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(54) **METHOD AND APPARATUS FOR USING CUES AND MUSIC DURING EXERCISE ROUTINE**

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USPC **434/247**

(57) **ABSTRACT**

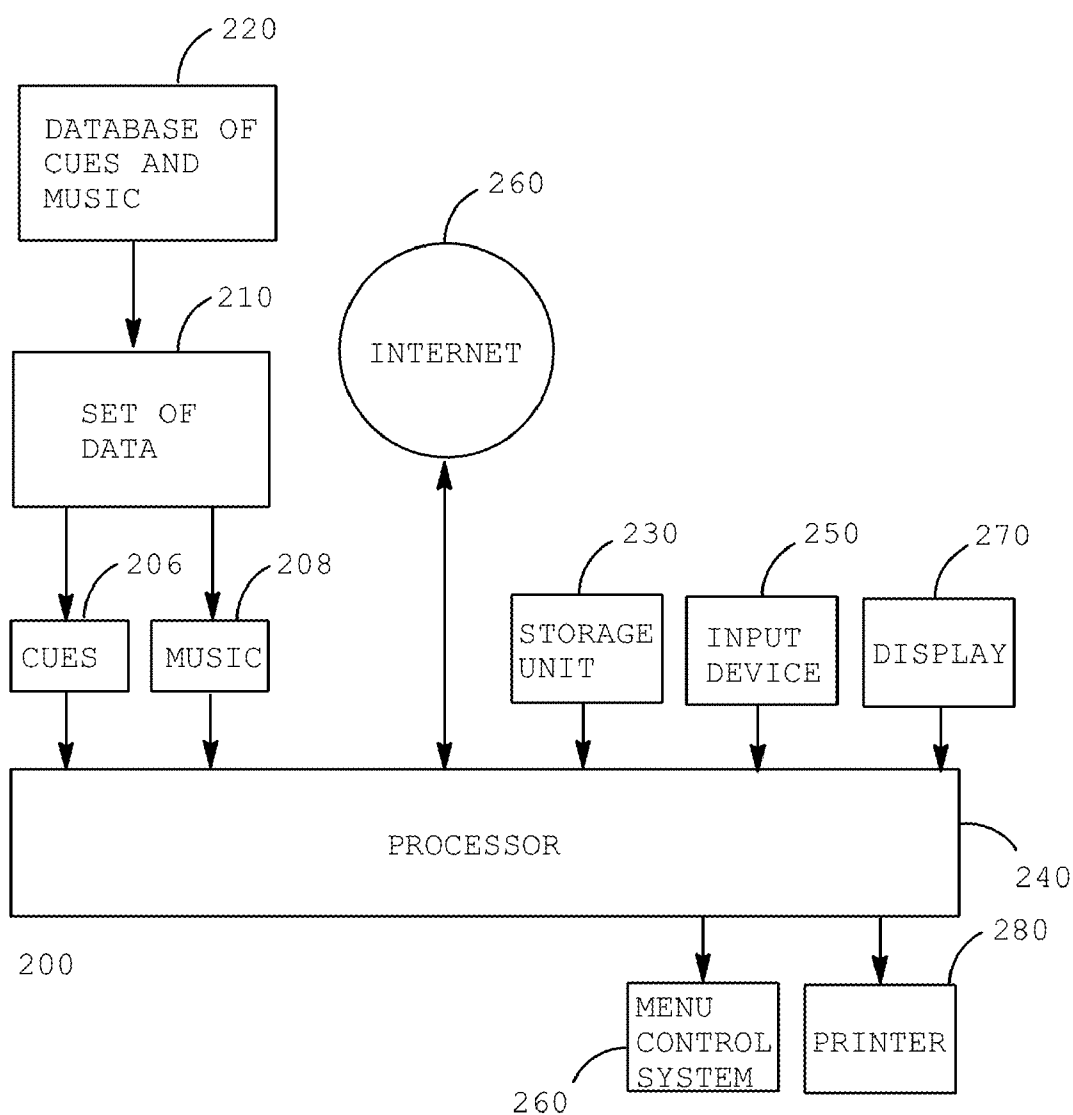A method of instructing, motivating and influencing a user's exercise routine using cues and music is disclosed.

Fig 1

Fig 2

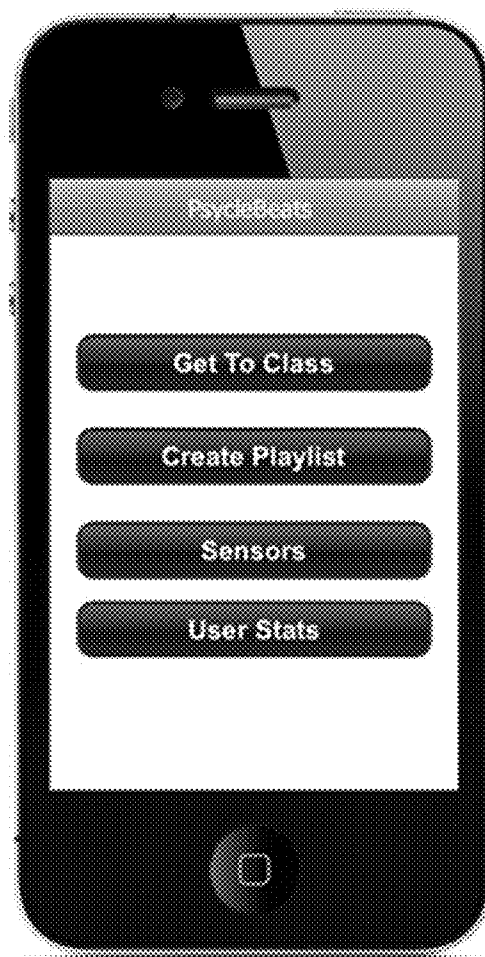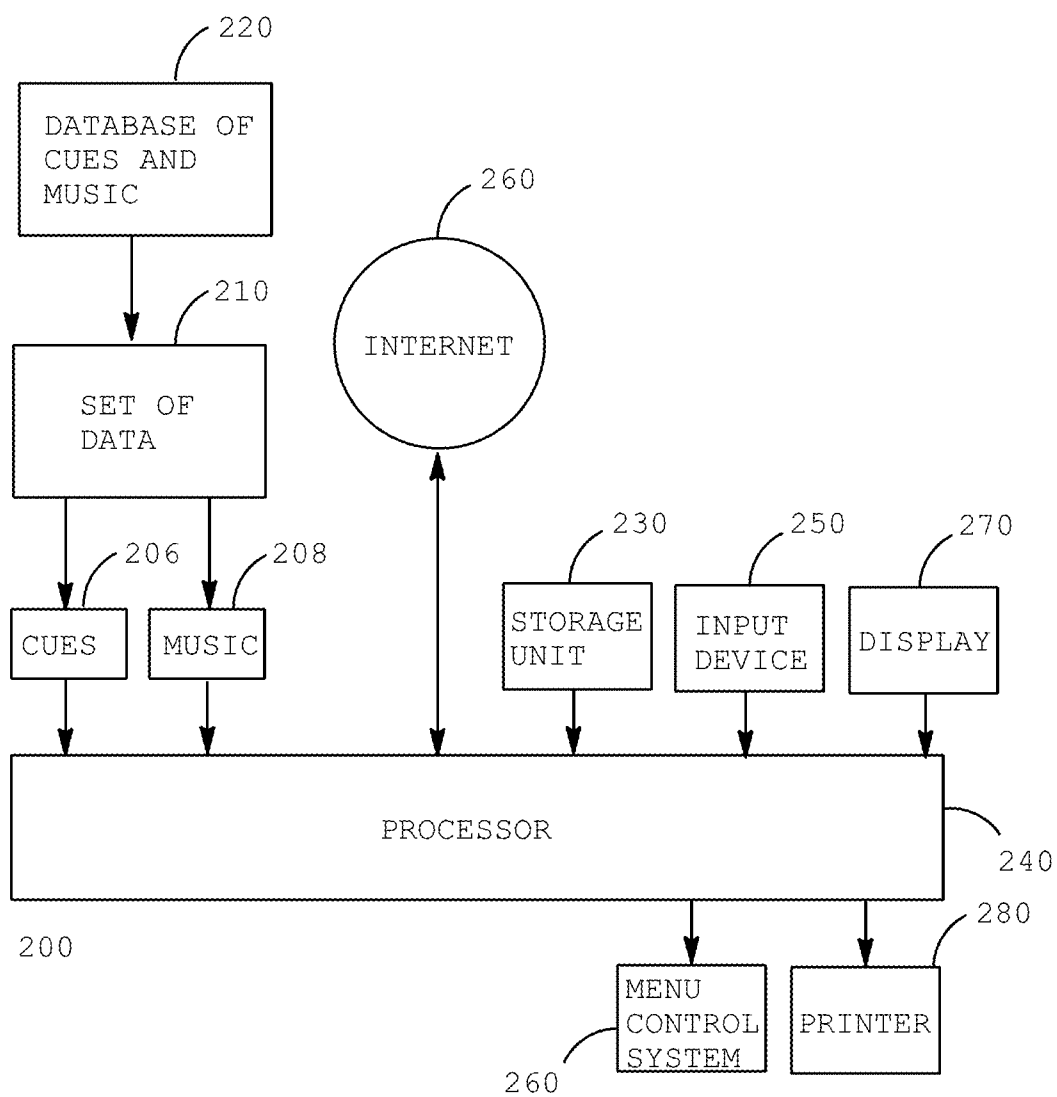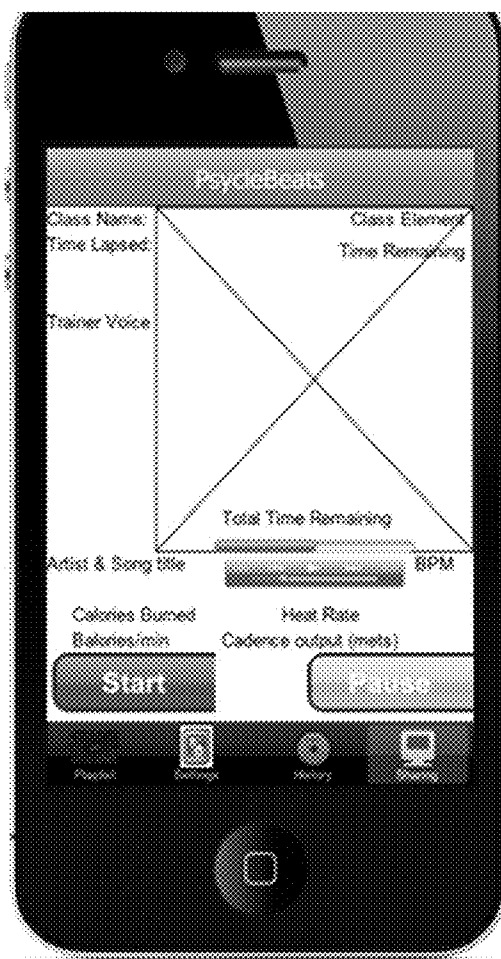Fig 3

Fig 4

Fig 5

Fig 6

6a

6b

6c
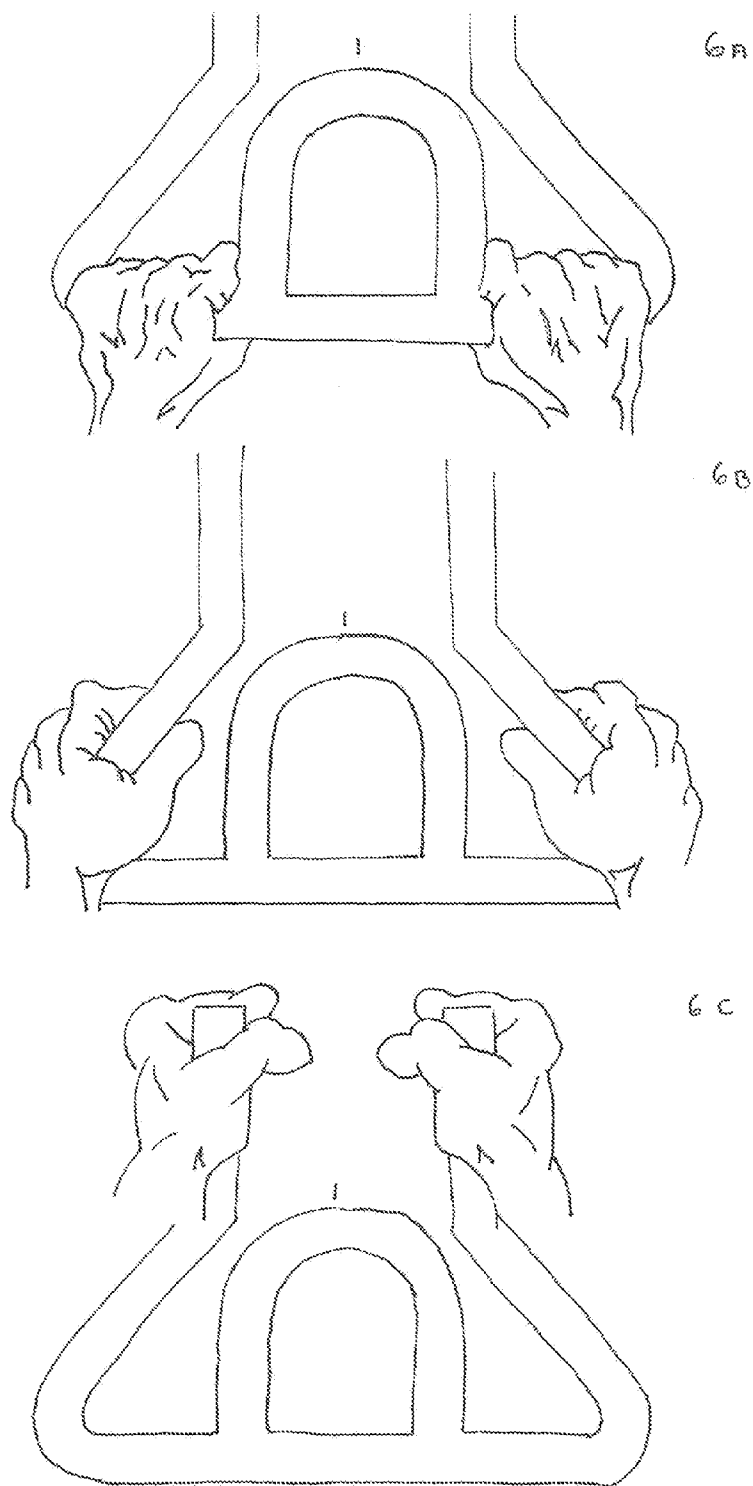
Fig 7
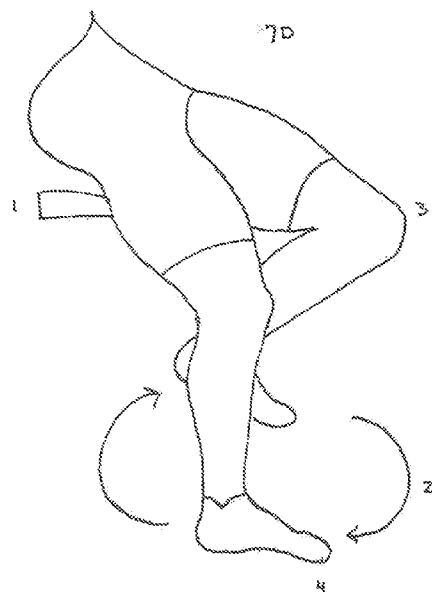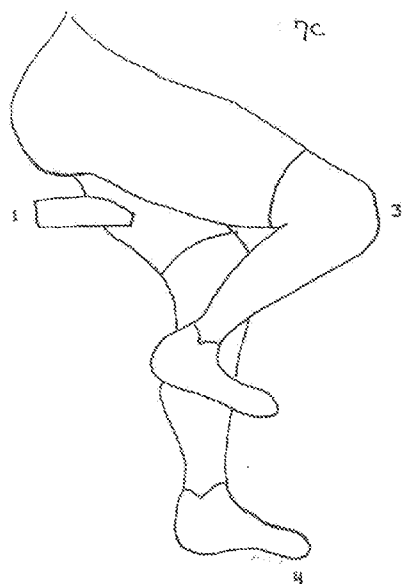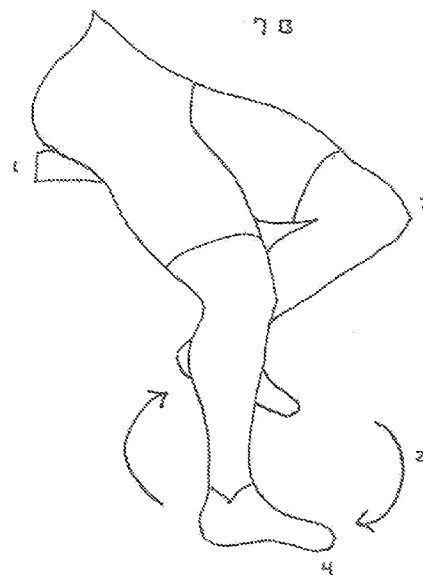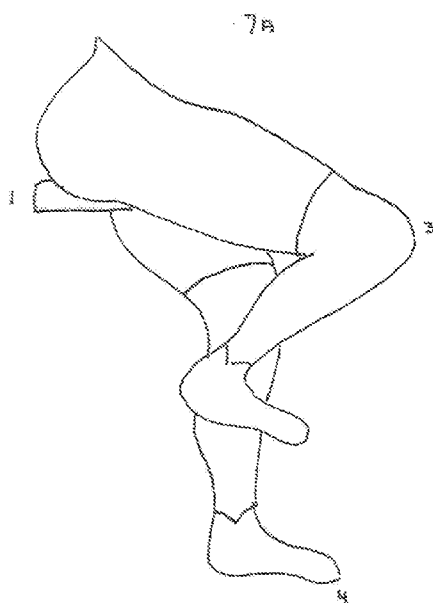
Fig 8

Fig 9a
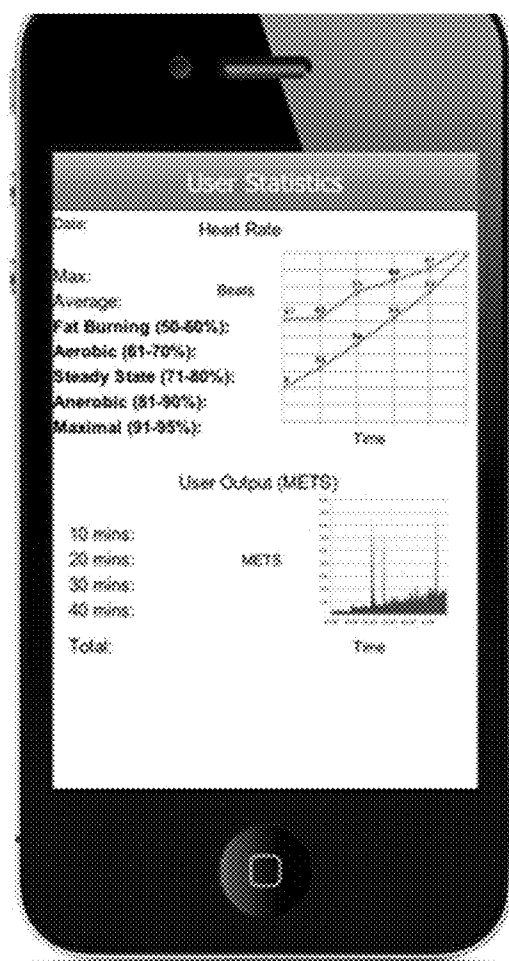
Fig 9b
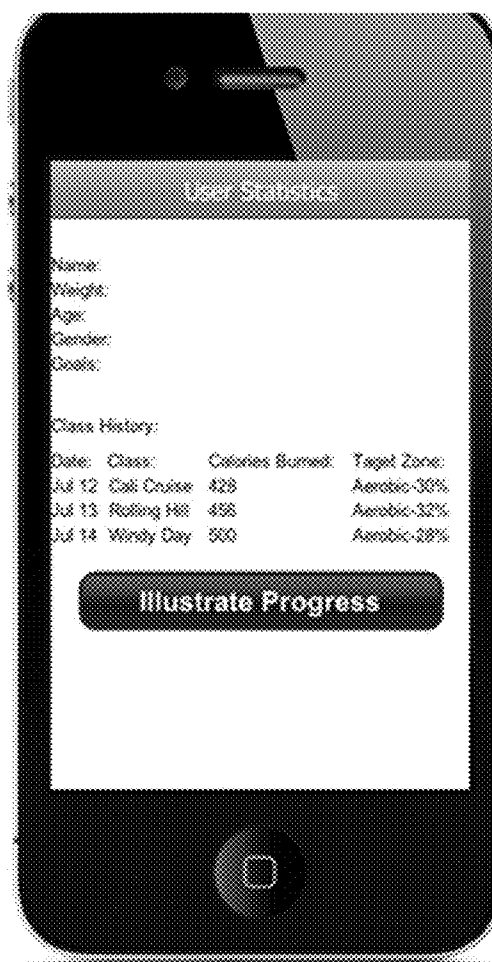
METHOD AND APPARATUS FOR USING CUES AND MUSIC DURING EXERCISE ROUTINE

FIELD OF INVENTION

[0001] The present invention relates, generally, to a computer-implemented method of instructing, motivating and influencing a user's exercise routine using cues and music. In particular, this invention relates to a system that provides exercise instruction and music to a person. The system has the ability to factor in beats per minute from digital audio files with a specific type of exercise instruction. The system also allows the user to search for music that fits into the one or more stages of exercise instruction. Optional settings such as integrated difficulty setting, multiple exercise modalities options, cardiovascular monitoring, foot pressure monitoring, topography maps, timed classes, and the like can also be incorporated into the system.

BACKGROUND OF THE INVENTION

[0002] Increasing awareness of health benefits derived from physical exercise and participation in athletic events has resulted in an increase in the numbers of individuals engaged in such activities. Many individuals train or work out in clubs or indoor gyms using exercise equipment that include various sensors for measuring physical and/or physiological parameters associated with the user's workout. For example, treadmills, elliptical trainers, stair steppers, stationary bicycles, and the like often provide electronic devices that measure or estimate various physical and/or physiological parameters associated with a workout or training exercise, such as the distance traveled, the elapsed time of the exercise, the altitude climbed, the inclination level, the movement rate, the heart rate, the power expended, the calories burned, the rate of calories burned, etc. In some gyms or clubs, data relating to an individual's workout may be transmitted automatically from the exercise equipment directly to a computer system and stored. Athletes, their trainers, and/or their coaches may gain access to this data, e.g., for post-workout analysis, to gauge progress or improvement, to develop future workout routines or plans, etc.

[0003] Some athletic workouts, training routines, or events simply do not lend themselves to the use of indoor gyms and/or stationary exercise equipment of the type described above. For example, long distance runners (e.g., marathoners), cyclists, triathletes, and the like typically cover long distances during each workout, and they must train over a variety of different terrains and conditions. Such athletes also may quickly become bored when using stationary, indoor exercise equipment for the length of time required to prepare for the events in which they compete. Moreover, some individuals simply prefer being outdoors and working out outdoors as compared to the confinements of an indoor gym or club. Working out individually and outdoors additionally has advantages over use of indoor facilities in that an individual outdoor workout typically will not require club or gym memberships and their associated membership fees, thereby eliminating at least some of the expense involved in keeping fit and participating in athletic events.

[0004] Recently, athletic performance monitoring systems utilizing global positioning satellite ("GPS") data to provide data and information to athletes and/or to equipment used by athletes during an athletic event has been described. Also, a computing device that receives and analyzes data indicating current physiology and movement of a user in order to provide certain music that influences the user has been reported.

[0005] However, there is still a need in the art for other portable athletic performance monitoring systems and methods that correlate measured physical and/or physiological data associated with an athletic performance to other data collected during the performance including the elapsed time and/or distance in the performance. There also is a need in the art for systems and methods that will automatically store data associated with an athletic performance and make it available to athletes, their coaches, and/or their trainers for post-performance analysis. There also is a need in the art for improved athletic performance monitoring systems and methods that will allow athletes to better use data generated from past performances.

[0006] Accordingly, the instant invention utilizes a music-based system to provide exercise-related instruction to a user, thereby fulfilling the needs presented above.

SUMMARY OF INVENTION

[0007] In accordance with the present invention, a computer-implemented method provides a user with a combination of exercise instruction matched to digital music beats-per-minute (BPM). As described herein, the BPM is the unit of measure for the tempo of the music in question. The method can be used for exercise specific routines, such as, indoor cycling, elliptical trainers, stair climbers or stationary row machines. A specific non-limiting example the method of the invention can be used in is a simulated indoor cycling class. The exercise instruction is in the form of verbal and/or visual cues to explain, for example, proper body alignment, including but not limited to, hip, spine, shoulder and hand positioning during exercise. The method of the present invention provides the user with one or more settings/options to 1) select music from the user's own library to match the given class BPM segments; 2) control the difficulty level of the exercise program; 3) change the instruction type; 4) connect to one or more external sensors such as a heart rate monitor, cadence-enabled sensors and Bluetooth-enabled sensors; and 5) adjust time settings. The method can also optionally provide for integrated software which will allow for variations controlled by the user, creating a vast number of workouts.

[0008] Accordingly, it will be understood by those skilled in the art that one or more aspects of this invention can meet certain objectives, while one or more other aspects can meet certain other objectives. Each objective may not apply equally, in all its respects, to every aspect of this invention. As such, the following objects can be viewed in the alternative with respect to any one aspect of this invention.

[0009] Other objects, features, benefits and advantages of the present invention will be apparent from this summary and the following descriptions of certain embodiments, and will be readily apparent to those skilled in the art. Such objects, features, benefits and advantages will be apparent from the above as taken into conjunction with the accompanying examples, data, and all reasonable inferences to be drawn therefrom. The disclosures in this application of all articles and references, including patents, are incorporated herein by reference.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] FIG. 1 is a pictorial diagram illustrating an exemplary user interface for a home page of the application.

[0011] FIG. 2 is a pictorial diagram illustrating an exemplary user interface for an exercises or classes screen of the application.

[0012] FIG. 3 is a pictorial diagram illustrating an exemplary user interface for a music playlist of the application.

[0013] FIG. 4 is a flow chart illustrating an exemplary embodiment of a processor system configured to implement the methods of the invention.

[0014] FIG. 5 is a pictorial diagram illustrating an exemplary user interface for instructing a user.

[0015] FIG. 6 is an example of a hand animation instruction that can be provided to a user; a)-c) show different positions.

[0016] FIG. 7 is an example of a lower-body animation instruction that can be provided to a user; a)-d) show different positions.

[0017] FIG. 8 is a pictorial diagram illustrating an exemplary user interface for a past performance of a user.

[0018] FIG. 9 is a pictorial diagram illustrating an exemplary user interface for a user's past performances via statistics; a) first page including graph of heart rate; and b) second page including calories burned.

DETAILED DESCRIPTION OF THE INVENTION

[0019] Illustrating certain non-limiting aspects and embodiments of the invention, and specifically referring now to the drawings in detail wherein like numbers represent like elements throughout, a method comprising a processor-based application comprising a multiple option user interface 500 is provided (FIG. 1). From the interface 500, a user obtains a set of data from a database 220 (see FIG. 4). Thus, the method can also comprise receiving exercise instructions and music from a set of data, the set of data comprising a set of exercise instructions and a music list segmented by music beats-per-minute (BPM); inputting the set of data into a computer readable storage unit coupled to one or more processors; configuring the processor to couple the exercise instructions with certain music; and deriving and storing in volatile or non-volatile memory an association of the set of exercise instructions with the certain music.

[0020] In a specific embodiment of the invention, FIG. 1 depicts an example of the top view and home screen of the mobile application as it appears after it completes loading from the initial start up/short cut. In one embodiment, FIG. 1 consists of several user interfaces that are specifically designed to customize a program based on selections made. Each interface in FIG. 1 instruct/lead the user to a decision which is used in calculations resulting in the desired workout format. The interface 500 has multiple functions and displays during operation of the application.

[0021] In a specific example and again referring to FIG. 1, which describes a specific non-limiting example of the invention, the interface 500 provides the user with an option to choose a specific exercise (for example, a "Get To Class") 1. By choosing this option, the user is redirected to another screen (FIG. 2) from which a specific type of class 10 can be chosen, such as, for example, indoor cycling, indoor rowing, stair climber, elliptical training, and the like, with each class having a plurality of sub-classes 12 from which to choose from. For example, and referring to FIG. 2, choosing the class 10 indoor cycling provides the user with a variety of indoor cycling sub-classes 12 to choose from, such as Rolling Hills 12a, Cali Cruise 12b, Windy Day 12c, Double Time 12d, Interval Hills 12e, and the like. The sub-classes 12 can appear, for example, in a pop up screen. Additional options can be

presented in choosing a class, such as, for example, the length of time, or duration, 14 the exercise is to be performed; the skill or difficulty level 16 of the particular exercise; and even a recollection of past performance results 18 for the user for any given exercise (see FIGS. 8 and 9 for an example of a past performances and/or statistics).

[0022] Once a selection is made, the application, in one embodiment, takes the user back to the original screen (or home screen) as depicted in FIG. 1. The user then selects the music from, for example, a create playlist option 2. In another embodiment, the user is not taken back to the home screen, but is prompted with a create playlist 2 option in the screen depicted in FIG. 2 after the class 10 and all options thereto are selected.

[0023] Regardless, the create playlist 2 option takes the user to another screen as depicted in FIG. 3. In an embodiment, the playlist 20 provides the user with, for example, the option to select a custom playlist 22. The custom playlist allows the user to choose the BPM 20b for each element 20a of the class. By element is meant each individual section of the class, such as, for example, a warm-up section, a running section, a jumping section, and the like, to which is assigned a specific BPM 26. Optionally, the artist's name 20c, the track number and/or title 20d, and the duration of the track 20e can also be displayed. The custom playlist 22 allows the user the ability to choose certain songs based on the BPM 20b. In other words, each element 20a with its assigned BPM 20b has a plurality of songs for the user to choose from. In contrast, and representing another embodiment, the user can elect to have the application choose the songs for each element 20a of the selected class 10, or in other words, an "auto" option 24 from the playlist 20. Again, those songs have a particular BPM 20b, which correlates to the specific element 20a of the class 10. The auto option includes, for example, the ability for the user to use a playlist 20 previously created. Still another embodiment allows the user to connect to a shared playlist, such as, for example, an online community, 26 enabling the user to create and share one or more playlists 20 she creates through social networks. Once the class 10 and playlist 20 is selected, the user may start 28 his workout.

[0024] In certain other non-limiting examples, an optional skill level button 16 depicted in FIG. 2, when depressed, can display one or more separate options, including but not limited to, increasing or decreasing the BPM start up and rest period during operation. In other words, the skill level 16 can be, but does not necessarily have to be, related to the duration 18 of class 10. Once selected, the application can formulate, for example, rest periods, and set BPM 20b settings for each element 20a of the class 10. The duration 18 button can also display the time remaining by default, but regardless, when the duration button 18 is depressed, the option of time lapse or time remaining can pop up on the screen for the user.

[0025] Once the workout is defined by the class 10 and the playlist 20, the application provides a new screen dedicated to user instruction/cues (FIG. 5). This can be achieved automatically or by depressing a button. FIG. 5 is an example of a screen in which cues or instructions 30, either verbal 30a or visual 30b or both, are displayed. In FIG. 5, the box marked with an "X" can be a display for the visual cues 30b, and can display such instruction (either a picture display or in text), for example, as certain body position. Thus, the visual cue 30b, can show the user how to adjust his or her body into a given position using animations and other visual cues. For example, the visual cue 30b can be a display of a two-stage

animation of the suggested hand (FIG. **6**) and foot position (FIG. **7**) depending on the current body position the application has the user in. Preferably, the instruction screen **30** can also display the duration **18**, the heart rate of the user **32** if the user is wearing sensors (see, for example, U.S. Pat. No. 7,683, 252, incorporated herein by reference), and the calories burned by a user **34** during a particular workout.

[0026] The ability for the disclosed method to integrate its software with digital music relies on its ability to play digital audio track(s) at the same time as the verbal/visival cues **30**a and **30**b are given to the user during the workout. The user also has the ability to initiate **36** or pause **38** the workout once started. Optionally, a countdown timer can be displayed at or near the duration display **18** to alert the user of the start of workout. In addition, an optional button can be added to the instruction screen **30** such that the user, at any point during her workout, has a means to return to the original interface **500**. The instruction screen **30** can also optionally allow the user to connect with online communities **26** enabling the user to create, use and share the playlists created in the individual community. The instruction screen **30** can additionally allow the user to view past workouts **18** and to check settings **39** of in-progress workouts.

[0027] In a specific example, a user can elect the specific exercise of indoor cycling, and a specific sub-class of, for example, Rolling Hills, Cali Cruise, Windy Day, Double Time, Interval Hills, and the like from the class screen. Once a playlist is selected, the computer readable storage unit uses an algorithm to differentiate between the program options. Upon the start of the application, the user is directed to the instruction screen. The user will see the marker representing him/her with the percentage completed and a mach map based on the time lapsed. The use of sensors such as cadence foot sensors and a heart rate monitor can increase accuracy of distance and energy output. The skill level interface, when pressed, gives the user two or more choices in a pop up window. For example, novice, amateur, professional and elite can be displayed until the user makes a selection. This selection increases or decreases the selected class segments BPM count, therefore changing the difficulty of the workout. Simultaneously, the option screen disappears and redirects the user back to the home screen with the selection made visible in the skill level box. The skill level button uses an underlying computer readable storage unit that increases the specified exercise modality's class segments BPM as the skill level moves from novice towards the elite. In an example, the computer readable storage unit calculates a higher BPM for each class segment for a user that elects an elite skill level, as compared to, a lower BPM for each class segment and longer rest period between class segments for a user that elects a novice skill level. This algorithm uses the information from the duration button in determining not only the total time of the workout but the intervals the user is experiencing during the workout. The algorithm distributes verbal and/or visual cues programmed into the computer readable storage unit and separates them according to the exercise program, skill level and duration selected.

[0028] When the class buttons, the skill select button and the duration button **7** are filled in with the users selection, the start button is highlighted and allows the user to begin the program by pressing the same. Depressing the start button initializes several of the other components and interfaces contained on the home screen, and subsequently directs the user to the instruction screen. The instruction screen provides the user with specific verbal and/or visual instructions, including specific body position(s) the user is instructed to be in during the specific elements of the workout.

[0029] In an example, and referring now to FIGS. **6** and **7**, animations of hand and foot positions are displayed when the user is instructed to be in a specific position. The user is prompted to sit straight up with hips flat in the saddle or seat **110**, as shown in FIG. **7**a, of an indoor cycling bike, while maintaining a hand position closest to the user and medial to the handle bars **100**, as shown in FIG. **6**a. The proper hand, shoulder, foot and pelvic positions are displayed when the specific program requires the user to shift body position. Instructions have the user altering between a seated position (FIG. **7**a) to having their hips positioned slightly forward (FIGS. **7**b-**7**c) and or raised off of the saddle **110**, depending on the specific instructions, informing the user to activate the rhomboids in their shoulder girdle to retract the scapulas and force the shoulders back while maintaining a forward chest and straight back. The hands also change positions on the handle bars **100**, as depicted in FIG. **6**a and FIG. **6**b, respectively.

[0030] FIG. **4** illustrates an exemplary embodiment of a processor system **200** configured to implement the methods of the invention disclosed herein. A processing unit **240**, for example, is a mainframe, server or mobile device coupled to an array of peripherals or a desktop computer or a laptop computer. Coupled to the processor are one or more databases **220** which may themselves be coupled to additional processors.

[0031] During climbs and sprints, the user is required to alter the hips by raising them off of the saddle **110** vertically and slightly forward, as shown in FIG. **7**c, then returning to, or repeating from, the original position. This position tells the user, through animation, to maintain shoulder position while taking the hands to the furthest point away from the body on the handlebars **100** and as lateral position as can be obtained on the grips, as shown in FIG. **6**c.

[0032] The instruction screen, when activated during use, displays animations of the last body position and how to adjust into the current body position. These illustrations are synced with the BPM of the selected program, giving the user a visual representation of the preferred or recommended cadence for the users leg speed during exercise. These animations, illustrated by the direction arrow **120** shown in FIGS. **7**b and FIG. **7**d, show knee height **130** and speed changes, and toe angle **140** and force direction during a specific point of the workout.

[0033] In a preferred embodiment, a display for the user's current heart rate is provided when the user is connected, via wire or wirelessly, using a heart rate monitor/sensors. Upon completion of the workout, the heart rate display can optionally become an interactive user interface, allowing the user to see, for example, his/her lowest heart rate count, highest heart rate count, and average heart beats per minute. This information is displayed in list, graph and/or spread sheet form.

[0034] In another preferred embodiment, the amount of calories used during the workout session is displayed. The formula needed to ensure accuracy of calculations will include the user's information, such as, for example, his weight, height, age, gender, skill level and heart rate information. Once the workout is completed, the calorie display can optionally become an interactive user interface.

[0035] In FIG. **4**, a database of exercise instructions **206** segmented by digital audio BPM **20**b provides a set of data

210 to the processor 240. Such data 240 can be provided by an input drive 250, coupled to the processor 240, or through an internet network 260 connection, either by hardwired or wireless devices. The data 210 is stored in a computer readable storage unit coupled 230 to the processor 240 and manipulated by a menu control system 260 coupled to the processor 240. As stated, the processor typically includes an input device 250, for example a mouse, a keyboard or touch screen, and a display device 270, for example a monitor screen or a smart phone. Such devices can be hardwired to the processor or connected wirelessly with appropriate software, firmware and hardware. The display device 270 may optionally include a printer 280 coupled to the processor 240. The printer 280 may be configured to mail or fax reports as determined by a user of the processor system 200. The network is constructed from a database or databases 220 that stores a predetermined set of exercise instructions and a correlating list of music defined by BPM 20b. The playlist is not predetermined based on the workout, but the BPM (music) 20b imbedded in the program is predetermined in order to allow the user to upload a random playlist or create one from, for example, an internet search. This search can be conducted using a BPM analyzing software similar to a system and method for predicting musical keys from an audio source representing a musical composition, as disclosed in U.S. Pat. No. 7,842,878, incorporated herein by reference. Based on the exercise selection, the processor 200, in turn, is configured to couple a set of exercise instructions with certain music BPM 20b, which is dependent on exercise and skill selections made by the user. The methods, as described herein, can be in the form of a mobile application, i.e. the processor 200 can be a mobile application.

[0036] Other optional functions can also be incorporated into the instant method. For example, the user, from the settings button on the instruction screen, can enter his/her email address in the allocated space. This option can also be linked to one or more social networking sites, and information can be shared. Other options include a birthday entry screen, a gender screen and a weight screen to allow the program to calculate for, for example, a proper heart rate during any given program.

[0037] In another aspect, the invention is drawn to the combination of verbal and/or visual cues of an indoor cycling class being transmitted on the same frequency as the user's music to eliminate sound dampening between the verbal and digital music from their mobile device. Other aspects of this invention include indoor rowing classes, stair climbing classes and elliptical training classes. The instant invention pertains to a computer-readable storage unit with the ability to integrate verbal cues and digital music of the user's choosing, along with the ability to sync and overlay specific verbal cues designed to instruct a user through a simulated indoor cycling class while simultaneously and without volume dampening allowing the user to hear the desired music tracks from any music folder, directory, or file available to be played during the operational phase. The aforementioned verbal cues refer to, but are not limited to, the language spoken from an instructor before, during, and after an indoor cycling class, indoor rowing session, stair climber use or elliptical training instruction. These cues allow the user to understand, participate and improve his cardiovascular endurance while increasing his neuromuscular awareness and overall health without being in a class setting.

[0038] The user can select from one or a combination of genres of music, e.g. rock, dance, Top 40. The application takes the pre-programmed class segmented BPM creates a playlist based on the BPM of the class and the user's genre selection. The results are displayed in a list showing the separate class segments, their BPM rating and the songs that match to the specific class segments.

[0039] As an example, a class list shows the type of movement, the BPM rating and the number of songs available. When a class segment is selected, the user is directed to a list of songs available for that particular class segment. This gives the user an option to customize her own playlist. Once chosen, the application places the selected song into the class segment playlist. The selected songs, matching the BPM and user's preference, are set into a random playlist or a custom playlist created by the user, and played in conjunction with an audio recording of the indoor cycling class. The playback of the two will fluctuate in volume. As the voice instruction is given, the music volume is lowered to a level that ensures the user hears a clear vocal instruction. The music then returns to the user's desired/preset volume once the instruction is over. The user has the option to increase or decrease this ratio to his/her preference.

[0040] The playlist is generated at random, unless specified otherwise by the user, by the search/file sharing software. The application allows the user to search a library connected to or part of the mobile device, i.e. files on his/her home computer. This search enables the user to playback songs in his own library. The application also allows the user to breakdown the class intervals into single searches. This gives the user the opportunity to create a playlist in conjunction with a music generator.

[0041] The disclosures of all articles and references, including patents, are incorporated herein by reference.

[0042] The invention and the manner and process of making and using it are now described in such full, clear, concise and exact terms as to enable any person skilled in the art to which it pertains, to make and use the same. It is to be understood that the foregoing describes preferred embodiments of the present invention and that modifications may be made therein without departing from the spirit or scope of the present invention as set forth in the claims.

1. A computer-implemented method for providing a user with a combination of exercise instructions matched to digital music beats-per-minute (BPM) comprising

a) receiving exercise instructions and music from a set of data, the set of data comprising a set of exercise instructions and a music list segmented by music beats-per-minute (BPM);

b) inputting the set of data into a computer readable storage unit coupled to one or more processors;

c) configuring the processor to couple the exercise instructions with music from the music list segmented by music beats-per-minute; and

d) deriving and storing in volatile or non-volatile memory an association of the set of exercise instructions with the music segmented by music beats-per-minute; wherein one or more steps a)-d) are performed using one or more configured processors.

2. A non-transitory computer-readable medium having computer-executable instructions for performing the method of claim 1.

3. A computer-implemented method according to claim **1**, wherein the exercise instructions are selected from a group consisting of verbal, visual or both.

4. A computer-implemented method according to claim **3**, wherein the exercise instructions is to proper body alignment.

5. A computer-implemented method according to claim **1**, the method used for exercise specific routines selected from a group consisting of indoor cycling, elliptical trainers, stair climbers and stationary row machines.

6. A computer-implemented method according to claim **1**, further comprising two or music lists.

7. A computer-implemented method according to claim **6**, wherein each music list represents an individual section for an exercise specific routine.

8. A computer-implemented method according to claim **7**, wherein the user can select a previously selected music list or a previously selected combination of music lists.

9. A computer-implemented method according to claim **5**, wherein the user can further select a level of skill for the exercise specific routine.

*   *   *   *   *