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(71) Applicant: **HEWLETT-PACKARD DEVELOPMENT COMPANY, L.P.** [US/US]; 11445 Compaq Center Drive W., Houston, Texas 77070 (US).

(72) Inventors: **WOODWORTH, Jeffrey**; 11311 Chinden Blvd, Boise, Idaho 83714-0021 (US). **SEILER, Peter**; 3390 E. Harmony Road, Fort Collins, Colorado 80528 (US). **PANDIT, Amol**; 3390 E. Harmony Rd, Zhangjiang Micro-Electric Port, Fort Collins, Colorado 80528 (US). **FLACH, Matthew**; 3390 E. Harmony Road, Fort Collins, Colorado 80528 (US).

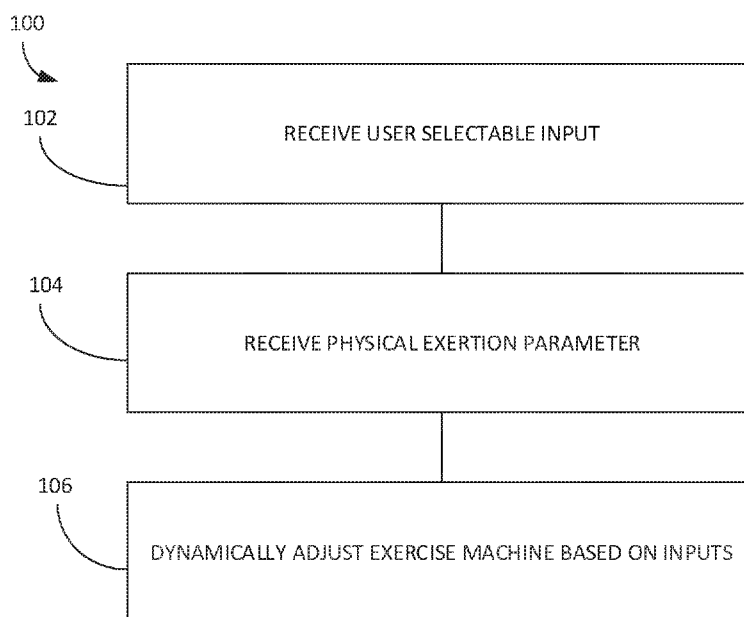
(74) Agent: **WOODWORTH, Jeffrey** et al.; HP Inc., 3390 E. Harmony Road, Mail Stop 35, Fort Collins, Colorado 80528 (US).

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(54) Title: EXERCISE PROGRAMS

FIGURE 1



(57) Abstract: A method of providing an exercise program is disclosed. A user selectable input is received into a computing device. An input indicative of a physical exertion parameter of the user during the exercise program is received into the computing device. The computing device dynamically adjusts an exercise machine during the exercise program based on the user selectable input and the input indicative of the physical exertion parameter.

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EXERCISE PROGRAMS

Background

[0001] Physical exercise is any bodily activity that enhances or maintains physical fitness and overall health and wellness. The benefits of exercise have been known since antiquity, and Marcus Cicero once stated, "It is exercise alone that supports the spirits, and keeps the mind in vigor." The link between physical health and exercise, or the lack of exercise, however, was not reported until the second half of the twentieth century. Exercise can be performed for various reasons, including increasing growth and development, reducing aging, strengthening muscles and the cardiovascular system, honing athletic skills, weight loss or weight maintenance, and enjoyment. Frequent and regular physical exercise may boost the immune system and reduce the likelihood of cardiovascular disease, type two diabetes, and obesity. Exercise can be performed with a personal trainer, in a coach-directed fitness class, in groups, or alone either without exercise equipment or with exercise equipment including computerized electromechanical devices executing an exercise program.

Brief Description of the Drawings

[0002] Figure 1 is a block diagram illustrating an example method.

[0003] Figure 2 is a block diagram illustrating another example method.

[0004] Figure 3 is a block diagram illustrating an example system to implement the example methods of Figures 1 and 2.

[0005] Figure 4 is a block diagram illustrating an example system to implement the example system of Figure 3.

Detailed Description

[0006] The use of exercise machines to execute an exercise program includes the benefits of flexibility to perform the exercise program despite inclement weather or having to conform to the schedule of a personal trainer or fitness class. When using indoor or home exercise equipment, the experience is not the same as exercising outdoors or with a group. Furthermore, users may not have proper training or know how to meet their workout goals or generate effective workouts.

[0007] This disclosure relates to a computerized exercise machine and system that can receive inputs from a user to create an immersive and personalized workout experience. By monitoring physical exertion quantified by biometric inputs in context with an exercise regimen, the exercise machine can help the user attain personal fitness goals with more efficiency in the workout's effects on the specific user.

[0008] Figure 1 illustrates an example method 100 of providing an exercise program in which a user can engage in an exercise plan with an exercise machine. A user selectable input is received into a computing device at 102. An input indicative of a physical exertion parameter of the user during the exercise program is received into the computing device at 104. The computing device dynamically adjusts an exercise machine during the exercise program based on the user selectable input or the input indicative of the physical exertion parameter at 106. The computing device may adjust the exercise program continuously, periodically, when the physical exertion parameter crosses a threshold, when user input is received, or the like.

[0009] In a basic hardware configuration, the computing device (or devices) of this disclosure typically includes a processor system having a processing unit, i.e., processors and memory operably coupled to the exercise machine, that may dynamically adjust a setting, such as speed or pressure or resistance or duration, of the exercise machine. The computing device can take several forms. Such forms include a personal computer, a workstation, a server, a handheld device (such as a mobile phone or tablet), a wearable device, a

consumer electronic device (such as a video game console or a digital video recorder), a controller in the exercise machine, or other, and can be a stand-alone device or configured as part of a computer network. The dynamically adjustable exercise machine (or machines) of this disclosure can also take several forms. Such forms include an aerobic or cardiovascular trainer having an adjustable speed or resistance or duration, such as treadmill having an adjustable speed and incline, an exercise bicycle, elliptical trainer, stair-climber, or other; an anaerobic trainer or resistance machine, such as a machine with computer adjustable weights (adjustable during or between repetitions of a complete motion) or with a motor to assist or spot the user, resulting in a pressure on the user or other resistance mechanisms; or other exercise machine including recirculating stream swimming pools. The computing device may be physically coupled to the exercise machine via direct signal pathways, coupled to the exercise machine via a computer network such as the internet or local network, or otherwise coupled to the exercise machine to effect adjustment of the settings.

[0010] The user selectable input can include several forms including a preselected exercise regimen, user selectable inputs modifying the exercise regimen prior to commencement of the exercise program, user selectable inputs in addition to or instead of the exercise regimen that can be received prior to commencement of the exercise program, and user inputs that can be received during the exercise program. In one example, the exercise regimen includes a base exercise plan to be dynamically modified during the exercise program. In one example, the user selectable input can be received in response to a prompt from the computing device such as prior to or during the exercise program. In one example, the exercise regimen may include a programmed set of input parameters defined by a clinician, such as a physician, nurse, or physical therapist, or physical professional such as a personal trainer or coach, with the intent of targeting a specific set of physical exertion parameters. The exercise program can assist the user to achieve selected goals as prescribed by the clinician or professional. For instance, a physical therapist may be working with a patient to rebuild muscle in a certain muscle group. The exercise program

may take this input and adjust resistances and workout profiles to specifically target the muscle groups that the physical therapist prescribes.

[0011] As used herein, the term “physical exertion parameter” refers to a metric directly or inferentially related to a physiological response to the exercise program. For example, the physical exertion parameter can include a heart rate, body temperature, breathing rate, breathing volume, lactate or lactic acid level, electro-dermal activity (or galvanic skin response) related to an amount of sweat secretion from the user’s sweat glands, or other metric related to physiologic response to physical exertion. Additionally, the physical exertion parameter can be based on changes to the physiological response during the exercise program.

[0012] The physical exertion parameter is one example of biometric data. Biometric data refers to data related to the user’s characteristics including physical and behavior characteristics of the user during the exercise program. Examples of physical characteristics include height, weight, shape or other geometry of body or portion of the body, or scent. Behavior characteristics include limb speed (such as foot speed or hand speed), body, limb, or other portion of the body position during exercise (e.g., absolute position, position relative to the exercise equipment, etc.), body or limb rhythm, or voice. The physical exertion parameter may include physical or behavioral characteristics of the biometric data.

[0013] Figure 2 illustrates an example method 200 of providing an exercise program with a computing device and an exercise machine. A user selectable input is received into the computing device at 202. The user selectable input at 202 includes an exercise regimen and a response to an interactive prompt from the computing device. A biometric input is also received into the computing device at 204. The exercise machine is dynamically adjusted with the computing device during the exercise program based on the user selectable input and the biometric input at 206.

[0014] The user selectable input can include additional inputs. In addition to the exercise regimen, the user selectable input can include an exercise program adjustment input, in which the user can selectively adjust a parameter of the

exercise program such as speed, pressure from the exercise machine, resistance of the exercise machine and duration of exercise of during the exercise program. The exercise program adjustment input can be included in addition to the response to the interactive prompt. In some examples, the computing device can output an interactive prompt, such as via a display or speaker, which seeks a response from the user. For instance, the computing device may detect, based on a biometric input, that the user might want to increase speed, pressure, or resistance, and a prompt may ask the user whether to increase the speed, pressure, or resistance or other parameter of the exercise program. The user may respond, such as via a verbal command detected by a microphone or via an input on a touch screen, touchpad, or keyboard, and the response can be applied to dynamically adjust the exercise machine. Data regarding the exercise program, including dynamic adjustments made during the participation of the exercise program, can be saved in a memory device stored locally with the computing device, on a network, or otherwise, and used to provide a subsequent exercise regimen for the user. This data may be used by a program running on the computing device, or by a physician or trainer or physical therapist to influence future workout exercise regimens. In some examples, the exercise program may dynamically adjust the workout to avoid discomfort to the user, such that the user avoids inadvertent over exertion during the workout.

[0015] Figure 3 illustrates an example system 300 that can be used to implement the methods 100, 200. System 300 includes a computing device to operate an exercise application 302 that is operably coupled to an adjustable exercise machine 304 to at least partially control and dynamically adjust the exercise machine 304 during an exercise program. Exercise application 302 can be implemented as a combination of hardware and programming for controlling the system 300 to provide an exercise program and implement methods 100, 200. In one example, the exercise application 302 can include a set of processor-executable instructions stored on a non-transitory computer readable medium. The exercise application 302 can receive a set of inputs including an exercise regimen 306, user inputs 308, and biometric information 310 from the

user. Additionally, the exercise application 302 can include a user interaction 312, which can include providing interactive prompts during the exercise program to request a user response that are received as interactive inputs. The exercise application 302 may store data regarding the exercise program including inputs as exercise data 314 such as locally or on a network.

[0016] The exercise regimen 306 can include computer instructions and data regarding the base exercise program to be executed in methods 100, 200, such as a schedule of exercises with various exercise parameters such as speed, pressure, resistance, and duration for the user. The exercise regimen 306 can also include information regarding various target physical exertion parameters, such as a target heart rate for a given amount of time, to be achieved by the user during the performance of exercise program. In some examples, the exercise regimen can be prescribed by a clinician or professional, downloaded from a set of available exercise regimens from database on a computer network, or user generated. In one example, the user generated exercise program may be generated by the user selecting specific muscle groups to target during the exercise regimen 306. The exercise regimen 306 can apply to dynamically adjustable exercise machines, such as exercise machine 304. Additionally, the exercise regimen can change over time based on whether the user executes the exercise program. Further, exercise data 314 can be used to adjust the exercise regimen 306, and the exercise data 314 can include information regarding the user or other users. The user is able to load the exercise regimen 306 into the exercise application 302 on the computing device such as by entering a code or other identification signal, via biometric information identifying the user, or directly. The exercise application 302 can select the proper exercise regimen based on the selected exercise regimen and other information such as time of day, length of time since the exercise regimen was last performed, user input, or other criteria.

[0017] In addition to configuring settings for the exercise machine, the exercise regimen 306 can configure settings for a virtual environment during the exercise program. For example, if the exercise machine is a treadmill or exercise bike, the user may select a run or ride through Central Park in New York City, around

the Eiffel Tower in Paris, France, or other place of interest that the exercise application 302 will then display on an operably coupled monitor or headset. The monitor or headset may occupy all or substantially all of the user's field of view with images of setting to create an immersive experience such that the user feels like the user is at the particular setting. The exercise regimen 306 may also include music or other audio or visual output appropriate for the exercise program.

[0018] As part of the virtual environment, the exercise application 302 can also include a virtual coach to encourage the user, suggest modifications, or otherwise guide the user during the exercise program via a display or speaker. The virtual coach may include a virtual representation, such as an avatar, image, or video, which is inserted into the display with the scenery. Avatars or images of other users (e.g., remotely located users) may also be inserted into the scenery. The insertion of the virtual coach or other users into the scenery may more realistically imitate a private training session or group exercise class. The representation of the virtual coach may run ahead of the user, look at the user, or clap their hands, while outputting the audio encouraging the user.

[0019] Various aspects of the exercise program may be configured prior to the performance of the exercise program, during breaks between exercises, or during the exercises via user inputs 308 that can be applied to adjust the exercise machine 304, the exercise regimen 306, or other aspects of the exercise program. The user may provide user inputs 308 via buttons, switches, levers, a keyboard, touchscreens, microphones, gestures in front of a camera or other device, or other input devices operably coupled to the computing device to modify the exercise application 302.

[0020] The exercise application 302 can continuously receive biometric inputs 310 from the user during the performance of the exercise program. These biometric inputs can include physical and behavioral characteristics of the user including physical exertion parameters. The exercise application 302 may help prevent discomfort or health issues. In one example, the exercise application 302 can suggest modifications to the performance of the exercise (an audio output of a recommendation such as "keep your back straight" in the virtual

coach's voice) based on the biometric inputs 310. The exercise application 302 may monitor galvanic response to determine if the user is becoming dehydrated, and so the exercise application 302 can either stop the exercise program or prompt the user to hydrate before severe dehydration or even heat stroke. The exercise application 302 may also have the ability to monitor chemical levels in the user's bloodstream, such as detecting high levels of lactic acid to determine when the user might be getting a cramp or might be excessively sore in which continuing the workout could harm the user.

[0021] The exercise application 302 may respond to how the user feels. The user may say "I need to go slower because I have discomfort in a [body part]," and the exercise application 302 may adjust the speed, pressure, resistance, duration, or heart rate goals accordingly. The exercise application may check in periodically to see if the discomfort has gone away or is persisting. The exercise application 302 may return to the original speed, pressure, resistance, duration, or heart rate or may encourage the user to cease the workout depending on whether the discomfort has abated or persists. The exercise application 302 may also evaluate biometric data, such as form, to determine whether a workout is overly ambitious or risks discomfort. For example, if the user's heart rate or temperature is too high, the user repeatedly falls behind pace, or the user has worse form than usual, the exercise application 302 may change the exercise program or encourage the user to do so (for example, the exercise program may provide an audio output such as, "Perhaps today isn't a good day to try for a personal best. [You are overheating./You were running a fever when you started./You are struggling with your form.]" in the virtual coach's voice).

[0022] Additionally, the exercise application 302 can suggest modifications to the exercise program (an audio output of a recommendation such as "let's pick up the pace" in the virtual coach's voice) based on a physical exertion parameter and then dynamically modify the speed of the exercise machine either at a preselected configuration or at the user's selected configuration based on another biometric input 310 such as limb speed or limb position. In this example, the exercise application may make a suggestion to modify the exercise program based on biometric inputs 310 and also dynamically modify

the exercise machine 304 based on biometric inputs 310 that may be the same or different than the biometric inputs used to make the suggestion. In one example, the virtual coach may identify that the user's body position is susceptible to incurring injury to the user, and so for the user's safety, the virtual coach may instruct the user to adjust body position to avoid injury, or the exercise application may preemptively terminate the exercise regimen to avoid further discomfort to the user.

[0023] The virtual coach may also offer encouragement when the user is failing to meet a heart rate or speed, pressure, or resistance goal or encourage the user to pace the user's self if the user is exceeding a heart rate or speed, pressure, or resistance goal. For example, the virtual coach may output audio encouragement, such as preprogrammed or dynamically generated audio messages. The virtual coach may adjust parameters of the equipment while delivering messages (e.g., "Your heart rate isn't high enough. Time to increase the speed!" "You are falling behind your pace. Keep up!"). In an example, the virtual coach may use body position to control the speed, pressure, or resistance of the exercise equipment but also nudge the speed, pressure, or resistance faster or slower gradually to encourage the user to increase or decrease effort. Body position and heart rate measurements may be used to ensure that the exercise program is not overzealous. The user may be able to set a mood or meanness of the virtual coach, and the voice used, tone, volume, word choice can be adjusted accordingly (e.g., the virtual coach can be set to swear and yell).

[0024] The exercise application 302 can provide prompts for inputs during the performance of the exercise program (or prior to or subsequent to the completion of the performance of the exercise program) via user interaction 312. User responses to the prompts from user interaction 312 can be applied to dynamically modify the exercise machine. In some examples, the prompts may be based on the exercise regimen 306, user inputs 308, and biometric information received prior to or during the performance of the exercise program. For example, the user prompt may be an output via a display or audio message asking whether the user would like to increase the current pace, the resistance,

or duration of the exercise. The user could then respond via an input, such as a voice command or other input to the system whether to increase the current pace or resistance or time of the exercise. In another example, the prompt may seek clarification about other inputs. For instance, biometric information 310 may indicate the user is unusually stressed from the exercise program. User interaction 312 may request additional detail or clarification such as whether the user is actually struggling to complete the exercise program. Thus, inputs via user interaction 312 may be used to directly modify the exercise program and dynamically adjust the exercise machine 304, may be used to seek additional inputs from the user prior to a determination by the exercise application 302 of whether to modify the exercise program, or other.

[0025] The user could request a particular workout verbally (e.g., “I want to do a 30-minute interval run;” “I want to run a 7 minute mile for 4 miles;” “I want to beat my personal best for a 5K;” or “I want an easy 20 minute run.”). The exercise application 302 can monitor heart rate to make sure it stays at the right value (e.g., for an interval run or an easy run) or monitor pace. As discussed above, the virtual coach can offer verbal encouragement or adjust parameters when the user is not meeting their requested goal or workout. If the user has not requested a particular speed, pressure, resistance, duration, or heart rate, the digital coach may look at previous workouts, target heart rate for the user’s age, or the like to decide whether to encourage the user to try harder. The exercise application 302 may determine the speed, pressure, resistance, duration, or heart rate based on the how the exercise was described (e.g., “easy,” “hard,” “light,” “aggressive,” etc.), such as by analyzing previous workouts. The virtual coach may have prompted the user at the end of previous workouts to gather a description of the workout (e.g., descriptive terms), for example, by asking “How was the workout?” When the exercise application 302 is unsure of speed, pressure, resistance, duration, or heart rate, it may probe the user via prompts (e.g., “I think you could do a little faster. Would you like me to push you harder?” or “You probably won’t be able to maintain this pace. Do you want me to help pace you?”). The user may request a particular total calorie burn or burn rate. The exercise application 302 may analyze heart rate,

breathing rate, breathing volume, perspiration, temperature, etc. to determine the total calorie burn or burn rate. In the total calorie burn case, the exercise application 302 may determine how the user would take to burn that many calories and inform the user. The exercise application 302 may consider heart rate and the calculated time to decide whether to encourage the user to speed up to save time or to slow down to prevent exhaustion before the goal is met.

[0026] In some examples, the exercise application 302 may generate the exercise program dynamically. The exercise application 302 may convert the user's request from a broad description or from different formats into inclines, speeds, pressures, resistances, durations, etc. (e.g., The user may request a 5 mile run that rises 1000 feet in the first four miles and drops 100 feet in the last mile. The exercise application 302 may vary the incline over the first four miles but provide a total rise of 1000 feet and may determine an appropriate heart rate or speed.) The exercise application 302 may select video with the requested incline profile. Alternatively, the user may request a particular environment (e.g., "I want a run near a river."), and the exercise application 302 may select the video and/or the incline/speed profile based on the requested environment. The exercise application 302 may generate or stitch together video to create a requested incline/speed profile. For example, turns or hill peaks may allow video to be stitch together in an almost seamless manner. In an example, the user and virtual coach could discuss the workout while the user is warming up (e.g., "User: Let's warm-up for five minutes. Coach: Alright, I will start the warm-up. What would you like to do after the warm-up? User: I would like to do [a 30-minute interval run/run by the river/etc.]. Coach: How about a run that includes [X/Y/Z interval times and heart rates/ X/Y/Z inclines along a river in Colorado]? User: Let's do that but with W instead of X. Coach: Okay, I have adjusted the workout to have W/Y/Z [intervals/inclines].).

[0027] The exercise application 302 may continuously adjust a training schedule/regimen. For example, a user may want to train for a marathon. By tracking and recording previous biometric data and storing it as exercise data 314, the next exercise program could be pre-determined and the equipment settings changed accordingly. For example, the exercise application 302 may

determine the aggressiveness of the next workout of the exercise program based on how the user performed during previous workouts of the exercise program. The exercise application 302 can maintain user profiles and be an advisor based on how it has been used by a particular user. For instance a user exercises on the machine with the digital advisor and it keeps track of what that user has been doing and may recommend a certain routine the next time that user wants to exercise. The exercise application 302 may adjust workouts of the exercise program based on the time since a previous workout and may prompt the user to determine if any independent workouts occurred. The exercise application 302 may change or make adjustments to get a good overall workout say per week or per month depending on the use. The exercise machine may be linked to a computer network such as a public cloud and track user profiles, or the user profile may be stored on a selected computing device such as the user's mobile device or wearable. The user may be able to work out on different exercise machines or in different locations but be able to still link all the exercise data 314 and other information together to enable the exercise application 302 to make further recommendations. The exercise application 302 may provide the user with the benefits of having a personal trainer present for every workout.

[0028] Figure 4 illustrates an example computer-implemented exercise system 400, which can be configured to implement the system 300. The computer-implemented exercise system 400 includes a computing device 402 having a processor 404 and memory 406 and exercise application 408, which can include an implementation of exercise application 302. The computing device 402 is operably coupled to a dynamically adjustable exercise machine 410, which can correspond with exercise machine 304, via a direct connection or over a network to implement example methods 100, 200 and apply an exercise program. Additionally, the computing device 402 can be operably coupled to a data storage mechanism 412 or database, which can be used to store exercise data 314.

[0029] In one example, exercise application 408 can be implemented as a set of processor-executable instructions stored on a non-transitory computer readable medium, such as memory 406 or data storage mechanism 412. Computer

readable media, computer storage media, or memory may be implemented to include a combination of volatile or nonvolatile computer storage media or as any suitable method or technology for storage of information such as computer readable instructions, data structures, program modules or other data. A propagating signal by itself does not qualify as storage media or a memory device.

[0030] Computing device 402 includes input and output connections, such as USB connections, display ports, wireless connections, proprietary connections, and others to connect to various devices to provide inputs and outputs to and from the computing device 402. For example, computing device 402 may be coupled to inputs devices 420, sensors 422, imaging equipment 424, and output devices 426.

[0031] Input devices 420 can include keyboards, pointing devices, dedicated buttons or switches, soft buttons or switches, voice input devices such as microphones, touch input devices, or others. Sensors 422 can include biometric sensors such as heart rate sensors, weight sensors to locate the weight and distribution of the user in relation to the exercise machine, electro-dermal activity sensors, sonar to detect limb speed or limb position, and other sensors. Imaging equipment 424 can include visual imaging cameras or depth cameras that can be applied to detect, for example, body position of the user during exercise, facial recognition, or other inputs. Additionally, output devices 426 can include visual outputs displays such as monitors, headsets including virtual reality headsets or wearables, audio outputs such as speakers or connections for speakers or headphones, and haptic output devices to provide responses via the sense of touch.

[0032] Although specific examples have been illustrated and described herein, a variety of alternate and/or equivalent implementations may be substituted for the specific examples shown and described without departing from the scope of the present disclosure. This application is intended to cover any adaptations or variations of the specific examples discussed herein. Therefore, it is intended that this disclosure be limited only by the claims and the equivalents thereof.

CLAIMS

1. A method of providing an exercise program, the method comprising:
receiving a user selectable input into a computing device;
receiving an input indicative of a physical exertion parameter of the user during the exercise program into the computing device; and
dynamically adjusting an exercise machine with the computing device during the exercise program based on the user selectable input and the input indicative of the physical exertion parameter.
2. The method of claim 1 wherein the user selectable input further includes a response to an interactive prompt from the computing device.
3. The method of claim 1 wherein the user selectable input includes an exercise regimen.
4. The method of claim 1 wherein the physical exertion parameter includes heart rate, breathing rate, breathing volume, temperature, electro-dermal activity, or lactic acid level of the user.
5. The method of claim 1 wherein adjusting the exercise machine includes adjusting speed, pressure, or resistance of the exercise machine with the computing device.
6. The method of claim 1 wherein receiving the user selectable input includes receiving the user selectable input prior to the exercise program.
7. The method of claim 1 further including receiving additional biometric data during the exercise program including limb speed or limb position of the user.

8. A method of providing an exercise program, the method comprising:
 - receiving a user selectable input into a computing device, the user selectable input including an exercise regimen and a response to an interactive prompt from the computing device;
 - receiving a biometric input into the computing device; and
 - dynamically adjusting an exercise machine with the computing device during the exercise program based on the user selectable input and the biometric input.
9. The method of claim 8 including storing data representative of the exercise program including dynamic adjustments onto a memory device.
10. The method of claim 8 wherein the interactive prompt is an audio prompt from a speaker operably coupled to the computing device and the response to the interactive prompt is configured to be received via microphone operably coupled to the computing device.
11. The method of claim 10 wherein the response to the interactive prompt is provided during the exercise program based on the biometric input.
12. The method of claim 8 wherein the user selectable input includes the exercise regimen received prior to the exercise program and an exercise program adjustment input received during the exercise program.
13. A non-transitory computer readable medium to store computer executable instructions to control a processor to:
 - receive a user selectable input including an exercise regimen;
 - receive an input indicative of a physical exertion parameter of the user during an exercise program; and
 - dynamically adjust an exercise machine during the exercise program based on the user selectable input and the input indicative of the physical exertion parameter.

14. The computer readable medium of claim 13 wherein the physical exertion parameter is received via a sensor input.

15. The computer readable medium of claim 13 wherein the exercise regimen is received via a memory device operably coupled to the processor.

FIGURE 1

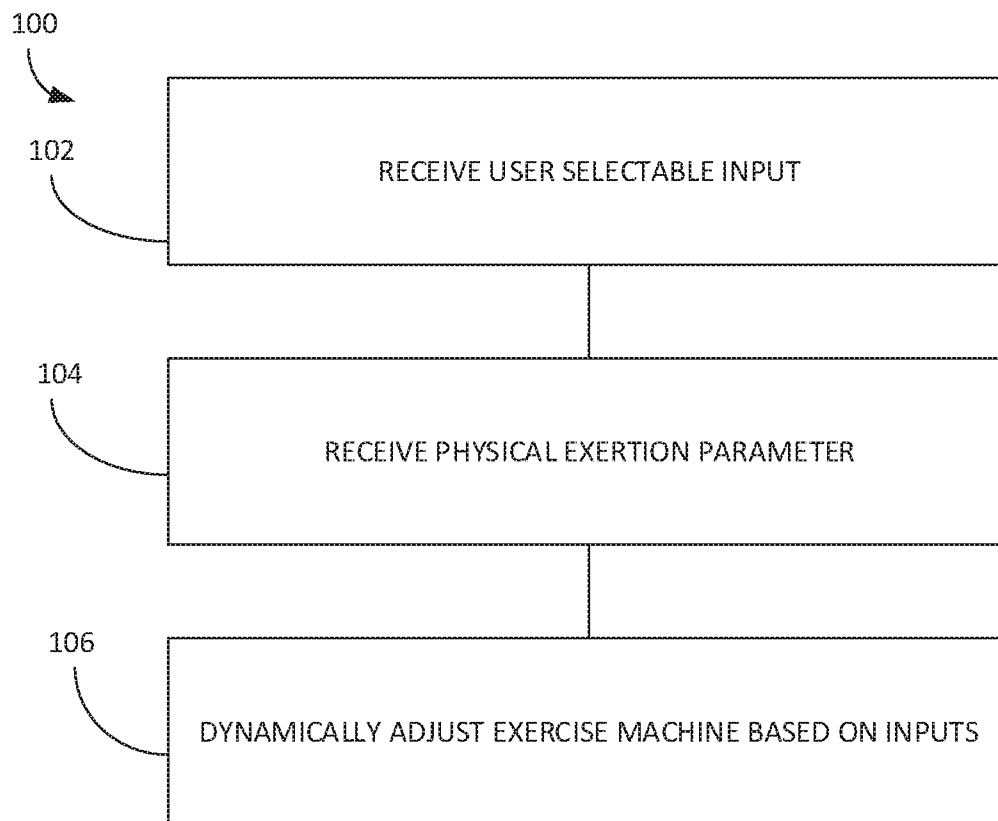
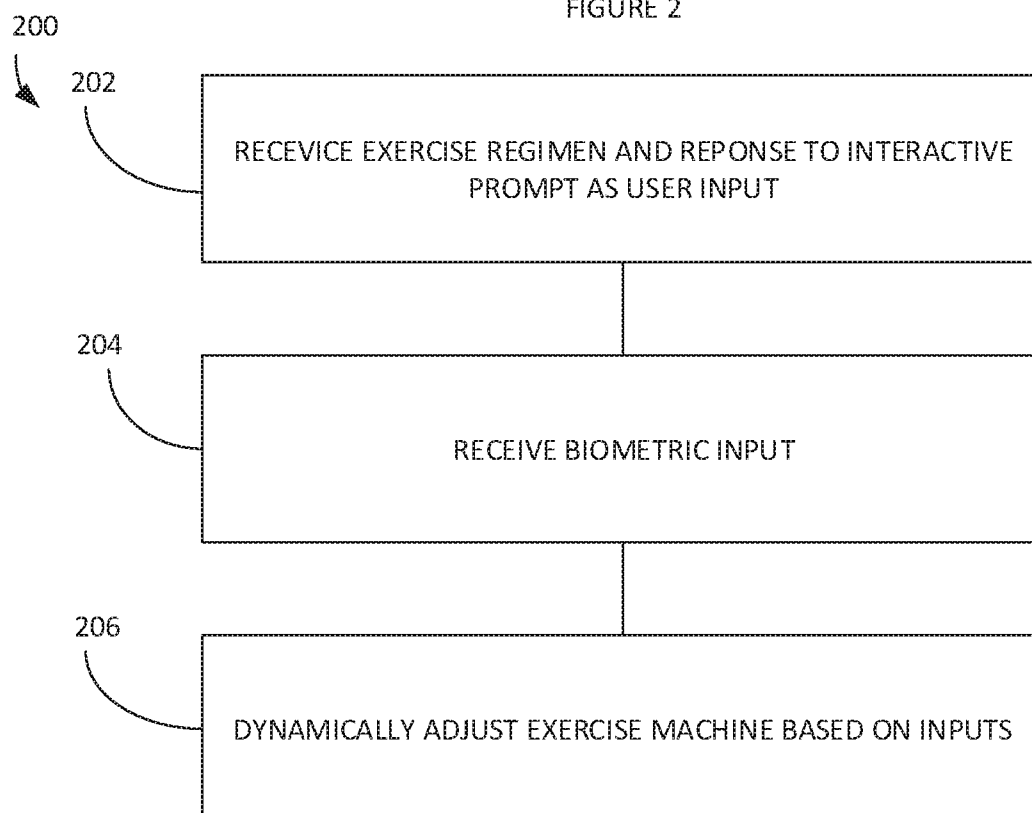


FIGURE 2



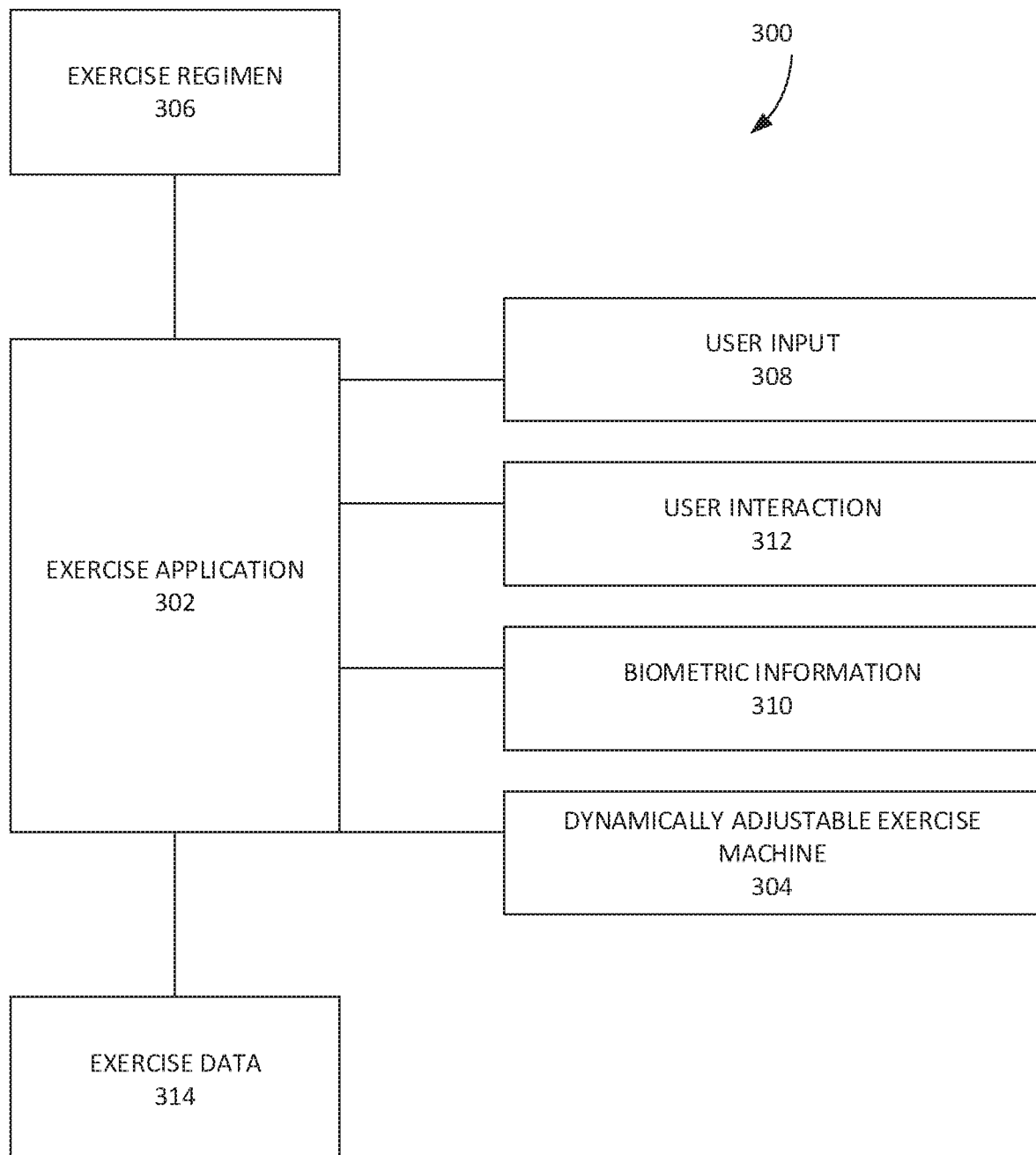


FIGURE 3

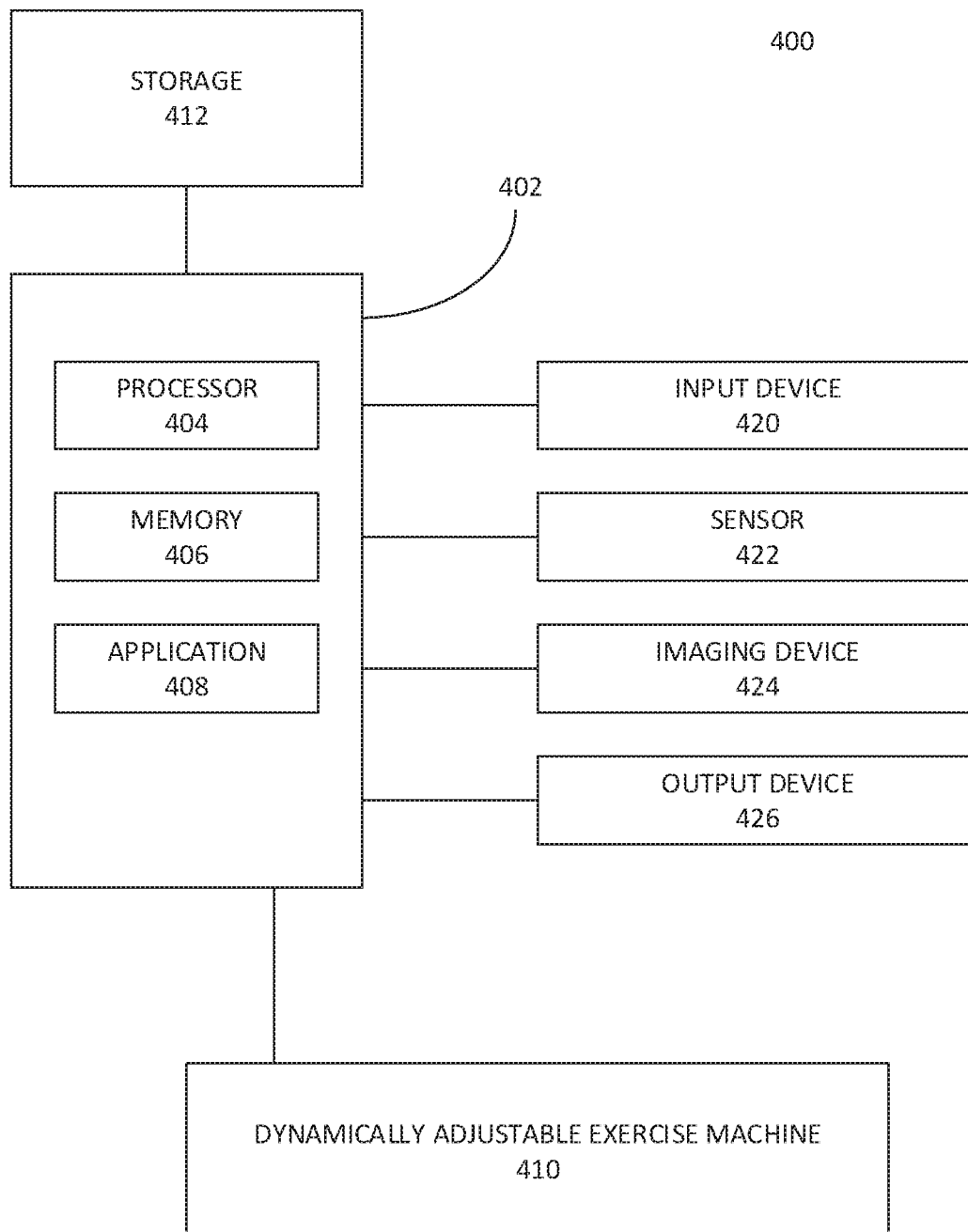


FIGURE 4

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 2017/043525

A. CLASSIFICATION OF SUBJECT MATTER <i>A63B 24/00 (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) A61B 5/00, 5/22, A63B 24/00 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) Esp@cenet, USPTO, RUPTO, PatSearch (RUPTO internal)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2010/109383 A1 (KONINKLIJKE PHILIPS ELECTRONICS N.V.) 30.09.2010, abstract, p. 3, lines 12-20, 31-34, p. 4, lines 9-14, claims 1-5, fig. 2, 3	1-15
X	US 2012/0150327 A1 (STEVEN R. ALTMAN et al.) 14.06.2012, paragraphs [0007], [0008], [0033], [0036], fig. 1, 2, abstract	1, 8, 13
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