculate a readiness score based on the body response summary and a previous body response summary, whereby the readiness score indicates a level of readiness of the user.

[0018] The term readiness in this description encompasses not only alertness or readiness of the user, or the lack of alertness or readiness of the user, but also physical and mental recovery from various kinds of stress. The readiness score is an estimated readiness of the user to perform well at a given day. It summarizes both physical and mental prerequisites for a good day. In essence, it covers the effects of earlier physical activity, previous night's sleep, and body responses measured lately. Body responses can mean for instance temperature, resting heart rates relative to user's own normative values, or how much they have changed as a response to previous day's physical activity. The terms recovery, alertness and readiness can be used interchangeably in this description and are meant to be understood as stated above.

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[0019] The present method may use different calculation parameters and it is preferably designed to learn from previous measurements. For example, the method and device may take into account the data from previous week, two weeks, a month or two months (or any other time lapse), in order to set personalized calibrations, averages and/or limits, that are typical to the user. The device may also comprise a means for resetting all measurements and calculations. Such personalized settings can be used to give further instructions to the user, to improve the user's life balance. Indeed, different users may have different reactions to stress and illnesses, as well as different means to cope and recover from stress. Furthermore, the gathered data could be used for varying the weight that is given to different aspects measured or obtained by the user, in order to further personalize the device.

[0020] In an embodiment, the ring of the system is configured to be suitably worn at a finger, such as an index finger, of the user. However, it may be evident to those skilled in the art that the system may be associated with other wearable devices, such as a device adapted to be worn at a wrist of the user. For example, the device may have the form of a ring and may be configured to have a size that is large enough to be suitably worn at the wrist of the user. According to a further embodiment, the ring is as described in PCT/FI2014/000043, which application is hereby incorporated by reference.

[0021] The ring or other device is configured to measure at least one biosignal of the user, and optionally the user's movements, which may be referred to as 'raw data' associated with the user. Further, the measured data is associated with the activity period and the rest period, as may be relevant. The term 'activity period' used herein refers to those periods of a day when the user is subjected to any physical activity, such as when the user is exercising, walking, playing or attending to normal day to day tasks. Further, the term 'rest period' used herein primarily relates to a sleeping period of the user in a day. However, the rest period may also include time period when the user is sitting or lying down to relax. The movements of the user are measured or obtained from a separate device, and used to determine whether the user is active or resting, i.e. to select the nature of the period.

[0022] In the present description, the step of measuring or obtaining the user's movements provides movement data and the measuring of at least one biosignal provides biosignal or biosignal

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data (which terms can be used interchangeably). The obtained movement data of the user during the rest period can be used for various purposes. For example, it is typically used to determine whether a moment of time belongs to the activity period or the rest period or possibly a further type of period if one or more such further types of period(s) have been defined. Further, it can be used as part of the starting data for determining the rest summary. A biosignal or several biosignals is determined during a rest period, but may be also determined during an activity period. For example, in case the temperature of the user is elevated during a rest period, it may be continued to be monitored during a following activity period, in order to ensure whether the increase was due to fever or another reason. Furthermore, elevated temperature readings such as fever can be programmed to adjust the readiness over an extended period of time, i.e. not only the following day. In practice, after being sick one or more days it will be beneficial to take additional easy days proportional to the length of the sickness.

[0023] According to an embodiment, the step of obtaining the user's movements is performed by measuring the user's movements or by retrieving the user's movement data from a separate device. The user's movements can comprise for example actual movements such as raising an arm or a hand, walking, running etc, or accumulated steps, an active time or a distance covered by the user.

[0024] Typically, the movements are measured by means for measuring the user's movements. These means can be arranged on the ring or other similar device to be worn, or in a mobile communication device or in a separate device destined to measure a user's movements, such as a pedometer. In one embodiment, the means for measuring user's movements is selected from the group consisting of an accelerometer, a gyroscope and a magnetic field sensor. It is further to be noted that the means for measuring the user's movements during the rest period can be the same means or different means from those used for measuring the user's movements during the activity period. For example, it is possible to use the measured biosignal for determining the movement data for the rest period.

[0025] According to an embodiment, the method further comprises measuring at least one biosignal during the activity period. According to another embodiment, the at least one biosignal (for either the rest period or the activity period) is selected from the group consisting of an

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electrocardiogram (EKG or ECG), a photoplethysmogram (PPG), an electromyogram (EMG), an electroocylogram (EOG), a heart rate, a heart rate variability, body temperature, a resting heart rate, an average heart rate and signals related to breathing. When a biosignal is measured both during activity and rest, it can be the same or different.

[0026] According to a further embodiment, determining the rest summary comprises at least one of determining a hypnogram, determining a sleep balance, determining lowest body temperature during rest and determining a resting heart rate. A hypnogram can be determined up to a certain accuracy with only motion data, although REM-sleep is rather difficult to differentiate from light sleep without a biosignal such as breathing rate and its dynamics, heart beat intervals or amplitude variation in ECG or PPG signal. Other possibilities are EMG, EEG or EOG that are part of polysomnographic measurement used in clinical sleep tests. On the other hand, it is also possible to use only PPG data to derive much of the same movement information than is needed regarding motion data, thus an accelerometer or other movement sensor is not mandatory. A movement sensor can be used to measure some additional information about the posture of the user, for example, but a PPG is typically sufficient to detect most of the movements. Regarding rest time related factors behind recovery/readiness, an alternative of a hypnogram would also be to determine parameters that are associated with deep sleep (for physical recovery) and REM sleep (for mental or cognitive recovery). This means determining how mentally rewarding the sleep was, and how physically rewarding the sleep was without use of a hypnogram. Use of a hypnogram could be beneficial in validating the determination, but there are alternative intermediate parameters that could also be used, such as breathing inconsistency, respiratory effort related parameters calculated from heart beat intervals or PPG pulse amplitude parameters, heart rate dynamics or stability of the parameters, eye motions, and so on. In the following, the general term "sleep factor" is used to encompass hypnograms as well as its alternatives as mentioned above.

[0027] Heart rate is one possible biosignal measured by the device in question. The heart rate is thus one optional, additional feature derivable from a PPG signal or an ECG signal. Further on, changes around the local mean or difference from whole night mean are more sensitive to sleep phases than the heart rate or the heart beat interval itself. The dynamics of PPG signal amplitude

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(e.g. difference between local max and local min around each heart beat pulse) or R peak amplitude (from ECG) provide approximately the same information as heart beat interval dynamics.

[0028] In a further embodiment, the heart rate is measured by means for measuring a heart rate, which comprise a photon source arranged on the inner surface of the ring and a photon detector arranged on the inner surface of the ring. In yet another embodiment, the ring further comprises a first electrode and a second electrode adapted to measure an electrocardiogram.

[0029] In one embodiment, the ring thus includes at least one motion sensor, such an accelerometer, a gyroscope, a magnetic field sensor or a combination thereof, to measure user's movement. The motion sensor is configured to generate motion data that is indicative of the movements of the user. For example, the motion sensor may be configured to determine linear motion information, rotational motion information, and the like. Further, such information (linear motion or rotational motion) may be combined or correlated to generate the motion data that is indicative of the user's movement. As mentioned above, the movement data can also be generated by a separate device and retrieved or obtained by the ring or the server.

[0030] In one embodiment, the heart rate is measured by measuring blood volume pulse. Specifically, the heart rate is determined by measuring PPG (photoplethysmogram) from the blood volume pulse. The PPG can be measured using optical electronics, particularity using the principle of transmittance or reflectance of light. For example, the ring includes optical electronics, i.e. at least one photon source and at least one photon detector positioned on an inner surface of the ring. The at least one photon source is infrared light (IR) emitting diode and the at least one photon detector is IR receiving diode (such as photon diode or photon transistor).

[0031] In an embodiment, when the ring is worn at the user's finger the optical electronics thereof acquire appropriate measurement data or biosignal data (i.e. blood volume pulse). Specifically, an IR light pulse is sent from the at least one photon source and thereafter the reflected IR light is received by the at least one photon detector. Further, the variations in volume of the blood vessels (during the flow of blood) result in variation in the measured transmission (i.e. IR light intensity) which is measured and processed to generate the PPG. Further, from a PPG waveform an inter-beat-interval i.e. a heart rate (time between two beats) is determined. Body temperature of the user

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is typically measured using a sensor for measuring temperature comprised in the device, for example a thermometer included in the ring.

[0032] The ring may also include other electronic components apart from the motion sensor and the optical electronics. Specifically, the ring is configured to collect and analyse the raw data (i.e. data of the motion sensor and the optical electronics). For example, the ring may include other electronic components which may include but not limited to a controller, a microprocessor, a memory and a communication module. The controller is operable to control operation of the motion sensor and the optical electronics for generating data related to the user's movement and the heart rate. The microprocessor may be operable to process or analyse the raw data generated by the motion sensor and the optical electronics. Further, the memory is used for storing the analysed or processed data. Moreover, the communication module is configured to establish a communication between the ring and the mobile communication device.

[0033] In an embodiment, the mobile communication device is connected to a communication network through a communication module. For example, the mobile communication device may be wirelessly connected to the ring by a wireless connection such as a WiFi, Bluetooth and the like.

[0034] The mobile communication device is associated with the user wearing the ring. In an embodiment, the mobile communication device includes a computing device which incudes but not limited to a smartphone, a tablet computer, a phablet and a laptop.

[0035] In an embodiment, the mobile communication device is configured to collect the analysed raw data from the ring. Further, the mobile communication device is operable to perform deep data analysis of such raw data. It is to be understood that the mobile communication device includes required electronic elements, such as a processor, and algorithms to perform such deep data analysis.

[0036] In an example, the mobile communication device is operable to perform the deep data analysis of such raw data for example to determine a heart-rate-variability (HRV) from the inter-beat-interval. Also, a respiration rate (a signal related to breathing) can be determined from the PPG wave by analysing peak values thereof.

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[0037] In another example, the deep data analysis includes determining a sleeping pattern of the user. Specifically, the data from the motion sensor may be processed by the mobile communication device to determine the sleeping pattern of the user. For example, based on the data from the motion sensor when the user went to bed and woke up can be identified. Also, based on the data from the motion sensor how long the user slept can be determined. Therefore, the data (i.e. when the user went to bed, when the user woke up and how long the user slept) enables in defining the sleeping pattern of the user.

[0038] In another example, the deep data analysis includes determining a sleep factor, such as a hypnogram for the rest period, for example when the user is sleeping. Specifically, the hypnogram is determined based on the measured motion data, photoplethysmogram waveform dynamics and heart rate dynamics using a classification algorithm, a decision tree, a neural network or equivalent. For a certain value of the hypnogram (e.g. with a resolution between 30 s and 10 min), a measurement period that is longer than the resolution of the hypnogram can be used (e.g. data from 10-20 minutes). This is because some characteristic features in the measured data appear more rarely than what is the aimed resolution of the hypnogram. Further, it gives an advantage to use more data from the history than from the future in certain features (e.g. deep sleep may start only after a certain duration of rest time but may stop when the rest time stops) in the determination of the hypnogram for a given time point. The hypnogram is used for analysing a sleep quality and various stages of sleep associated with a particular night. Similarly, the various other factors and parameters qualifying sleep may be used instead of a hypnogram. For example, the various sleep stages may include deep sleep, light sleep and rapid eye movement (REM) stage. Further, based on the absolute time at each stage and the percentage of various sleep stages the quality of sleep can be determined. Also, some or all of the following, i.e. how much the user typically accumulates on each stage, how much the user typically accumulates when weighted against the previous day's activity and what kind of feedback the user has given earlier in respect of nights that have properties similar enough to the night in question (the current night), may be also taken into consideration for determining the quality of the sleep.

[0039] In yet another example, the deep data analysis includes comparing sleep quality of the user for different nights. For example, the sleep quality may be compared by collecting various data of

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the user for those nights. Further, based on the comparison the sleep quality may be categorized into a good sleep, a bad sleep or an average sleep.

[0040] In an example, the categorization of the sleep quality may be determined with the amplitude of heart rates, duration of sleep and measured percentage of various sleep stages (i.e. deep sleep, light sleep and rapid eye movement stages). For example, the sleep quality may be said to be good if the heart rates is between 70-40 beats per minutes, the duration of sleep is about 7 hours and the percentage of the deep sleep is around 1 to 2 hours (10-20 %) among the various sleep stages. Further, the user's feedback is taken to validate the sleep quality.

[0041] In an embodiment, the deep data analysis also includes measuring various physical provocations or non-provocations, as well as strength of such physical provocations or non-provocations. The physical provocations may be referred to as change in the physical activity level, i.e. when the user changes or attains a physical activity level from another physical activity level. For example, the physical provocations can be when the user stands up form a lying position, when the user starts walking form a sitting position, and the like. Further, the non-provocation may relate to situations when the user is subjected to no physical activity, i.e. when the user is sitting, lying down and the like.

[0042] In an embodiment, the various physical provocations or non-provocations may be measured by correlating the measured user's movement data and the heart rate. Specifically, the transitional changes in the activity of a person (i.e. standing up, sitting down, climbing stairs etc.) and the strength of provocation is measured. For example, the bodily reaction to provocation happens after a delay, therefore measurement of HR/HRV (where HR stands for heart rate) can be initiated only when such provocation is detected and the whole phenomena and bodily reactions during each phase (before, during and after transition/provocation) are measured.

[0043] In another example, the deep data analysis includes determining the user's stress level. Specifically, the user's stress level is determined by calculating the heart rate variability (HRV) for the activity period and the rest period, based on the measured heart rate. For example, the user's stress level may be determined based on the HR and/or the HRV, and/or the activity level and/or other sympato-vagal provocation, loading or a withdrawal of provocation. The HR, the HRV, and the activity level or provocation, the withdrawal of provocation, the load of a user are

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recorded at various times during the day and the values are correlated to arrive at a stress level of the user. The stress level is estimated based on a predetermined set of algorithms and analysis methods. Further, the physical disposition or sympato-vagal provocation and the activity levels of the user are automatically detected and the vital parameters, i.e., the HR and/or the HRV are recorded at different times.

[0044] For example, if there is no activity, i.e. no physical provocation but HR is high, the user may potentially be acutely suffering e.g. from a mental, psychological or emotional stress or is having a physiological stress reaction related to breathing (e.g. holding the breath) or other physiological stimulus like contraction, or a physiological stress reaction due to drinking or eating something that raises the pulse rate. Similarly, if there is any physical activity such as when the user is doing some physical exercise (walking, jogging or running), the bodily reactions are measured during the exercise period to detect the stress level.

[0045] In an embodiment, the mobile communication device is configured to calculate a readiness score for assessing readiness of the user. Specifically, based on long data, trends, cross-correlation analysis of the deep data analysis (i.e. heart rate variability, hypnogram, stress level and the like) the readiness score is calculated. Further, the long data, trends, cross-correlation analysis may be associated with a time period (for example a day, a week or a month) for which the deep data analysis is performed. Therefore, the measured user movements, and biosignals such as heart rate, sleep factor, heart rate variability and stress level for such time period are correlated to calculate the readiness score and thereby assessing readiness of the user.

[0046] The readiness score indicates a level of readiness of the user as well as the recovery of the user from the mental and physical load. The term 'readiness' used herein means also a return to a normal state of mental and physical strength (or energy level) after the mental and physical load. In an example, if the physical load is associated with an activity period (such as physical exercise), the readiness score may be based on the heart rate, heart rate variability and stress level of the user. For example, the readiness score may be good or high (such as about 90 %), if the heart rate, heart rate variability and stress level of the user have returned to the normal state after the exercise. It is to be understood that the readiness score may be measured after a certain time period (for example half an hour) of the activity period. Similarly, if the mental load is associated with a rest

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period (such as sleep), the readiness score may be based on the movements, heart rate and sleep factor of the user. For example, the readiness score may be good or high (such as about 90 %), if the user moves less, the heart rate is within a desired level (70-40 beats per minutes) and the sleep factor shows a good amount of deep sleep.

[0047] In one embodiment, historical data of the user is also used for calculating the readiness score. For example, the historical data may include information related to a medical history of the user, but also on historical data collected by the system itself. For example, the historical data may comprise data showing how the user typically recovers from a load. Otherwise, the historical data may include information related to past professional life, food habits, and the like. Therefore, it may be evident to those skilled in the art that the historical data may have substantial influence on measurement of the readiness score of the user.

[0048] In one embodiment, the method comprises providing the user with appropriate instructions, related to at least one of physical activity and mental activity, for improving the user's readiness score. That is, based on the readiness score, the user may be provided with appropriate instructions related to at least one of physical and mental load. Specifically, the appropriate instructions are provided to the user for improving the user's readiness score against such physical and mental load. For example, if the readiness score of the user is poor or low (such as about 40 %) after doing exercise, the user may be instructed to take more rest such that the heart rate, heart rate variability and stress level return to normal state. This in turn may improve the readiness score related to the physical load. Similarly, if the readiness score of the user is poor or low (such as about 40 %) after a sleep, the user may be instructed to sleep longer or to do mild exercise to have good quality sleep, which in turn may improve the readiness score related to the mental load.

[0049] In an embodiment, the mobile communication device is configured to visually present the readiness score to the user. For example, the mobile communication device is rendered with various user interfaces based on the readiness score. Specifically, the user interfaces are based on (or include) information related to the readiness score and the instructions for improving such readiness score. For example, the user interfaces may include a readiness score (shown with percentage i.e. 80 - 90 %) and an instruction (such as 'sleep longer" or "do mild exercise'). Also, the user interface may include information related to the user's movement, heart rate, hypnogram,

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heart rate variability, body temperature, stress level and other data measured or obtained by the method and system. For example, the interface may show user's movement (i.e. number of miles the user has walked), heart rate (i.e. a digital representation of current beats per minute), duration of sleep, sleeping pattern, sleep factor such as hypnogram (various sleeping stages and their percentages) and the like.

[0050] According to another embodiment, the user interface is configured to also show separately the different elements which contribute to the readiness score. According to yet another embodiment the user interface also shows their effect on the readiness score (such as with signs + or -) and optionally also the history and/or estimate for following days. This embodiment allows the user to see in which direction the readiness score is evolving and at which rate it is changing. Moreover, the user interface may include a possibility for the user to enter data, such as an estimate of length of the following night's sleep and the interface would then be able to show a prediction of readiness score for the following day. Furthermore, the user may be given an estimate of time it takes to recover from one short night, for example.

[0051] Some possible elements to be shown according to this embodiment include (but are not limited to) activity of the previous day, heart rate at rest, sleep of the previous night, sleep debt (i.e. if the user did not sleep enough, the difference between the user's optimal amount of sleep and the amount of sleep the previous night or nights), activity of the day and body temperature.

[0052] The server is operable to calculate the readiness score and provide appropriate instructions to improve the user's readiness score. Specifically, the server of the system is operable to do the required analysis or processing of data (i.e. the deep data analysis and long data, trends, cross-correlation analysis of the deep data analysis) for rending the user interface on the mobile communication device. For example, the deep data analysis may be partly performed in the server and partly performed in the mobile communication device; otherwise the deep data analysis may be completely performed in the server. Similarly, the long data, trends, cross-correlation analysis of the deep data analysis may be partly or completely performed by the server. Further, the server may be configured to collect the raw data from the ring directly or may be configured to collect the raw data indirectly through the mobile communication device. Therefore, the server may perform the required analysis for rending the user interface related to the readiness score and the

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instruction (i.e. various aspects subjected to assessing readiness and recovery of the user from mental and physical load). It is to be understood that the server includes required electronic elements, such as a processor, and algorithms to perform such analysis.

[0053] In an embodiment, the server is communicatively coupled to the user terminal through a communication network which can be wired, wireless or a combination thereof. For example, the communication network includes, but are not limited to, Local Area Networks (LANs), Wide Area Networks (WANs), Metropolitan Area Networks (MANs), Wireless LANs (WLANs), Wireless WANs (WWANs), Wireless MANs (WMANs), the Internet, second generation (2G) telecommunication networks, third generation (3G) telecommunication networks, fourth generation (4G) telecommunication networks, and Worldwide Interoperability for Microwave Access (WiMAX) networks.

[0054] Some examples of concrete parameters that may be defined and monitored in respect to daily readiness to perform, as well as their effect on readiness, are listed below.

- Previous or last night; the quantity and quality of sleep; getting enough sleep improves daily readiness.
- Sleep balance (sleep debt); the sum of how much accumulated sleep over past 1-3 weeks differs from individual sleep needs; insufficient sleep results in sleep debt that reduces daily readiness.
- Previous day (physical activity); excess sedentary time, excess vigorous intensity and excess total volume of physical activity reduces daily readiness, but also lack of sedentary time, exercise and physical activity reduce daily readiness.
- Activity balance (cumulative level compared to user's own history); the activity balance is calculated over a period of for example 1-3 weeks and compared to the user's long term activity (e.g. 1-12 months average or typical level changes, best readiness is achieved during easy periods when activity levels are somewhat below average (i.e. not excess of activity, but not zero activity levels either).
- Body temperature; changes in maximal nightly skin temperature can be markers of sickness and clear deviation from user's norm reduces readiness; body temperature may also be an indication of the menstrual cycle for pre-menopausal women.

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- Resting heart rate; changes in minimum nightly heart rate are markers of stress that usually reduces readiness; a user's resting heart rate may change for various reasons and thus maximum readiness is typically encountered when resting heart rate is somewhat below user's norm (but not too much below as that could be associated with excess fatigue).
- Resting heart rate-based recovery index; how long restorative sleep the user reached after his/her hear rate had stabilized to the proximity of the resting heart rate; longer accumulated bedtime/sleep/deep sleep/deep+REM after heart rate has stabilized predicts improved readiness; this contributor will react also to alcohol consumption and late exercise, among other things, both challenging the user's readiness.

[0055] The various data or parameters may be weighted, based on how each contributes to the readiness score. Some principles used in the weighting may be for example as follows. Some of the parameters have monotonously decreasing contribution, while some others have monotonously increasing contribution. Some of the parameters have an optimal area and the readiness decreases in both directions (i.e. below and above the optimal area). Furthermore, the device and method may be configured to take the body temperature in account when weighting the data, i.e. the weighing may be performed continuously. For example, if the user's temperature is within a pre-defined, normal scale, its weight can be minimal and a "normal" weighting is used for the other parameters or data. However, if the user's temperature is elevated (i.e. above a pre-determined limit), its weight can be big and optimal activity levels can be lowered accordingly. Again, the device may be set such that it is able to define the normal scale of temperature for the user.

[0056] Still further, the method and device may be configured to take into account the calendar. For example, the device may be able to recognise the time of the year (such as winter, spring, summer or autumn) or weekdays from weekends. This information may be taken into account in the need of sleep, for example, as typically persons sleep more in the winter than in the summer. This information may also be taken into account in the history data. For example, the device may recognise that the current month is January, and also compare current data to data from a previous year's January.

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[0057] According to a preferred embodiment, the output in the device (i.e. on its user interface) is a percentage as a readiness score. It may also show the main contributors for example as a graphical element (for example showing a bar for each contributor). One example of a simple interpretation of single readiness contributors is the following.

- < 35 % means that the user needs to take actions with this contributor in order to improve the readiness;
- 35-70 % means that the user could pay attention to this contributor in order to improve the readiness;
- 70-85 % means that this particular contributor is below recommended levels - apparently helping the user to manage his/her daily requirements; and
- 85-100 % means that this particular contributor is within general recommendations and also good at the user's individual level, i.e. to the level that it boosts the user's readiness to perform the given day.

[0058] The user interface may also comprise a means for warning if one or more contributors are above a pre-defined maximum level. It is evident that the combination of challenging and boosting contributors can be displayed and mathematically presented in many different ways. However, the presented example calculations give one example on the solution to the problem how one could combine the complex and occasionally contradictory contributions of sleep, activity and body responses to the readiness of the user (body responses for example due to sickness or environmental factors). It may be useful to show the combination of factors for several reasons. For example, not everybody can similarly adjust every parameter (shift work, other responsibilities or preferences or life habits or temperament) so it is necessary to leave the freedom and possible choice to the user. Moreover, each factor may be important on different times (holiday, weekday/weekend day, depending on family situations or training phase etc.).

[0059] The readiness score can be scaled on many different ways. One example is a scale between 0 and 100, where 85 means sufficient or normal or adequate readiness for the current day. This value is intended to correspond with the user's average condition, provided the user has been living his/her normal life. In addtion, the device and method may comprise certain means to recognize abnormal life, as is explained below.

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[0060] One example of possible calculations and effects of the different variables and parameters in the present method and device is given below.

1. Sleep1_previous_night_quality
    a. Device calculates a sleep score for each night (0-100).

        Alternative could be e.g. total sleep time / 9 hours (the latter is the maximum sleep need that can be expected for a normal individual), or deep+REM / 4.5 hours.

    b. Device calculates user spesific average and deviation from earlier sleep scores from the same user

        Alternative can be human specific norm that is especially practical in the beginning when individual data is not available. A human specific norm can also be used at later stages as a comparison to the user specific average.

    c. Device calculates how much and in which direction current Sleep1_previous_night_quality differs from what is an adequate level for user (named as Average)

        Z_index = (Current value – Average) / Deviation

        Z_index is 1 when your value is 1 deviation higher than your average.

    d. Device controls that user's average is good enough to be regarded as a reference for "sufficient" or "adequate" sleep score - if not, the device selects a predetermined minimum/maximum sleep score (for example 85/95) that can be regarded as sufficient or adequate for reference and uses that value instead of user's own Average value.

    e. Device also controls that user's deviation is within sensible range (e.g. 5-10) – otherwise the measurement can become too sensitive or insensitive to changes.

    f. Device estimates the contribution of previous night's sleep to the Readiness to perform the following day so that it gives a higher contribution the better the sleep score was the previous night

        ReadinessContributors(1) = 85 + 12.5 * Z_index_1;

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In practical terms, maximal contribution to the daily readiness, by Sleep1_previous_night_quality, is achieved for example when sleep score is both minimum 90 % and higher than user's long term average sleep score by a margin that depends on sleep score variability.

2. Sleep2_Balance

g. The user is supposed to be have higher readiness the more he/she has slept during preceding 2 weeks.

h. Device registers total sleep time on several nights

S(0) =7.5 h, S(1) = 8.0 h, S(2) = 7.8 h, S(3) = 6.0 h, S(4) = 5.8 h, S(5) = 7.2 h, ….

i. Device estimates what is user's individual sleep need

Device calculates user's long term average, and controls that it is between normative range (7-9 hours, in a preferred embodiment the acceptable range can also be age dependent).

j. Device calculates how much sleep time differs from individual estimated sleep need

D(0) =7.5 h - Avg, D(1) = 8.0 h - Avg, D(2) = 7.8 h - Avg, D(3) = 6.0 h - Avg, and so on.

k. Device also calculates how much user's sleep durations typically vary between nights (SleepDeviation), and checks that the deviation is not too small or too high to represent user's sensitivity to changes (acceptable deviation range can be e.g. 25-45 minutes).

l. Device calculates a weighted mean of the differences (weighing is needed for smoothing the effect on the edge of the window)

SleepBalance = W(0)*D(0) + W(1)*D(1) + W(2)*D(2) + and so on (exponentially decreasing weight as time elapses).

m. The user is supposed to have the higher readiness the more he/she has slept during preceding 2 weeks

ReadinessContributors(2) = 85 + 30 * (SleepBalance / SleepDeviation));

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In practical terms, maximal contribution to the daily readiness, by Sleep2_Balance, is achieved for example when average two week sleep time is both 7-9 hours and exceeds long term average sleep time by 15-20 minutes, depending on that average.

3. Activity1_Last_day

n. Z-index is calculated for total daily movement Z_index_3a (from distance, steps, kcal and/or equivalent kilometers etc.) in a similar way as presented above for the sleep score when estimating the contribution of Sleep1_previous_night_quality (i.e. utilizing user spesific average and deviation, and controlling if user spesific average is a good value to be the proxy for a normative reference point (acceptable limits e.g. 4-20 km/day). Correspondingly, Z-index is calculated separately for vigorous intensity activity Z_index_3b (from time or METmins or kcals accumulated at high intensity exercise) and sedentary behaviour Z_index_3c (e.g. accumulated daily sedentary time or number of inactive periods that last longer than a pre-determined threshold period of e.g. 30 minutes, or their combination).

o. The user's readiness is the lower the higher his/her total daily movement has been (in kcal, distance, steps, eq.km, etc.), the more vigorous and more sedentary activity he/she had during the previous day. In a preferred embodiment more value is given to vigorous/intensive physical activity. In our example vigorous intensity accumulates also total activity, this arrangement leads to pronounced effect of vigorous intensity. More sedentary day also decreases the readiness.

ReadinessContributors(3) = 85 - 6*(Z_index_3a + Z_index_3b + Z_index_3c;
In practical terms maximal contriburion to the daily readiness, with regards to the physical activity of the last day, is achieved after a day which has about one third less of total activity, vigorous activity, AND sedentary time compared to long term averages. The contribution is weaker both with very little activity, or excess of activity.

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4. Activity2_balance

p. A weighted 2-week measure of user's daily activity is calculated in an analogue way to sleep balance above including the checks. Total activity can be expressed in eq. km, kcal or kcal/body weight, steps and so on.

q. ReadinessContributors(4) = 100 - 60 * abs(0.25 + (ActivityBalance / ActivityDeviation)); In practical terms maximal contribution to the daily readiness, with regards to the physical activity of the last day, is achieved when average two week total activity is 10-60 % less than long term average total activity (the margin depends on user's long term average and daily variability in long term activity). Increasing distance from that level in either way decreases the contribution to the readiness.

5. Body_Response1_Temperature

r. The wearable device, such as the ring, can be programmed to record user's maximal stable temperature during the night, or during certain time of the night when ring measured distal body temperature best matches with the body temperature. It may be favorable to make the measurement when core body temperature is the lowest in circadian variation i.e. typically between 2 and 5 a.m.

s. In an analogue way to parameters1 (last night's sleep) and parameter 3 (previous day's activity), Z-index_5 is calculated for nightly temperature reading. The user has the lower readiness the more his/her night_time temperature deviates from his/her long term mean, taking his/her normal variation into account.

t. It is more certain that an elevated temperature is causing decreased readiness compared to a lowered temperature, as the latter can sometimes be a measurement error: if Z_index_5 > 0.15, ReadinessContributors(5) = 105 - 25 * Z_index_5; elseif Z_index_5 < -0.50, ReadinessContributors(5) = 105 + 10 * Z_index_5; else ReadinessContributors_5 = 100; end.

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u. In favorable solution women's period / menstrual cycle is taken into account so that the biphasic temperature (rise in the middle of the period and fall in the end) is taken into account so that sensitivity to a sickness, for example, is not lost.

In practical terms the highest contribution to readiness by body temperature reading is achieved when the filetered body temperature that was determined during the night differs from long term average by less than 0.4C, the exact number also depending on the normal variability of the user's temperature.

6. Body_Response2_Resting HR

v. User's readiness is the lower the more his/her resting HR deviates from his/her norm – in a favorable solution there is some asymmetry, as it seems to be a sign of good recocery and a positive physical training effect to have resting heart rate little below norm.

w. In an analogue way to parameters1 (last night's sleep) and parameter 3 (previous day's activity) and parameter5 (body temperature), Z-index_6 is calculated for nightly resting HR reading.

x. if Z_index_6 > -1, ReadinessContributors(6) = 87.5 - 30 * Z_index_6; else ReadinessContributors(6) = 116 + 16 * Z_index_6;

In practical terms, the highest contribution to readiness regarding this parameter is reached when resting heart rate is 2-5 bpm below long term average (margin depends on variability and average value of the long term HR). Strongly negative values indicate only slightly decreased readiness, while elevated HR is a clear indicator of negative contribution.

7. Body_Response3, Bedtime or sleep accumulated after HR has stabilized

y. One body response parameter within the readiness score is the amount of rest after reaching resting zone of heart rate. This is influenced by for example alcohol consumption, heavy eating or a too intense sport late in the evening.

z. The user has the higher readiness the more bedtime he/she has accumulated after he/she has got within 1-3 bpm to his/her HR minimum.

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æ. Z_index_7 is calculated in an analogue way to Z_indexes explained above. The acceptable range for normative user reference can be for example 4-7 hours.

ø. ReadinessContributors(7) = 85 + 15 * Z_index_7;

In practical terms the highest contribution to readiness regarding this parameter is reached if user has accumulated 5-7 hours of bedtime, preferably sleep, after the lowest heart rate period of the night has been reached (margin depending on long term average and deviation of that time)

All ReadinessContributors have been scaled between 0...100. Finally it is useful to check that the scale is maintained as some of the equations presented above may result in numbers that fall outside this scale.

for i = 1:size(ReadinessContributors), if ReadinessContributors(i) < 0, ReadinessContributors(i) = 0; elseif ReadinessContributors(i) > 100, ReadinessContributors(i) = 100; end

[0061] The present disclosure further relates to a user interface comprising an area indicating a readiness score of the user, an area indicating parameters affecting the readiness score and an area indicating change of at least one of said parameters with respect to an earlier point of time. Some examples of suitable user interfaces are given below in connection with the drawings. The user interface may for example include indications on readiness score on a three-level scale, such as bad, average, good. Different components of the readiness score may also be shown, as well as their influence on the readiness score. The user interface may also include a possibility for the user to simulate different ways of improving the readiness score, for example when the ideal way to improve readiness score would be to do a physical exercise for an hour, but the user only has a half an hour available. The user could then for example choose between different sports available to him/her (such as gym, running or swimming), and choose the one having the most positive effect on the readiness score. Users that are for example travelling and busy with business meetings etc, could thus optimise their use of free time. The user interface may also show past readiness scores as well as what has influenced them.

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[0062] There are a number of advantages for using a ring device instead of a wrist device. For example, many persons prefer to wear a bracelet or wristlet on his/her wrist rather than a measuring device. Furthermore, a ring is optimal for measuring HR/HRV optically, as in a finger, two arteries are close to the skin. These arteries are on the palm side of the hand and covered by soft tissue, the wearable ring does thus not need to be tightened to ensure a good contact to the skin. Thus the position of the ring in relation to the finger and arteries typically stays very stable although the palm is turned up and down and in consequence, the ring does not move in relation to the arteries. Furthermore, in a wrist there are two bones and turning the palm up and down means that the bones are twisted which then causes the wrist device to move with respect to the skin underneath the device and thus also with respect to the arteries in the wrist. A yet further advantage is that if the user wants to change the measurement position due to inconvenience in one finger (for example abrasion, rubbing, scar), he/she can change the ring easily from one finger to another, whereas the choice of measurement position is more limited for wrist-worn devices. In case of swelling, the ring can also be changed to a smaller finger. A ring is also a much lighter device to carry than a wrist device.

[0063] The present disclosure provides a method and a system for assessing readiness of a user. Specifically, the method and the system are configured to calculate the readiness score and provide appropriate instructions to improve the readiness score against such mental and physical load the user is subjected to. Further, the readiness score is based on real time, exhaustive and comprehensive analysis of data (i.e. the user's movement, biological signals and the like) which makes the method and the system of the present disclosure to provide appropriate instructions to the user. Therefore, the appropriate instructions enable the user to manage his or her health related aspects (for example sleep, stress level and physical activity).

DETAILED DESCRIPTION OF THE DRAWINGS

[0064] Referring now to the drawings, particularly by their reference numbers, FIG. 1 is a schematic illustration of a system **100** for assessing readiness of a user, in accordance with an embodiment of the present disclosure. The system **100** includes a ring **102**, a mobile communication device **104** and a server **106**. The ring **102** is communicably coupled to the mobile

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communication device **104** by a communication network **120** and the mobile communication device **104** is communicably coupled to the server **106** by communication network **122**.

[0065] The ring **102** is associated with a user (not shown) and configured to measure user's movements and a heart rate associated with the user. Specifically, the ring **102** includes optical electronics **130** (such as at least one photon source and at least one photon detector) and at least one motion sensor **132** (such as an accelerometer, a gyroscope, a magnetic field sensor or a combination thereof). The ring also includes other electronic **134** configured to collect and analyse raw data (i.e. data of the motion sensor and the optical electronics). The other electronic components **134** include but is not limited to a controller, a microprocessor, a memory and a communication module.

[0066] The mobile communication device **104** and the server **106** are configured to collect the raw data generated by the ring **102**. Further, the server **106** are configured to perform a deep data analysis of the raw data in order to find heart rate variability, hypnogram, stress level and the like. It is also possible that part or all of the analysis is performed by the mobile communication device, in which case the server is incorporated in the mobile communication device. Also, the mobile communication device **104** and the server **106** are configured to perform long data, trends and cross-correlation analysis of the deep data analysis in order to calculate a readiness score (i.e. based on the user's movements, heart rate, heart rate variability, hypnogram and stress level). Moreover, based on the readiness score the user is provided with appropriate instructions to improve the readiness score against the mental and physical load the user is subjected to. Specifically, the mobile communication device **104** is configured to visually present the readiness score to the user with the help of various user interfaces (or a single interface incorporating all the information). The user interfaces are based on (or include) information related to the readiness score, the instructions and data associated with user's movement, heart rate, hypnogram, heart rate variability and stress level. The raw data analysis may also be used to determine another sleep factor than hypnogram, as explained above.

[0067] Referring now to FIG. 2, shown is a schematic illustration of a ring **200** worn on a finger **202** for collecting a heart rate of the user, in accordance with an embodiment of the present disclosure. Specifcally, the ring **200** is configured to collect the heart rate of the user (during both

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an activity period and a rest period) using the optical electronics **130** (shown in FIG. 1). As shown, a measured graph includes a heart rate pulse wave form **210** as function of time. The measurement is done by measuring a change of blood volume using PPG of blood vessels **220**. Further, from the wave form **210** an inter beat interval (IBI) is determined. The IBI is the time between two beats such as time t1 and t2, and is also referred to as the heart rate.

[0068] Moreover, from the wave form **210** a heart rate variability (HRV) can be determined by subtracting inter beat intervals, for example t1-t2. Also, a respiration rate can be determined from the wave form **210** by analyzing peak values. As shown, a respiration curve **230** is based on the peak values, which correspond to a rate of breathing of the user. The respiration curve **230** is used to analyze exercise impact and recovery of the user together with other heart rate related indications (IBI, heart rate, heart rate variability). It to be understood that the heart rate variability and the rate of breathing may be calculated by the mobile communication device **104** and/or the server **106** (shown in FIG. 1), as a part of the deep data analysis. The ring **200** is also configured to measure user's movement, which is explained in conjunction with FIG. 3.

[0069] Referring now to FIG. 3, shown is a schematic illustration of a graph **300** related to physical activity data of the user for a week, in accordance with an embodiment of the present disclosure. Specifically, the graph **300** shows data collected from the motion sensor **132** (shown in FIG. 1) for a week (i.e. Mon-Sun) for both the activity period and the rest period. As shown, the data shows more movement on the time when the user is awake (i.e. during the activity period) than when the user is sleeping (i.e. during the rest period). Based on such data a sleeping pattern (when the user went to bed and when woke up) can be determined. Also, a total number of hours the user slept on a particular night can be determined. For example, as shown, on Mon the user slept form about 9 pm to 6 am (i.e total of 9 hours sleep), whereas on Tus the user slept form about 12 am to 6 am (i.e total of 6 hours sleep).

[0070] Referring now to FIG. 4, shown is a schematic illustration of a hypnogram **400** of the user, in accordance with an embodiment of the present disclosure. The hypnogram **400** depicts a quality of sleep the user had on a particular night. Specifically, the hypnogram **400** is determined using a heart rate wave form of the user for that particular night. The hypnogram **400** is used to analyze sleep quality and stages (i.e. deep, light, REM (Rapid eye movement)). As shown, the hypnogram

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400 includes various stages of sleep i.e. REM **402**, light sleep **404** and deep sleep **406**. Also, the hypnogram **400** includes indications **408** when the user is awake (i.e. before attaining sleep and after getting up from the sleep).

[0071] Referring now to FIG. 5, shown is a schematic illustration of a graph **500** related to collected heart rate of the user for two nights, in accordance with an embodiment of the present disclosure. The graph **500** shows the collected heart rate of the user for two different nights, for example last two nights. As shown, a heart rate wave form **502** depicts an example of a 'good night sleep' associated with one particular night. The determination of the good night sleep is based on the wave form **502** (which may be associated with a 'normal day' of the user) having a measurement i.e. lowest HR 41 bpm (beats per minute) at about 5:15 (6 hours 15 min of sleep). Also, determination of good sleep is substantiated with the user's feedback.

[0072] The graph **500** also shows a heart rate wave form **504** depicting an example of a 'bad night sleep' associated with another night. The determination of the bad night sleep is based on the wave form **504** (which may be associated with a day when the user did too much exercise just before sleeping). For example, the wave form **504** includes a measurement i.e. lowest HR is 47 bpm at 7:30 AM which is 8 hours 15 min after bedtime, showing dramatic change between the two days. Therefore, the wave form **504** shows that the heart rate decreases slowly down to normal resting pulse and thus disturbs the sleep. Based on such measurements the user may be instructed to ease up for example 2 hours before predicted sleeping time to make sure that the heart rate is not too high during the sleep period.

[0073] Referring now to FIG. 6, shown is a schematic illustration of a provocation measurement of the user, in accordance with an embodiment of the present disclosure. Specifically, the FIG. 6 illustrates a graph **600** with a heart rate wave form **602** associated with a provocation measurement (i.e. when the user stands from a lying position). For example, while the user lies in bed in the morning after a night of sleep, the heart rate measurement begins at time T0. Thereafter, when the user stands up, the heart rate measurement begins at time T1. The user stands still and pulse data is measured for subsequent times T2-T7. Further, the strength of physiological provocation/activity is measured during each phase with an accelerometer.

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[0074] Referring now to FIG. 7, shown is a schematic illustration of various stages involved in calculating a readiness score by the system **100**, in accordance with an embodiment of the present disclosure. As shown in FIG. 7, the calculation of the readiness score includes the following stages, for example, a first stage **702** which relates to measuring raw data and basic analysis of the raw data.. Further, a second stage **704** is related to the deep data analysis, i.e. when the mobile communication device **104** and the server **106** (shown in FIG. 1) are configured to perform the deep data analysis of the raw data in order find various health related aspects of the user. As shown, the second stage **704** includes determining the hypnogram **400**, the determining of heart rate variability to compare sleep quality (shown with the graph **500**) and the provocation measurement (shown with the graph **600**).

[0075] It may be evident to those skilled in the that the second stage **704** also includes various other kinds of measurements such as the respiration rate, the stress level measurement and the like. Moreover, FIG. 7 also illustrates a third stage **706** which includes long data, trends and cross-correlation analysis of the deep data analysis (i.e. heart rate variability, sleep factor, stress level and the like measurement performed in the second stage **704**). Based on the measurement associated with the third stage **706**, a readiness score is calculated, which is an indication of a level of readiness of the user. Further, appropriate instructions are provided to the user for improving the user's readiness score. As shown, an appropriate instruction **710** includes "You recovered from your exercise very nicely. Resting heart rate 30 minutes after the exercise while sitting is 59".

[0076] Referring now to FIG. 8, shown are steps of a method **800** for calculating a readiness score by the system **100**, in accordance with an embodiment of the present disclosure. Specifically, the method **800** depicts the various stages involved in the measurement of the readiness score, as explained in conjunction with FIG. 7.

[0077] At stage **802**, raw data is collected and analysed by a wearable device (such as the ring **200**). The raw data is associated with the user's movements and the heart rate.

[0078] At stage **802**, deep data analysis is performed on the raw data using algorithms in a user communication device or a server. Specifically, the deep data analysis is performed in at least one of the user communication device and/or the server. The deep data analysis provides various health

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related aspects associated with the user such as the heart rate variability, respiration rate, sleep factor, stress level, provocation measurement and the like.

[0079] At stage **806**, instructions are provided to the user based on long data, trends and/or cross-correlation analysis of the deep data analysis. Specifically, a readiness score is calculated from the various data, such as the heart rate variability, respiration rate, sleep factor, stress level, provocation measurement and the like. Thereafter, appropriate instructions are provided to the user for improving the user's readiness score against the mental and physical load.

[0080] Referring now to FIGS. 9-12, shown are schematic illustrations of user interfaces rendered on a mobile communication device, in accordance with various embodiments of the present disclosure.

[0081] FIG. 9 shows a user interface (UI) **900** rendered on the mobile communication device (such as the mobile communication device **104** of FIG. 1). As shown, the UI **900** provides statistical information related to a particular night's sleep (for example last night's sleep). For example, the UI **900** provides information about the various stages of sleep (i.e. the REM, the light sleep and the deep sleep) for a particular night. Further, the UI **900** provides information related to weekday and date, such as 'Tuesday Night-11/4/14'. Also, the UI **900** provides information how well the user slept (for example 'You slept well last night'). Moreover, the UI **900** provides information when the user went to sleep, when the user woke up and how long the user slept (for example the user went to sleep at 10:12 pm, woke up at 6:27 am and slept for 8 hr 15 min). Also, the UI **900** provides information about Resting HR and sleep quality (for example 58 bpm and 90 % respectively). Furthermore, the UI **900** provides information related to measurement of the various stages of sleep (for example, deep sleep 1 hr 54 min, REM 2 hr 15 min, awake 2 min and light sleep 2 hr 45 min).

[0082] FIG. 10 shows another user interface **1000** rendered on the mobile communication device. Specifically, the UI **1000** shows a summary report for a user (for example Hannu) for both mental and physical changes as trends. The UI **1000** provides correlation of physiology, behavior and subjective feedback on feelings. For example, the UI **1000** provides trend of feelings (i.e. how the user has been feeling since last couple of days - Mon, Tue and today). Also, the UI **1000** provides information about performance against and recovery from prolonged stress. As shown, the UI

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1000 provides a current readiness score (i.e. "Readiness -10 %") and an instruction "Your readiness is a little low today. Moderate intensity exercise could improve your readiness and mood". The UI **1000** also provides a readiness score trend based on past days. Further, the UI **1000** provides a sleeping trend (current and past sleeping data) and a comment based on the sleeping trend. For example, the UI **1000** shows that the user slept for 8 hr 4 min on Tuesday night and the comment "You slept well last night, but you still have some sleep debt form previous nights".

[0083] FIG. 11 shows yet another user interface **1100** rendered on the mobile communication device. Specifically, the UI **1100** is associated with proposals for the user, which can help the user to understand what affects physiology and feelings of the user and what the user can do to improve them. As shown, the UI **1100** provides an appropriate instruction (or proposal) associated with recovery of the user that may be after physical exercise, i.e. "You recovered from your exercise very nicely. Resting heart rate 30 minutes after the exercise while sitting: 59". Also, the UI **1100** provides an appropriate instruction associated with sleep of the user, i.e. "Your REM sleep was quite short last night. Finding a few minutes during the day to close your eyes and relax, will help you recover". Further, the UI **1100** provides an appropriate instruction associated with physical activity of the user, i.e. "You were a bit below your usual activity level today. Try and get back on track tomorrow".

[0084] FIG. 12 shows another user interface **1200** rendered on the mobile communication device. Specifically, the UI **1200** is associated with updates of a particular day for a user (Anthony). As shown, the UI **1200** provides a latest update (just now) about physical activity, i.e. "GREAT JOB! 1 hr 24 min of light activity". Also, the UI **1200** provides a past update (4 m before) about the physical activity, i.e. "KEEP PUSHING - Only 0.5 miles more needed to reach your goal. You can do it!". The UI **1200** also include past update (4 m before) about user's feedback regarding the physical activity, i.e. "Started a new schedule this week, 1 hour ago". The UI **1200** also includes an old update (at 8:45 am) about the user sleep, i.e. "Last night you slept 30 min more than normal Sleep duration 7 hr 45 min. Additionally, the user interface **1200** depicts the readiness score of the user, i.e. about 90 %.

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[0085] Referring now to FIG. 13, illustrated are steps of a method **1300** for assessing readiness of a user, in accordance with an embodiment of the present disclosure. Specifically, the method **1300** illustrates the steps for assessing readiness of a user using the system **100**, explained in conjunction with the FIGS. 1-12.

[0086] At step **1302**, the user's movements is measured during an activity period and a rest period.

[0087] At step **1304**, the user's biosignal (at least one) is measured during a rest period. The biosignal may be for example derived as explained below in connection with Figure 15. At an optional step **1306**, the user's biosignal (at least one) is measured during an activity period. It is to be understood that step **1302** and the optional step **1306** are typically performed simultaneously.

[0088] The method may also comprise a step where various features are generated based on the measured biosignals. The features include for example IBI and heart rate and their distribution, zero crossing parameters and their distribution, autocorrelation parameters, amplitude variation and its distribution, and so on.

[0089] At step **1308**, a summary for the activity period is determined, based on the measured movements.

[0090] At step **1310**, a summary for the rest period is determined, based on the measured biosignal. Thereafter, in step **1312**, a body response summary is determined, based on steps **1308** and **1310**. . It is to be understood that steps **130**8 and **1310** can be performed in either order or simultaneously.

[0091] At step **1314**, a readiness score is calculated based on the measured movements, and body response parameters based on steps **1308-1312**, whereby the readiness score indicates a level of readiness of the user.

[0092] The steps **1302** to **1314** are only illustrative and other alternatives can also be provided where one or more steps are added, one or more steps are removed, or one or more steps are provided in a different sequence without departing from the scope of the claims herein. For example, the method **1300** may further include providing the user with appropriate instructions, related to at least one of physical activity and mental activity, for improving the user's readiness score. Also, the method **1300** may include using also historical data of the user to calculate the readiness score.

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[0093] FIG. 14 is a further schematic illustration of a user interface in accordance with an embodiment of the present disclosure. The user interface **1400** is rendered on a mobile communication device. Specifically, the upper part of the UI **1400** is associated with a readiness of the user summarizing data over several days. The readiness graph **1406** may also be compared to subjective feelings **1408** that are collected based on user input. Readiness is a sum of the measured or estimated physical and mental resources that are in ideal case scaled according to the user's own norms. As shown, the UI **1410** may also express the readiness of each day as a main proposal associated with it, e.g. "Take it easier today to recover" given on Saturday 7/4/14. The lower part of the UI displays graphically the negative **1402** and positive **1404** contributors for readiness on each day. The size of the graphical obstacles represents their significance (magnitude or severity), and the color (intensity) represents positive or negative sign. Negative contributors can be e.g. sleep debt assessed over several nights **1402**, sleep disturbance of previous night or abnormal body responses e.g. higher than typical night time heart rate. Importantly, on each day there can be both positive and negative contributors that may at least partially compensate for each other. Positive contributors can be e.g. optimal physical activity on the previous days **1404**.

[0094] Fig. 15 is an illustration of steps of a method in accordance with a further embodiment of the present disclosure. In step **1500**, movement data is measured during an activity period (in practice with an accelerometer, gyroscope, etc. or alternatively from a motion artifact of a biosignal such as an electrocardiogram (EKG), a PPG, an electromyogram (EMG), or data from global positioning system (GPS)). In an alternative step 1502, movement data is measured during a rest period (in practice with an accelerometer, gyroscope, etc. or alternatively from a motion artifact of a biosignal such as EKG, PPG, EMG). In a yet alternative step **1504**, corresponding to a preferred case, also a biosignal (EKG, PPG, EMG, an electrodermal activity (EDA)) or another measurement associated with breathing (for example a breathing rate with impedance measurement or termistor, sensor attached to bed, microphone, video recording) is measured. In a still further alternative step **1506**, which is also preferred, the user's subjective input on prevailing feelings is requested via a series of questions. The questionnaire may be synched to watch-time, rise-time, or start or end times of certain activity or rest parameters as determined based on steps

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1500-1504. All of these steps can be performed either simultaneously or in sequence, as the case may be.

[0095] In step **1508**, based on the results of step **1500**, an activity summary for the day is determined, including one or more of the following: active time, steps, distance, energy expenditure, training impact/load, distribution of intensity/speed/step rate, time of activity in respect to bedtime, etc. If need be, results from any of the other steps can also be used for this determination. In step **1510**, based on the steps **1502-1504**, a rest summary for the night is determined, including one or more of the following: bedtime, rise time, total sleep duration, sleep disturbances, hypnogram, lowest hear rate, average heart rate, biosignal amplitude variation, heart rate variability, restlessness etc.

[0096] In step **1512** and based on steps **1508-1510**, a body response summary for day to night, or activity period to rest period, is determined. The body response parameters may be e.g. training impact vs. heart rate recovery speed, daily physical activity parameter vs. amount of deep sleep or lowest heart rate of the night. The body response may also be changes in body signal as a response from rest to stand-up at rise time as determined based on steps **1500-1504**.

[0097] In step **1514** and based on the user's history, a distribution of parameter in activity and rest summary is calculated, in order to use them as user dependent reference values (e.g. mean, standard deviation, percentiles). In step **1516**, subjective feelings are correlated with activity and rest summary parameters over different time constants and delays in order to find user dependent reference values that can be described e.g. with words as sub-optimal or optimal. In a further step **1518**, based on the user's own data (history database) activity or rest parameters are correlated with the following days' activity or rest parameters or readiness scores in order to provide supportive feedback how user has earlier managed to recover from challenging situations.

[0098] In step **1520** and based on steps **1506-1518**, the relevance/significance for each activity and rest parameter is correlated in respect to estimated readiness using the user-independent and user-dependent scales. Finally, in step **1522** and based on steps **1506-1518**, the relevance of a number of pre-determined textual advice is computed, and the most relevant of them is selected.

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[0099] Fig. 16 is an illustration of steps for calculating readiness score 1650 for a user. In a first step set of parameters is measured with a ring 1600. The ring is configured to measure heart rate (HR) 1602, body temperature 1604 and activity 1606. Accelerometer is used to measure the activity 1606. IR is used to measure heart rate (HR) 1062. Temperature 1604 is measured with temperature sensor. The temperature 1604 refers to body temperature of the user.

[00100] Sub parameters 1610 are calculated using the measured parameters using algorithm 1630. Sub parameters 1610 include sleeping times of previous three nights. Sleeping time of last night is 1612, sleeping time of night before last night is 1614 and sleeping time of two nights before last night is 1616. Sub parameters further include activity level parameter 1 1618 and activity level parameter 2 1620. Further sub parameters include first heart rate parameter 1622 and second heart rate parameter 1624. The sub parameters 1610 are used by second algorithm to determine readiness score 1650.

[00101] Fig. 17 is an illustration of user interface view 1730. The view 1730 has indication 1750 for indicating neutral value. Values left from the neutral value are considered as negative values and values from right are considered as positive values. According embodiments user view 1730 can be configured also to show negative values can be in right and positive in left. Readiness score is rendered to user in area 1710. The value of the readiness score is indicated with a graphical element 1740. Sub parameter values related to sleep of previous nights, heart rate, activity, temperature are rendered in the areas 1710, 1712, 1714, 1716, 1718, 1720, 1722, 1724. Value is indicated with slider bar 1742.

[00102] Based on embodiment user can use pointer such as finger to move slider bar 1742 to simulate readiness score value 1740 as shown in user view 1732. In an example user has selected to drag slider bar 1742 of areas 1718 and 1720 (in present example activity 1 and activity 2) to direction indicated with arrow to simulate effect of adding more activities to the day. The user can see in the user view 1732 that the recover index shows more positive sign if the user adds activities (such as moving).

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[00103] Figures Fig 18A, Fig. 18B and Fig. 18C are illustrations of alternative user interface views 1800, 1802, 1804 respectively. The user interfaces show readiness value 1810 and positively affecting sub parameters 1830 and negatively affecting sub parameters 1820. User interface can be further configured to indicate trend of the readiness by animations or arrows or similar. The user interface can be in addition configured to enable user to test impact of each sub parameters for the readiness value.

[00104] Further different colors can be used for differentiating "plus or minus" values. For example green has a positive meaning and red a negative one. Colors and left-right bars can be used also together to visualize and emphasize different parameter values and their contribution. Also different shades of colors can be used. The shade can be darker or lighter if a parameter value is higher or lower.

[00105] Modifications to embodiments of the present disclosure described in the foregoing are possible without departing from the scope of the present disclosure as defined by the accompanying claims. Expressions such as "including", "comprising", "incorporating", "have", "is" used to describe and claim the present disclosure are intended to be construed in a non-exclusive manner, namely allowing for items, components or elements not explicitly described also to be present. Reference to the singular is also to be construed to relate to the plural.

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CLAIMS

1. A method for assessing readiness of a user, the method comprising:
- obtaining the user's movements;
- using the obtained user's movements to determine a nature of the period, wherein the nature of the period is selected from an activity period and a rest period;
- measuring at least one biosignal of the user during the rest period;
- determining a rest summary for the rest period, based on the measured at least one biosignal and at least one biosignal of a previous rest period;
- determining an activity summary for the activity period, based on the obtained movements of an activity period and obtained movements of at least one previous activity period;
- determining a body response summary based on the rest summary and the activity summary; and
- calculating a readiness score based on the body response summary and a previous body response summary, whereby the readiness score indicates a level of readiness of the user.

2. A method according to claim 1, wherein obtaining the user's movements is performed by measuring the user's movements or by retrieving the user's movement data from a separate device.

3. A method according to claim 1 or 2, further comprising measuring at least one biosignal during the activity period.

4. A method according to any of the preceding claims, wherein the at least one biosignal is selected from the group consisting of an electrocardiogram, a photoplethysmogram, an electromyogram, an electroocylogram, a heart rate, a heart rate variability, a body temperature, a resting heart rate, an average heart rate and signals related to breathing.

5. A method according to any of the preceding claims, wherein determining the rest summary comprises at least one of determining a sleep factor, determining a sleep balance, determining lowest body temperature during rest and determining a resting heart rate.

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6. A method according to any of the preceding claims, further comprising providing the user with appropriate instructions, related to at least one of physical activity, mental activity and rest, for improving the user's readiness score.

7. A method according to any of the preceding claims, further comprising using historical data of the user to calculate the readiness score.

8. A method according to any of the preceding claims, further comprising using at least one of target information provided by the user, personal characteristics provided by the user and personal characteristics previously determined by the method.

9. A system for assessing readiness of a user, the system comprising:

- a ring configured to be worn by the user and comprising means for measuring at least one biosignal of the user during a rest period,
- a mobile communication device configured to communicate with the ring,
- means for measuring user's movements during an activity period and the rest period, and
- a server configured to communicate with the mobile communication device, the server being operable to
    - use the measured user's movements to determine a nature of the period, wherein the nature of the period is selected from the activity period and the rest period,
    - determine a rest summary for the rest period, based on the measured at least one biosignal and at least one biosignal of a previous rest period,
    - determine an activity summary for the activity period, based on the measured movements and measured movements of at least one previous activity period,
    - determine a body response summary based on the rest summary and the activity summary; and
    - calculate a readiness score based on the body response summary and a previous body response summary, whereby the readiness score indicates a level of readiness of the user.

10. A system according to claim 9, wherein the means for measuring user's movements are arranged on the ring, in the mobile communication device or in an activity determination device.

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11. A system according to claim 9 or 10, wherein the mobile communication device is configured to visually present the readiness score to the user.

12. A system according to any of the claims 9-11, wherein the means for measuring user's movements is selected from the group consisting of an accelerometer, a gyroscope and a magnetic field sensor.

13. A system according to any of the claims 9-12, wherein the means for measuring a heart rate comprises a photon source arranged on the inner surface of the ring and a photon detector arranged on the inner surface of the ring.

14. A system according to any of the claims 9-13, wherein the ring further comprises a first electrode and a second electrode adapted to measure an electrocardiogram.

15. A user interface comprising an area indicating a readiness score of the user, an area indicating parameters affecting the readiness score and an area indicating change of at least one of said parameters with respect to an earlier point of time.

Petitioner Samsung Ex-1004, 0280

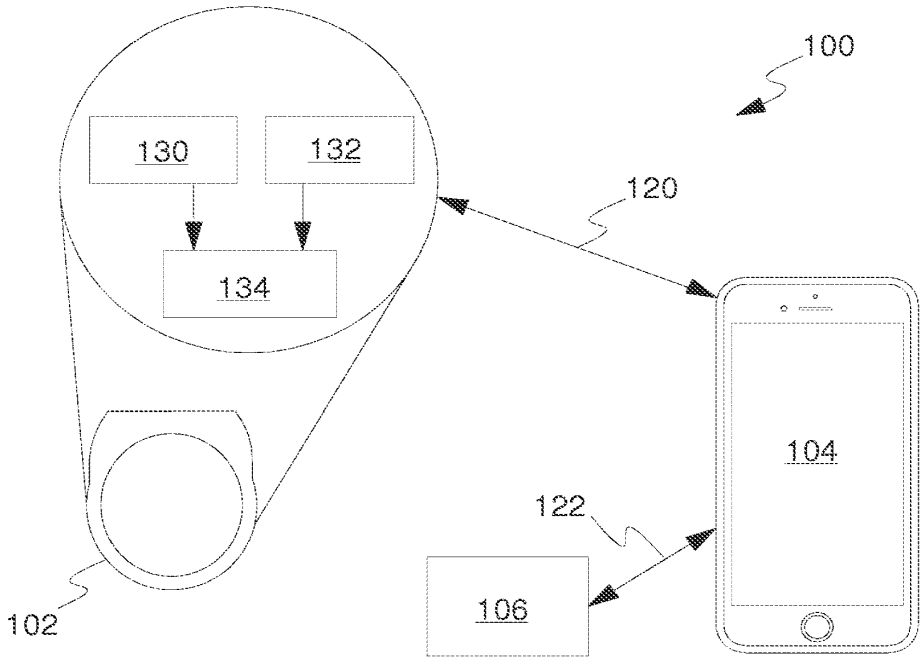


FIG. 1

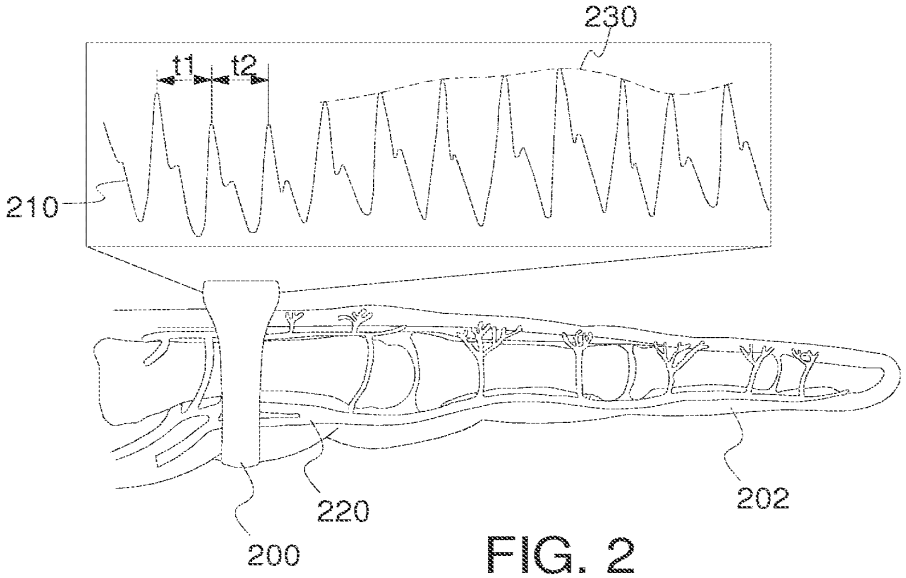


FIG. 2

Petitioner Samsung Ex-1004, 0281

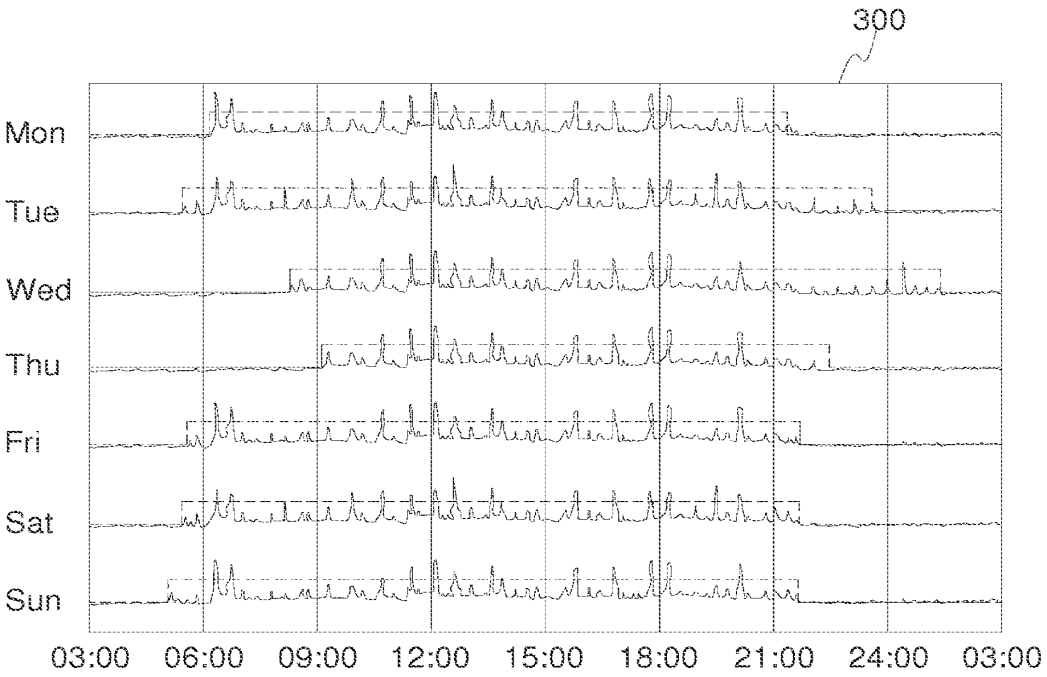


FIG. 3

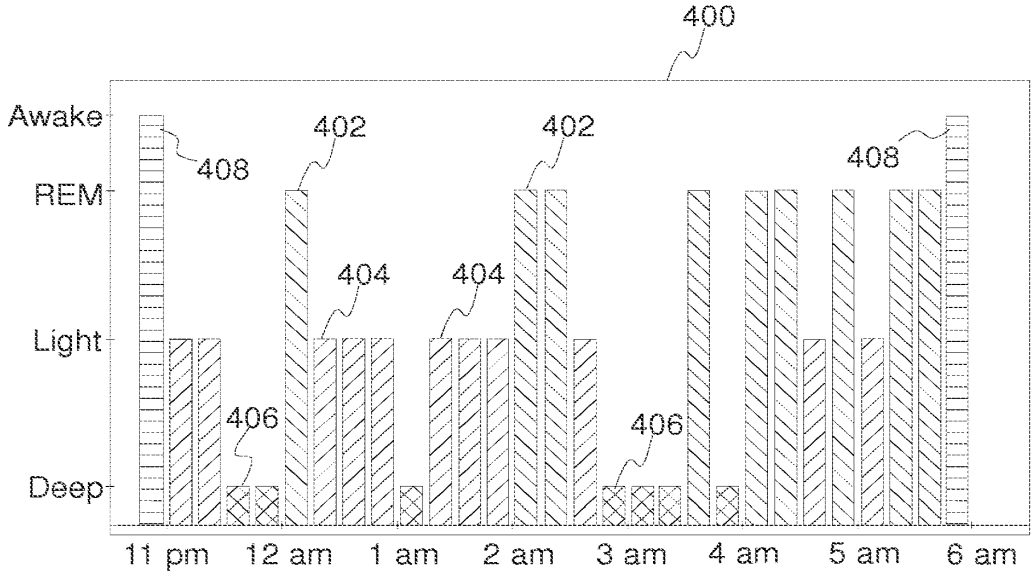


FIG. 4

Petitioner Samsung Ex-1004, 0282

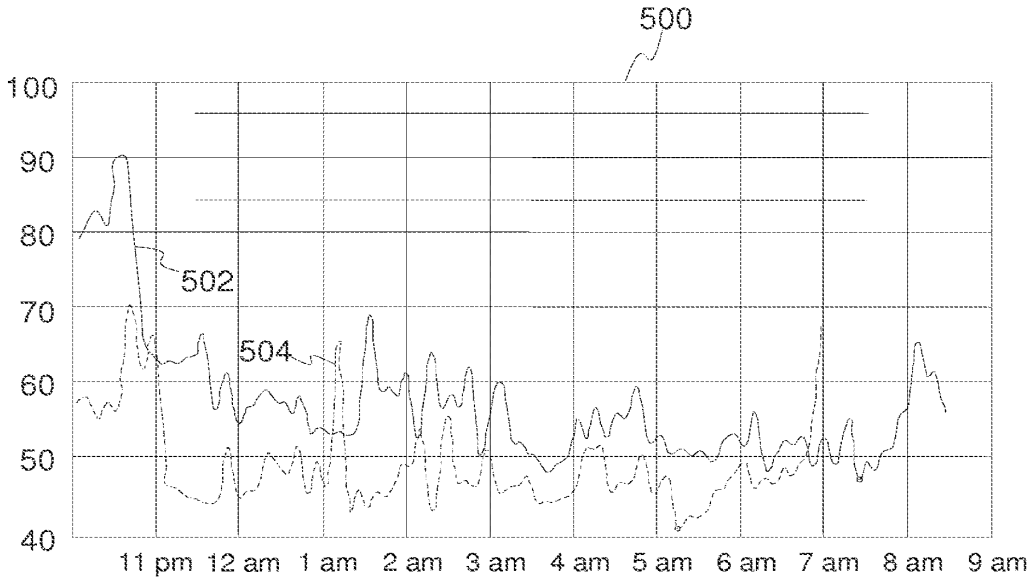


FIG. 5

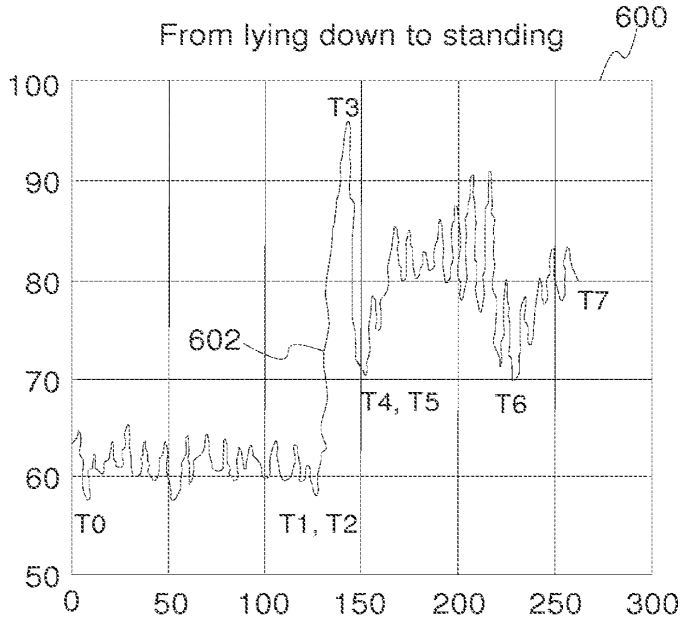


FIG. 6

Petitioner Samsung Ex-1004, 0283

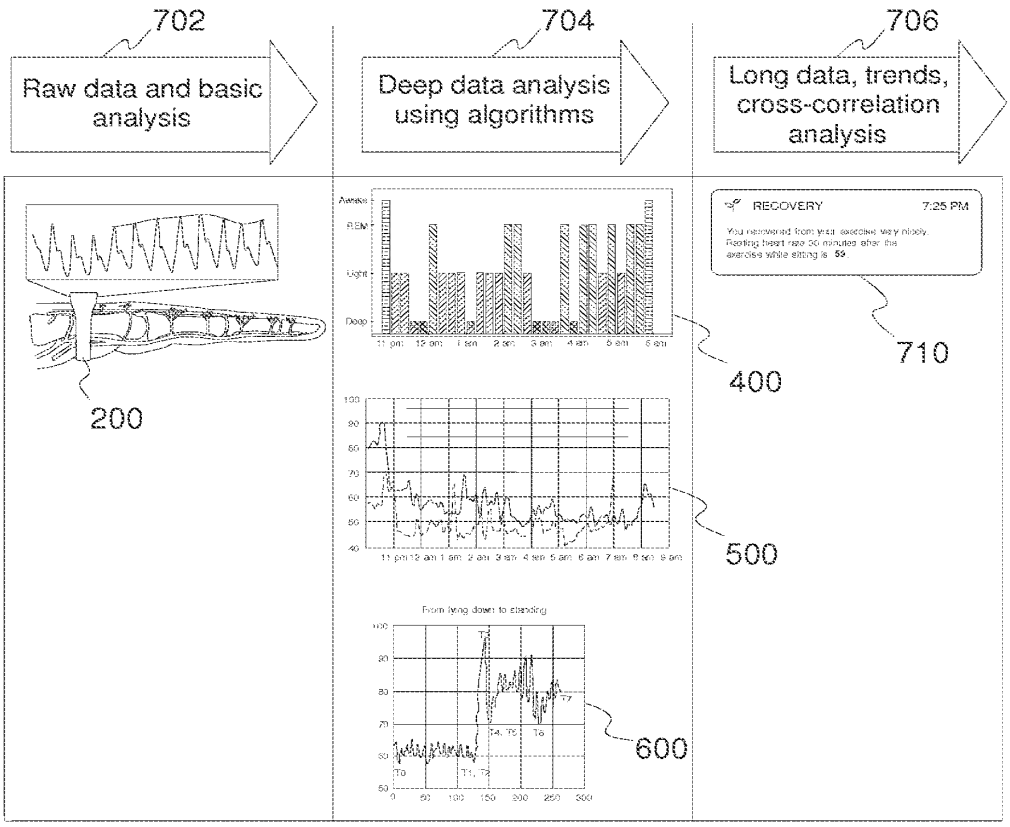


FIG. 7

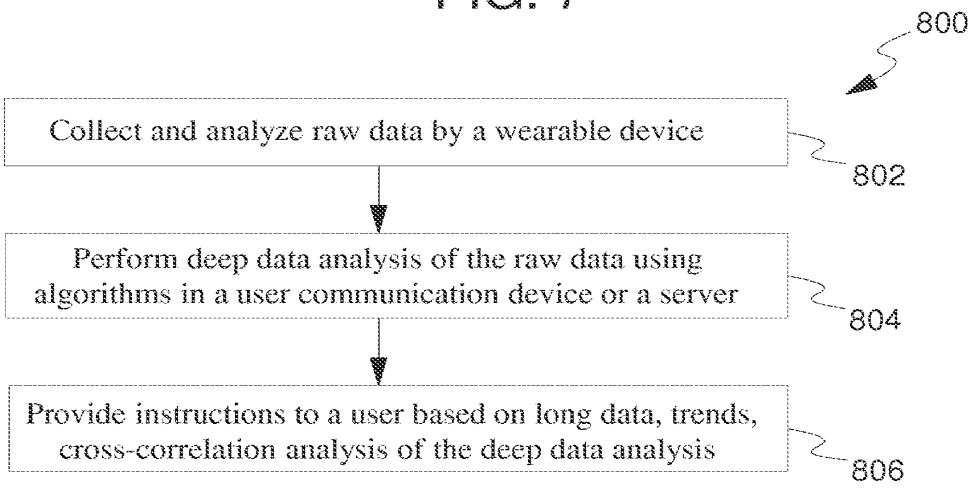


FIG. 8

Petitioner Samsung Ex-1004, 0284

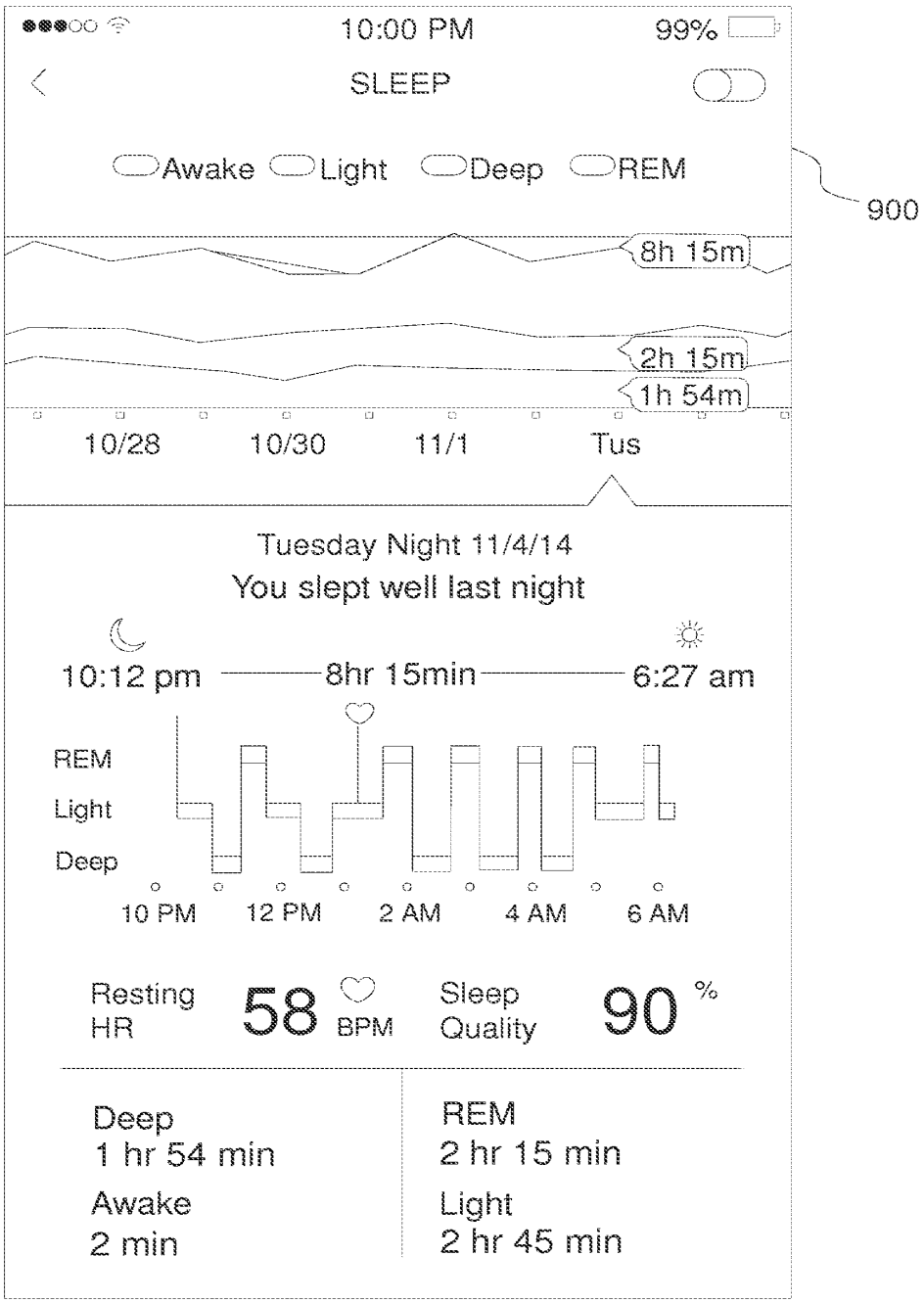

10:00 PM
99%
SLEEP
Awake
Light
Deep
REM
900
8h 15m
2h 15m
1h 54m
10/28
10/30
11/1
Tus
Tuesday Night 11/4/14
You slept well last night
10:12 pm
8hr 15min
6:27 am
REM
Light
Deep
10 PM
12 PM
2 AM
4 AM
6 AM
Resting HR
58
BPM
Sleep Quality
90
%
Deep
1 hr 54 min
Awake
2 min
REM
2 hr 15 min
Light
2 hr 45 min

FIG. 9

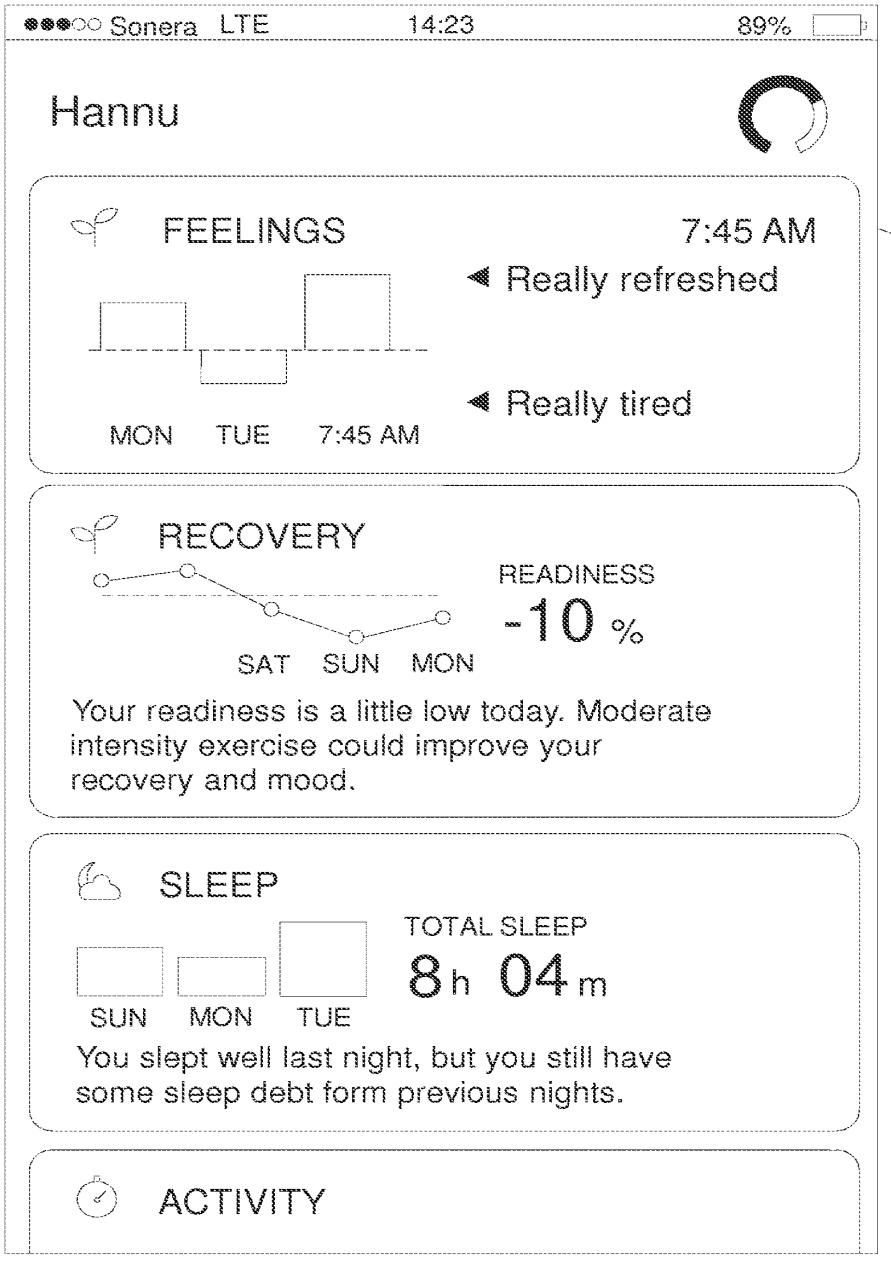


FIG. 10

Petitioner Samsung Ex-1004, 0286

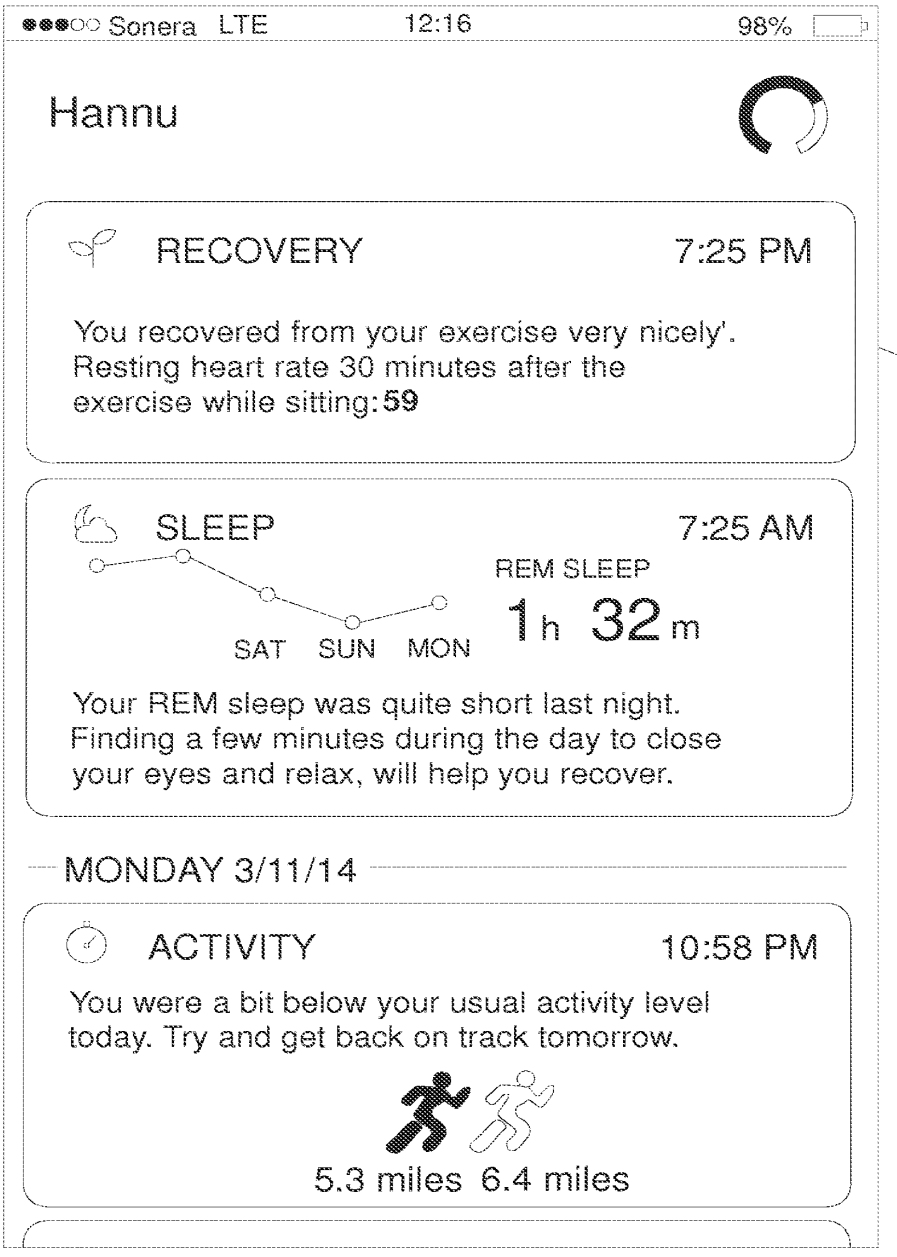

Sonera LTE
12:16
98%
Hannu
RECOVERY
7:25 PM
You recovered from your exercise very nicely'. Resting heart rate 30 minutes after the exercise while sitting: 59
1100
SLEEP
7:25 AM
REM SLEEP
1 h 32 m
SAT SUN MON
Your REM sleep was quite short last night. Finding a few minutes during the day to close your eyes and relax, will help you recover.
MONDAY 3/11/14
ACTIVITY
10:58 PM
You were a bit below your usual activity level today. Try and get back on track tomorrow.
5.3 miles 6.4 miles

FIG. 11

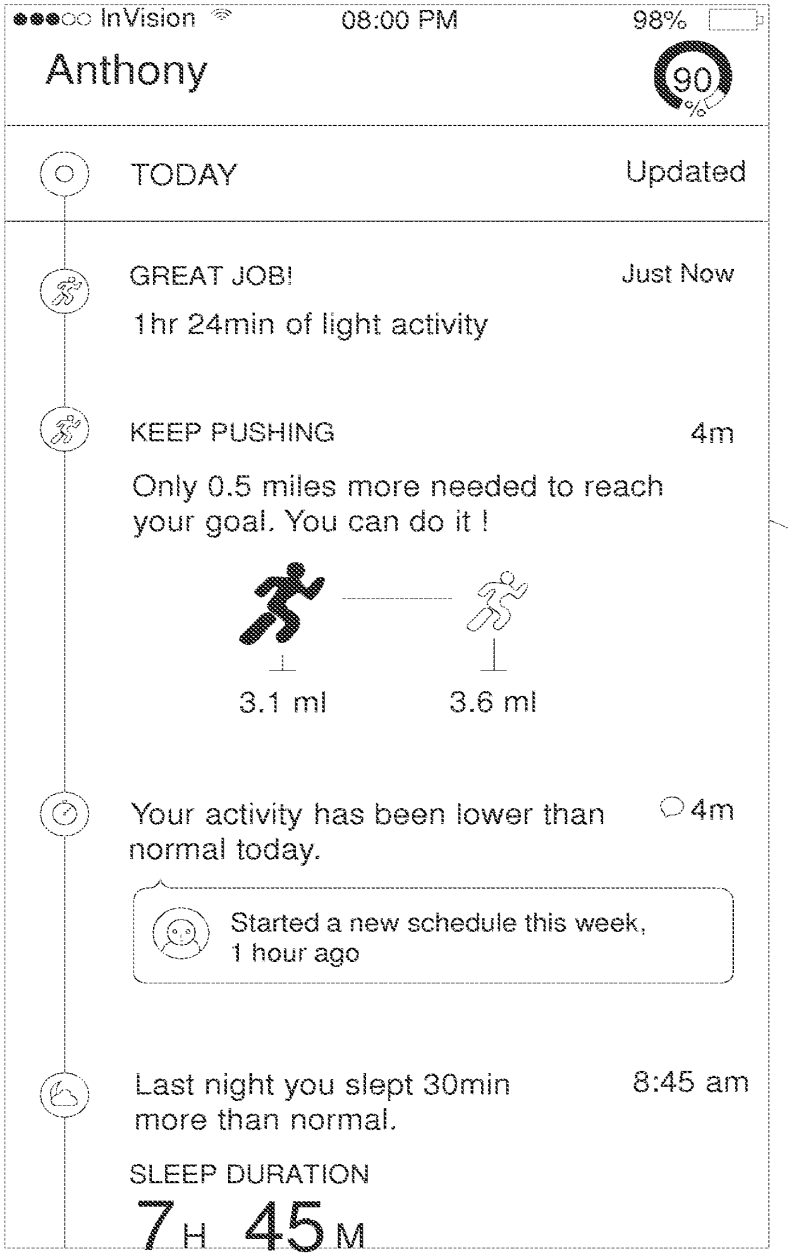

InVision
08:00 PM
98%
Anthony
90
%
TODAY
Updated
GREAT JOB!
Just Now
1hr 24min of light activity
KEEP PUSHING
4m
Only 0.5 miles more needed to reach your goal. You can do it !
3.1 ml
3.6 ml
1200
Your activity has been lower than normal today.
4m
Started a new schedule this week, 1 hour ago
Last night you slept 30min more than normal.
8:45 am
SLEEP DURATION
7 H 45 M

FIG. 12

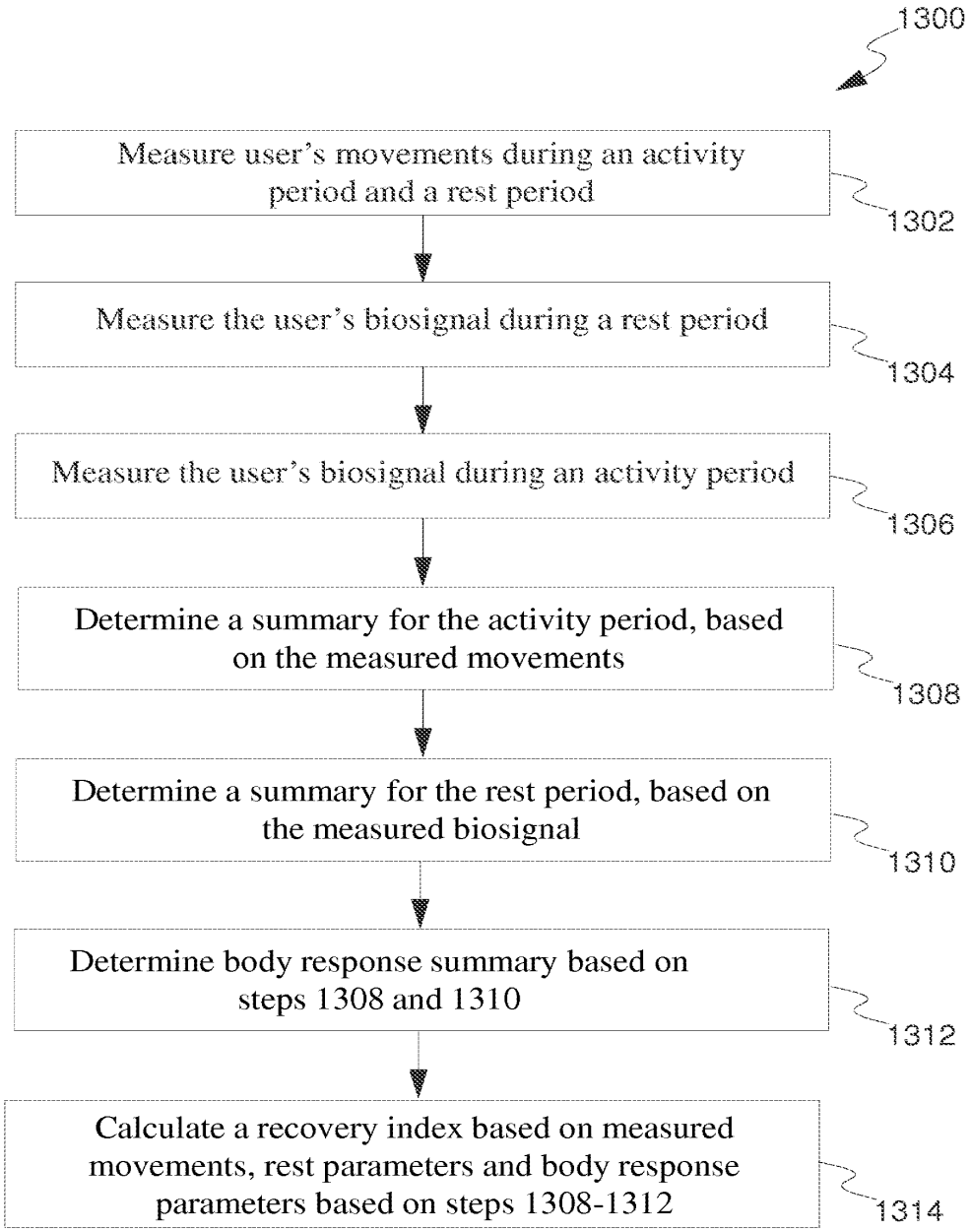


FIG. 13

Petitioner Samsung Ex-1004, 0289

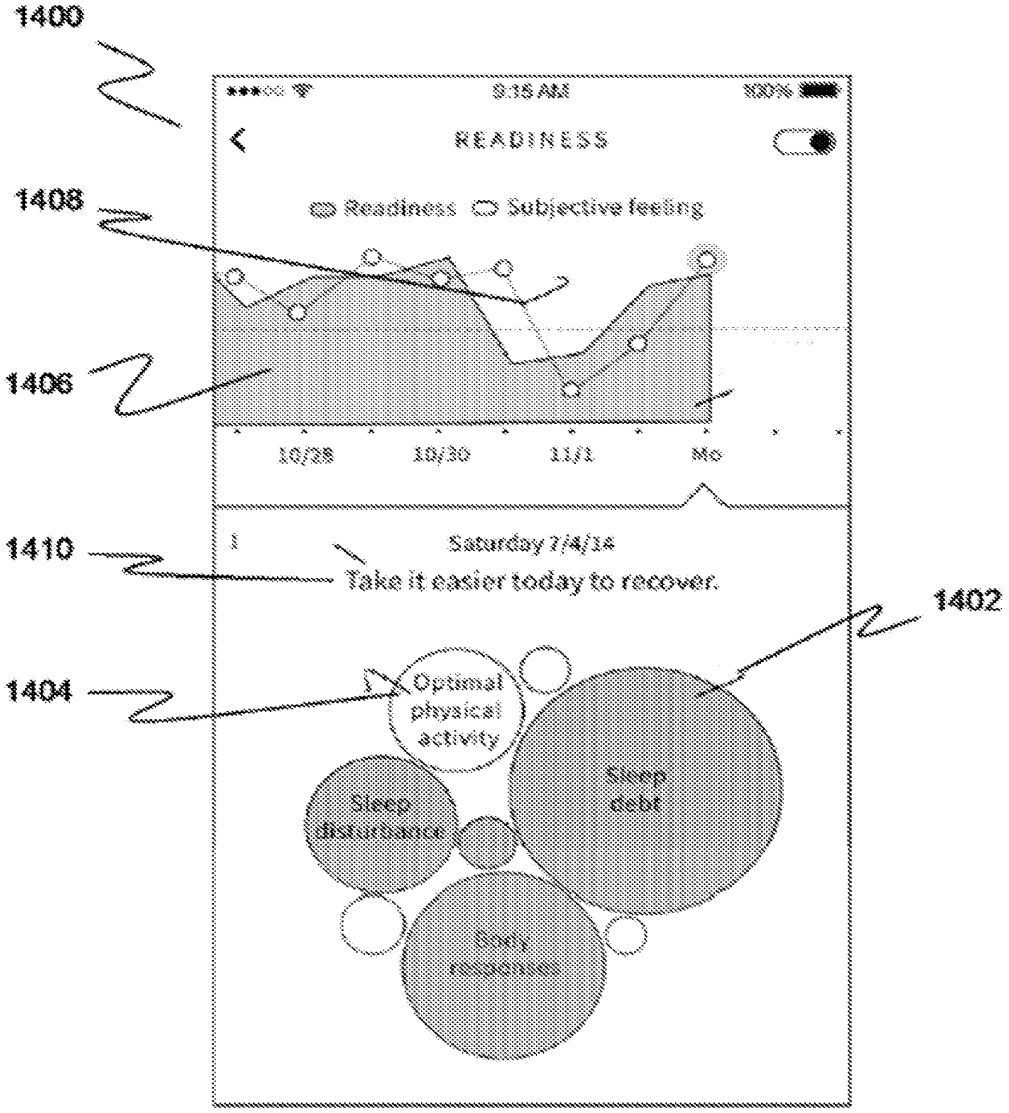

1400
1408
1406
1410
1404
1402
9:15 AM
100%
READINESS
Readiness
Subjective feeling
10/28
10/30
11/1
Mo
Saturday 7/4/14
Take it easier today to recover.
Optimal physical activity
Sleep debt
Sleep disturbance
Body responses

FIG. 14

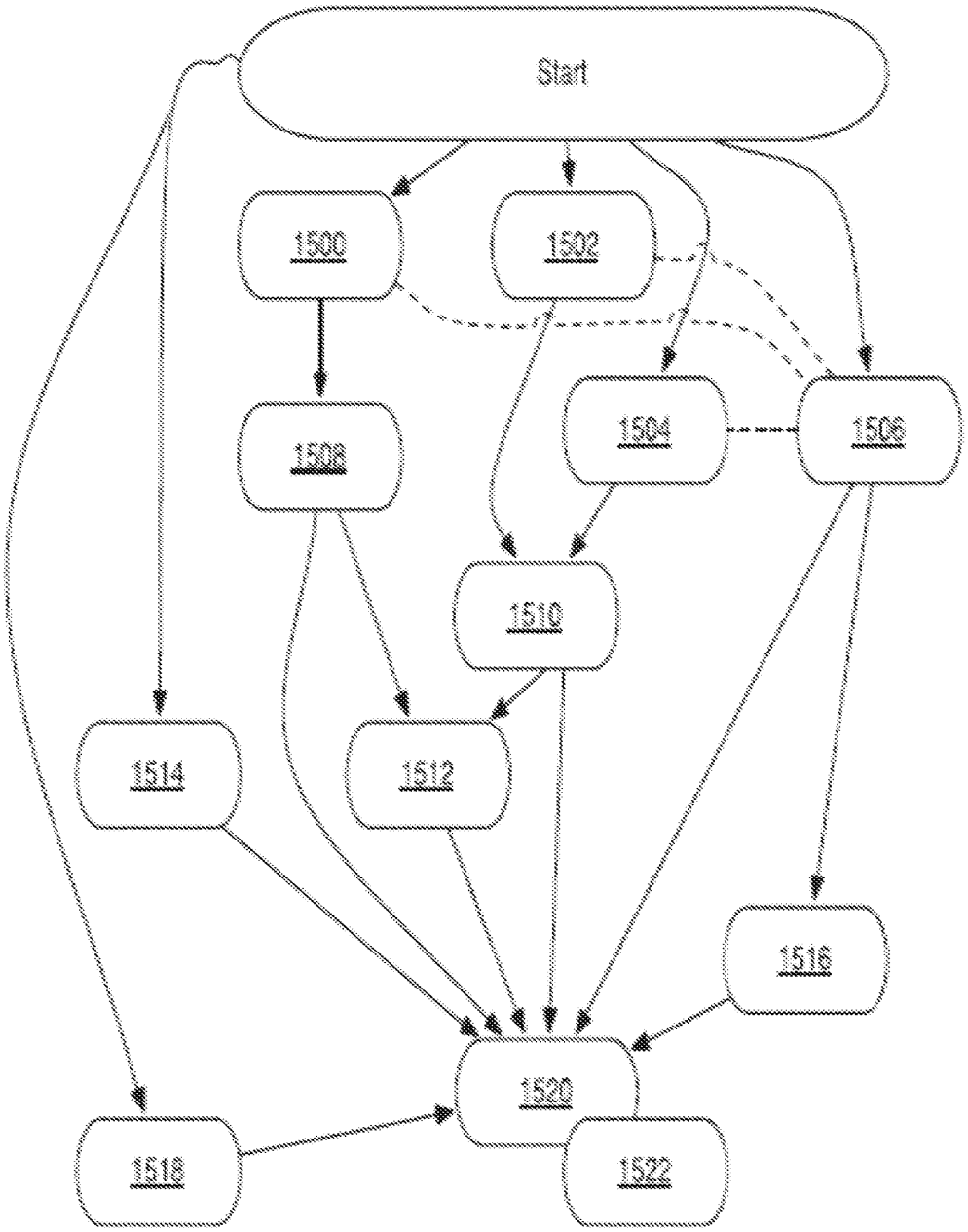


FIG. 15

Petitioner Samsung Ex-1004, 0291

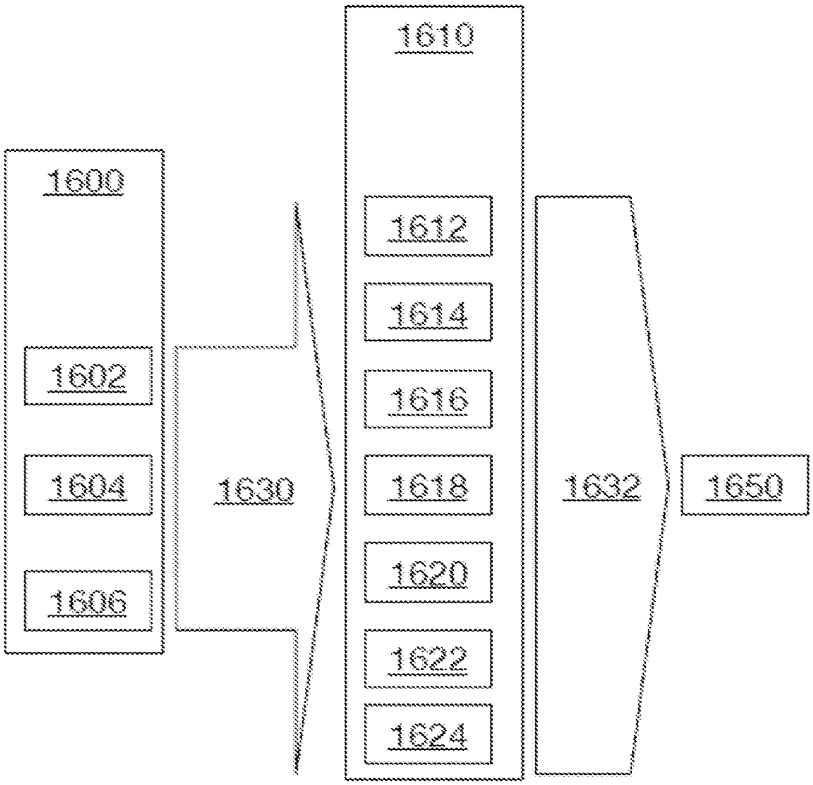


FIG. 16

Petitioner Samsung Ex-1004, 0292

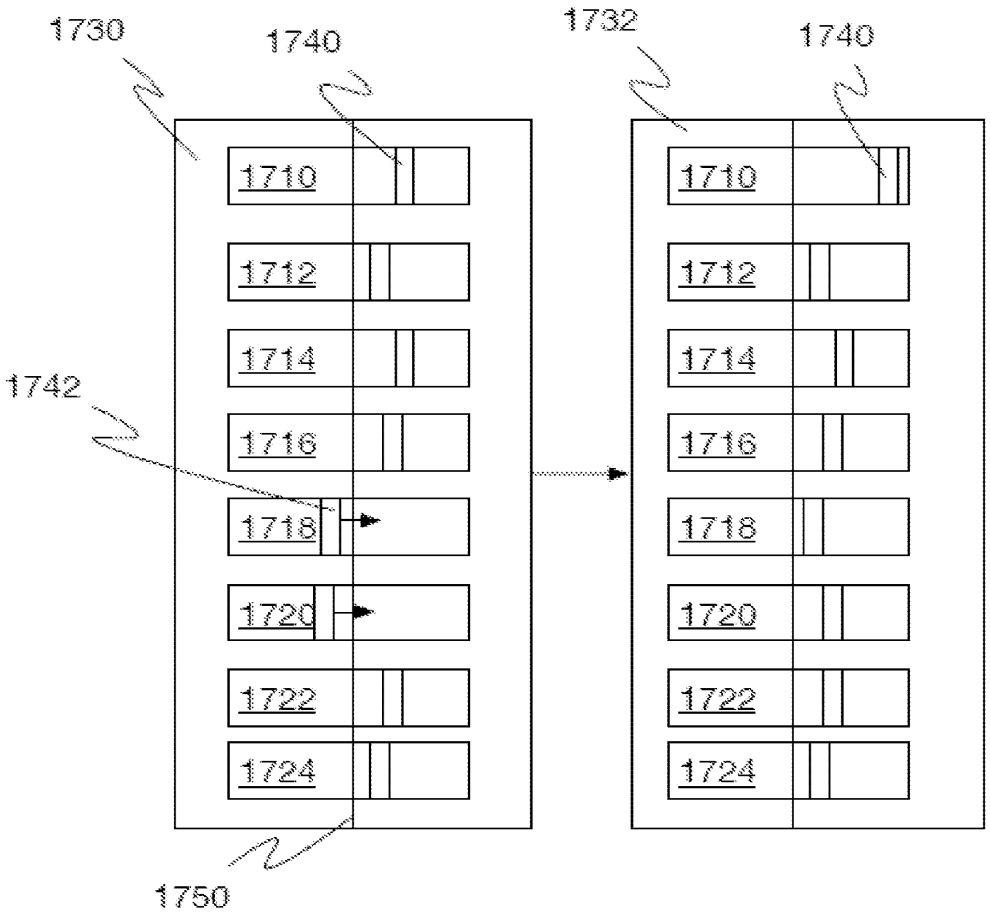


FIG. 17

Petitioner Samsung Ex-1004, 0293

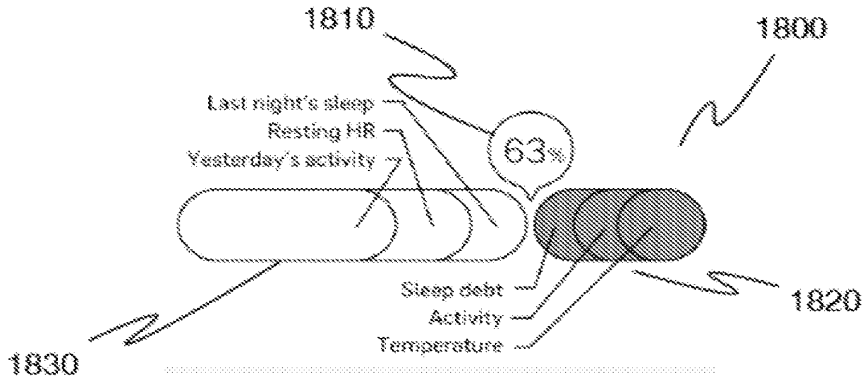


FIG. 18A

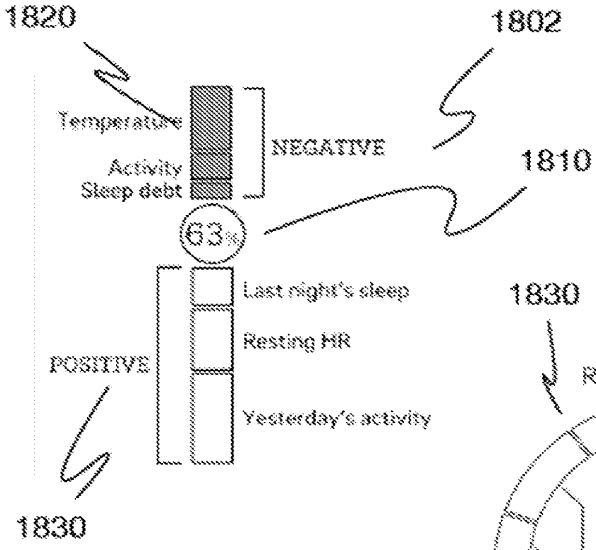


FIG. 18B

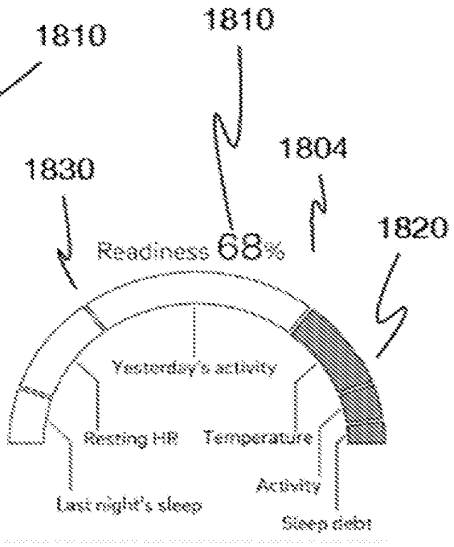


FIG. 18C

Petitioner Samsung Ex-1004, 0294

504507654 08/17/2017

PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1
Stylesheet Version v1.2

EPAS ID: PAT4554359

SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	ASSIGNMENT

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KARI KIVELA	06/21/2017
ASHLEY COLLEY	07/20/2017
PETTERI LAHTELA	06/21/2017
MARKKU KOSKELA	06/21/2017
HEIDI JURVELIN	06/26/2017

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PROPERTY NUMBERS Total: 4

Property Type	Number
Application Number:	15551632
Application Number:	62121425
Application Number:	62205114
Application Number:	62260760

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ATTORNEY DOCKET NUMBER:	MDOA.4026.USN1

NAME OF SUBMITTER:	GEZA C. ZIEGLER
SIGNATURE:	/gcz44004/
DATE SIGNED:	08/17/2017
	This document serves as an Oath/Declaration (37 CFR 1.63).
Total Attachments: 3 source=170817_4026_DAsign#page1.tif source=170817_4026_DAsign#page2.tif source=170817_4026_DAsign#page3.tif	

COMBINED DECLARATION AND ASSIGNMENT FOR A UTILITY PATENT APPLICATION

As the below named inventor(s), I/we declare that:

1) This declaration and assignment are directed to:

Title of Invention **METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER**

☐ The specification of which is attached hereto; OR

☒ United States application or PCT international application number:

PCT/FI2016/050113 filed on **23 February 2016**

☐ As amended on _____ (if applicable);

(I/We hereby authorize and request the Company or its designated attorneys, representatives or agents to insert above the title, application number and filing date of the application, or any other information herein, when known.)

2) The above-identified application was made or authorized to be made by me/us.
3) I/We believe that I/we are the original and/or joint inventors of a claimed invention in the application.
4) I/We hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. §1001 by fine or imprisonment of not more than five (5) years, or both.
5) I/We have reviewed and understand the contents of the above-identified application, including the claims, as amended by any amendment referred to above.
6) I/We acknowledge the continuing duty to disclose to the United States Patent and Trademark Office all information known to us to be material to patentability of this application, as defined in Title 37, Code of Federal Regulations, Section 1.56, including, for continuation-in-part applications, material information which becomes available between the filing date of the prior application and the filing date of the continuation-in-part application.

Authorization To Permit Access To Application by Participating Office

☒ If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the above-identified patent application is filed access to the above-identified patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the above-identified patent application is filed to have access to the above-identified patent application. In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the above-identified patent application with respect to: 1) the above-identified patent application-as-filed; 2) any foreign application to which the above-identified patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the above-identified patent application; and 3) any U.S. application-as-filed from which benefit is sought in the above-identified patent application. In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date of filing the Authorization to Permit Access to Application by Participating Offices.

Petitioner Samsung Ex-1004, 0297

OATH:

I/We do hereby declare that all statements made herein of my/our own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

ASSIGNMENT OF RIGHTS:

Whereas, I/we have invented certain new and useful improvements in the Invention identified above and described in the above-identified patent application(s) and/or patent(s) (hereinafter referred to as "Invention"); and,

Whereas I/we desire to assign my above-identified rights, title and interest in the Invention to the Assignee identified herein;

Now, this indenture witnesseth, that for good and valuable consideration, the receipt whereof is hereby acknowledged, I/we,

Inventor(s) (assignor(s))

Name	*Address*
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Harri LAAKKONEN	Pasuritie 6 90550 Oulu, Finland
Kari KIVELÄ	Pursimiehenkatu 21 A 3 00150 Helsinki, Finland
Ashley COLLEY	Louhikkotie 18 A 1 96500 Rovaniemi, Finland
Petteri LAHTELA	Heikkisen- tie 85 90940 Jääli, Finland
Markku KOSKELA	Pateniementie 68 A 1 90800 Oulu, Finland
Heidi JURVELIN	Hippiäiskuja 6 C 90420 Oulu, Finland

do hereby assign, sell and transfer to:

Assignee

Name of Company	*Address*
Oura Health Oy	Elektroniikkatie 3 90590 Oulu, Finland

herein referred to as the "Company", its successors and assigns, my entire rights, titles and interests in and to the Invention and improvements made or conceived by me/us described the application(s) listed above and in the following table:

Country	*Type of Filing*	*Application Number*	*Filing Date*	*Title*
US	Provisional	62/121,425	26 February 2015	METHOD AND SYSTEM FOR ASSESSING RECOVERY OF USER FROM MENTAL AND PHYSICAL LOAD

Petitioner Samsung Ex-1004, 0298

US	Provisional	62/205,114	14 August 2015	METHOD AND SYSTEM FOR ASSESSING RECOVERY OF USER FROM MENTAL AND PHYSICAL LOAD
US	Provisional	62/260,760	30 November 2015	METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER

(We hereby authorize and request the Company or its delegated attorneys, representatives or agents to insert above the relevant application number, filing date and other information required herein, when known.)

and any and all applications for patent or patents therefrom in any and all countries, including all divisions, continuations, and continuations-in-part, reexaminations, reissues and renewals thereof, and all benefits, rights of priority resulting from the filing of the application(s), and any and all Letters Patent of the United States, and countries foreign thereto, which may be granted or have granted for the Invention, and other benefits accruing or to accrue to us with respect to the filing of applications for patents or securing of patents in the United States and countries foreign thereto, unto the Company;

and I/we hereby authorize and request the Director of the United States Patent and Trademark Office to issue any United States Letters Patent which may issue for the Invention to the Company, as assignee of the whole right, title and interest thereto;

and I/we further agree to, without any further consideration, communicate to the Company or its representatives or nominees any facts known to me/us respecting the Invention and improvements and testify in any legal proceeding, make all rightful oaths, sign and execute all necessary and lawful future documents required or requested for the making and prosecution of any applications of any type for patent, utility model, or other similar rights in all countries including but not limited to, any provisional, non-provisional, continuation, continuation-in-part, divisional, renewal or substitute thereof, for any derivation proceedings relating thereto, and, as to any patents that issue from such applications, for any supplemental examination, derivation proceeding, opposition, post grant review, reissue, re-examination, inter partes review, or extension thereof, and generally do everything possible to aid the Company, its successors, assigns and nominees, to obtain and enforce proper patent protection for the Invention and its improvements in all countries.

Inventor(s) Signature(s)

Name	*Signature*	*Date*
Hannu KINNUNEN		21 Jun 2017
Harri LAAKKONEN		21 Jun 2017
Kari KIVELÄ		21 Jun 2017
Ashley COLLEY		20 July 2017
Petteri LAHTELA		21 Jun 2017
Markku KOSKELA		21 JUN 2017
Heidi JURVELIN		22 Jun 2017

Petitioner Samsung Ex-1004, 0299

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference Jouzen003PCT	**FOR FURTHER ACTION**	See item 4 below
International application No. PCT/FI2016/050113	International filing date *(day/month/year)* 23 February 2016 (23.02.2016)	Priority date *(day/month/year)* 26 February 2015 (26.02.2015)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant OURA HEALTH OY		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 9 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☒	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis* .2).

	Date of issuance of this report 29 August 2017 (29.08.2017)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Authorized officer Simin Baharlou e-mail: pct.team9@wipo.int

Form PCT/IB/373 (January 2004)

Petitioner Samsung Ex-1004, 0300

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/FI2016/050113	23.02.2016	26.02.2015

International Patent Classification (IPC) or both national classification and IPC
INV. G06F19/00 A61B5/01 A61B5/024 A61B5/0404 A61B5/11 A61B5/00 ADD. A61B5/0488 A61B5/0496 A61B5/16

Applicant
JOUZEN OY

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notifed the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA:	Date of completion of this opinion	Authorized Officer
European Patent Office P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Fax: +31 70 340 - 3016	see form PCT/ISA/210	Albrecht, Ronald Telephone No. +31 70 340-0

Form PCT/ISA/237 (Cover Sheet) (January 2015)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/FI2016/050113

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed.

   ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:

   a. ☐ forming part of the international application as filed:

      ☐ in the form of an Annex C/ST.25 text file.

      ☐ on paper or in the form of an image file.

   b. ☐ furnished together with the international application under PCT Rule 13*ter*.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.

   c. ☐ furnished subsequent to the international filing date for the purposes of international search only:

      ☐ in the form of an Annex C/ST.25 text file (Rule 13*ter*.1(a)).

      ☐ on paper or in the form of an image file (Rule 13*ter*.1(b) and Administrative Instructions, Section 713).

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

Petitioner Samsung Ex-1004, 0302

Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-14
	No:	Claims	15
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-15
Industrial applicability (IA)	Yes:	Claims	1-15
	No:	Claims	

2. Citations and explanations

see separate sheet

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Petitioner Samsung Ex-1004, 0303

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:

D1 WO 2013/161072 A1 (TOYOTA MOTOR CO LTD [JP]; IIZUKA HISASHI [JP]) 31 October 2013 (2013-10-31);

D1' & EP 2 842 491 A1 (TOYOTA MOTOR CO LTD [JP]) 4 March 2015 (2015-03-04), providing a translation of D1

D2 JP 2007 222276 A (TANITA SEISAKUSHO KK) 6 September 2007 (2007-09-06)

D3 JONES A Y M ET AL: "Activity Levels and Resting Energy Expenditure in an Elderly Population: A Pilot Study",
HONG KONG PHYSIOTHERAPY JOURNAL, ELSEVIER, AMSTERDAM, NL,
vol. 22, no. 1, 1 January 2004 (2004-01-01), pages 29-32, XP026251662, ISSN: 1013-7025, DOI: 10.1016/S1013-7025(09)70047-8
[retrieved on 2004-01-01]

D4 RENNIE K ET AL: "A COMBINED HEART RATE AND MOVEMENT SENSOR: PROOF OF CONCEPT AND PRELIMINARY TESTING STUDY",
EUROPEAN JOURNAL OF CLINICAL NUTRITION, XX, XX,
vol. 54, no. 5, 1 May 2000 (2000-05-01), pages 409-414, XP008034744, DOI: 10.1038/SJ.EJCN.1600973

D5 US 2010/168531 A1 (SHALTIS PHILLIP ANDREW [US] ET AL) 1 July 2010 (2010-07-01)

D6 US 2014/073486 A1 (AHMED WILLIAM [US] ET AL) 13 March 2014 (2014-03-13)

1 Independent Claims

Petitioner Samsung Ex-1004, 0304

The present application does not meet the criteria of Article 33(1) PCT, because the respective subject-matter of claims 1 and 9 does not involve an inventive step in the sense of Article 33(3) PCT, and the subject matter of claim 15 is not new in the sense of Article 33(2) PCT.

1.1 Claim 1

Document D1 is regarded as being the prior art closest to the subject-matter of claim 1, and discloses (references in parentheses apply to document D1) a method for assessing readiness of a user, the method comprising:

- obtaining the user's **movements** (see par. 28);
- using the obtained user's movements to **determine** a nature of the period, wherein the nature of the period is selected from an **activity** period and a **rest** period (see par. 29);
- measuring at least one **bio-signal** of the user during the rest period (see par. 28);
- determining a **rest summary** for the rest period, based on the measured at least one **bio-signal** and at least one bio-signal of a previous rest period (see par. 31; amount of recovery is the sum of recovery of the "amount of physical activity of the subject recovered at each pint in time in a day", hence based on multiple rest periods);
- determining an **activity summary** for the activity period, based on ~~the obtained **movements** of~~ *at least one bio-signal* of an activity period and obtained movements of at least one previous activity period (see par. 30);
- determining a **body response summary** based on the rest summary and the activity summary (see par. 33); and
- calculating a **readiness score** based on the body response summary and a previous body response summary (see par. 32, introducing the retained physical activity of a previous period as reference amount of physical activity; furthermore, par. 34 discloses the calculation of a change in the amount of retained physical activity and the calculation of a prediction of physical activity amount, hence another score that can be regarded as a *"readiness score"*.), whereby the readiness score indicates a level of readiness of the user.

Petitioner Samsung Ex-1004, 0305

The subject-matter of claim 1 therefore differs from this known method in that the **activity summary** for the activity period is based on the user's movements of an activity period and not on a bio-signal of the user of an activity period.

Basing the activity summary on a user's movements instead of another bio-signal provides the technical effect of covering a slightly different aspect of activity/energy expenditure and solving the problem of providing an alternative way of assessing activity summaries.

The solution proposed in claim1 of the present application cannot be considered to involve an inventive step (Article 33(3) PCT).

Measuring activity and determining activity summaries based on movement data (e.g. obtained from accelerometer readings) is well-known in the technical field. In particular document D2 discloses a very similar method for assessing readiness (or its reciprocal value "fatigue-degree" which is considered a valid equivalent), see D2, par. 22-26 and 29-34. In D2, accelerometer based movement are used to determine activity summaries (D2, par. 24).

for the skilled person, seeking to cover an alternative view on activities summaries with respect to energy expenditure/readiness scores, it would be an obvious option to employ the method steps disclosed in D2 in the method he or she already knows from D1. Using no inventive skill, said skilled person would thereby arrive at the solution defined in present claim 1.

Furthermore, it should be noted that movement analysis is quite often associated with the measurement of physical capacity, energy expenditure and readiness, see for example the "Method" sections of documents D3 and D4.

1.2 Claim 9

Claim 9 discloses a system dedicated for processing all the method steps of claim 1 According to the reasoning given above (see 1.1), this method is not considered to involve an inventive step (Article 33(3) PCT).

Petitioner Samsung Ex-1004, 0306

Document D1 also discloses most features of a corresponding system for conducting the method and hence the same reasoning applies, mutatis mutandis, to claim 9. The only exception is that document D9 does not disclose the feature of a ring for measuring at least one bio-signal of the user.

However, rings for measuring for a bio-signal and in particular a heart rate (which is one of the bio-signals used in D1) are known, see for example document D5 (par. 35 and fig. 5). Implementing such a ring to measure the heart rate in the system of D1 is considered a simple and straightforward choice among several options which the skilled person might take into account, in accordance with circumstances, and without the exercise of inventive skill.

1.3 Claim 15

The application does not meet the requirements of Article 6 PCT, because claim 15 is not clear.

Claim 15 refers to a "readiness score", to "said parameters", and to an "earlier point in time". These terms are completely undefined in the context of *independent* claim 15.

However, interpreting claim 15 in view of the description, it should be noted that similar user interfaces indicating similar scores are well-known from the prior art, see for example document D6, fig. 15-18. Consequently, it appears that the subject-matter of claim 15 is not new in the sense of Article 33(2) PCT.

2 Dependent Claims

Dependent claims 2-8, and 10-14 do not appear to contain any additional features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT with respect to inventive step.

The subject-matter of these claims only relates to features that are already employed in similar devices and methods or that are obvious design options for the person skilled in the art, which he would therefore choose, without exercising inventive skill, in order to solve the respective problem. Some subject-matter of these claims is for example also disclosed in documents D1, see par. 28 (claims 2, 4, 10, 12), par. 30 (claim 3), par. 31 (claim 5), par. 36 (claim 6), par. 34, 80 (claim 7), D5, par. 35 (claim 13) and D6, fig. 15-18 (claim 11).

Petitioner Samsung Ex-1004, 0307

Re Item VII

Certain defects in the international application

The features of the claim are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in D1-D6 is not mentioned in the description, nor are these documents identified therein.

Petitioner Samsung Ex-1004, 0308

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 15/551,632

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	140		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	240		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	360		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	14 minus 20 =	*	x 40 =	0.00	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	*	x 210 =	0.00			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	740		TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE($)	ADDITIONAL FEE($)	OR	RATE($)	ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

MULTIPLE DEPENDENT CLAIM FEE CALCULATION SHEET

Substitute for Form PTO-1360
(For use with Form PTO/SB/06)

Application Number	Filing Date
15551632	

Applicant(s) Hannu KINNUNEN

* May be used for additional claims or amendments

CLAIMS	AS FILED		AFTER FIRST AMENDMENT		AFTER SECOND AMENDMENT			*		*		*	
	Indep	Depend	Indep	Depend	Indep	Depend		Indep	Depend	Indep	Depend	Indep	Depend
1	1		1				51						
2		1		1			52						
3		2		1			53						
4		(1)		1			54						
5		(1)		1			55						
6		(1)		1			56						
7		(1)		1			57						
8		(1)		1			58						
9	1		1				59						
10		1		1			60						
11		2		1			61						
12		(1)		1			62						
13		(1)		1			63						
14		(1)					64						
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43							93						
44							94						
45							95						
46							96						
47							97						
48							98						
49							99						
50							100						
Total Indep	3		3		0								
Total Depend	14	↵	11	↵	0	↵							
Total Claims	17		14		0								

Petitioner Samsung Ex-1004, 0310

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
15/551,632	08/17/2017		740	MDOA.4026.USN1_Jouzen003	14	3

CONFIRMATION NO. 1733

93582
ZIEGLER IP LAW GROUP, LLC.
55 Greens Farms Road
WESTPORT, CT 06880

FILING RECEIPT

OC000000095259387

Date Mailed: 11/07/2017

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Hannu KINNUNEN, Oulu, FINLAND;
Harri LAAKKONEN, Oulu, FINLAND;
Kari KIVELÄ, Helsinki, FINLAND;
Ashley COLLEY, Rovaniemi, FINLAND;
Petteri LAHTELA, Jääli, FINLAND;
Markku KOSKELA, Oulu, FINLAND;
Heidi JURVELIN, Oulu, FINLAND;

Applicant(s)

Oura Health Oy, Oulu, FINLAND;

Power of Attorney: The patent practitioners associated with Customer Number 93582

Domestic Priority data as claimed by applicant

This application is a 371 of PCT/FI2016/050113 02/23/2016
which claims benefit of 62/121,425 02/26/2015
and claims benefit of 62/205,114 08/14/2015
and claims benefit of 62/260,760 11/30/2015

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Petitioner Samsung Ex-1004, 0311

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 11/03/2017
The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 15/551,632**
Projected Publication Date: 02/15/2018
Non-Publication Request: No
Early Publication Request: No
**** SMALL ENTITY ****
Title

METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER

Preliminary Class

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific

Petitioner Samsung Ex-1004, 0312

countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

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The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

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The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop

Petitioner Samsung Ex-1004, 0313

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Petitioner Samsung Ex-1004, 0314

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United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

U.S. APPLICATION NUMBER NO.	FIRST NAMED INVENTOR	ATTY. DOCKET NO.
15/551,632	Hannu KINNUNEN	MDOA.4026.USN1_Jouzen003

93582
ZIEGLER IP LAW GROUP, LLC.
55 Greens Farms Road
WESTPORT, CT 06880

INTERNATIONAL APPLICATION NO.	
PCT/FI2016/050113	
I.A. FILING DATE	PRIORITY DATE
02/23/2016	02/26/2015

CONFIRMATION NO. 1733
371 ACCEPTANCE LETTER

OC000000095259388

Date Mailed: 11/07/2017

NOTICE OF ACCEPTANCE OF APPLICATION UNDER 35 U.S.C 371 AND 37 CFR 1.495

The applicant is hereby advised that the United States Patent and Trademark Office, in its capacity as a Designated / Elected Office (37 CFR 1.495), has ACCEPTED the above identified international application for national patentability examination in the United States Patent and Trademark Office.

The United States Application Number assigned to the application is shown above. A Filing Receipt will be issued for the present application in due course. **THE DATE APPEARING ON THE FILING RECEIPT AS THE "FILING DATE or 371(c) DATE" IS THE DATE ON WHICH THE LAST OF THE 35 U.S.C. 371 (c)(1) and (c)(2) REQUIREMENTS HAS BEEN RECEIVED IN THE OFFICE. THIS DATE IS SHOWN BELOW.** The filing date of the above identified application is the international filing date of the international application (Article 11(3) and 35 U.S.C. 363)

08/17/2017
DATE OF RECEIPT OF 35 U.S.C.
371(c)(1) and (c)(2) REQUIREMENTS

The following items have been received:

- Indication of Small Entity Status
- Copy of the International Application filed on 08/17/2017
- Copy of the International Search Report filed on 08/17/2017
- Preliminary Amendments filed on 08/17/2017
- Information Disclosure Statements filed on 08/17/2017
- Inventor's Oath or Declaration filed on 08/17/2017
- Request for Immediate Examination filed on 08/17/2017
- U.S. Basic National Fees filed on 08/17/2017
- Authorize Access to Search Results filed on 08/17/2017
- Priority Documents filed on 08/17/2017
- Power of Attorney filed on 08/17/2017
- Authorization to Permit Access filed on 08/17/2017
- Application Data Sheet (37 CFR 1.76) filed on 08/17/2017

Petitioner Samsung Ex-1004, 0315

Applicant is reminded that any communications to the United States Patent and Trademark Office must be mailed to the address given in the heading and include the U.S. application no. shown above (37 CFR 1.5)

SHELBY J MILLER

Telephone: (571) 272-0384

FORM PCT/DO/EO/903 (371 Acceptance Notice)

Petitioner Samsung Ex-1004, 0316

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
15/551,632	08/17/2017	Hannu KINNUNEN	MDOA.4026.USN1_Jouzen003

CONFIRMATION NO. 1733

93582
ZIEGLER IP LAW GROUP, LLC.
55 Greens Farms Road
WESTPORT, CT 06880

PUBLICATION NOTICE



Title:METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER

Publication No.US-2018-0042540-A1
Publication Date:02/15/2018

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Public Records Division. The Public Records Division can be reached by telephone at (571) 272-3150 or (800) 972-6382, by facsimile at (571) 273-3250, by mail addressed to the United States Patent and Trademark Office, Public Records Division, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently https://portal.uspto.gov/pair/PublicPair. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Office of Data Managment, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

Petitioner Samsung Ex-1004, 0317

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/551,632	08/17/2017	Hannu KINNUNEN	MDOA.4026.USN1_Jouzen003	1733

93582 7590 08/21/2019

ZIEGLER IP LAW GROUP, LLC.
55 Greens Farms Road
WESTPORT, CT 06880

EXAMINER
WU, TONG E

ART UNIT	PAPER NUMBER
3792	

NOTIFICATION DATE	DELIVERY MODE
08/21/2019	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

paralegal_ziplaw@arcticinvent.com
ptomail@gziplaw.com

Petitioner Samsung Ex-1004, 0318

Office Action Summary	**Application No.** 15/551,632	**Applicant(s)** KINNUNEN et al.	
	Examiner Eugene T Wu	**Art Unit** 3792	**AIA (FITF) Status** Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 2 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on 8/17/17.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL.** 2b) ☐ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 1-15 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☐ Claim(s) _____ is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☑ Claim(s) 1-15 are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☑ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

Petitioner Samsung Ex-1004, 0319

DETAILED ACTION

Election/Restriction

REQUIREMENT FOR UNITY OF INVENTION

As provided in 37 CFR 1.475(a), a national stage application shall relate to one invention only or to a group of inventions so linked as to form a single general inventive concept ("requirement of unity of invention"). Where a group of inventions is claimed in a national stage application, the requirement of unity of invention shall be fulfilled only when there is a technical relationship among those inventions involving one or more of the same or corresponding special technical features. The expression "special technical features" shall mean those technical features that define a contribution which each of the claimed inventions, considered as a whole, makes over the prior art.

The determination whether a group of inventions is so linked as to form a single general inventive concept shall be made without regard to whether the inventions are claimed in separate claims or as alternatives within a single claim. See 37 CFR 1.475(e).

When Claims Are Directed to Multiple Categories of Inventions:

As provided in 37 CFR 1.475 (b), a national stage application containing claims to different categories of invention will be considered to have unity of invention if the claims are drawn only to one of the following combinations of categories:

(1) A product and a process specially adapted for the manufacture of said product; or

(2) A product and a process of use of said product; or

(3) A product, a process specially adapted for the manufacture of the said product, and a use of the said product; or

(4) A process and an apparatus or means specifically designed for carrying out the said process; or

Petitioner Samsung Ex-1004, 0320

(5) A product, a process specially adapted for the manufacture of the said product, and an apparatus or means specifically designed for carrying out the said process.

Otherwise, unity of invention might not be present. See 37 CFR 1.475 (c).

1. Restriction is required under 35 U.S.C. 121 and 372.

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1.

In accordance with 37 CFR 1.499, applicant is required, in reply to this action, to elect a single invention to which the claims must be restricted.

Group I, claim(s) 1-8, drawn to a method for assessing readiness.

Group II, claim(s) 9-14, drawn to a smart ring system.

Group III, claim(s) 15, drawn to a user interface.

2. The groups of inventions listed above do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons:

Groups I and II lack unity of invention because even though the inventions of these groups require the technical feature of using various steps to calculate a readiness score, this technical feature is not a special technical feature as it does not make a contribution over the prior art in view of Iizuka (US 2015/0127265). In particular, Iizuka discloses the same obtaining a user's movements (Paragraph 40) to determine a nature of activity/rest (Paragraph 41), measuring at least one biosignal of the user during the rest period (Paragraph 40) to determine a rest summary based on current and past rest data (Paragraph 43), determining an activity summary based on current and past activity data (Paragraphs 42, 77), determining a body response summary based on the rest and activity

Petitioner Samsung Ex-1004, 0321

summaries (Paragraphs 45, 46), and calculating a readiness score based on current and past body response summaries (Paragraphs 47, 48).

Groups I and III lack unity of invention because the groups do not share the same or corresponding technical feature.

Groups II and III lack unity of invention because the groups do not share the same or corresponding technical feature.

3. Applicant is advised that the reply to this requirement to be complete must include (i) an election of a species or invention to be examined even though the requirement may be traversed (37 CFR 1.143) and (ii) identification of the claims encompassing the elected invention.

The election of an invention or species may be made with or without traverse. To preserve a right to petition, the election must be made with traverse. If the reply does not distinctly and specifically point out supposed errors in the restriction requirement, the election shall be treated as an election without traverse. Traversal must be presented at the time of election in order to be considered timely. Failure to timely traverse the requirement will result in the loss of right to petition under 37 CFR 1.144. If claims are added after the election, applicant must indicate which of these claims are readable on the elected invention or species.

Should applicant traverse on the ground that the inventions have unity of invention (37 CFR 1.475(a)), applicant must provide reasons in support thereof. Applicant may submit evidence or identify such evidence now of record showing the inventions to be obvious variants or clearly admit on the record that this is the case. Where such evidence or admission is provided by applicant, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

Petitioner Samsung Ex-1004, 0322

4. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be corrected in compliance with 37 CFR 1.48(a) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. A request to correct inventorship under 37 CFR 1.48(a) must be accompanied by an application data sheet in accordance with 37 CFR 1.76 that identifies each inventor by his or her legal name and by the processing fee required under 37 CFR 1.17(i).

5. The examiner has required restriction between product or apparatus claims and process claims. Where applicant elects claims directed to the product/apparatus, and all product/apparatus claims are subsequently found allowable, withdrawn process claims that include all the limitations of the allowable product/apparatus claims should be considered for rejoinder. All claims directed to a nonelected process invention must include all the limitations of an allowable product/apparatus claim for that process invention to be rejoined.

In the event of rejoinder, the requirement for restriction between the product/apparatus claims and the rejoined process claims will be withdrawn, and the rejoined process claims will be fully examined for patentability in accordance with 37 CFR 1.104. Thus, to be allowable, the rejoined claims must meet all criteria for patentability including the requirements of 35 U.S.C. 101, 102, 103 and 112. Until all claims to the elected product/apparatus are found allowable, an otherwise proper restriction requirement between product/apparatus claims and process claims may be maintained. Withdrawn process claims that are not commensurate in scope with an allowable product/apparatus claim will not be rejoined. See MPEP § 821.04. Additionally, in order for rejoinder to occur, applicant is advised that the process claims should be amended during prosecution to require the limitations of the product/apparatus claims. **Failure to do so may result in no rejoinder.** Further, note that the prohibition against double patenting rejections of 35 U.S.C.

Petitioner Samsung Ex-1004, 0323

121 does not apply where the restriction requirement is withdrawn by the examiner before the patent issues. See MPEP § 804.01.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eugene T Wu whose telephone number is (571)270-5053. The examiner can normally be reached on M-F 8am-5pm.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Layno can be reached on 571-272-4949. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Eugene T Wu/
Primary Examiner, Art Unit 3792

Petitioner Samsung Ex-1004, 0324

Notice of References Cited	Application/Control No. 15/551,632	Applicant(s)/Patent Under Reexamination KINNUNEN et al.	
	Examiner Eugene T Wu	Art Unit 3792	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-20150127265-A1	05-2015	Iizuka; Hisashi	G06F19/3481	702/19
	B					
	C					
	D					
	E					
	F					
	G					
	H					
	I					
	J					
	K					
	L					
	M					

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Petitioner Samsung Ex-1004, 0325

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT(s):	Hannu KINNUNEN	CONF. NO.	1733
SERIAL NO.:	15/551,632	ART UNIT:	3792
FILING DATE:	17 August 2017	EXAMINER:	WU, Tong E.
TITLE:	METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER		
ATTORNEY REFERENCE NO.:	MDOA.4026.USN1	Jouzen003US	

Commissioner of Patents
P.O. Box 1450
Alexandria, VA 22313-1450

RESPONSE

This is in response to the Office Action mailed 21 August 2019. The action requires election between the claims of Group I, claims 1-8; Group II, claims 9-14 and Group III, claim 15. For purposes of the election, and without any waiver or disclaimer, Applicant elects the claims of Group II, claims 9-14 for further prosecution herein.

Respectfully submitted,

/gcz44004/ 21 October 2019

Geza C. Ziegler, Jr. Date
Reg. No. 44,004
Customer No. 93582
Ziegler IP Law Group, LLC.
55 Greens Farms Road
Westport, CT 06880
Tel: 203 659 0388
Fax: 203 222 5299
Email:ptomail@gziplaw.com

Electronic Acknowledgement Receipt

EFS ID:	37507192
Application Number:	15551632
International Application Number:	
Confirmation Number:	1733
Title of Invention:	METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER
First Named Inventor/Applicant Name:	Hannu KINNUNEN
Customer Number:	93582
Filer:	GEZA C ZIEGLER JR
Filer Authorized By:	
Attorney Docket Number:	MDOA.4026.USN1_Jouzen003
Receipt Date:	21-OCT-2019
Filing Date:	17-AUG-2017
Time Stamp:	10:00:42
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Response to Election / Restriction Filed	191021_4026_Response_RR_190821.pdf	14801 8d1843a62cb3e24f8dfa99a70b9af0618756 1d12	no	1

Warnings:

Petitioner Samsung Ex-1004, 0327

Information:	
Total Files Size (in bytes):	14801

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/551,632	08/17/2017	Hannu KINNUNEN	MDOA.4026.USN1_Jouzen003	1733

93582 7590 11/15/2019

ZIEGLER IP LAW GROUP, LLC.
55 Greens Farms Road
WESTPORT, CT 06880

EXAMINER
WU, TONG E

ART UNIT	PAPER NUMBER
3792	

NOTIFICATION DATE	DELIVERY MODE
11/15/2019	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

paralegal_ziplaw@arcticinvent.com
ptomail@gziplaw.com

Petitioner Samsung Ex-1004, 0329

Office Action Summary	**Application No.** 15/551,632	**Applicant(s)** KINNUNEN et al.	
	Examiner Eugene T Wu	**Art Unit** 3792	**AIA (FITF) Status** Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on 10/21/19.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL.** 2b) ☑ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 1-15 is/are pending in the application.

5a) Of the above claim(s) 1-8 and 15 is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 9-14 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☑ The drawing(s) filed on 8/17/17 is/are: a)☑ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☑ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☑ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☑ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☑ Notice of References Cited (PTO-892)

2) ☑ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

Petitioner Samsung Ex-1004, 0330

DETAILED ACTION

10/21/19 - Applicant election.
08/21/19 - Lack of unity requirement.

Notice of Pre-AIA or AIA Status

1. The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Election/Restrictions

2. Applicant's election without traverse of Group II, claims 9-14, in the reply filed on 10/21/19 is acknowledged.

3. Claims 1-8, 15 withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 10/21/19.

Claim Interpretation

4. The following is a quotation of 35 U.S.C. 112(f):

> (f) Element in Claim for a Combination. – An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.

The following is a quotation of pre-AIA 35 U.S.C. 112, sixth paragraph:

> An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.

5. The claims in this application are given their broadest reasonable interpretation using the plain meaning of the claim language in light of the specification as it would be understood by one of ordinary skill in the art. The broadest reasonable interpretation of a claim element (also commonly referred to as a claim limitation) is limited by the description in the specification when 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph, is invoked.

Petitioner Samsung Ex-1004, 0331

As explained in MPEP § 2181, subsection I, claim limitations that meet the following three-prong test will be interpreted under 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph:

(A) the claim limitation uses the term "means" or "step" or a term used as a substitute for "means" that is a generic placeholder (also called a nonce term or a non-structural term having no specific structural meaning) for performing the claimed function;

(B) the term "means" or "step" or the generic placeholder is modified by functional language, typically, but not always linked by the transition word "for" (e.g., "means for") or another linking word or phrase, such as "configured to" or "so that"; and

(C) the term "means" or "step" or the generic placeholder is not modified by sufficient structure, material, or acts for performing the claimed function.

Use of the word "means" (or "step") in a claim with functional language creates a rebuttable presumption that the claim limitation is to be treated in accordance with 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph. The presumption that the claim limitation is interpreted under 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph, is rebutted when the claim limitation recites sufficient structure, material, or acts to entirely perform the recited function.

Absence of the word "means" (or "step") in a claim creates a rebuttable presumption that the claim limitation is not to be treated in accordance with 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph. The presumption that the claim limitation is not interpreted under 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph, is rebutted when the claim limitation recites function without reciting sufficient structure, material or acts to entirely perform the recited function.

Claim limitations in this application that use the word "means" (or "step") are being interpreted under 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph, except as otherwise indicated in an Office action. Conversely, claim limitations in this application that do not use the

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word “means” (or “step”) are not being interpreted under 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph, except as otherwise indicated in an Office action.

Not Invoked Despite Presence of "means"

6. This application includes one or more claim limitations that use the word “means” or “step” but are nonetheless not being interpreted under 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph because the claim limitation(s) recite(s) sufficient structure, materials, or acts to entirely perform the recited function. Such claim limitation(s) is/are:

Claim 12: "means for measuring user's movements..." is modified by sufficient structure.

Claim 13: Assuming this was meant to recite "means for measuring at least one biosignal...", the claim recites further sufficient structure.

Claim 14: Recites further sufficient structure for the "means for measuring at least one biosignal...".

Because this/these claim limitation(s) is/are **not** being interpreted under 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph, it/they is/are **not** being interpreted to cover only the corresponding structure, material, or acts described in the specification as performing the claimed function, and equivalents thereof.

If applicant intends to have this/these limitation(s) interpreted under 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph, applicant may: (1) amend the claim limitation(s) to remove the structure, materials, or acts that performs the claimed function; or (2) present a sufficient showing that the claim limitation(s) does/do not recite sufficient structure, materials, or acts to perform the claimed function.

Claim Objections

7. Claims objected to because of the following informalities:

Claim 9, line 5, and claims 10, 12: Should recite means for measuring the user's movements.

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Appropriate correction is required.

Claim Rejections - 35 USC § 102

8. In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a)(2) the claimed invention was described in a patent issued under section 151, or in an application for patent published or deemed published under section 122(b), in which the patent or application, as the case may be, names another inventor and was effectively filed before the effective filing date of the claimed invention.

10. Claim(s) 9-14 is/are rejected under 35 U.S.C. 102(a)(2) as being anticipated by Wisbey (US 2015/0119732).

Regarding claim 9, Wisbey discloses the same invention as claimed, including a ring configured to be worn by the user (Figures 1-3, 6; Paragraphs 36, 41: wristband is a "ring" shaped structure) and comprising means for measuring at least one biosignal of the user during a rest period (Paragraphs 38-40, 45), a mobile communication device configured to communicate with the ring (Figure 7; Paragraphs 48-49: smartphone), means for measuring the user's movements during an activity period and the rest period (Paragraphs 37, 39, 51, 72-78), and a server configured to communicate with the mobile communication device (Figure 7; Paragraphs 48-49), the server being operable to use the measured user's movements to determine a nature of the period, wherein the nature of the period is selected from the activity period and the rest period (Paragraphs 39, 67, 79, 85, 90), determine a rest summary for the rest period, based on the measured at least one biosignal (Paragraph 39: fatigue calculation includes a summary of sleep and rest-related parameters, including

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HRV) and at least one biosignal of a previous rest period (Paragraph 102, end: reference HRV based on past measurements), determine an activity summary for the activity period, based on the measured movements (Paragraphs 39, 51) and measured movements of at least one previous activity period (Paragraphs 53, 93, 104, 116), determine a body response summary based on the rest summary and the activity summary (Paragraphs 39, 53: fatigue and/or dynamic recovery profile), and calculate a readiness score based on the body response summary and a previous body response summary, whereby the readiness score indicates a level of readiness of the user (Paragraphs 57, 110, 111, 122).

Regarding claim 10, Wisbey discloses the means for measuring the user's movements are arranged on the ring or elsewhere in the system as recited (Paragraphs 37, 90, 129).

Regarding claim 11, Wisbey discloses the mobile communication device is configured to visually present the readiness score to the user (Paragraphs 46, 124).

Regarding claim 12, Wisbey discloses at least an accelerometer and gyroscope (Paragraphs 37, 72).

Regarding claim 13, Wisbey discloses a photon source and photon detector arranged on the inner surface of the ring as recited (Paragraphs 40, 45).

Regarding claim 14, Wisbey discloses the ring comprises first and second electrodes adapted to measure an electrocardiogram (Paragraphs 38, 101).

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Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

a. Ahmed (US 2014/0073486) also shows calculating a readiness score based on activity and rest periods.

b. Nishii (US 2005/0080344) shows determining readiness based on activity and rest periods.

c. Colley (US 2015/0182129) shows a smart ring for assessing readiness in terms of stress.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eugene T Wu whose telephone number is (571)270-5053. The examiner can normally be reached on M-F 8am-5pm.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Layno can be reached on 571-272-4949. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Eugene T Wu/
Primary Examiner, Art Unit 3792

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Notice of References Cited	Application/Control No. 15/551,632	Applicant(s)/Patent Under Reexamination KINNUNEN et al.	
	Examiner Eugene T Wu	Art Unit 3792	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-20140073486-A1	03-2014	Ahmed; William	A61B5/02405	482/9
*	B	US-20150182129-A1	07-2015	Colley; Ashley	A61B5/0205	600/301
*	C	US-20050080344-A1	04-2005	Nishii, Katsuyoshi	A61B5/02	600/483
*	D	US-20150119732-A1	04-2015	WISBEY; BEN	A61B5/02405	600/508
	E					
	F					
	G					
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	I					
	J					
	K					
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FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

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Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15/551,632	KINNUNEN et al.
	Examiner	**Art Unit**
	Eugene T Wu	3792

CPC - Searched*		
Symbol	**Date**	**Examiner**
A61B5/0002,0004,0006,0008,01,02,0205,16,165,168,4806,4809,4812,4815,6826,7271,7275,74,742	11/10/2019	ETW

CPC Combination Sets - Searched*		
Symbol	**Date**	**Examiner**

US Classification - Searched*			
Class	**Subclass**	**Date**	**Examiner**

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	**Date**	**Examiner**
INVENTOR NAME	11/10/2019	ETW
ASSIGNEE SEARCH	11/10/2019	ETW
EAST KEYWORD	11/10/2019	ETW

Interference Search			
US Class/CPC Symbol	**US Subclass/CPC Group**	**Date**	**Examiner**

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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L6	2	(US-20140073486-$ or US-20150119732-$).did.	US-PGPUB	OR	ON	2019/11/10 13:22
L7	2	6 and (acceleromet$3 motion movement activity) with (sleep$3 rest$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/10 13:50
L9	1	6 and fatigue with metabolic	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/10 14:16
L10	1	6 and fatigue	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/10 14:17
L13	2	6 and (acceleromet$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/10 14:46
L14	2	6 and display$3	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/10 14:48
L15	2	6 and output$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/10 14:52
S1	125	kinnunen-hannu.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	ON	2019/11/09 15:39

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S2	18	laakkonen-harri.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 15:39
S3	4	kivela-kari.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 15:39
S4	110	colley-ashley.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 15:39
S5	3	lahtela-petteri.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 15:39
S6	28	koskela-markku.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 15:39
S7	8	jurvelin-heidi.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 15:39
S8	270	(S1 S2 S3 S4 S5 S6 S7)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 15:39
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S15	131	kinnunen-hannu$.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 15:49
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S19	31	koskela-markku$.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 15:49
S20	8	jurvelin-heidi$.in.	US-	OR	ON	2019/11/09

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S24	2	"12934009"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 15:52
S25	1	"10980614"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 15:52
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S27	2	"11803713"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 15:52
S28	8	"12366796"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 15:52
S29	3	"12994185"	US-	OR	ON	2019/11/09

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S32	4	"11789425"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 15:54
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S36	5	"56787492".FMID.	US-PGPUB; USPAT; FPRS; JPO	OR	ON	2019/11/09 15:54
S37	2	"58777793".FMID.	US-PGPUB; USPAT; FPRS; JPO	OR	ON	2019/11/09 15:55
S38	4	"57471918".FMID.	US-PGPUB; USPAT;	OR	ON	2019/11/09 15:55

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S41	3	S40 and readiness	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 16:05
S42	16	S40 and summary	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 16:07
S43	8	S40 and activity with rest	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 16:08
S44	11	S40 and recover$3	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 16:11
S45	14	S40 and (scor$3 index$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 16:15
S46	6	"20110015495"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 16:25

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S48	5	"56787492".FMID.	US-PGPUB; USPAT; FPRS; JPO	OR	ON	2019/11/09 16:28
S49	10	("20130287622" | "20150220109" | "20160058375" | "20160116941" | "20160139702" | "20160274621" | "20160287102" | "6553667").PN. OR ("2017/0042477" | "2018/0103902" | "9861314").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2019/11/09 16:28
S50	3	"55538270".FMID.	US-PGPUB; USPAT; FPRS; JPO	OR	ON	2019/11/09 16:28
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S52	4	"57471918".FMID.	US-PGPUB; USPAT; FPRS; JPO	OR	ON	2019/11/09 16:28
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S55	6	("9352207" | "9414784" | "9691253" | "9795324" | "9848823").PN. OR ("10105095" | "2017/0150918").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2019/11/09 16:28
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S73	8	("20030013995" | "20090192391" | "5297558" | "6104947" | "6540686" | "6554776").PN. OR ("2009/0156944" | "8768445").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2019/11/09 16:30
S74	5	"36539991".FMID.	US-PGPUB; USPAT; FPRS; JPO	OR	ON	2019/11/09 16:30
S75	118	("20010004622" | "20010022433" | "20010032743" | "20010033145" | "20010041647" | "20040007835" | "20040066011" | "20040094613" | "20040102684" | "20040239056" | "20050184878" | "20050233859" | "20050261609" | "20050276164" | "20060022417" | "20060079800" | "20080214903" | "4050171" | "4691453" | "5149084" | "5154677" | "5179792" | "5249376" | "5286043" | "5290205" | "5308300" | "5335188" | "5387164" | "5388350" | "5437289" | "5449002" | "5545112" | "5598849" | "5615132" | "5794361" | "5813142" | "5890997" | "5899963" | "5916063" | "5931763" | "5944633" | "5947486" | "6032108" | "6050357" | "6059062" | "6239501" | "6244988" | "6251048" | "6255799" | "6315694" | "6336891" | "6497638" | "6503173" | "6506142" | "6527674" | "6536785" | "6571200" | "6629698" | "6659916" | "6687535" | "6702719" | "6736759" | "6740007" | "6783482" | "6786848" | "6790178" | "6793607" | "6808473" | "6813582" | "6824502" | "6832109" | "6836744" | "6863641" | "6866613" | "6955630" | "6991586" | "6997852" | "7022047" | "7044891" | "7056265" | "7060006" | "7060008" | "7070539" | "7097588" | "7107706" | "7115076" | "7128693" | "7163490" | "7166062" | "7174976" | "7186270" | "7195251" | "7204041" | "7219449" | "7254516" | "7261305" | "7303032" | "7350787" | "7354380" | "7370713" | "7383908" | "7395614" | "7610972" | "7621850" | "7658695" | "7766794").PN. OR ("2008/0214359" | "7901326").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2019/11/09 16:30
S76	4	"36539987".FMID.	US-PGPUB; USPAT; FPRS; JPO	OR	ON	2019/11/09 16:30
S77	28	("20020156386" | "20060004265" |	US-	OR	ON	2019/11/09

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		"4281663" | "5706822" | "6132337" | "6212427").PN. OR ("2007/0287928" | "8082030").URPN.	PGPUB; USPAT; USOCR			16:30
S78	6	"36540037".FMID.	US-PGPUB; USPAT; FPRS; JPO	OR	ON	2019/11/09 16:30
S79	17	("20010016689" | "20030065257" | "20040015195" | "20040077954" | "20050033200" | "20050054938" | "4566461" | "5318596" | "6132337" | "6513532").PN. OR ("2007/0276200" | "7917198").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2019/11/09 16:30
S80	4	"35185253".FMID.	US-PGPUB; USPAT; FPRS; JPO	OR	ON	2019/11/09 16:30
S81	104	("20040102931" | "20040171460" | "20050228237" | "20070219059" | "4408613" | "5081991" | "5158093" | "5769755" | "5921891" | "5976083" | "6176241").PN. OR ("2007/0082789" | "8512238").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2019/11/09 16:31
S82	10	"34940019".FMID.	US-PGPUB; USPAT; FPRS; JPO	OR	ON	2019/11/09 16:31
S83	28	("20020111555" | "20040019289" | "6190324" | "6212427").PN. OR ("2006/0009701" | "7477934").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2019/11/09 16:31
S84	11	"29558668".FMID.	US-PGPUB; USPAT; FPRS; JPO	OR	ON	2019/11/09 16:31
S85	27	("20020109600" | "20040112151" | "20040116837" | "20050004436" | "4625733" | "4962469" | "5164967" | "5573013" | "6477421").PN. OR ("2005/0130802" | "8021312").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2019/11/09 16:31
S86	3	"8566042".FMID.	US-PGPUB; USPAT; FPRS; JPO	OR	ON	2019/11/09 16:31
S87	42	("20020019585" | "20020047867" | "20020099274" | "20020107433" | "20020109600" | "20020133378" | "20030065257" | "20030208133" | "20030219513" | "20030226695" | "20050113650" | "20060015016" | "4625733" | "4951197" | "5704350" | "5839901" | "5890128" | "6039989" | "6102706" | "6277080").PN. OR ("2005/0004436" | "7361141").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2019/11/09 16:31
S88	10	"8557864".FMID.	US-	OR	ON	2019/11/09

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S89	21	("4566461" | "5297558" | "5640956" | "5853351" | "5976083" | "6287262" | "6361502").PN. OR ("2001/0023320" | "6537227").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2019/11/09 16:31
S90	1	"56433647".FMID.	US-PGPUB; USPAT; FPRS; JPO	OR	ON	2019/11/09 16:31
S91	2	("2016/0213267").URPN.	USPAT	OR	ON	2019/11/09 16:31
S92	4	"40848474".FMID.	US-PGPUB; USPAT; FPRS; JPO	OR	ON	2019/11/09 16:31
S93	57	("20020107433" | "20030013995" | "20060032315" | "20060063980" | "20060281606" | "20070026999" | "20070082789" | "20080300498" | "20090069156" | "6537227" | "6540686" | "6554776" | "6687535" | "7534206" | "7641592" | "8052580" | "8066514" | "8348809").PN. OR ("2011/0021319" | "9370691").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2019/11/09 16:31
S94	595	(S49 S53 S55 S57 S59 S61 S63 S65 S67 S69 S71 S73 S75 S77 S79 S81 S83 S85 S87 S89 S91 S93)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 16:34
S95	1	"58663686".FMID.	US-PGPUB; USPAT; FPRS; JPO	OR	ON	2019/11/09 16:36
S96	1	("2017/0132946").URPN.	USPAT	OR	ON	2019/11/09 16:36
S97	2	"58777793".FMID.	US-PGPUB; USPAT; FPRS; JPO	OR	ON	2019/11/09 16:36
S98	6	("9352207" | "9414784" | "9691253" | "9795324" | "9848823").PN. OR ("10105095" | "2017/0150918").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2019/11/09 16:36
S99	12	jouzen.as. jouzen.aanm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 16:42
S100	5	((("20150127265") or ("20100168531") or	US-	OR	OFF	2019/11/09

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		("20140073486")).PN.	PGPUB; USPAT; USOCR; FPRS; EPO; JPO			16:43
S101	1	("2007222276").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	OFF	2019/11/09 16:43
S102	2	("20100168531" | "20140073486").PN.	US-PGPUB; USPAT	OR	ON	2019/11/09 16:46
S103	5	(("20140073486") or ("20130123666") or ("20120299731")).PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	OFF	2019/11/09 17:26
S104	223	S94 and (recover$3 ready readiness)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 17:47
S105	18	"14137942"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 18:01
S106	1	"15946903"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 18:09
S107	33	(US-20170042477-$ or US-20180042540-$ or US-20170156036-$ or US-20170150918-$ or US-20170132946-$ or US-20160256741-$ or US-20150182129-$ or US-20130110265-$ or US-20120010478-$ or US-20110137191-$ or US-20070249470-$ or US-20090216143-$ or US-20090156944-$ or US-20080214359-$ or US-20070287928-$ or US-20070276200-$ or US-20070082789-$ or US-20060009701-$ or US-20050130802-$ or US-20050004436-$ or US-20010023320-$ or US-20160213267-$ or US-20110021319-$ or US-20110015495-$ or US-20160027282-$ or US-20150127265-$).did. or (US-20140073486-$ or US-20100168531-$ or US-20150119732-$ or US-20060004265-$).did. or (US-9864843-$ or US-9622685-$).did. or (JP-2007222276-$).did.	US-PGPUB; USPAT; JPO	OR	ON	2019/11/09 18:11

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S108	20	S107 and (recover$3 ready readiness)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 18:11
S109	14	S107 and (recover$3 ready readiness) with (score status level amount degree extent measure index)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 18:24
S110	10	S107 and (recover$3 ready readiness) near3 (score status level amount degree extent measure index)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 18:26
S111	19066	A61B5/0002.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 18:28
S112	3638	A61B5/0004.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 18:28
S113	7810	A61B5/0006.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 18:28
S114	3541	A61B5/0008.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 18:28
S115	17054	A61B5/01.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 18:28
S116	4544	A61B5/02.CPC.	US-PGPUB; USPAT; USOCR; FPRS;	OR	ON	2019/11/09 18:28

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			EPO; JPO			
S117	17592	A61B5/0205.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 18:28
S118	5275	A61B5/16.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 18:28
S119	6292	A61B5/165.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 18:28
S120	1245	A61B5/168.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 18:29
S121	2304	A61B5/4806.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 18:29
S122	2902	A61B5/4809.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 18:29
S123	3187	A61B5/4812.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 18:29
S124	1920	A61B5/4815.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 18:29
S125	6939	A61B5/6826.CPC.	US-PGPUB; USPAT;	OR	ON	2019/11/09 18:29

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			USOCR; FPRS; EPO; JPO			
S126	1487	A61B5/7271.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 18:29
S127	11506	A61B5/7275.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 18:29
S128	1088	A61B5/74.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 18:29
S129	16358	A61B5/742.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 18:29
S130	92730	(S111 S112 S113 S114 S115 S116 S117 S118 S119 S120 S121 S122 S123 S124 S125 S126 S127 S128 S129)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 18:29
S131	1191	S130 and (recover$3 ready readiness) near3 (score status level amount degree extent measure index)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 18:30
S132	864	S130 and (recover$3) near3 (score status level amount degree extent measure index)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 18:30
S133	618	S130 and (recover$3) near2 (score status level amount degree extent measure index)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 18:30
S134	295	S130 and (recover$3) near (score status	US-	OR	ON	2019/11/09

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		level amount degree extent measure index)	PGPUB; USPAT; USOCR; FPRS; EPO; JPO			18:31
S135	457	S130 and (recover$3 ready readiness) near (score status level amount degree extent measure index)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 18:31
S136	55	(US-20170042477-$ or US-20180042540-$ or US-20170156036-$ or US-20170150918-$ or US-20170132946-$ or US-20160256741-$ or US-20150182129-$ or US-20130110265-$ or US-20120010478-$ or US-20110137191-$ or US-20070249470-$ or US-20090216143-$ or US-20090156944-$ or US-20080214359-$ or US-20070287928-$ or US-20070276200-$ or US-20070082789-$ or US-20060009701-$ or US-20050130802-$ or US-20050004436-$ or US-20010023320-$ or US-20160213267-$ or US-20110021319-$ or US-20110015495-$ or US-20160027282-$ or US-20150127265-$).did. or (US-20140073486-$ or US-20100168531-$ or US-20150119732-$ or US-20060004265-$ or US-20140194756-$ or US-20160106320-$ or US-20160232807-$ or US-20180303425-$ or US-20190214144-$ or US-20090275442-$ or US-20150305688-$ or US-20160324488-$ or US-20050080344-$ or US-20160066827-$ or US-20170053078-$ or US-20110190645-$ or US-20160213334-$ or US-20150250417-$ or US-20150120017-$ or US-20160030809-$ or US-20150118669-$ or US-20160058378-$ or US-20150116117-$ or US-20150190072-$ or US-20150116125-$).did. or (US-9864843-$ or US-9622685-$ or US-10420504-$).did. or (JP-2007222276-$).did.	US-PGPUB; USPAT; JPO	OR	ON	2019/11/09 20:49
S137	42	S136 and (recover$3 ready readiness)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 20:49
S138	1	(US-20140073486-$).did.	US-PGPUB	OR	ON	2019/11/09 21:04
S139	1	S138 and (accelerometer$3 motion activity)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 21:04
S140	1	S138 and intensity	US-PGPUB; USPAT; USOCR;	OR	ON	2019/11/09 21:18

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			FPRS; EPO; JPO			
S141	53	S136 and (accelerometer$3 motion movement activity)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 21:46
S142	1	"14134942"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 22:17
S143	18	"14137942"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 22:17
S144	32	"14137734"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 22:17
S145	1	(US-20150119732-$).did.	US-PGPUB	OR	ON	2019/11/09 22:51
S146	1	S145 and sleep	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 22:51
S147	1	S145 and hrv	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2019/11/09 22:53

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Doc description: Information Disclosure Statement (IDS) Filed

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	
Filing Date	
First Named Inventor	Hannu KINNUNEN
Art Unit	
Examiner Name	
Attorney Docket Number	MDOA.4026.USN1_Jouzen003

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	1	20100168531	A1	2010-07-01	Shaltis et al.	
	2	20140073486	A1	2014-03-13	Ahmed et al.	

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	1	2013161072	WO	A1	2013-10-31	TOYOTA MOTOR CO LTD		☓
	2	2007222276	JP	A	2007-09-06	TANITA SEISAKUSHO KK		☒

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	
	Filing Date	
	First Named Inventor	Hannu KINNUNEN
	Art Unit	
	Examiner Name	
	Attorney Docket Number	MDOA.4026.USN1_Jouzen003

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	1	JONES A Y ME ET AL: "Activity Levels and Resting Energy Expenditure in an Elderly Population: A Pilot Study", Hong Kong Physiotherapy Journal, Elsevier, Amsterdam, NL, vol. 22, no. 1, 1 January 2004, ISSN: 1013-7025(09)70047-8, 4 pages.	
	2	RENNIE K ET AL: "A Combined Heart Rate and Movemetn Sensor: Proof of Concept and Preliminary Testing Study", European Journal of Clinical Nutirition, vol. 54, no 5, 1 May 2000, DOI: 10.1038/SJ.EJCN.1600973, 6 pages.	
	3	International Search Report, Application Number PCT/FI2016/050113, mailed 26 May 2016, 3 pages.	

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Examiner Signature	/Eugene T Wu/	Date Considered	11/09/2019

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Petitioner Samsung Ex-1004, 0358

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	
	Filing Date	
	First Named Inventor	Hannu KINNUNEN
	Art Unit	
	Examiner Name	
	Attorney Docket Number	MDOA.4026.USN1_Jouzen003

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/gcz44004/	Date (YYYY-MM-DD)	2017-08-17
Name/Print	Geza C. Ziegler	Registration Number	44004

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Petitioner Samsung Ex-1004, 0359

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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /EW/

Petitioner Samsung Ex-1004, 0360

Bibliographic Data

Application No: 15/551,632

Foreign Priority claimed: ○ Yes ◉ No

35 USC 119 (a-d) conditions met: ☐ Yes ☑ No ☐ Met After Allowance

Verified and Acknowledged: /Eugene T Wu/ (Examiner's Signature) | (Initials)

Title: METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
08/17/2017	600	3792	MDOA.4026.USN1_Jouzen003
RULE			

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CONTINUING DATA

This application is a 371 of PCT/FI2016/050113 02/23/2016

PCT/FI2016/050113 has PRO of 62260760 11/30/2015

PCT/FI2016/050113 has PRO of 62205114 08/14/2015

PCT/FI2016/050113 has PRO of 62121425 02/26/2015

FOREIGN APPLICATIONS

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

INVENTOR(s):	Hannu KINNUNEN	CONF. NO.	1733
SERIAL NO.:	15/551,632	ART UNIT:	3792
FILING DATE:	17 August 2017	EXAMINER:	WU, Tong E.
TITLE:	METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER		
ATTORNEY REFERENCE NO.:	MDOA.4026.USN1	Jouzen003US	

Commissioner of Patents
P.O. Box 1450
Alexandria, VA 22313-1450

AMENDMENT

I.Introduction

This is a response to the Non-Final Office Action dated 15 November 2019 for this application.

Amendments to the Claims begin on page 2 of this paper.

Remarks begin on page 6 of this paper.

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II.Amendments to the Claims

The following listing of claims will replace all prior versions and listings of claims in the application:

1. (Withdrawn) A method for assessing readiness of a user, the method comprising:

obtaining the user's movements;

using the obtained user's movements to determine a nature of the period, wherein the nature of the period is selected from an activity period and a rest period;

measuring at least one biosignal of the user during the rest period;

determining a rest summary for the rest period, based on the measured at least one biosignal and at least one biosignal of a previous rest period;

determining an activity summary for the activity period, based on the obtained movements of an activity period and obtained movements of at least one previous activity period;

determining a body response summary based on the rest summary and the activity summary; and

calculating a readiness score based on the body response summary and a previous body response summary, whereby the readiness score indicates a level of readiness of the user.

2. (Withdrawn) A method according to claim 1, wherein obtaining the user's movements is performed by measuring the user's movements or by retrieving the user's movement data from a separate device.

3. (Withdrawn-Previously Presented) A method according to claim 1, further comprising measuring at least one biosignal during the activity period.

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4. (Withdrawn-Previously Presented) A method according to claim 1, wherein the at least one biosignal is selected from the group consisting of an electrocardiogram, a photoplethysmogram, an electromyogram, an electroocylogram, a heart rate, a heart rate variability, a body temperature, a resting heart rate, an average heart rate and signals related to breathing.

5. (Withdrawn-Previously Presented) A method according to claim 1, wherein determining the rest summary comprises at least one of determining a sleep factor, determining a sleep balance, determining lowest body temperature during rest and determining a resting heart rate.

6. (Withdrawn-Previously Presented) A method according to claim 1, further comprising providing the user with appropriate instructions, related to at least one of physical activity, mental activity and rest, for improving the user's readiness score.

7. (Withdrawn-Previously Presented) A method according to claim 1, further comprising using historical data of the user to calculate the readiness score.

8. (Withdrawn-Previously Presented) A method according to claim 1, further comprising using at least one of target information provided by the user, personal characteristics provided by the user and personal characteristics previously determined by the method.

9. (Currently Amended) A system for assessing readiness of a user, the system comprising:

a ring configured to be worn by the user and comprising means for measuring at least one biosignal of the user during a rest period,

a mobile communication device configured to communicate with the ring,

means for measuring the user's movements during an activity period and the rest period, and

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a server configured to communicate with the mobile communication device, the server being operable to

use the measured user's movements to determine a nature of the period, wherein the nature of the period is selected from the activity period and the rest period,

determine a rest summary for the rest period, based on the measured at least one biosignal and at least one biosignal of a previous rest period,

determine an activity summary for the activity period, based on the measured movements and measured movements of at least one previous activity period,

determine a body response summary based on the rest summary and the activity summary; and

calculate a readiness score based on the body response summary and a previous body response summary, whereby the readiness score indicates a level of readiness of the user.

10. (Currently Amended) A system according to claim 9, wherein the means for measuring the user's movements are arranged on the ring, in the mobile communication device or in an activity determination device.

11. (Previously Presented) A system according to claim 9, wherein the mobile communication device is configured to visually present the readiness score to the user.

12. (Currently Amended) A system according to claim 9, wherein the means for measuring the user's movements is selected from the group consisting of an accelerometer, a gyroscope and a magnetic field sensor.

13. (Previously Presented) A system according to claim 9, wherein the means for measuring a heart rate comprises a photon source arranged on the inner surface of the ring and a photon detector arranged on the inner surface of the ring.

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14. (Previously Presented) A system according to claim 9, wherein the ring further comprises a first electrode and a second electrode adapted to measure an electrocardiogram.

15. (Withdrawn) A user interface comprising an area indicating a readiness score of the user, an area indicating parameters affecting the readiness score and an area indicating change of at least one of said parameters with respect to an earlier point of time.

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III.Remarks

Claims 9-14 are under consideration. Claims 1-8 and 15 are withdrawn. Claims 9, 10, and 12 are amended.

Claim Objections

Claims 9, 10, and 12 are amended to overcome the claim objections.

Rejections under 35 U.S.C. §102

Claims 9-14 are rejected under 35 U.S.C. §102(a)(2) as being anticipated by Wisbey et al. (US 2015/0119732, "Wisbey").

Applicant respectfully submits that Wisbey fails to disclose or suggest:

use the measured user's movements to determine a nature of the period, wherein the nature of the period is selected from the activity period and the rest period,

determine a rest summary for the rest period, based on the measured at least one biosignal and at least one biosignal of a previous rest period,

determine an activity summary for the activity period, based on the measured movements and measured movements of at least one previous activity period,

determine a body response summary based on the rest summary and the activity summary; and

calculate a readiness score based on the body response summary and a previous body response summary, whereby the readiness score indicates a level of readiness of the user.

as recited by claim 9.

The present Action cites paragraphs [0039], [0067], [0079], [0085], and [0090] of Wisbey as disclosing "use the measured user's movements to determine a nature of the period, wherein the nature of the period is selected from the activity period and the rest period." Applicant respectfully disagrees. Paragraph [0039] discloses calculating a fatigue level by combining an amount of physical activity, sleep, rest, an amount of time without physical activity, in combination with a heart vate variability (HRV) to calculate a fatigue level. Paragraph [0067] describes different reference activities. Paragraph

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[0079] describes determining different reference activity types. Paragraph [0085] describes presenting reference activity types in descending order of likelihood for user selection, and paragraph [0090] discloses using sensors to determine a user's activity type. However, none of these paragraphs disclose or suggest using measured user's movements to determine a nature of a period, selected from an activity period and a rest period.

The present Action cites paragraphs [0039] and [0102] of Wisbey as disclosing "determine a rest summary for the rest period, based on the measured at least one biosignal and at least one biosignal of a previous rest period." Applicant respectfully disagrees. Paragraph [0039] discloses calculating a fatigue level by combining an amount of physical activity, sleep, rest, an amount of time without physical activity, in combination with a heart vate variability (HRV) to calculate a fatigue level. There is no determination based on a biosignal of a rest period and a biosignal of a previous rest period. Paragraph [0102] basing a fatigue level on an amount of sleep for the previous night and duration, type, and intensity of activity for a previous time period, as opposed to comparing bisignals of present and previous rest periods.

The present Action cites paragraphs [0039], [0051], [0053], 0093], [0104], and [116] of Wisbey as disclosing "determine an activity summary for the activity period, based on the measured movements and measured movements of at least one previous activity period." Applicant respectfully disagrees. Paragraph [0039] discloses calculating a fatigue level by combining an amount of physical activity, sleep, rest, an amount of time without physical activity, in combination with a heart rate variability (HRV) to calculate a fatigue level. Paragraph [0051] describes monitoring movement to create a metabolic activity score. Paragraph [0053] describes creating a dynamic recovery profile based on historical fatigue level information or historical movement and metabolic activity scores, but not an activity summary based on measured movements and measured movements of a previous activity period. Paragraph [0093], discloses updating a set of period of activity scores that are based on movement monitored during a set of score periods, but again, not an activity summary based on measured movements and measured movements of a previous activity period. Paragraph [0104] detects a fatigue level to determine whether an activity is necessary, an appropriate intensiy and an appropriate duration, but does not disclose determining an activity

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summary for an activity period, based on measured movements and measured movements of at least one previous activity period.

The present Action cites paragraphs [0039] and [0053] of Wisbey as disclosing "determine a body response summary based on the rest summary and the activity summary." Applicant respectfully disagrees. As argued above, paragraph [0039] discloses calculating a fatigue level by combining an amount of physical activity, sleep, rest, an amount of time without physical activity, in combination with a heart rate variability (HRV) to calculate a fatigue level. Also as argued above, paragraph [0053] describes creating a dynamic recovery profile based on historical fatigue level information or historical movement and metabolic activity scores, but neither paragraph disclose or suggests determining a body response summary based on the rest summary and the activity summary.

The present Action cites paragraphs [0057], [0110], [0111], and [0122] of Wisbey as disclosing "calculate a readiness score based on the body response summary and a previous body response summary, whereby the readiness score indicates a level of readiness of the user." Applicant respectfully disagrees. Applicant notes that the readiness score is based on a body response summary and a previous body response summary, where the body response summaries are based on rest summaries and activity summaries. The rest summaries are based on a measured at least one biosignal and at least one biosignal of a previous rest period, and the activity summaries are based on the measured movements and measured movements of at least one previous activity period. Instead of such a readiness score, Wisbey's paragraphs [0057], [0110], [0111], and [0122] disclose an interpreted recovery score based on a user's personalized fatigue levels over time and a measured heart rate variability.

Thus, Wisbey fails to disclose or suggest these features of claim 9 and therefore fails to anticipate claim 9.

By way of further explanation, Whisbey calculates a fatigue level by using an amount physical activity, sleep, or rest and heart rate variability (HRV). The recovery index is based on the fatigue level. As stated in paragraph [0039]:

> [0039] In some embodiments, logic circuits 240 detect and store metrics such as the amount of physical activity, sleep, or rest over a recent period of time, or the

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> amount of time without physical activity over a recent period of time. Logic circuits 240 may then use the HRV, or the HRV in combination with said metrics, to calculate a fatigue level. In one embodiment, the fatigue level is a function of the recovery interval. Logic circuits 240 may detect, for example, the amount of physical activity and the amount of sleep a user experienced over the last 48 hours, combine those metrics with the user's HRV, and calculate a fatigue level of between 1 and 10,

The metabolic loading is used for defining an activity level/load. Different tables are used to define the activity type and its load. Food intake or calorie consumption reduces the metabolic load. Thus, Whisbey discloses a simple fatigue and recovery score determination method that uses fatigue as a parameter that activity increases, calorie consumption reduces, an amount of sleep reduces, and an amount of rest reduces. The method is designed for determining a load of an activity and then how the user is recovering from that single activity/exercise. Sleep time, and or rest time directly reduces the fatigue score. A recovery score is then calculated as a interpreting index to illustrate a fatigue level to a user.

The presently claimed invention operates differently. The presently claimed invention uses both a rest time score and an activity time score as separate contributors to calculate a body response summary. Sleep and activity scores are based on more than one night period or more than 1 day period. Sleep and activity parameters are compared first to their own rest and activity references, respectively. Next, a body response summary is determined based on both the rest summary and the activity summary. From paragraph [0018] of the present application:

> [0018] …Body responses can mean for instance temperature, resting heart rates relative to user's own normative values, or how much they have changed as a response to previous day's physical activity.

The significance of this is set out in paragraph [0058]:

> [0058] …However, the presented example calculations give one example on the solution to the problem how one could combine the complex and occasionally contradictory contributions of sleep, activity and body responses to the readiness of the user (body responses for example due to sickness or environmental factors). It may be useful to show the combination of factors for several reasons. For example, not everybody can similarly adjust every parameter (shift work, other responsibilities or preferences or life habits or temperament) so it is necessary to leave the freedom and possible choice to the user. Moreover, each factor may be important on different times (holiday, weekday/weekend day, depending on family situations or training phase etc.).

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Conclusion

Applicant respectfully submits that the application is in condition for allowance, and such action is respectfully requested

The Commissioner is hereby authorized to charge any fees associated with this communication or credit any over payment to Deposit Account No. 50-5215.

Respectfully submitted,

/jvg44695/ 07 February 2010
Joseph V. Gamberdell, Jr. Date
Reg. No. 44,695

Ziegler IP Law Group, LLC.
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Petitioner Samsung Ex-1004, 0372

Electronic Acknowledgement Receipt

EFS ID:	38523741
Application Number:	15551632
International Application Number:	
Confirmation Number:	1733
Title of Invention:	METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER
First Named Inventor/Applicant Name:	Hannu KINNUNEN
Customer Number:	93582
Filer:	Joseph V. Gamberdell/Ruth DeSabia
Filer Authorized By:	Joseph V. Gamberdell
Attorney Docket Number:	MDOA.4026.USN1_Jouzen003
Receipt Date:	07-FEB-2020
Filing Date:	17-AUG-2017
Time Stamp:	12:17:32
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		200126_4026USN1_Jouzen003_NFOA_Reply.pdf	49949 68e3bd95743d394134c5feaefaff8607156b995c	yes	10

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Amendment/Req. Reconsideration-After Non-Final Reject	1	1
	Claims	2	5
	Applicant Arguments/Remarks Made in an Amendment	6	10
Warnings:			
Information:			
	Total Files Size (in bytes):	49949	

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If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/551,632	08/17/2017	Hannu KINNUNEN	MDOA.4026.USN1_Jouzen003	1733

93582 7590 02/18/2020

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EXAMINER
WU, TONG E

ART UNIT	PAPER NUMBER
3792	

NOTIFICATION DATE	DELIVERY MODE
02/18/2020	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

eofficeaction@appcoll.com
paralegal_ziplaw@arcticinvent.com
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Petitioner Samsung Ex-1004, 0375

Office Action Summary	Application No. 15/551,632	Applicant(s) KINNUNEN et al.	
	Examiner Eugene T Wu	Art Unit 3792	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on 2/7/20.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☑ This action is **FINAL.** 2b) ☐ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 1-15 is/are pending in the application.

5a) Of the above claim(s) 1-8 and 15 is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 9-14 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

DETAILED ACTION

02/07/20 - Applicant response.
11/15/19 - First action on the merits.
10/21/19 - Applicant election.
08/21/19 - Lack of unity requirement.

Response to Arguments

1. Applicant's arguments filed 2/7/20 have been fully considered but they are not persuasive.

Regarding Wisbey, Applicant's arguments summarize points from each cited paragraph of Wisbey, and then assert that the paragraphs of Wisbey do not disclose each element as claimed (i.e. verbatim). However, a reference need not use the same exact words (*ipsis verbis*) in order to anticipate a claim. See MPEP 2131. Examiner maintains that the interpreted recovery score of Wisbey (Paragraphs 57, 110, 111, 122) sufficiently reads on the readiness score as claimed. Applicant's arguments also fail to comply with 37 CFR 1.111(b) because they amount to a general allegation that the claims define a patentable invention without specifically pointing out how the language of the claims patentably distinguishes them from the references.

Claim Interpretation

2. The following is a quotation of 35 U.S.C. 112(f):

> (f) Element in Claim for a Combination. – An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.

The following is a quotation of pre-AIA 35 U.S.C. 112, sixth paragraph:

> An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.

3. The claims in this application are given their broadest reasonable interpretation using the plain meaning of the claim language in light of the specification as it would be understood by one of ordinary skill in the art. The broadest reasonable interpretation of a claim element (also commonly

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referred to as a claim limitation) is limited by the description in the specification when 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph, is invoked.

As explained in MPEP § 2181, subsection I, claim limitations that meet the following three-prong test will be interpreted under 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph:

(A) the claim limitation uses the term "means" or "step" or a term used as a substitute for "means" that is a generic placeholder (also called a nonce term or a non-structural term having no specific structural meaning) for performing the claimed function;

(B) the term "means" or "step" or the generic placeholder is modified by functional language, typically, but not always linked by the transition word "for" (e.g., "means for") or another linking word or phrase, such as "configured to" or "so that"; and

(C) the term "means" or "step" or the generic placeholder is not modified by sufficient structure, material, or acts for performing the claimed function.

Use of the word "means" (or "step") in a claim with functional language creates a rebuttable presumption that the claim limitation is to be treated in accordance with 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph. The presumption that the claim limitation is interpreted under 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph, is rebutted when the claim limitation recites sufficient structure, material, or acts to entirely perform the recited function.

Absence of the word "means" (or "step") in a claim creates a rebuttable presumption that the claim limitation is not to be treated in accordance with 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph. The presumption that the claim limitation is not interpreted under 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph, is rebutted when the claim limitation recites function without reciting sufficient structure, material or acts to entirely perform the recited function.

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Claim limitations in this application that use the word “means” (or “step”) are being interpreted under 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph, except as otherwise indicated in an Office action. Conversely, claim limitations in this application that do not use the word “means” (or “step”) are not being interpreted under 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph, except as otherwise indicated in an Office action.

Not Invoked Despite Presence of "means"

4. This application includes one or more claim limitations that use the word “means” or “step” but are nonetheless not being interpreted under 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph because the claim limitation(s) recite(s) sufficient structure, materials, or acts to entirely perform the recited function. Such claim limitation(s) is/are:

Claim 12: "means for measuring user's movements..." is modified by sufficient structure.

Claim 13: Assuming this was meant to recite "means for measuring at least one biosignal...", the claim recites further sufficient structure.

Claim 14: Recites further sufficient structure for the "means for measuring at least one biosignal...".

Because this/these claim limitation(s) is/are **not** being interpreted under 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph, it/they is/are **not** being interpreted to cover only the corresponding structure, material, or acts described in the specification as performing the claimed function, and equivalents thereof.

If applicant intends to have this/these limitation(s) interpreted under 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph, applicant may: (1) amend the claim limitation(s) to remove the structure, materials, or acts that performs the claimed function; or (2) present a sufficient showing that the claim limitation(s) does/do not recite sufficient structure, materials, or acts to perform the claimed function.

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Claim Rejections - 35 USC § 102

5. In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a)(2) the claimed invention was described in a patent issued under section 151, or in an application for patent published or deemed published under section 122(b), in which the patent or application, as the case may be, names another inventor and was effectively filed before the effective filing date of the claimed invention.

7. Claim(s) 9-14 is/are rejected under 35 U.S.C. 102(a)(2) as being anticipated by Wisbey (US 2015/0119732).

Regarding claim 9, Wisbey discloses the same invention as claimed, including a ring configured to be worn by the user (Figures 1-3, 6; Paragraphs 36, 41: wristband is a "ring" shaped structure) and comprising means for measuring at least one biosignal of the user during a rest period (Paragraphs 38-40, 45), a mobile communication device configured to communicate with the ring (Figure 7; Paragraphs 48-49: smartphone), means for measuring the user's movements during an activity period and the rest period (Paragraphs 37, 39, 51, 72-78), and a server configured to communicate with the mobile communication device (Figure 7; Paragraphs 48-49), the server being operable to use the measured user's movements to determine a nature of the period, wherein the nature of the period is selected from the activity period and the rest period (Paragraphs 39, 67, 79, 85, 90), determine a rest summary for the rest period, based on the measured at least one biosignal (Paragraph 39: fatigue calculation includes a summary of sleep and rest-related parameters, including HRV) and at least one biosignal of a previous rest period (Paragraph 102, end: reference HRV based

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on past measurements), determine an activity summary for the activity period, based on the measured movements (Paragraphs 39, 51) and measured movements of at least one previous activity period (Paragraphs 53, 93, 104, 116), determine a body response summary based on the rest summary and the activity summary (Paragraphs 39, 53: fatigue and/or dynamic recovery profile), and calculate a readiness score based on the body response summary and a previous body response summary, whereby the readiness score indicates a level of readiness of the user (Paragraphs 57, 110, 111, 122).

Regarding claim 10, Wisbey discloses the means for measuring the user's movements are arranged on the ring or elsewhere in the system as recited (Paragraphs 37, 90, 129).

Regarding claim 11, Wisbey discloses the mobile communication device is configured to visually present the readiness score to the user (Paragraphs 46, 124).

Regarding claim 12, Wisbey discloses at least an accelerometer and gyroscope (Paragraphs 37, 72).

Regarding claim 13, Wisbey discloses a photon source and photon detector arranged on the inner surface of the ring as recited (Paragraphs 40, 45).

Regarding claim 14, Wisbey discloses the ring comprises first and second electrodes adapted to measure an electrocardiogram (Paragraphs 38, 101).

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Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Petitioner Samsung Ex-1004, 0382

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eugene T Wu whose telephone number is (571)270-5053. The examiner can normally be reached on M-F 8am-5pm.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Layno can be reached on 571-272-4949. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Eugene T Wu/
Primary Examiner, Art Unit 3792

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15/551,632	KINNUNEN et al.
	Examiner	Art Unit
	Eugene T Wu	3792

CPC - Searched*		
Symbol	Date	Examiner
A61B5/ 0002,0004,0006,0008,01,02,0205,16,165,168,4806,4809,4812,4815, 6826,7271,7275,74,742	11/10/2019	ETW

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
INVENTOR NAME	11/10/2019	ETW
ASSIGNEE SEARCH	11/10/2019	ETW
EAST KEYWORD	11/10/2019	ETW
UPDATED SEARCH	02/10/2020	ETW

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

Petitioner Samsung Ex-1004, 0384

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L5	19	"oura health".as. "oura health".aanm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/02/10 21:06
L6	19	laakkonen-harri$.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/02/10 21:06
L7	132	kinnunen-hannu$.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/02/10 21:06
L8	6	kivela-kari$.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/02/10 21:06
L9	111	colley-ashley$.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/02/10 21:06
L10	3	lahtela-petteri$.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/02/10 21:06
L11	32	koskela-markku$.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/02/10 21:06
L12	8	jurvelin-heidi$.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/02/10 21:06
L13	278	(L7 L8 L9 L10 L11 L12 L6)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/02/10 21:06
L14	4	(L13 L5) and @pd>"20191115"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/02/10 21:06
L15	21057	A61B5/0002.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/02/10 21:08
L16	4332	A61B5/0004.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/02/10 21:08

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L17	8717	A61B5/0006.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/02/10 21:08
L18	3940	A61B5/0008.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/02/10 21:08
L19	19909	A61B5/01.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/02/10 21:08
L20	5460	A61B5/02.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/02/10 21:08
L21	20383	A61B5/0205.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/02/10 21:08
L22	5925	A61B5/16.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/02/10 21:08
L23	7512	A61B5/165.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/02/10 21:08
L24	1471	A61B5/168.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/02/10 21:08
L25	2823	A61B5/4806.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/02/10 21:08
L26	3437	A61B5/4809.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/02/10 21:08
L27	3747	A61B5/4812.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/02/10 21:08
L28	2225	A61B5/4815.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/02/10 21:08
L29	7742	A61B5/6826.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/02/10 21:08
L30	1738	A61B5/7271.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/02/10 21:08
L31	13592	A61B5/7275.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	ON	2020/02/10 21:08

Petitioner Samsung Ex-1004, 0386

			JPO			
L32	1294	A61B5/74.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/02/10 21:08
L33	19496	A61B5/742.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/02/10 21:08
L34	107323	(L15 L16 L17 L18 L19 L20 L21 L22 L23 L24 L25 L26 L27 L28 L29 L30 L31 L32 L33)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/02/10 21:08
L35	1262	L34 and (recover$3 ready readiness) near3 (score status level amount degree extent measure index)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/02/10 21:08
L36	920	L34 and (recover$3) near3 (score status level amount degree extent measure index)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/02/10 21:08
L37	656	L34 and (recover$3) near2 (score status level amount degree extent measure index)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/02/10 21:08
L38	322	L34 and (recover$3) near (score status level amount degree extent measure index)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/02/10 21:08
L39	491	L34 and (recover$3 ready readiness) near (score status level amount degree extent measure index)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/02/10 21:08
L40	42	(L35 L36 L37 L38 L39) and @pd>"20191115"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/02/10 21:08

EAST Search History (Interference)

< This search history is empty>

2/10/2020 9:09:14 PM
C:\Users\ewu1\Documents\EAST\Workspaces\15551632 - Readiness score smart ring sensor.wsp

Petitioner Samsung Ex-1004, 0387

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

INVENTOR(s):	Hannu KINNUNEN	CONF. NO.	1733
SERIAL NO.:	15/551,632	ART UNIT:	3792
FILING DATE:	17 August 2017	EXAMINER:	WU, Tong E.
TITLE:	METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER		
ATTORNEY REFERENCE NO.:	MDOA.4026.USN1	Jouzen003US	

Commissioner of Patents
P.O. Box 1450
Alexandria, VA 22313-1450

AMENDMENT

I. Introduction

This is a response to the Final Office Action dated 18 February 2020 for this application.

Amendments to the Claims begins on page 2 of this paper.

Remarks begin on page 6 of this paper.

Petitioner Samsung Ex-1004, 0388

PTO/SB/06 (09-11)
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 15/551,632	Filing Date 08/17/2017	☐ To be Mailed

ENTITY: ☐ LARGE ☑ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $40 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $210 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	04/20/2020	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 15	Minus	** 20	= 0		x $50 =	0
	Independent (37 CFR 1.16(h))	* 2	Minus	*** 3	= 0		x $230 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/ANNETTE COWAN/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

INVENTOR(s):	Hannu KINNUNEN	CONF. NO.	1733
SERIAL NO.:	15/551,632	ART UNIT:	3792
FILING DATE:	17 August 2017	EXAMINER:	WU, Tong E.
TITLE:	METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER		
ATTORNEY REFERENCE NO.:	MDOA.4026.USN1	Jouzen003US	

Commissioner of Patents
P.O. Box 1450
Alexandria, VA 22313-1450

AMENDMENT

I. Introduction

This is a response to the Final Office Action dated 18 February 2020 for this application.

Amendments to the Claims begins on page 2 of this paper.

Remarks begin on page 6 of this paper.

Petitioner Samsung Ex-1004, 0390

II. Amendments to the Claims

The following listing of claims will replace all prior versions and listings of claims in the application:

1. (Withdrawn) A method for assessing readiness of a user, the method comprising:

obtaining the user's movements;

using the obtained user's movements to determine a nature of the period, wherein the nature of the period is selected from an activity period and a rest period;

measuring at least one biosignal of the user during the rest period;

determining a rest summary for the rest period, based on the measured at least one biosignal and at least one biosignal of a previous rest period;

determining an activity summary for the activity period, based on the obtained movements of an activity period and obtained movements of at least one previous activity period;

determining a body response summary based on the rest summary and the activity summary; and

calculating a readiness score based on the body response summary and a previous body response summary, whereby the readiness score indicates a level of readiness of the user.

2. (Withdrawn) A method according to claim 1, wherein obtaining the user's movements is performed by measuring the user's movements or by retrieving the user's movement data from a separate device.

3. (Withdrawn-Previously Presented) A method according to claim 1, further comprising measuring at least one biosignal during the activity period.

Petitioner Samsung Ex-1004, 0391

4. (Withdrawn-Previously Presented) A method according to claim 1, wherein the at least one biosignal is selected from the group consisting of an electrocardiogram, a photoplethysmogram, an electromyogram, an electroocylogram, a heart rate, a heart rate variability, a body temperature, a resting heart rate, an average heart rate and signals related to breathing.

5. (Withdrawn-Previously Presented) A method according to claim 1, wherein determining the rest summary comprises at least one of determining a sleep factor, determining a sleep balance, determining lowest body temperature during rest and determining a resting heart rate.

6. (Withdrawn-Previously Presented) A method according to claim 1, further comprising providing the user with appropriate instructions, related to at least one of physical activity, mental activity and rest, for improving the user's readiness score.

7. (Withdrawn-Previously Presented) A method according to claim 1, further comprising using historical data of the user to calculate the readiness score.

8. (Withdrawn-Previously Presented) A method according to claim 1, further comprising using at least one of target information provided by the user, personal characteristics provided by the user and personal characteristics previously determined by the method.

9. (Currently Amended) A system for assessing readiness of a user, the system comprising:

a ring configured to be worn by the user and comprising means for measuring at least one biosignal of the user during a rest period,

a mobile communication device configured to communicate with the ring,

means for measuring the user's movements during an activity period and the rest period, and

Petitioner Samsung Ex-1004, 0392

a server configured to communicate with the mobile communication device, the server being operable to

use the measured user's movements to determine a nature of the period, wherein the nature of the period is selected from the activity period and the rest period,

determine a rest summary for the rest period, based on the measured at least one biosignal and at least one biosignal of a previous rest period,

determine an activity summary for the activity period, based on the measured movements and measured movements of at least one previous activity period,

determine a body response summary based on the rest summary and the activity summary; and

calculate a readiness score based on the body response summary and a previous body response summary, whereby the readiness score indicates a level of readiness of the user; and

a user interface of the mobile communication device configured to show elements contributing to the readiness score and instructions, related to physical activity and mental activity for improving the readiness score.

10. (Previously Presented) A system according to claim 9, wherein the means for measuring the user's movements are arranged on the ring, in the mobile communication device or in an activity determination device.

11. (Previously Presented) A system according to claim 9, wherein the mobile communication device is configured to visually present the readiness score to the user.

12. (Previously Presented) A system according to claim 9, wherein the means for measuring the user's movements is selected from the group consisting of an accelerometer, a gyroscope and a magnetic field sensor.

Petitioner Samsung Ex-1004, 0393

13. (Previously Presented) A system according to claim 9, wherein the means for measuring a heart rate comprises a photon source arranged on the inner surface of the ring and a photon detector arranged on the inner surface of the ring.

14. (Previously Presented) A system according to claim 9, wherein the ring further comprises a first electrode and a second electrode adapted to measure an electrocardiogram.

15. (Withdrawn) A user interface comprising an area indicating a readiness score of the user, an area indicating parameters affecting the readiness score and an area indicating change of at least one of said parameters with respect to an earlier point of time.

Petitioner Samsung Ex-1004, 0394

III. Remarks

Claims 9-14 are under consideration. Claims 1-8 and 15 are withdrawn. Claim 9 is amended and support for the amendments may be found in the application, for example, in paragraphs [0048] and [0050].

Rejections under 35 U.S.C. §102

Claims 9-14 are rejected under 35 U.S.C. §102(a)(2) as being anticipated by Wisbey et al. (US 2015/0119732, "Wisbey").

Applicant respectfully submits that Wisbey fails to disclose or suggest:

> a user interface of the mobile communication device configured to show elements contributing to the readiness score and instructions, related to physical activity and mental activity for improving the readiness score.

as recited by claim 9.

Applicant finds no disclosure in Wisbey related to these features. While Wisbey discloses "providing a recovery status" in paragraph [0119] there is no disclosure in Wisbey directed to showing elements that contribute to the readiness score on a user interface of a mobile communication device.

Furthermore, while Wisbey discloses providing an activity recommendation in paragraph [0121], Wisbey does not disclose providing instructions, related to physical activity and mental activity for improving the readiness score on a user interface of a mobile communication device.

At least for these reasons, Wisbey fails to disclose or suggest all the features of independent claim 9 and therefore fails to anticipate claim 9. Dependent claims 10-14 are patentable because of their dependencies and for the subject matter they recite.

Petitioner Samsung Ex-1004, 0395

Conclusion

Applicant respectfully submits that the application is in condition for allowance, and such action is respectfully requested

The Commissioner is hereby authorized to charge any fees associated with this communication or credit any over payment to Deposit Account No. 50-5215.

Respectfully submitted,

/jvg44695/ 20 April 2020
Joseph V. Gamberdell, Jr. Date
Reg. No. 44,695
Customer No.: 93582
Ziegler IP Law Group, LLC.
55 Greens Farms Road
Westport, CT 06880
203-659-0388

Petitioner Samsung Ex-1004, 0396

Electronic Acknowledgement Receipt

EFS ID:	39203628
Application Number:	15551632
International Application Number:	
Confirmation Number:	1733
Title of Invention:	METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER
First Named Inventor/Applicant Name:	Hannu KINNUNEN
Customer Number:	93582
Filer:	Joseph V. Gamberdell/Deandra Castro
Filer Authorized By:	Joseph V. Gamberdell
Attorney Docket Number:	MDOA.4026.USN1
Receipt Date:	20-APR-2020
Filing Date:	17-AUG-2017
Time Stamp:	13:24:41
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		200417_4026_USN1_Jouzen003_FOA_Reply.pdf	33691 52667700fd4fce6c7e8adaacd8e3ecc06e46be7e	yes	7

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Response After Final Action	1	1
	Claims	2	5
	Applicant Arguments/Remarks Made in an Amendment	6	7
Warnings:			
Information:			
	Total Files Size (in bytes):	33691	

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New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/551,632	08/17/2017	Hannu KINNUNEN	MDOA.4026.USN1	1733

93582 7590 04/24/2020

ZIEGLER IP LAW GROUP, LLC.
55 GREENS FARMS ROAD
WESTPORT, CT 06880

EXAMINER	
WU, TONG E	

ART UNIT	PAPER NUMBER
3792	

NOTIFICATION DATE	DELIVERY MODE
04/24/2020	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

eofficeaction@appcoll.com
ptomail@gziplaw.com

Petitioner Samsung Ex-1004, 0399

Advisory Action Before the Filing of an Appeal Brief	**Application No.** 15/551,632	**Applicant(s)** KINNUNEN et al.	
	Examiner Eugene T Wu	**Art Unit** 3792	**AIA (FITF) Status** Yes

--The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

THE REPLY FILED 20 April 2020 FAILS TO PLACE THIS APPLICATION IN CONDITION FOR ALLOWANCE.

NO NOTICE OF APPEAL FILED

1. ☑ The reply was filed after a final rejection. No Notice of Appeal has been filed. To avoid abandonment of this application, applicant must timely file one of the following replies: (1) an amendment, affidavit, or other evidence, which places the application in condition for allowance; (2) a Notice of Appeal (with appeal fee) in compliance with 37 CFR 41.31; or (3) a Request for Continued Examination (RCE) in compliance with 37 CFR 1.114 if this is a utility or plant application. Note that RCEs are not permitted in design applications. The reply must be filed within one of the following time periods:
   a) ☐ The period for reply expires ____ months from the mailing date of the final rejection.
   b) ☑ The period for reply expires on: (1) the mailing date of this Advisory Action; or (2) the date set forth in the final rejection, whichever is later. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of the final rejection.
   c) ☐ A prior Advisory Action was mailed more than 3 months after the mailing date of the final rejection in response to a first after-final reply filed within 2 months of the mailing date of the final rejection.The current period for reply expires ____ months from the mailing date of *the prior Advisory Action* or SIX MONTHS from the mailing date of the final rejection, whichever is earlier.
   Examiner Note: If box 1 is checked, check either box (a), (b) or (c). ONLY CHECK BOX (b) WHEN THIS ADVISORY ACTION IS THE FIRST RESPONSE TO APPLICANTS FIRST AFTER-FINAL REPLY WHICH WAS FILED WITHIN TWO MONTHS OF THE FINAL REJECTION. ONLY CHECK BOX (c) IN THE LIMITED SITUATION SET FORTH UNDER BOX (c). See MPEP 706.07(f).

Extensions of time may be obtained under 37 CFR 1.136(a). The date on which the petition under 37 CFR 1.136(a) and the appropriate extension fee have been filed is the date for purposes of determining the period of extension and the corresponding amount of the fee. The appropriate extension fee under 37 CFR 1.17(a) is calculated from: (1) the expiration date of the shortened statutory period for reply originally set in the final Office action; or (2) as set forth in (b) or (c) above, if checked. Any reply received by the Office later than three months after the mailing date of the final rejection, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

NOTICE OF APPEAL

2. ☐ The Notice of Appeal was filed on _____. A brief in compliance with 37 CFR 41.37 must be filed within two months of the date of filing the Notice of Appeal (37 CFR 41.37(a)), or any extension thereof (37 CFR 41.37(e)), to avoid dismissal of the appeal. Since a Notice of Appeal has been filed, any reply must be filed within the time period set forth in 37CFR 41.37(a).

AMENDMENTS

3. ☑ The proposed amendments filed after a final rejection, but prior to the date of filing a brief, will not be entered because
   a) ☑ They raise new issues that would require further consideration and/or search (see NOTE below);
   b) ☐ They raise the issue of new matter (see NOTE below);
   c) ☐ They are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal; and/or
   d) ☐ They present additional claims without canceling a corresponding number of finally rejected claims.
   NOTE: _____ (See 37CFR 1.116 and 41.33(a)).
4. ☐ The amendments are not in compliance with 37CFR 1.121. See attached Notice of Non-Compliant Amendment (PTOL-324).
5. ☐ Applicants reply has overcome the following rejection(s): _____
6. ☐ Newly proposed or amended claim(s) _____ would be allowable if submitted in a separate, timely filed amendment canceling the non-allowable claim(s).
7. ☑ For purposes of appeal, the proposed amendment(s):(a) ☑ will not be entered, or (b) ☐ will be entered, and an explanation of how the new or amended claims would be rejected is provided below or appended.

AFFIDAVIT OR OTHER EVIDENCE

8. ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____
9. ☐ The affidavit or other evidence filed after final action, but before or on the date of filing a Notice of Appeal will not be entered because applicant failed to provide a showing of good and sufficient reasons why the affidavit or other evidence is necessary and was not earlier presented. See 37 CFR 1.116(e).
10. ☐ The affidavit or other evidence filed after the date of filing the Notice of Appeal, but prior to the date of filing a brief, will not be entered because the affidavit or other evidence failed to overcome all rejections under appeal and/or appellant fails to provide a showing of good and sufficient reasons why it is necessary and was not earlier presented. See 37 CFR 41.33(d)(1).
11. ☐ The affidavit or other evidence is entered. An explanation of the status of the claims after entry is below or attached.

REQUEST FOR RECONSIDERATION/OTHER

12. ☑ The request for reconsideration has been considered but does NOT place the application in condition for allowance because: Amendment adds limitations which require further search/consideration beyond a cursory review.
13. ☐ Note the attached Information *Disclosure Statement*(s). (PTO/SB/08) Paper No(s). _____
14. ☐ Other: _____.

STATUS OF CLAIMS

15. The status of the claim(s) is (or will be) as follows:
    Claim(s) allowed:_____.
    Claim(s) objected to:_____.
    Claim(s) rejected:9-14.
    Claim(s) withdrawn from consideration:1-8 and 15.

/Eugene T Wu/ Primary Examiner, Art Unit 3792	

Petitioner Samsung Ex-1004, 0400

Electronic Acknowledgement Receipt	
EFS ID:	39290127
Application Number:	15551632
International Application Number:	
Confirmation Number:	1733
Title of Invention:	METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER
First Named Inventor/Applicant Name:	Hannu KINNUNEN
Customer Number:	93582
Filer:	Joseph V. Gamberdell/Ruth DeSabia
Filer Authorized By:	Joseph V. Gamberdell
Attorney Docket Number:	MDOA.4026.USN1
Receipt Date:	28-APR-2020
Filing Date:	17-AUG-2017
Time Stamp:	16:03:46
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	Yes
Payment Type	CARD
Payment was successfully received in RAM	$650
RAM confirmation Number	E20204RG04087655
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

1	Request for Continued Examination (RCE)	200428_4026_RCE.pdf	1364262 e2003e3cfe3e16fb0f75400933519904e79cebc1	no	3
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30628 1f18aa5ebf627d7585ea1dd3db00925bae2d5fb3	no	2
Warnings:					
Information:					
3	EFS Acknowledgment Receipt	efilingAck.pdf	47724 fc6aed987ff88b8880328ab03e7f8c19e19258ed	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	1442614		

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New Applications Under 35 U.S.C. 111
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Doc code: RCEX
Doc description: Request for Continued Examination (RCE)

PTO/SB/30EFS (02-18)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL
(Submitted Only via EFS-Web)

Application Number	15/551,632	Filing Date	2017-08-17	Docket Number (if applicable)	MDOA.4026.USN1	Art Unit	3792
First Named Inventor	Hannu KINNUNEN			Examiner Name	Tong E WU		

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV

SUBMISSION REQUIRED UNDER 37 CFR 1.114

Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

☒ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____

☐ Other _____

☐ Enclosed

☐ Amendment/Reply

☐ Information Disclosure Statement (IDS)

☐ Affidavit(s)/ Declaration(s)

☐ Other _____

MISCELLANEOUS

☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months _____
(Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

☐ Other _____

FEES

☐ **The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.**
The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No _____

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature

Applicant Signature

Petitioner Samsung Ex-1004, 0403

PTO/SB/30EFS (02-18)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Signature of Registered U.S. Patent Practitioner			
Signature	/jvg44695/	Date (YYYY-MM-DD)	2020-04-28
Name	Joseph V Gamberdell Jr.	Registration Number	44695

This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Petitioner Samsung Ex-1004, 0405

Electronic Patent Application Fee Transmittal

Application Number:	15551632
Filing Date:	17-Aug-2017
Title of Invention:	METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER
First Named Inventor/Applicant Name:	Hannu KINNUNEN
Filer:	Joseph V. Gamberdell/Ruth DeSabia
Attorney Docket Number:	MDOA.4026.USN1

Filed as Small Entity

Filing Fees for U.S. National Stage under 35 USC 371

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
RCE- 1ST REQUEST	2801	1	650	650
		Total in USD ($)		**650**

Electronic Acknowledgement Receipt

EFS ID:	39290127
Application Number:	15551632
International Application Number:	
Confirmation Number:	1733
Title of Invention:	METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER
First Named Inventor/Applicant Name:	Hannu KINNUNEN
Customer Number:	93582
Filer:	Joseph V. Gamberdell/Ruth DeSabia
Filer Authorized By:	Joseph V. Gamberdell
Attorney Docket Number:	MDOA.4026.USN1
Receipt Date:	28-APR-2020
Filing Date:	17-AUG-2017
Time Stamp:	16:03:46
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Request for Continued Examination (RCE)	200428_4026_RCE.pdf	1364262 e2003e3cfe3e16fb0f7540093351990 4a79cebc1	no	3

Warnings:

Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30628 1f18aa5ebf627d7585ea1dd3db00925bae2d5fb3	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	1394890	

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New International Application Filed with the USPTO as a Receiving Office

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UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/551,632	08/17/2017	Hannu KINNUNEN	MDOA.4026.USN1	1733

93582 7590 05/29/2020

ZIEGLER IP LAW GROUP, LLC.
55 GREENS FARMS ROAD
WESTPORT, CT 06880

EXAMINER	
WU, TONG E	

ART UNIT	PAPER NUMBER
3792	

NOTIFICATION DATE	DELIVERY MODE
05/29/2020	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

eofficeaction@appcoll.com
ptomail@gziplaw.com

Petitioner Samsung Ex-1004, 0410

Office Action Summary	Application No. 15/551,632	Applicant(s) KINNUNEN et al.	
	Examiner Eugene T Wu	Art Unit 3792	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on 4/28/20.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL.** 2b) ☑ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 1-15 is/are pending in the application.

5a) Of the above claim(s) 1-8 and 15 is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 13 is/are rejected.

8) ☑ Claim(s) 9-12 and 14 is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

Petitioner Samsung Ex-1004, 0411

DETAILED ACTION

04/28/20 - RCE.
04/24/20 - Advisory action.
04/20/20 - Applicant after-final response.
02/18/20 - Final rejection.
02/07/20 - Applicant response.
11/15/19 - First action on the merits.
10/21/19 - Applicant election.
08/21/19 - Lack of unity requirement.

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 4/20/20 has been entered.

Response to Arguments

2. Applicant's arguments filed 4/20/20 with respect to Wisbey have been fully considered and are persuasive. The rejection with Wisbey has been withdrawn.

Claims 9-14 are allowable except for a claim objection and 112(b) antecedent issue, as noted in the action below.

In addition, this application would be in condition for allowance except for the presence of claims 1-8 and 15 directed to inventions non-elected without traverse. As an alternative to cancelling all the withdrawn claims, Examiner suggests the following changes:

- Claims 1-8 may be rejoined for allowance if amended to include the user interface details that were added to claim 9.

Petitioner Samsung Ex-1004, 0412

- Claim 7 would face a 112(b)/(d) issue, since the readiness score is already calculated based on "historical" body response data of the user. Examiner suggests further specifying a type of historical data (see Paragraph 94 of PGPUB).
- Claim 8 would face a 112(b) issue, since it is not clear what the recited data is being used for. Examiner suggests cancelling the claim.
- Claim 15 should be cancelled.

Claim Interpretation

3. The following is a quotation of 35 U.S.C. 112(f):

> (f) Element in Claim for a Combination. – An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.

The following is a quotation of pre-AIA 35 U.S.C. 112, sixth paragraph:

> An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.

4. The claims in this application are given their broadest reasonable interpretation using the plain meaning of the claim language in light of the specification as it would be understood by one of ordinary skill in the art. The broadest reasonable interpretation of a claim element (also commonly referred to as a claim limitation) is limited by the description in the specification when 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph, is invoked.

As explained in MPEP § 2181, subsection I, claim limitations that meet the following three-prong test will be interpreted under 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph:

(A) the claim limitation uses the term "means" or "step" or a term used as a substitute for "means" that is a generic placeholder (also called a nonce term or a non-structural term having no specific structural meaning) for performing the claimed function;

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(B) the term "means" or "step" or the generic placeholder is modified by functional language, typically, but not always linked by the transition word "for" (e.g., "means for") or another linking word or phrase, such as "configured to" or "so that"; and

(C) the term "means" or "step" or the generic placeholder is not modified by sufficient structure, material, or acts for performing the claimed function.

Use of the word "means" (or "step") in a claim with functional language creates a rebuttable presumption that the claim limitation is to be treated in accordance with 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph. The presumption that the claim limitation is interpreted under 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph, is rebutted when the claim limitation recites sufficient structure, material, or acts to entirely perform the recited function.

Absence of the word "means" (or "step") in a claim creates a rebuttable presumption that the claim limitation is not to be treated in accordance with 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph. The presumption that the claim limitation is not interpreted under 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph, is rebutted when the claim limitation recites function without reciting sufficient structure, material or acts to entirely perform the recited function.

Claim limitations in this application that use the word "means" (or "step") are being interpreted under 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph, except as otherwise indicated in an Office action. Conversely, claim limitations in this application that do not use the word "means" (or "step") are not being interpreted under 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph, except as otherwise indicated in an Office action.

Not Invoked Despite Presence of "means"

5. This application includes one or more claim limitations that use the word "means" or "step" but are nonetheless not being interpreted under 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth

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paragraph because the claim limitation(s) recite(s) sufficient structure, materials, or acts to entirely perform the recited function. Such claim limitation(s) is/are:

Claim 12: "means for measuring user's movements..." is modified by sufficient structure.

Claim 13: Assuming this was meant to recite "means for measuring at least one biosignal...", the claim recites further sufficient structure.

Claim 14: Recites further sufficient structure for the "means for measuring at least one biosignal...".

Because this/these claim limitation(s) is/are **not** being interpreted under 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph, it/they is/are **not** being interpreted to cover only the corresponding structure, material, or acts described in the specification as performing the claimed function, and equivalents thereof.

If applicant intends to have this/these limitation(s) interpreted under 35 U.S.C. 112(f) or pre-AIA 35 U.S.C. 112, sixth paragraph, applicant may: (1) amend the claim limitation(s) to remove the structure, materials, or acts that performs the claimed function; or (2) present a sufficient showing that the claim limitation(s) does/do not recite sufficient structure, materials, or acts to perform the claimed function.

Claim Objections

6. Claims objected to because of the following informalities:

a. Claim 9, second to last line: The extraneous comma at "instructions, related to" should be removed.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

7. The following is a quotation of 35 U.S.C. 112(b):

> (b) CONCLUSION.—The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention.

The following is a quotation of 35 U.S.C. 112 (pre-AIA), second paragraph:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claim 13 rejected under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the inventor or a joint inventor, or for pre-AIA the applicant regards as the invention.

Claim 13: "the means for measuring a heart rate" lacks proper antecedent basis in the claims. Examiner suggests reciting "the means for measuring at least one biosignal".

Allowable Subject Matter

9. Claims 9-14 are allowable except for the claim objection and 112(b) rejection noted above.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eugene T Wu whose telephone number is (571)270-5053. The examiner can normally be reached on M-F 8am-5pm.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Layno can be reached on 571-272-4949. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Eugene T Wu/
Primary Examiner, Art Unit 3792

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15/551,632	KINNUNEN et al.
	Examiner	Art Unit
	Eugene T Wu	3792

CPC - Searched*		
Symbol	Date	Examiner
A61B5/0002,0004,0006,0008,01,02,0205,16,165,168,4806,4809,4812,4815,6826,7271,7275,74,742	11/10/2019	ETW

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
INVENTOR NAME	11/10/2019	ETW
ASSIGNEE SEARCH	11/10/2019	ETW
EAST KEYWORD	11/10/2019	ETW
UPDATED SEARCH	02/10/2020	ETW
UPDATED SEARCH	05/25/2020	ETW

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
	USPGPUB INTERFERENCE TEXT SEARCH	05/25/2020	ETW

Petitioner Samsung Ex-1004, 0418

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15/551,632	KINNUNEN et al.
	Examiner	Art Unit
	Eugene T Wu	3792

Petitioner Samsung Ex-1004, 0419

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L6	21465	A61B5/0002.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/05/25 13:25
L7	4526	A61B5/0004.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/05/25 13:25
L8	8957	A61B5/0006.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/05/25 13:25
L9	4034	A61B5/0008.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/05/25 13:25
L10	20575	A61B5/01.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/05/25 13:25
L11	5680	A61B5/02.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/05/25 13:25
L12	21078	A61B5/0205.CPC.	US-PGPUB; USPAT; USOCR;	OR	ON	2020/05/25 13:25

			FPRS; EPO; JPO			
L13	6060	A61B5/16.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/05/25 13:25
L14	7897	A61B5/165.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/05/25 13:25
L15	1523	A61B5/168.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/05/25 13:25
L16	2925	A61B5/4806.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/05/25 13:25
L17	3581	A61B5/4809.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/05/25 13:25
L18	3864	A61B5/4812.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/05/25 13:25
L19	2311	A61B5/4815.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/05/25 13:25

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L21	1799	A61B5/7271.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/05/25 13:25
L22	14119	A61B5/7275.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/05/25 13:25
L23	1342	A61B5/74.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/05/25 13:25
L24	20235	A61B5/742.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/05/25 13:25
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L27	967	L25 and (recover$3) near3 (score status level amount degree extent measure index)	US-PGPUB; USPAT; USOCR;	OR	ON	2020/05/25 13:25

			FPRS; EPO; JPO			
L28	694	L25 and (recover$3) near2 (score status level amount degree extent measure index)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/05/25 13:25
L29	349	L25 and (recover$3) near (score status level amount degree extent measure index)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/05/25 13:25
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L32	22	"oura health".as. "oura health".aanm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/05/25 13:25
L33	20	laakkonen-harri$.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/05/25 13:25
L34	133	kinnunen-hannu$.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/05/25 13:25

L35	7	kivela-kari$.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/05/25 13:25
L36	112	colley-ashley$.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/05/25 13:25
L37	3	lahtela-petteri$.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/05/25 13:25
L38	33	koskela-markku$.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/05/25 13:25
L39	8	jurvelin-heidi$.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/05/25 13:25
L40	281	(L34 L35 L36 L37 L38 L39 L33)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/05/25 13:25
L41	2	(L40 L32) and @pd>"20200218"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/05/25 13:25
L45	318	(L26 L27 L28 L29 L30) and (contribut$3 improv$5 better boost$3 enhanc$3 help$3 increas$3 progress$3 promot$3 affect$3	US-PGPUB; USPAT; USOCR;	OR	ON	2020/05/25 13:38

		effect$3 recommend$6) with (recover$3 ready readiness) near3 (score status level amount degree extent measure index)	FPRS; EPO; JPO			

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L42	7701	((recover$3 ready readiness) near3 (score status level amount degree extent measure index)).CLM.	US-PGPUB; USPAT	OR	ON	2020/05/25 13:32
L43	2751	((recover$3 ready readiness) near (score status level amount degree extent measure index)).CLM.	US-PGPUB; USPAT	OR	ON	2020/05/25 13:33
L44	369	((movement activity rest$3) and (recover$3 ready readiness) near (score status level amount degree extent measure index)).CLM.	US-PGPUB; USPAT	OR	ON	2020/05/25 13:34
L46	858	((contribut$3 improv$5 better boost$3 enhanc$3 help$3 increas$3 progress$3 promot$3 affect$3 effect$3 recommend$6) with (recover$3 ready readiness) near3 (score status level amount degree extent measure index)).clm.	US-PGPUB; USPAT	OR	ON	2020/05/25 13:39

5/25/2020 1:39:28 PM
C:\Users\ewu1\Documents\EAST\Workspaces\15551632 - Readiness score smart ring sensor.wsp

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 15/551,632	Filing Date 08/17/2017	☐ To be Mailed

ENTITY: ☐ LARGE ☑ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $40 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $210 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	06/29/2020	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 13	Minus	** 20	= 0		x $50 =	0
	Independent (37 CFR 1.16(h))	* 2	Minus	*** 3	= 0		x $230 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/POLIN ANG/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

INVENTOR(s):	Hannu KINNUNEN	CONF. NO.	1733
SERIAL NO.:	15/551,632	ART UNIT:	3792
FILING DATE:	17 August 2017	EXAMINER:	WU, Tong E.
TITLE:	METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER		
ATTORNEY REFERENCE NO.:	MDOA.4026.USN1	Jouzen003US	

Commissioner of Patents
P.O. Box 1450
Alexandria, VA 22313-1450

AMENDMENT

I. Introduction

This is a response to the Non-Final Office Action dated 29 May 2020 for this application.

Amendments to the Claims begin on page 2 of this paper.

Remarks begin on page 6 of this paper.

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II. Amendments to the Claims

The following listing of claims will replace all prior versions and listings of claims in the application:

1. (Currently Amended) A method for assessing readiness of a user, the method comprising:

obtaining the user's movements;

using the obtained user's movements to determine a nature of the period, wherein the nature of the period is selected from an activity period and a rest period;

measuring at least one biosignal of the user during the rest period;

determining a rest summary for the rest period, based on the measured at least one biosignal and at least one biosignal of a previous rest period;

determining an activity summary for the activity period, based on the obtained movements of an activity period and obtained movements of at least one previous activity period;

determining a body response summary based on the rest summary and the activity summary; [[and]]

calculating a readiness score based on the body response summary and a previous body response summary, whereby the readiness score indicates a level of readiness of the user; and

using a user interface of the mobile communication device to show elements contributing to the readiness score and instructions related to physical activity and mental activity for improving the readiness score.

2. (Original) A method according to claim 1, wherein obtaining the user's movements is performed by measuring the user's movements or by retrieving the user's movement data from a separate device.

3. (Previously Presented) A method according to claim 1, further comprising measuring at least one biosignal during the activity period.

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4. (Previously Presented) A method according to claim 1, wherein the at least one biosignal is selected from the group consisting of an electrocardiogram, a photoplethysmogram, an electromyogram, an electroocylogram, a heart rate, a heart rate variability, a body temperature, a resting heart rate, an average heart rate and signals related to breathing.

5. (Previously Presented) A method according to claim 1, wherein determining the rest summary comprises at least one of determining a sleep factor, determining a sleep balance, determining lowest body temperature during rest and determining a resting heart rate.

6. (Previously Presented) A method according to claim 1, further comprising providing the user with appropriate instructions, related to at least one of physical activity, mental activity and rest, for improving the user's readiness score.

7. (Currently Amended) A method according to claim 1, further comprising using ~~historical data~~a medical history of the user to calculate the readiness score.

8. (Cancelled)

9. (Currently Amended) A system for assessing readiness of a user, the system comprising:

a ring configured to be worn by the user and comprising means for measuring at least one biosignal of the user during a rest period,

a mobile communication device configured to communicate with the ring,

means for measuring the user's movements during an activity period and the rest period, and

a server configured to communicate with the mobile communication device, the server being operable to

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use the measured user's movements to determine a nature of the period, wherein the nature of the period is selected from the activity period and the rest period,

determine a rest summary for the rest period, based on the measured at least one biosignal and at least one biosignal of a previous rest period,

determine an activity summary for the activity period, based on the measured movements and measured movements of at least one previous activity period,

determine a body response summary based on the rest summary and the activity summary; and

calculate a readiness score based on the body response summary and a previous body response summary, whereby the readiness score indicates a level of readiness of the user; and

a user interface of the mobile communication device configured to show elements contributing to the readiness score and instructions[[,]] related to physical activity and mental activity for improving the readiness score.

10. (Previously Presented) A system according to claim 9, wherein the means for measuring the user's movements are arranged on the ring, in the mobile communication device or in an activity determination device.

11. (Previously Presented) A system according to claim 9, wherein the mobile communication device is configured to visually present the readiness score to the user.

12. (Previously Presented) A system according to claim 9, wherein the means for measuring the user's movements is selected from the group consisting of an accelerometer, a gyroscope and a magnetic field sensor.

13. (Currently Amended) A system according to claim 9, wherein the means for measuring ~~a heart rate~~ at least one biosignal comprises a photon source arranged on the inner surface of the ring and a photon detector arranged on the inner surface of the ring.

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14. (Previously Presented) A system according to claim 9, wherein the ring further comprises a first electrode and a second electrode adapted to measure an electrocardiogram.

15. (Cancelled)

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III. Remarks

Claims 1-7 and 9-14 are under consideration. Claims 8 and 15 are cancelled. Claims 1, 7, 9, and 13 are amended. Support for the amendment to claim 7 may be found in the application, for example, in paragraph [0095] of the published specification.

Rejoinder

Applicant appreciates the indication that claims 1-7 may be rejoined if amended to include the user interface details that were added to claim 9, 112(b)/(d) issues of claim 7 are addressed, and claims 8 and 15 are cancelled. Accordingly, claim 1 is amended to include:

> using a user interface of the mobile communication device to show elements contributing to the readiness score and instructions related to physical activity and mental activity for improving the readiness score,

as recited by claim 9, claim 7 is amended to recite --a medical history--, and claims 8 and 15 are cancelled.

Applicant requests rejoinder of claims 1-7.

Claim Objections

Claim 9 is amended to remove the extraneous comma.

Claim Rejection under 35 U.S.C. §112(b)

Claim 13 is amended to recite --the means for measuring at least one biosignal-- to overcome the 35 U.S.C. §112(b) rejection.

Allowable Subject Matter

Applicant appreciates the indication that claims 9-14 are allowable except for the 112(b) rejection of claim 13 addressed above. Applicant submits that claims 1-7 and 9-14 are in condition for allowance.

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Conclusion

Applicant respectfully submits that the application is in condition for allowance, and such action is respectfully requested

The Commissioner is hereby authorized to charge any fees associated with this communication or credit any over payment to Deposit Account No. 50-5215.

Respectfully submitted,

/jvg44695/ 29 June 2020
Joseph V. Gamberdell, Jr. Date
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Westport, CT 06880
203-659-0388

Petitioner Samsung Ex-1004, 0433

Electronic Acknowledgement Receipt

EFS ID:	39850315
Application Number:	15551632
International Application Number:	
Confirmation Number:	1733
Title of Invention:	METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER
First Named Inventor/Applicant Name:	Hannu KINNUNEN
Customer Number:	93582
Filer:	Joseph V. Gamberdell/Ruth DeSabia
Filer Authorized By:	Joseph V. Gamberdell
Attorney Docket Number:	MDOA.4026.USN1
Receipt Date:	29-JUN-2020
Filing Date:	17-AUG-2017
Time Stamp:	10:36:45
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		200629_4026USN1_Jouzen003_NFOA_Reply.pdf	33126 00a2b4c140c867126e392a8b88bf681eb331e798	yes	7

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Amendment/Req. Reconsideration-After Non-Final Reject	1	1
	Claims	2	5
	Amendment/Req. Reconsideration-After Non-Final Reject	6	7
Warnings:			
Information:			
	Total Files Size (in bytes):	33126	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

93582 7590 07/13/2020

ZIEGLER IP LAW GROUP, LLC.
55 GREENS FARMS ROAD
WESTPORT, CT 06880

EXAMINER
WU, TONG E

ART UNIT	PAPER NUMBER
3792	

DATE MAILED: 07/13/2020

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/551,632	08/17/2017	Hannu KINNUNEN	MDOA.4026.USN1	1733

TITLE OF INVENTION: METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$500	$0.00	$0.00	$500	10/13/2020

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

Petitioner Samsung Ex-1004, 0436

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

93582 7590 07/13/2020
ZIEGLER IP LAW GROUP, LLC.
55 GREENS FARMS ROAD
WESTPORT, CT 06880

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/551,632	08/17/2017	Hannu KINNUNEN	MDOA.4026.USN1	1733

TITLE OF INVENTION: METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$500	$0.00	$0.00	$500	10/13/2020

EXAMINER	ART UNIT	CLASS-SUBCLASS
WU, TONG E	3792	600-301000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-09 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1_____
2_____
3_____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. Fees submitted: ❑Issue Fee ❑Publication Fee (if required) ❑Advance Order - # of Copies _____

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

❑ Electronic Payment via EFS-Web ❑ Enclosed check ❑ Non-electronic payment by credit card (Attach form PTO-2038)

❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

5. **Change in Entity Status** (from status indicated above)

❑ Applicant certifying micro entity status. See 37 CFR 1.29

❑ Applicant asserting small entity status. See 37 CFR 1.27

❑ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

Petitioner Samsung Ex-1004, 0437

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/551,632	08/17/2017	Hannu KINNUNEN	MDOA.4026.USN1	1733

93582 7590 07/13/2020

ZIEGLER IP LAW GROUP, LLC.
55 GREENS FARMS ROAD
WESTPORT, CT 06880

EXAMINER	
WU, TONG E	
ART UNIT	**PAPER NUMBER**
3792	

DATE MAILED: 07/13/2020

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

Petitioner Samsung Ex-1004, 0438

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	**Application No.** 15/551,632	**Applicant(s)** KINNUNEN et al.	
	Examiner Eugene T Wu	**Art Unit** 3792	**AIA (FITF) Status** Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☑ This communication is responsive to 6/29/20.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

3. ☑ The allowed claim(s) is/are 1-7 and 9-14 . As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information , please see **http://www.uspto.gov/patents/init_events/pph/index.jsp** or send an inquiry to **PPHfeedback@uspto.gov.**

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some *c) ☐ None of the:

   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____ .

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____.
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date. _____.
5. ☐ Examiner's Amendment/Comment
6. ☐ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/Eugene T Wu/
Primary Examiner, Art Unit 3792

Petitioner Samsung Ex-1004, 0440

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15/551,632	KINNUNEN et al.
	Examiner	**Art Unit**
	Eugene T Wu	3792

CPC - Searched*		
Symbol	**Date**	**Examiner**
A61B5/ 0002,0004,0006,0008,01,02,0205,16,165,168,4806,4809,4812,4815, 6826,7271,7275,74,742	11/10/2019	ETW

CPC Combination Sets - Searched*		
Symbol	**Date**	**Examiner**

US Classification - Searched*			
Class	**Subclass**	**Date**	**Examiner**

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	**Date**	**Examiner**
INVENTOR NAME	11/10/2019	ETW
ASSIGNEE SEARCH	11/10/2019	ETW
EAST KEYWORD	11/10/2019	ETW
UPDATED SEARCH	02/10/2020	ETW
UPDATED SEARCH	05/25/2020	ETW
UPDATED SEARCH	07/05/2020	ETW

Petitioner Samsung Ex-1004, 0441

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15/551,632	KINNUNEN et al.
	Examiner	Art Unit
	Eugene T Wu	3792

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
	USPGPUB INTERFERENCE TEXT SEARCH	05/25/2020	ETW

Petitioner Samsung Ex-1004, 0442

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15/551,632	KINNUNEN et al.
	Examiner	**Art Unit**
	Eugene T Wu	3792

CPC						
Symbol					**Type**	**Version**
A61B	/	5	/	16	F	2013-01-01
A61B	/	5	/	01	I	2013-01-01
A61B	/	5	/	02405	I	2013-01-01
A61B	/	5	/	02433	I	2013-01-01
A61B	/	5	/	0404	I	2013-01-01
A61B	/	5	/	1118	I	2013-01-01
A61B	/	5	/	4806	I	2013-01-01
A61B	/	5	/	6802	I	2013-01-01
A61B	/	5	/	6826	I	2013-01-01
G06F	/	19	/	3481	I	2013-01-01
A61B	/	5	/	4809	I	2013-01-01
A61B	/	5	/	1116	I	2013-01-01
A61B	/	5	/	7271	I	2013-01-01
A61B	/	2562	/	0219	A	2013-01-01
A61B	/	5	/	0022	A	2013-01-01
A61B	/	5	/	0496	A	2013-01-01
A61B	/	5	/	7264	A	2013-01-01
A61B	/	5	/	7275	A	2013-01-01
A61B	/	5	/	165	A	2013-01-01
A61B	/	5	/	742	A	2013-01-01
A61B	/	2562	/	0223	A	2013-01-01
A61B	/	5	/	0024	A	2013-01-01
A61B	/	5	/	0488	A	2013-01-01

CPC Combination Sets							
Symbol					**Type**	**Set**	**Ranking**	**Version**
	/		/					

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	13	
/Eugene T Wu/ Primary Examiner, Art Unit 3792	05 July 2020	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	14

U.S. Patent and Trademark Office — Part of Paper No.: 20200705

Petitioner Samsung Ex-1004, 0443

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15/551,632	KINNUNEN et al.
	Examiner	**Art Unit**
	Eugene T Wu	3792

INTERNATIONAL CLASSIFICATION					
CLAIMED					
A61B	/	5	/	00	

NON-CLAIMED					
	/		/		

US ORIGINAL CLASSIFICATION	
CLASS	**SUBCLASS**

CROSS REFERENCES(S)						
CLASS	**SUBCLASS (ONE SUBCLASS PER BLOCK)**					

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	13	
/Eugene T Wu/ Primary Examiner, Art Unit 3792	05 July 2020	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	14

U.S. Patent and Trademark Office — Part of Paper No.: 20200705

Petitioner Samsung Ex-1004, 0444

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15/551,632	KINNUNEN et al.
	Examiner	**Art Unit**
	Eugene T Wu	3792

☑ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIMS

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	13	
/Eugene T Wu/ Primary Examiner, Art Unit 3792	05 July 2020	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	14

U.S. Patent and Trademark Office — Part of Paper No.: 20200705

Petitioner Samsung Ex-1004, 0445

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	24	"oura health".as. "oura health".aanm.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/07/05 22:41
L2	20	laakkonen-harri$.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/07/05 22:41
L3	135	kinnunen-hannu$.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/07/05 22:41
L4	7	kivela-kari$.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/07/05 22:41
L5	112	colley-ashley$.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/07/05 22:41
L6	3	lahtela-petteri$.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/07/05 22:41
L7	33	koskela-markku$.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/07/05 22:41
L8	8	jurvelin-heidi$.in.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/07/05 22:41
L9	283	(L3 L4 L5 L6 L7 L8 L2)	US-PGPUB; USPAT;	OR	ON	2020/07/05 22:41

			USOCR; FPRS; EPO; JPO			
L10	0	(L9 L1) and @pd>"20200529"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/07/05 22:41
L11	21,575	A61B5/0002.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/07/05 22:41
L12	4,660	A61B5/0004.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/07/05 22:41
L13	9,087	A61B5/0006.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/07/05 22:41
L14	4,091	A61B5/0008.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/07/05 22:41
L15	21,020	A61B5/01.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/07/05 22:41
L16	5,841	A61B5/02.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/07/05 22:41
L17	21,499	A61B5/0205.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/07/05 22:41
L18	6,104	A61B5/16.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/07/05 22:41

L19	8,157	A61B5/165.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/07/05 22:41
L20	1,568	A61B5/168.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/07/05 22:41
L21	2,980	A61B5/4806.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/07/05 22:41
L22	3,635	A61B5/4809.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/07/05 22:41
L23	3,949	A61B5/4812.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/07/05 22:41
L24	2,357	A61B5/4815.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/07/05 22:41
L25	7,995	A61B5/6826.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/07/05 22:41
L26	1,816	A61B5/7271.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/07/05 22:41
L27	14,507	A61B5/7275.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/07/05 22:41
L28	1,384	A61B5/74.CPC.	US-PGPUB; USPAT; USOCR;	OR	ON	2020/07/05 22:41

			FPRS; EPO; JPO			
L29	20,689	A61B5/742.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/07/05 22:41
L30	112,602	(L11 L12 L13 L14 L15 L16 L17 L18 L19 L20 L21 L22 L23 L24 L25 L26 L27 L28 L29)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/07/05 22:41
L31	1,344	L30 and (recover$3 ready readiness) near3 (score status level amount degree extent measure index)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/07/05 22:41
L32	985	L30 and (recover$3) near3 (score status level amount degree extent measure index)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/07/05 22:41
L33	705	L30 and (recover$3) near2 (score status level amount degree extent measure index)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/07/05 22:41
L34	356	L30 and (recover$3) near (score status level amount degree extent measure index)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/07/05 22:41
L35	531	L30 and (recover$3 ready readiness) near (score status level amount degree extent measure index)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/07/05 22:41
L36	323	(L31 L32 L33 L34 L35) and (contribut$3 improv$5 better boost$3 enhanc$3 help$3 increas$3 progress$3 promot$3 affect$3 effect$3 recommend$6) with (recover$3 ready readiness) near3 (score status level amount degree extent measure index)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/07/05 22:41
L37	23	(L31 L32 L33 L34 L35 L36) and @pd>"20200527"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	ON	2020/07/05 22:41

EAST Search History (Interference)

<This search history is empty>

7/5/2020 10:44:05 PM
C:\Users\ewu1\Documents\EAST\Workspaces\15551632 - Readiness score smart ring sensor.wsp

Bibliographic Data

Application No: 15/551,632

Foreign Priority claimed: ○ Yes ◉ No

35 USC 119 (a-d) conditions met: ☐ Yes ☑ No ☐ Met After Allowance

Verified and Acknowledged: /Eugene T Wu/ (Examiner's Signature) | (Initials)

Title: METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
08/17/2017	600	3792	MDOA.4026.USN1
RULE			

APPLICANTS

Oura Health Oy, Oulu, FINLAND

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Petteri LAHTELA Jääli, FINLAND

Markku KOSKELA Oulu, FINLAND

Heidi JURVELIN Oulu, FINLAND

CONTINUING DATA

This application is a 371 of PCT/FI2016/050113 02/23/2016

PCT/FI2016/050113 has PRO of 62260760 11/30/2015

PCT/FI2016/050113 has PRO of 62205114 08/14/2015

PCT/FI2016/050113 has PRO of 62121425 02/26/2015

FOREIGN APPLICATIONS

IF REQUIRED, FOREIGN LICENSE GRANTED**

11/03/2017

**** SMALL ENTITY ****

STATE OR COUNTRY

FINLAND

ADDRESS

ZIEGLER IP LAW GROUP, LLC.

55 GREENS FARMS ROAD
WESTPORT, CT 06880
UNITED STATES

FILING FEE RECEIVED

$740

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/551,632	08/17/2017	Hannu KINNUNEN	MDOA.4026.USN1	1733

93582 7590 08/20/2020
ZIEGLER IP LAW GROUP, LLC.
55 GREENS FARMS ROAD
WESTPORT, CT 06880

EXAMINER	
WU, TONG E	

ART UNIT	PAPER NUMBER
3792	

NOTIFICATION DATE	DELIVERY MODE
08/20/2020	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ptomail@gziplaw.com
eofficeaction@appcoll.com

Petitioner Samsung Ex-1004, 0453

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

Application No. : 15551632
Applicant : Kinnunen
Filing Date : 08/17/2017
Date Mailed : 08/20/2020

NOTICE TO FILE CORRECTED APPLICATION PAPERS

Notice of Allowance Mailed

This application has been accorded an Allowance Date and is being prepared for issuance. The application, however, is incomplete for the reasons below.

Applicant is given two (2) months from the mail date of this Notice within which to respond. This time period for reply is extendable under 37 CFR 1.136(a) for only TWO additional MONTHS.

The informalities requiring correction are indicated in the attachment(s). If the informality pertains to the abstract, specification (including claims) or drawings, the informality must be corrected with an amendment in compliance with 37 CFR 1.121 (or, if the application is a reissue application, 37 CFR 1.173). Such an amendment may be filed after payment of the issue fee if limited to correction of informalities noted herein. See Waiver of 37 CFR 1.312 for Documents Required by the Office of Patent Publication, 1280 Off. Gaz. Patent Office 918 (March 23, 2004). In addition, if the informality is not corrected until after payment of the issue fee, for purposes of 35 U.S.C. 154(b)(1)(iv), "all outstanding requirements" will be considered to have been satisfied when the informality has been corrected. A failure to respond within the above-identified time period will result in the application being ABANDONED.

See attachment(s).

A copy of this notice MUST be returned with the reply. Please address response to "Mail Stop Issue Fee, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450".

/Naran Hem/
Publication Branch
Office of Data Management
(571) 272-4200

Application No. 15551632 **Drawings filed: 08/17/2017**

IDENTIFICATION OF DRAWING DEFICIENCIES

- [ ] There is a hole or the image thereof within the illustration. FIG(s)
- [ ] The illustration is penetrated or traversed by a solid or broken line that is not intended to be part of the drawing, such as a dark line caused by a flaw in the copying process. FIG(s)
- [ ] An ink stamp or the image thereof obscures part of the illustration. FIG(s)
- [ ] The drawing is marred by black smudges, obliterations, or fax/copier marks (for example, speckles or dots in a substantial portion of the drawing). FIG(s)
- [ ] Figure numbers are duplicated or missing. FIG(s)
- [ ] Drawing sheet or figure is missing. FIG(s)
- [ ] Numbers, letters, or reference characters in the drawing have been crossed out or are illegibly handwritten. FIG(s)
- [X] The character of the lines, numbers, and letters is poor. FIG(s) 7
- [ ] The drawing's background shows that the original drawing was made on graph paper or other paper with a pattern or decoration. FIG(s)
- [ ] The FIG. number label is placed in a location that causes the drawing to be read upside down. FIG(s)
- [X] Data, a reference number, or part of the drawing is truncated or missing, or a lead line has no reference number. FIG(s) 14
- [ ] The drawing and/or the FIG. label contain(s) foreign language. FIG(s)
- [ ] This utility application contains a photograph of a view that is capable of being illustrated as a line drawing. FIG(s)
- [ ] A petition under 37 CFR 1.84(a)(2) to accept color drawings has been granted, but the brief description of the drawings in the specification does not contain (or has not been amended to contain) the paragraph required by 37 CFR 1.84(a)(2)(iii).
- [ ] This reissue application contains added and/or amended drawings that are not labeled as “New” or “Amended” or “Canceled” as required by 37 CFR 1.173(b)(3). FIG(s)
- [ ] This Design reissue application contains a drawing that is labeled as “Canceled” but is not surrounded by brackets, or a drawing that is surrounded by brackets but is not labeled as “Canceled.” See 37 CFR 1.173(b)(3). FIG(s)
- [ ] OTHER:
- [ ] COMMENTS:

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

INVENTOR(s):	Hannu KINNUNEN	CONF. NO.	1733
SERIAL NO.:	15/551,632	ART UNIT:	3792
FILING DATE:	17 August 2017	EXAMINER:	WU, Tong E.
TITLE:	METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER		
ATTORNEY REFERENCE NO.:	MDOA.4026.USN1	Jouzen003US	

Commissioner of Patents
P.O. Box 1450
Alexandria, VA 22313-1450

RESPONSE TO NOTICE TO FILE CORRECTED APPLICATION PAPERS

I. Introduction

In response to the Notice to File Corrected Application Papers, Applicant submits replacement sheets for the drawings depicting Figures 7 and 14.

The Commissioner is hereby authorized to charge any fees associated with this communication or credit any over payment to Deposit Account No. 50-5215.

Respectfully submitted,

/jvg44695/ 28 September 2020
Joseph V. Gamberdell, Jr. Date
Reg. No. 44,695
Customer No.: 93582
Ziegler IP Law Group, LLC.
55 Greens Farms Road
Westport, CT 06880
203-659-0388

Petitioner Samsung Ex-1004, 0456

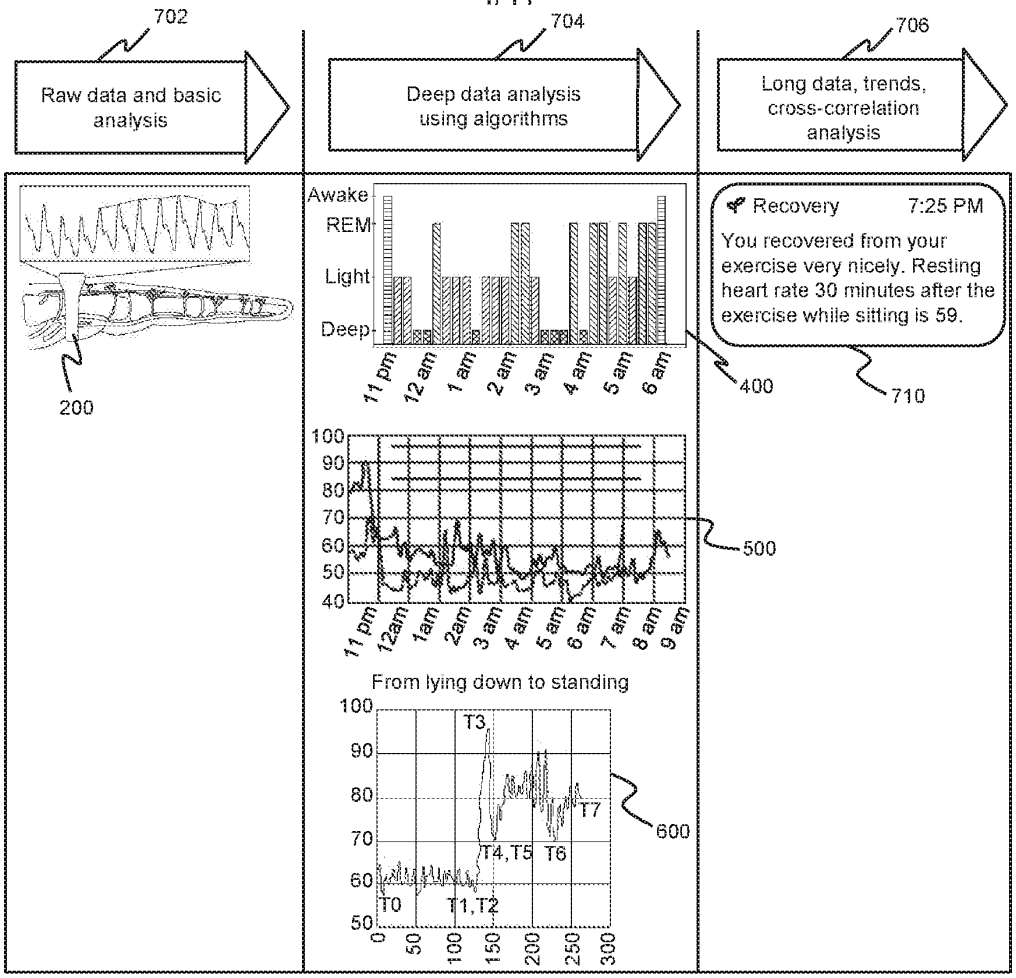

702
Raw data and basic analysis
704
Deep data analysis using algorithms
706
Long data, trends, cross-correlation analysis
Awake
REM
Light
Deep
11 pm
12 am
1 am
2 am
3 am
4 am
5 am
6 am
400
Recovery
7:25 PM
You recovered from your exercise very nicely. Resting heart rate 30 minutes after the exercise while sitting is 59.
710
200
100
90
80
70
60
50
40
11 pm
12am
1am
2am
3 am
4 am
5 am
6 am
7 am
8 am
9 am
500
From lying down to standing
T3
T7
T4,T5
T6
T0
T1,T2
600
0
50
100
150
200
250
300

FIG. 7

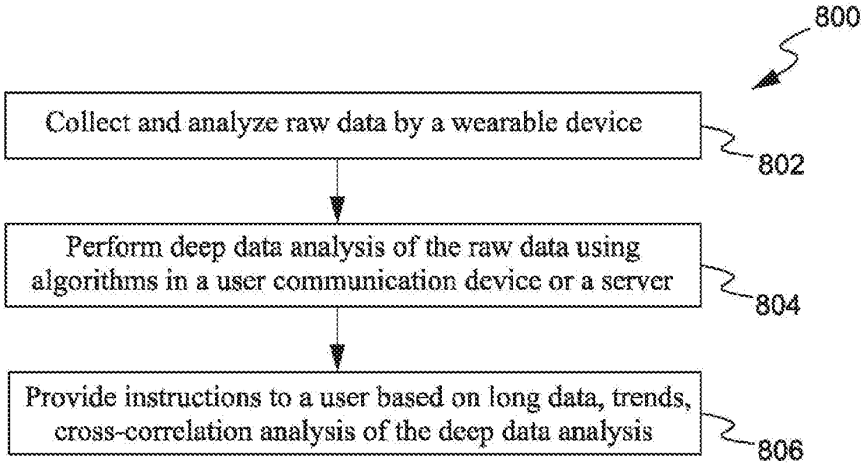

800
Collect and analyze raw data by a wearable device
802
Perform deep data analysis of the raw data using algorithms in a user communication device or a server
804
Provide instructions to a user based on long data, trends, cross-correlation analysis of the deep data analysis
806

FIG. 8

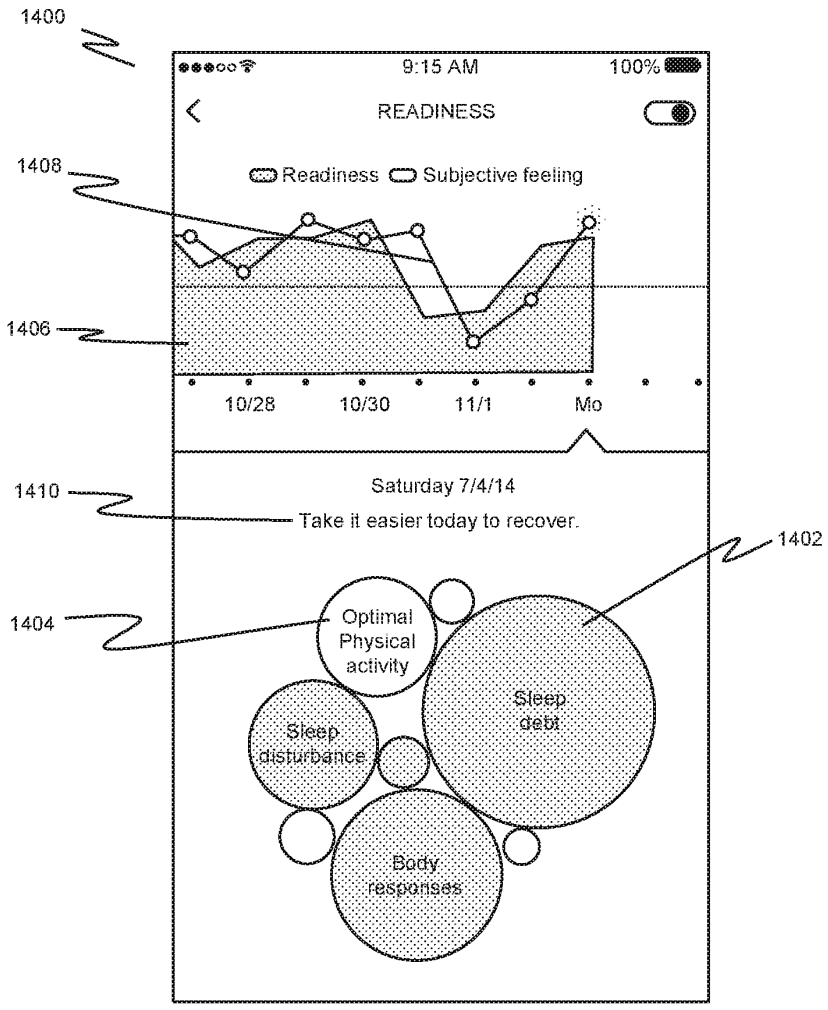

1400
9:15 AM
100%
READINESS
1408
Readiness
Subjective feeling
1406
10/28
10/30
11/1
Mo
Saturday 7/4/14
1410
Take it easier today to recover.
1402
1404
Optimal Physical activity
Sleep debt
Sleep disturbance
Body responses

FIG. 14

Electronic Acknowledgement Receipt

EFS ID:	40682494
Application Number:	15551632
International Application Number:	
Confirmation Number:	1733
Title of Invention:	METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER
First Named Inventor/Applicant Name:	Hannu KINNUNEN
Customer Number:	93582
Filer:	Joseph V. Gamberdell/Deandra Castro
Filer Authorized By:	Joseph V. Gamberdell
Attorney Docket Number:	MDOA.4026.USN1
Receipt Date:	28-SEP-2020
Filing Date:	17-AUG-2017
Time Stamp:	10:05:10
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Drawings-only black and white line drawings	200927_4026USN1_Jouzen003_NCAP_Reply.pdf	13482 cfc831c4adcc65ec9e5322280554adf9535726f4	no	1

Warnings:

Information:					
2	Drawings-only black and white line drawings	200927_4026USN1_Jouzen003_NCAP_ReplacementSheets_.pdf	254143 74ccaf9681309f4b8b1024e4f5a03b1bfad983e6	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	267625		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

93582 7590 07/13/2020
ZIEGLER IP LAW GROUP, LLC.
55 GREENS FARMS ROAD
WESTPORT, CT 06880

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/551,632	08/17/2017	Hannu KINNUNEN	MDOA.4026.USN1	1733

TITLE OF INVENTION: METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$500	$0.00	$0.00	$500	10/13/2020

EXAMINER	ART UNIT	CLASS-SUBCLASS
WU, TONG E	3792	600-301000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-09 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 Ziegler IP Law Group, LLC
2
3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE: Oura Health Oy

(B) RESIDENCE: (CITY and STATE OR COUNTRY): Oulu, Finland

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. Fees submitted: ☒ Issue Fee ☐ Publication Fee (if required) ☐ Advance Order - # of Copies _____

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

☒ Electronic Payment via EFS-Web ☐ Enclosed check ☐ Non-electronic payment by credit card (Attach form PTO-2038)

☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

5. **Change in Entity Status** (from status indicated above)

☐ Applicant certifying micro entity status. See 37 CFR 1.29

☐ Applicant asserting small entity status. See 37 CFR 1.27

☐ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature /jvg44695/ Date 29 September 2020

Typed or printed name Joseph V. Gamberdell Jr. Registration No. 44695

PTOL-85 Part B (08-18) Approved for use through 01/31/2020 OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Petitioner Samsung Ex-1004, 0461

Electronic Patent Application Fee Transmittal

Application Number:	15551632
Filing Date:	17-Aug-2017
Title of Invention:	METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER
First Named Inventor/Applicant Name:	Hannu KINNUNEN
Filer:	Joseph V. Gamberdell/Deandra Castro
Attorney Docket Number:	MDOA.4026.USN1

Filed as Small Entity

Filing Fees for U.S. National Stage under 35 USC 371

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
UTILITY APPL ISSUE FEE	2501	1	500	500

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**500**

Electronic Acknowledgement Receipt

EFS ID:	40703601
Application Number:	15551632
International Application Number:	
Confirmation Number:	1733
Title of Invention:	METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER
First Named Inventor/Applicant Name:	Hannu KINNUNEN
Customer Number:	93582
Filer:	Joseph V. Gamberdell/Deandra Castro
Filer Authorized By:	Joseph V. Gamberdell
Attorney Docket Number:	MDOA.4026.USN1
Receipt Date:	29-SEP-2020
Filing Date:	17-AUG-2017
Time Stamp:	14:28:41
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$500
RAM confirmation Number	E20209SE29283032
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	4026_Transmittal.pdf	1380967 5efef191aa7b1d4963f77568b4e7f768c9ab3a7f	no	1
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30397 00b3ee654e26b65658c99947433ef03e6377dd92	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	1411364		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/551,632	11/24/2020	10842429	MDOA.4026.USN1	1733

93582 7590 11/04/2020

ZIEGLER IP LAW GROUP, LLC.
55 GREENS FARMS ROAD
WESTPORT, CT 06880

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 272 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

Hannu KINNUNEN, Oulu, FINLAND;
Oura Health Oy, Oulu, FINLAND;
Harri LAAKKONEN, Oulu, FINLAND;
Kari KIVELÄ, Helsinki, FINLAND;
Ashley COLLEY, Rovaniemi, FINLAND;
Petteri LAHTELA, Jääli, FINLAND;
Markku KOSKELA, Oulu, FINLAND;
Heidi JURVELIN, Oulu, FINLAND;

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

Petitioner Samsung Ex-1004, 0466

Doc Code: PA..
Document Description: Power of Attorney

PTO/AIA/82A (07-13)
Approved for use through 03/31/2021. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5, unless the application number and filing date are identified in the Power of Attorney by Applicant form. If neither form PTO/AIA/82A nor form PTO/AIA82B identifies the application to which the Power of Attorney is directed, the Power of Attorney will not be recognized in the application.

Application Number	15/551,632
Filing Date	2017-08-17
First Named Inventor	Kinnunen et al.
Title	METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER
Art Unit	3792
Examiner Name	Tong E. Wu
Attorney Docket Number	P003.01 (112434.0015)

SIGNATURE of Applicant or Patent Practitioner

Signature	/Nathan J. Mutter/	Date (Optional)	2021-05-12
Name	Nathan J. Mutter	Registration Number	70,107
Title (if Applicant is a juristic entity)			
Applicant Name (if Applicant is a juristic entity)			

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.

☐ *Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Doc Code: PA..
Document Description: Power of Attorney

PTO/AIA/82B (07-13)
Approved for use through 03/31/2021. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number

POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in either the attached transmittal letter or the boxes below.

Application Number	Filing Date

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)

☑ I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above: 179918

OR

☐ I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

Please recognize or change the correspondence address for the application identified in the attached transmittal letter or the boxes above to:

☑ The address associated with the above-mentioned Customer Number

OR

☐ The address associated with Customer Number:

OR

☐ Firm or Individual Name					
Address					
City		State		Zip	
Country					
Telephone		Email			

I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

Oura Health Oy

☐ Inventor or Joint Inventor (title not required below)

☐ Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)

☐ Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)

☑ Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature	Kristin Lamb	Date (Optional)	
Name	Kristin Lamb		
Title	IP Counsel		

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.

☐ Total of forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Electronic Acknowledgement Receipt

EFS ID:	42702183
Application Number:	15551632
International Application Number:	
Confirmation Number:	1733
Title of Invention:	METHOD AND SYSTEM FOR ASSESSING A READINESS SCORE OF A USER
First Named Inventor/Applicant Name:	Hannu KINNUNEN
Customer Number:	93582
Filer:	Nathan J. Mutter/Jamie LaFleur
Filer Authorized By:	Nathan J. Mutter
Attorney Docket Number:	MDOA.4026.USN1
Receipt Date:	12-MAY-2021
Filing Date:	17-AUG-2017
Time Stamp:	12:13:09
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	15551632POA.pdf	221937 77022cb4d9ad6426a8d9821dfc8f705f7abac98b	no	2

Warnings:

Information:	
Total Files Size (in bytes):	221937

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

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New International Application Filed with the USPTO as a Receiving Office

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
15/551,632	08/17/2017	Hannu KINNUNEN	P003.01 (112434.0015)

CONFIRMATION NO. 1733

179918
Holland & Hart LLP/Oura Health Oy
P.O. Box 11583
Salt Lake City, UT 84147

POA ACCEPTANCE LETTER

OC000000125615108

Date Mailed: 05/18/2021

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 05/12/2021.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/atesfai/

Petitioner Samsung Ex-1004, 0471

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
15/551,632	08/17/2017	Hannu KINNUNEN	MDOA.4026.USN1

CONFIRMATION NO. 1733

93582
ZIEGLER IP LAW GROUP, LLC.
55 GREENS FARMS ROAD
WESTPORT, CT 06880

POWER OF ATTORNEY NOTICE

OC000000125615035

Date Mailed: 05/18/2021

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 05/12/2021.

- The Power of Attorney to you in this application has been revoked by the assignee who has intervened as provided by 37 CFR 3.71. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/atesfai/

Petitioner Samsung Ex-1004, 0472

AO 120 (Rev. 08/10)

TO:	REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK
Mail Stop 8 Director of the U.S. Patent and Trademark Office P.O. Box 1450 Alexandria, VA 22313-1450	

In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court for the Western District of Texas, Waco Division on the following

☐ Trademarks or ☑ Patents. (☐ the patent action involves 35 U.S.C. § 292.):

DOCKET NO.	DATE FILED	U.S. DISTRICT COURT
6:22-cv-00478	5/11/2022	for the Western District of Texas, Waco Division

PLAINTIFF	DEFENDANT
ŌURA HEALTH OY	CIRCULAR SAS

	PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1	10,893,833	1/19/2021	ŌURA HEALTH OY
2	10,842,429	11/24/2020	ŌURA HEALTH OY
3			
4			
5			

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1		
2		
3		
4		
5		

In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT

CLERK	(BY) DEPUTY CLERK	DATE

Copy 1—Upon initiation of action, mail this copy to Director Copy 3—Upon termination of action, mail this copy to Director
Copy 2—Upon filing document adding patent(s), mail this copy to Director Copy 4—Case file copy

UNITED STATES
PATENT AND TRADEMARK OFFICE

P.O. Box 1450
Alexandria, Virginia 22313-1450
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ACKNOWLEDGEMENT OF LOSS OF ENTITLEMENT TO ENTITY STATUS DISCOUNT

APPLICATION #	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET #	REQUEST ID
15/551,632	08/17/2017	Hannu KINNUNEN	P003.01 (112434.0015)	131120

The entity status change request below filed through Patent Center on 12/01/2023 has been accepted.

Certifications

APPLICANT CHANGING TO REGULAR UNDISCOUNTED FEE STATUS

Signature

I certify, in accordance with 37 CFR 1.4(d)(4), that I am one of the signatories making the entity status change.

Signature	Name	Registration #
/Nathan J. Mutter/	Nathan Mutter	70107