



- (51) International Patent Classification:
A63B 21/00 (2006.01)
- (21) International Application Number:
PCT/US2016/019199
- (22) International Filing Date:
23 February 2016 (23.02.2016)
- (25) Filing Language:
English
- (26) Publication Language:
English
- (30) Priority Data:
62/119,725 23 February 2015 (23.02.2015) US
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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, 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).

Declarations under Rule 4.17:

— of inventorship (Rule 4.17(iv))

[Continued on next page]

(54) Title: METHOD AND SYSTEM FOR VIRTUAL FITNESS TRAINING AND TRACKING SERVICES

(57) Abstract: A machine implemented method and system, including: transmitting one or more credentials of a user account from a user device to an exercise management system (EMS) having a processor and one or more sensors, where the EMS is disposed on an exercise equipment disposed in a selected at least one fitness center and the exercise equipment is part of a selected at least one exercise plan; transmitting the one or more credentials of the user account from the EMS to a cloud server having a processor; transmitting the selected at least one exercise plan for the new user account from the cloud server to the EMS; transmitting an exercise equipment information from the EMS; forming a user exercise data by the EMS for the exercise equipment based on data received from the one or more sensors; and transmitting an exercise feedback from the EMS.

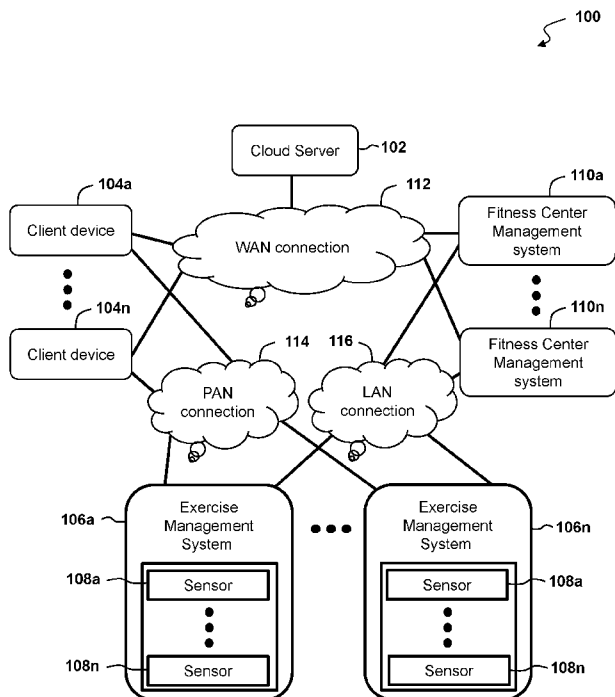


FIG. 1

WO 2016/138042 A4

Published:

- *with international search report (Art. 21(3))*
- *with amended claims (Art. 19(1))*

(88) Date of publication of the international search report:
27 October 2016

Date of publication of the amended claims: 15 December
2016

AMENDED CLAIMS

received by the International Bureau on 11 October 2016 (11.10.16)

CLAIMS

What is claimed is:

1. A machine implemented method, comprising:
 - 5 transmitting one or more credentials (122) of a user account from a user device (104a) to an exercise management system (EMS) (106a) having a processor (262) and one or more sensors (180), wherein the EMS (106a) is disposed on an exercise equipment disposed in a selected at least one fitness center (150), wherein the exercise equipment is part of a selected at least one exercise plan;
 - 10 transmitting the one or more credentials (122) of the user account from the EMS to a cloud server (102) having a processor;
 - transmitting the selected at least one exercise plan (180) for the new user account from the cloud server (102) to the EMS (106a);
 - transmitting an exercise equipment information based on the exercise equipment
 - 15 and the selected at least one exercise plan (180) from the EMS (106a);
 - forming a user exercise data (194) by the EMS (106a) for the exercise equipment based on data received from the one or more sensors (180); and
 - transmitting an exercise feedback from the EMS (106a) based on a comparison of the formed user exercise data (194) and the selected at least one exercise plan
 - 20 (180).

2. The machine implemented method of claim 1 further comprising:
 - determining a difference between the formed user exercise data (194) and the selected at least one exercise plan (180) at the cloud server (102);
 - 25 if the difference between the formed user exercise data and the selected at least one exercise plan is minimal:
 - maintaining the selected at least one exercise plan at the cloud server;
 - if the difference between the formed user exercise data and the selected at least one exercise plan shows a greater user performance:
 - 30 modifying the selected at least one exercise plan to an increased difficulty at the cloud server;
 - if the difference between the formed user exercise data and the selected at least one exercise plan shows a lower user performance:

- modifying the selected at least one exercise plan to a decreased difficulty at the cloud server; and
- if the difference between the formed user exercise data and the selected at least one exercise plan shows an exercise equipment not in the selected at least one exercise plan:
- 5 modifying the selected at least one exercise plan to add the exercise equipment to the selected at least one exercise plan at the cloud server.
3. The machine implemented method of claim 1 wherein an EMS mounted on an exercise equipment further measures usage patterns, and a club management module (802) provides said usage patterns to a fitness center operator for determining one or more of: preventative maintenance based on equipment use time and efficiency changes, usage time slot scheduling and exercise equipment use frequency.
- 10
- 15 4. The machine implemented method of claim 1 wherein:
the exercise equipment information comprises one or more of: exercise equipment settings, an exercise technique for the exercise equipment, a weight to be lifted, a duration, a number of repetitions, and a number of sets; and
the user device (104a) comprises one or more of: a smart phone having a processor (202), a near field communication (NFC) Tag (252), and a radio-frequency identification (RFID) tag (254).
- 20
5. The machine implemented method of claim 1 further comprising:
transmitting the formed new user exercise data (194) for the exercise equipment from the EMS (106a) to the user device (104a);
25 transmitting the formed new user exercise data (194) for the exercise equipment from the EMS (106a) to the cloud server (102); and
generating a new record in a new user exercise summary database (194) at the cloud server (102), wherein the new user exercise summary (194) includes the formed new user exercise data (196, 197, 198, 199).
- 30
6. The machine implemented method of claim 1 further comprising:
an EMS capturing exercise information in real time and a user module (804) gathering historical data, providing one or more of: number of calories burned

by a user over a time period, measure of user goal data, visual feedback based on user activity, enabling request for trainer assistance, and sharing user activity information on a social network .

- 5 7. The machine implemented method of claim 1 further comprising, prior to transmitting one or more credentials (122) of the user account:
- transmitting a user account request (452) from the user device (104a) having a processor (202) to the cloud server (102);
- 10 generating at the cloud server (102) the user account (122) containing information (124, 126) transmitted by the user device;
- transmitting a list of fitness centers (150) from the cloud server (102) to the user device (104a);
- transmitting a selection (454) of at least one of the list of fitness centers (150) from the user device (104a) to the cloud server (102);
- 15 transmitting a list of exercise plans (180) based on the selected at least one of the list of fitness centers (150) from the cloud server (102) to the user device (104a); and
- transmitting a selection (460) of at least one exercise plan of the list of exercise plans (180) from the user device (104a) to the cloud server (102).
- 20
8. The machine implemented method of claim 1 wherein:
- the one or more sensors comprise one or more of: an accelerometer, a gyroscope, a weight meter, a tension meter, a pulse meter, and a proximity sensor (282, 284, 286, 288, 290);
- 25 the method further comprising, based on collected data from users, generating real time leader board information via the leader board module (806), providing information including one or more of: identity of trainer which helped users to achieve most goals, user visit frequency to the fitness center, user weight lifting statistics.
- 30 9. The machine implemented method of claim 1 wherein the formed user exercise data comprises one or more of: a weight used, a number of sets, a number of repetitions, a lifting speed, a range, an energy, a maximum power, and a total calories spent (196, 197, 198, 199).

10. A machine implemented method, comprising:
- enabling by a trainer device (104a) having a processor (202), a recording mode (436) for an exercise management system (EMS) (106a) having a processor (262) and one or more sensors (180), wherein the EMS (106a) is disposed on an exercise equipment disposed in a fitness center (150);
- forming by the EMS (106a), one or more exercise details (190) based on data from the one or more sensors (180);
- transmitting by the EMS (106a), the formed data to a cloud server (102) having a processor;
- forming by the cloud server (102), a training plan (182) for a trainer (184) that includes the formed data.
11. The machine implemented method of claim 10, further comprising:
- enabling record mode of an EMS on a fitness equipment for recording, while trainer is working out, one or more of: sets, repetitions, tempo, and range of motion; automatically generating and a training plan which may be shared with users for guidance on performing an exercise;
- wherein the training plan comprises one or more of: a weight of an exercise for the fitness equipment, a number of sets for the exercise for the fitness equipment, a number of repetitions for the exercise for the fitness equipment, a lifting speed for the exercise for the fitness equipment, and a range for the exercise for the fitness equipment.
12. The machine implemented method of claim 10 further comprising, prior to enabling the recording mode:
- transmitting a trainer account request (432) from a trainer device (104a) to the cloud server (102);
- generating at the cloud server (102), a trainer account (170) containing information (171, 172, 174) transmitted by the trainer device (104a).

13. The machine implemented method of claim 10 wherein the one or more sensors comprise one or more of: an accelerometer, a gyroscope, a weight meter, a tension meter, a pulse meter, and a proximity sensor (282, 284, 286, 288, 290).
- 5 14. A system comprising:
an Exercise Management System (EMS) (106a) comprising:
one or more sensors (180); and
a processor (262) having memory (264), the processor configured to:
pair a user device (104a) to the EMS;
10 receive one or more credentials (122) of a user account from the user device;
transmit the one or more credentials (122) of the user account to a cloud server (102);
receive an exercise plan (180) for the user account from the cloud
15 server (102);
form a user exercise data (194) for an exercise equipment (601, 611, 621, 641, 651, 661) based on data received from the one or more sensors; and
transmit an exercise feedback based on a comparison of the formed
20 user exercise data and the received exercise plan (180).
15. The system of claim 14 wherein:
separate weight and motion sensors are coupled based on matching the timing of the lifting events; and
25 the formed user exercise data comprises one or more of: a weight used, a number of sets, a number of repetitions, a lifting speed, a range, an energy, a maximum power, and a total calories spent (196, 197, 198, 199).
16. The system of claim 14 wherein the EMS (106a) processor (262) is further configured
30 to:
transmit the formed user exercise data for the exercise equipment to the cloud server (102); and
unpair the user device from the EMS.

17. The system of claim 14 wherein the one or more sensors further comprise:
a tension meter (602) of the one or more sensors disposed on a cable (600) of the
exercise equipment (601), wherein the tension meter measures a weight lifted;
5 and
one or more motion sensors (602) of the one or more sensors disposed on the cable
(600) of the exercise equipment, wherein the one or more motion sensors
measure a movement of the weight lifted.
- 10 18. The system of claim 17 wherein:
the one or more motion sensors comprise an accelerometer and a gyroscope; and
the weight sensor comprises one or more of: a load cell type weight sensor and a
tension meter.
- 15 19. The system of claim 17 comprising separate weight and motion sensors, wherein the
weight sensor can be mounted on a support and a motion sensor can be mounted on the
support, such that the weight sensor may be used by itself or with the motion sensor to
record partial or full data for one or more of: sets, repetitions and weight.
- 20 20. The system of claim 17 wherein the weight pin further comprises one or more pin
relief features (617), wherein the one or more pin relief features concentrates the
weight and support forces on one or more predefined and fixed areas of the weight pin.
21. The system of claim 14 wherein the one or more sensors further comprise:
25 a weight sensor of the one or more sensors disposed in a weight pin (618) of the
exercise equipment (611), wherein the weight sensor measures a weight (614)
lifted; and
one or more motion sensors (616) of the one or more sensors mounted on the
weight pin (618), wherein the one or more motion sensors measure a movement
30 of the weight (614) lifted, and wherein the weight pin (618) compensates for an
orientation of the weight pin (618) with respect to ground.
22. The system of claim 21 wherein:

the system receives user input via a user interface and timing device, for: manually reserving fitness areas and classes in the fitness center, and recording time for functional training or repetitions for circuit training; and
the one or more motion sensors comprise an accelerometer and a gyroscope.

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23. The system of claim 21 wherein the weight sensor comprises one or more of: a load cell type weight sensor and a tension meter.
24. The system of claim 21 wherein the weight pin further comprises one or more pin relief features (617), wherein the one or more pin relief features concentrates the weight and support forces on one or more predefined and fixed areas of the weight pin.
25. The system of claim 14 wherein the one or more sensors further comprise:
a weight sensor of the one or more sensors disposed in a weight pin (622) of the exercise equipment, wherein the weight sensor measures a weight lifted; and
a rotation sensor (626) of the one or more sensors disposed about the weight pin, wherein the rotation sensor measures the movement of a cable of the exercise equipment about a rotatable pulley.
26. The system of claim 25 wherein the weight sensor comprises one or more of: a load cell type weight sensor and a tension meter.
27. The system of claim 25 wherein the weight pin (622) further comprises one or more pin relief features (617), wherein the one or more pin relief features concentrates the weight and support forces on one or more predefined and fixed areas of the weight pin.
28. The system of claim 14 wherein the one or more sensors further comprise:
a weight sensor (650) of the one or more sensors disposed in on support (644) of the exercise equipment (641), wherein the weight sensor measures a weight lifted; and
one or more motion sensors (648) of the one or more sensors mounted on a barbell (642), wherein the one or more motion sensors measure a movement of the weight lifted;

30

wherein the weight sensor (650) communicates (300, 310) with the one or more motion sensors (648).

29. The system of claim 28 wherein the one or more motion sensors comprise an
5 accelerometer and a gyroscope.
30. The system of claim 28 wherein the weight sensor comprises one or more of: a load cell type weight sensor and a tension meter.
- 10 31. The system of claim 14 wherein the EMS (106a) processor (262) is further configured to:
determine a type of exercise (166) performed based on a range of motion recorded
by the one or more sensors (180);
provide step-by-step training plan based on user activity, on how to perform
15 exercises and exercise sequence.
32. The system of claim 14 wherein the one or more sensors further comprise:
a weight sensor (656) of the one or more sensors disposed in a barbell (642) of the
exercise equipment (651), wherein the weight sensor (656) measures a weight
20 (646) lifted; and
one or more motion sensors (654) of the one or more sensors mounted on a sleeve
(652) of the barbell (642), wherein the one or more motion sensors (654)
measure a movement of the weight (646) lifted, and wherein the weight sensor
(656) compensates for an orientation of the barbell (642) with respect to
25 ground.
33. The system of claim 32 wherein the one or more motion sensors (654) comprise an accelerometer and a gyroscope.
- 30 34. The system of claim 32 wherein the weight sensor (656) comprises one or more of: a load cell type weight sensor and a tension meter.

35. The system of claim 14 further configured to: receive acceleration data from one or more sensors (180) at an exercise management system (EMS) (106a) having a processor (262);
apply at the EMS, a first high-pass filter (912) to the received acceleration data;
5 determining at the EMS, a velocity of the filtered acceleration data by integration (914);
apply at the EMS, a velocity drift compensation (916) to the filtered acceleration data;
apply at the EMS, a second high-pass filter (918);
10 determine at the EMS, a displacement (920) of the filtered acceleration data;
apply at the EMS, a drift compensation (922) to the filtered acceleration data;
apply at the EMS, a zero band point algorithm (924) to the displacement filtered acceleration data;
determine at the EMS, one or more of: a range, a tempo, a work done, a power, and
15 a calories consumed (926) based on the applied zero band point algorithm; and
identify different exercises having different motion based on acceleration and angular velocity signatures, for determining exercise type.