

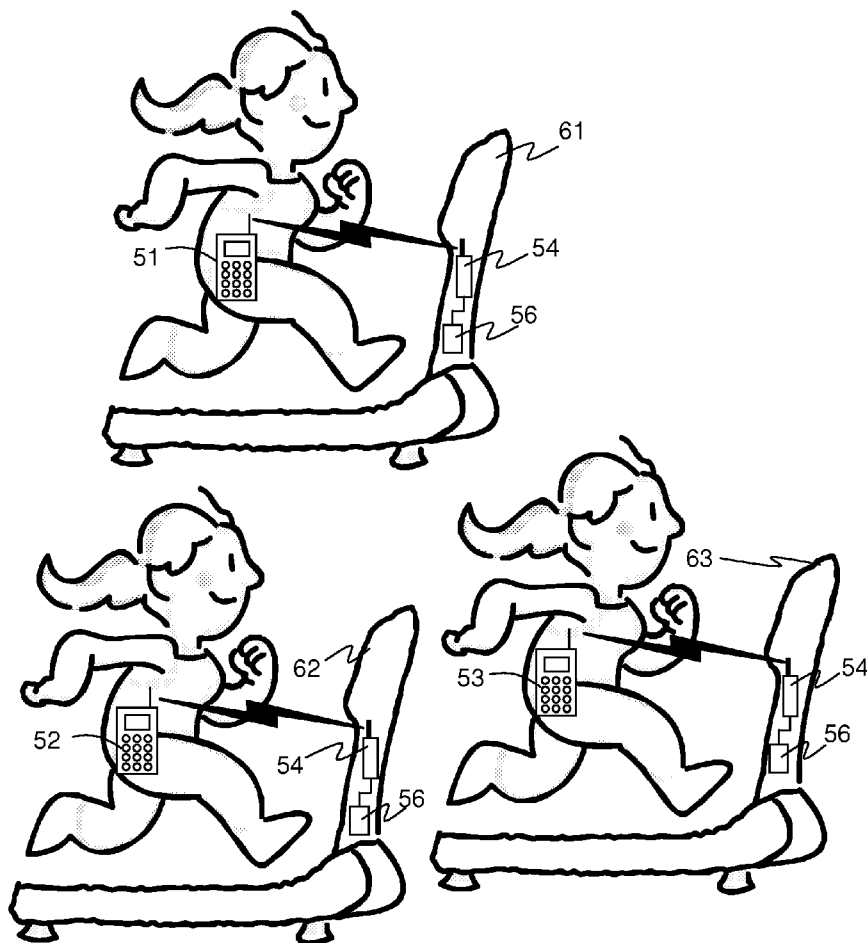


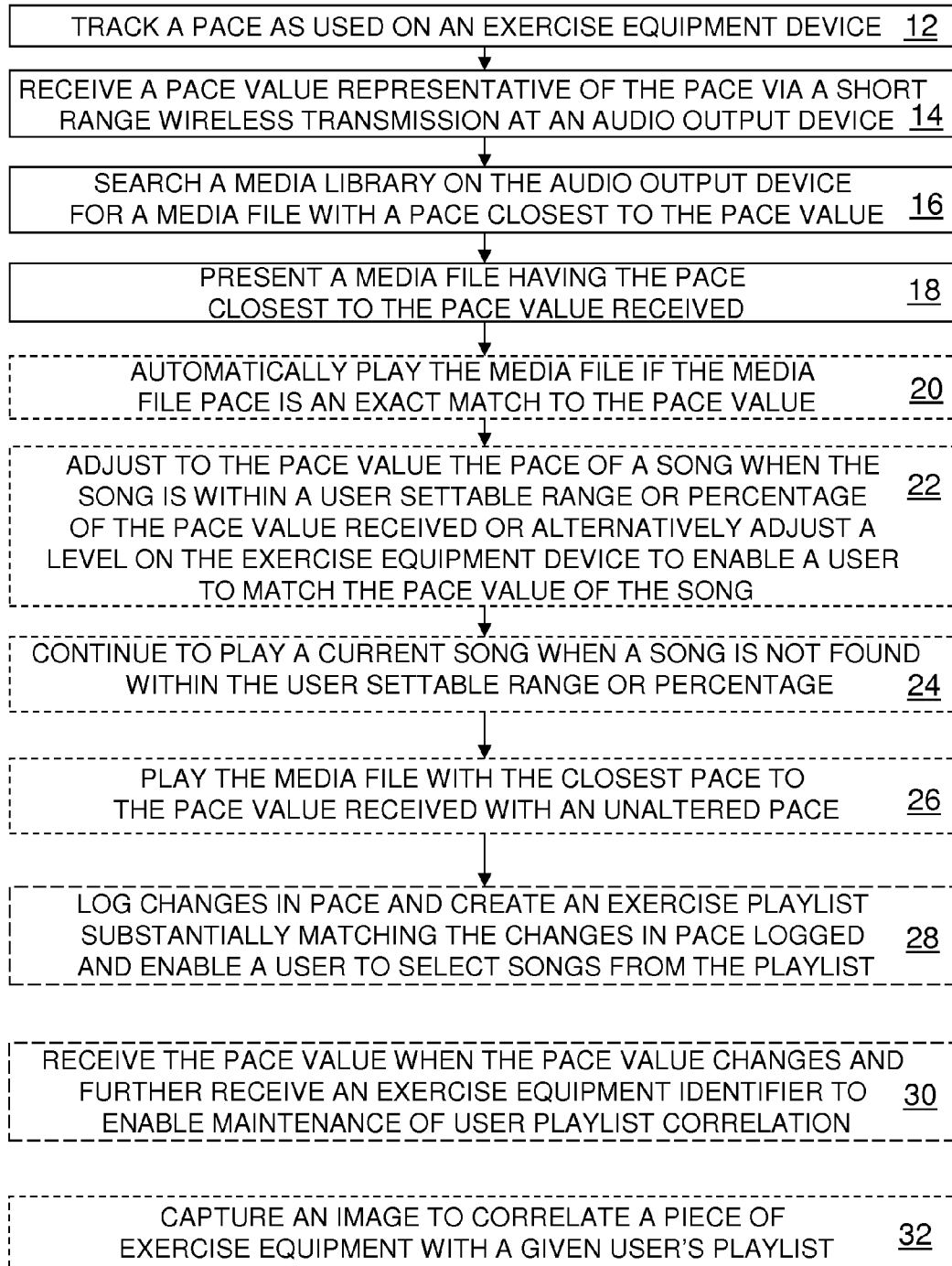
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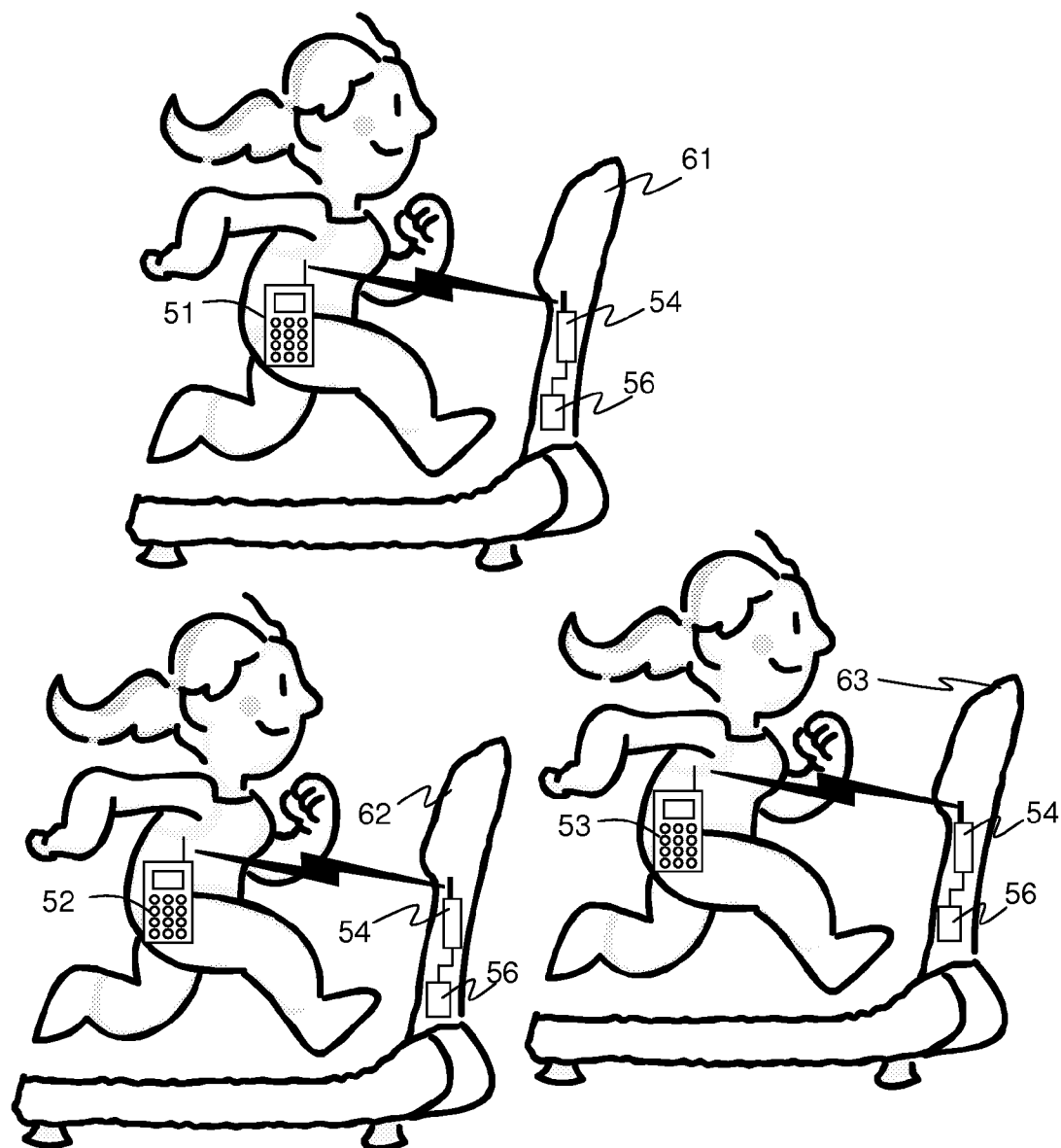
(19) **United States**(12) **Patent Application Publication**  
**DVORAK et al.**(10) **Pub. No.: US 2008/0103022 A1**(43) **Pub. Date: May 1, 2008**(54) **METHOD AND SYSTEM FOR DYNAMIC  
MUSIC TEMPO TRACKING BASED ON  
EXERCISE EQUIPMENT PACE****Publication Classification**(51) **Int. Cl.***A63B 71/00* (2006.01)*A63B 24/00* (2006.01)(52) **U.S. Cl. .... 482/3; 482/7**(57) **ABSTRACT**

A method (10) and system (50 or 200) for music selection based on pace can include tracking (12) a pace as used on an exercise equipment device (61), receiving (14) a pace value representative of the pace via a short range wireless transmission at an audio output device (51), searching (16) a media library within the audio output device for a media file with a pace closest to the pace value received, and presenting (18) a media file having the pace closest to the pace value received. The method can further optionally include automatically playing (20) the media file if the pace closest to the pace value received is an exact match and adjusting (22) to the pace value the pace of a song when the song is within a user settable range or percentage of the pace value.

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**FIG. 1** 10



50

**FIG. 2**

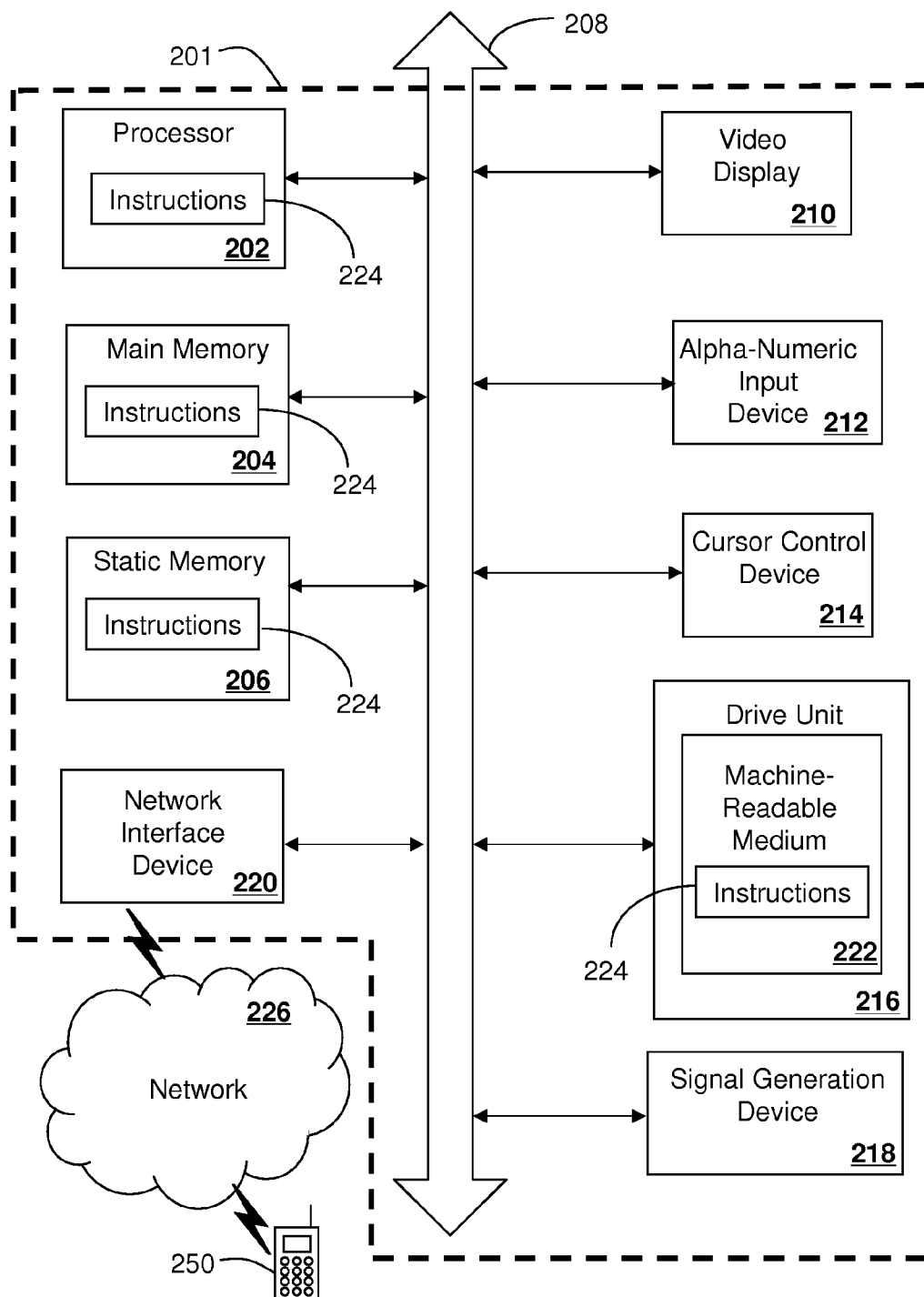


FIG. 3 300

## METHOD AND SYSTEM FOR DYNAMIC MUSIC TEMPO TRACKING BASED ON EXERCISE EQUIPMENT PACE

### FIELD

[0001] This invention relates generally to music tempo tracking, and more particularly to a method and system for dynamic music tempo tracking based on exercise equipment pace.

### BACKGROUND

[0002] As someone works out on a piece of exercise equipment, they tend to change the pace of their activity (stair climbing, running, etc.) as their workout progresses. Playing music that matches the current activity pace can help to maintain or increase a current pace and produce a better workout. However, it is often difficult to find a song that has the correct tempo to match the exercise pace. Furthermore, searching for an appropriate song can be intrusive and disruptive to the exercise activity.

[0003] While there has been discussion of using accelerometers to track a person's pace as they walk and transmitting such pacing information to a laptop containing a playlist songs to enable the appropriate selection from the playlist and further discussion of systems that allow a user to view or manage the playlist based on performance or the type of anticipated exercise to be done, such systems have not been applied to exercise equipment and portable audio output devices in a manner that would be feasible or practical.

### SUMMARY

[0004] Embodiments in accordance with the present invention can provide a mechanism enabling a phone or other handheld personal device providing music to continuously track changes in a person's activity pace as a workout progresses with minimal disruption to the workout.

[0005] In a first embodiment of the present invention, a method of music selection based on pace can include tracking a pace as used on an exercise equipment device, receiving a pace value representative of the pace via a short range wireless transmission at an audio output device, searching a media library within a memory on the audio output device for a media file with a pace closest to the pace value received, and presenting a media file having the pace closest to the pace value received. The method can further include the step of automatically playing the media file if the pace closest to the pace value received is an exact match and the step of adjusting to the pace value the pace of a song (serving as the media file having the pace closest to the pace value) when the song is within a user settable range or percentage of the pace value received or alternatively adjusting a degree of difficulty level on the exercise equipment device to enable a user to easily match the pace value of the song serving as the media file. The method can also continue to play a current song playing on the audio output device when a song is not found within the user settable range or percentage of the pace value received. The method can also play the media file with the closest pace to the pace value received with an unaltered pace. The method can also log changes in pace and create an exercise playlist substantially matching the changes in pace logged and enabling a user to select songs from the exercise playlist. The method can also include receiving the pace value representative of the pace

via the short range wireless transmission when the pace value changes and further receiving an exercise equipment identifier to enable maintenance of a playlist for each piece of equipment the user uses. The method can also include the step of capturing an image to correlate a piece of exercise equipment with a given user's playlist.

[0006] In a second embodiment of the present invention, a system of music selection based on pace can include a portable audio output device, a short range wireless transceiver coupled to the portable audio output device, and a processor coupled to the short range wireless transceiver and the portable audio output device. The portable audio output device can be or be a portion of a cellular phone, an MP3 player, a smart phone, or a personal digital assistant. The processor can be programmed to track a pace as used on exercise equipment, receive a pace value representative of the pace via the short range wireless transceiver, search a music library within a memory on the portable audio output device for a media file having a pace closest to the pace value received, and play a media file having the pace closest to the pace value received. The processor can also be programmed to automatically play the media file if the pace closest to the pace value received is an exact match, adjust to the pace value the pace of a song (serving as the media file having the pace closest to the pace value) when the song is within a user settable range or percentage of the pace value received, play a current song playing on the audio output device when a song is not found within the user settable range or percentage of the pace value received, or play the media file with the closest pace to the pace value received with an unaltered pace. The processor can also be programmed to log changes in pace and create an exercise playlist substantially matching the changes in pace logged and enable a user to select songs from the exercise playlist. Note, a song pace can be kept in a song's metadata. Also not that receiving the pace value representative of the pace via the short range wireless transmission occurs when the pace value changes and that the processor is further programmed to receive an exercise equipment identifier to enable maintenance of a playlist for each piece of equipment the user uses. The processor can also be programmed to capture an image to correlate a piece of exercise equipment with a given user's playlist.

[0007] In a third embodiment of the present invention, a portable wireless communication unit having a system of music selection based on a pace of an exercise equipment device can include a short range wireless transceiver coupled to portable wireless communication unit and a processor coupled to the short range wireless transceiver. The processor can be programmed to track a pace as used on the exercise equipment device (where the exercise equipment device further has an identifier), receive a pace value representative of a pace currently used on the exercise equipment device and receive the exercise equipment identifier via the short range wireless transceiver, search a media library within a memory on the portable audio output device for a media file having a pace closest to the pace value received, and play a media file having the pace closest to the pace value received. The processor can further be programmed to automatically play the media file if the pace closest to the pace value received is an exact match, adjust to the pace value the pace of a song serving as the media file having the pace closest to the pace value when the song is within a user settable range or percentage of the pace value

received or play the media file with the closest pace to the pace value received with an unaltered pace, and play a current song playing on the audio output device when a song is not found within the user settable range or percentage of the pace value received.

**[0008]** In a fourth embodiment of the present invention, a system of music selection based on a pace of an exercise equipment device can include a processor operatively coupled to an audio output device. The processor can be programmed to receive information correlated to a particular user's music library on the audio output device, track a pace as used on the exercise equipment device, send a pace value representative of a pace currently used on the exercise equipment device to the audio output device, search a music library within a memory on the portable audio output device for a media file having a pace closest to the pace value received, and play a media file having the pace closest to the pace value received.

**[0009]** The terms "a" or "an," as used herein, are defined as one or more than one. The term "plurality," as used herein, is defined as two or more than two. The term "another," as used herein, is defined as at least a second or more. The terms "including" and/or "having," as used herein, are defined as comprising (i.e., open language). The term "coupled," as used herein, is defined as connected, although not necessarily directly, and not necessarily mechanically.

**[0010]** The terms "program," "software application," and the like as used herein, are defined as a sequence of instructions designed for execution on a computer system. A program, computer program, or software application may include a subroutine, a function, a procedure, an object method, an object implementation, an executable application, an applet, a servlet, a source code, an object code, a shared library/dynamic load library and/or other sequence of instructions designed for execution on a computer system. The "processor" as described herein can be any suitable component or combination of components, including any suitable hardware or software, that are capable of executing the processes described in relation to the inventive arrangements.

**[0011]** Other embodiments, when configured in accordance with the inventive arrangements disclosed herein, can include a system for performing and a machine readable storage for causing a machine to perform the various processes and methods disclosed herein.

#### BRIEF DESCRIPTION OF THE DRAWINGS

**[0012]** FIG. 1 is a flow chart of a method of music selection based on pace accordance with an embodiment of the present invention.

**[0013]** FIG. 2 is an illustration of a system for music selection based on pace in accordance with an embodiment of the present invention.

**[0014]** FIG. 3 is an illustration of another system for music selection based on pace in accordance with an embodiment of the present invention.

#### DETAILED DESCRIPTION OF THE DRAWINGS

**[0015]** While the specification concludes with claims defining the features of embodiments of the invention that are regarded as novel, it is believed that the invention will be better understood from a consideration of the following description in conjunction with the figures, in which like reference numerals are carried forward.

**[0016]** Embodiments herein can be implemented in a wide variety of exemplary ways that can enable a portable device user such as cell phone or MP3 user to receive current exercise pace information from a piece of exercise equipment and further enable the portable device to play a media file such as a song matching or substantially matching the current pace on the exercise equipment. Such an arrangement enables the user to maintain their exercise pace without any or minimal action by the user and provides for a better workout.

**[0017]** Referring to FIG. 1, a flow chart illustrating a method 10 of music selection based on pace can include the step 12 of tracking a pace as used on an exercise equipment device, receiving a pace value representative of the pace via a short range wireless transmission at an audio output device at step 14, searching a media library within a memory on the audio output device for a media file with a pace closest to the pace value received at step 16, and presenting at step 18 a media file having the pace closest to the pace value received. The method 10 can further optionally include the step 20 of automatically playing the media file if the pace closest to the pace value received is an exact match and the step 22 of adjusting to the pace value the pace of a song (serving as the media file having the pace closest to the pace value) when the song is within a user settable range or percentage of the pace value received or alternatively adjusting a degree of difficulty level on the exercise equipment device to enable a user to easily match the pace value of the song serving as the media file. The method 10 can also optionally continue to play a current song playing on the audio output device when a song is not found within the user settable range or percentage of the pace value received at step 24. The method 10 can also play the media file with the closest pace to the pace value received with an unaltered pace at step 26. The method can also log changes in pace and create an exercise playlist substantially matching the changes in pace logged and enable a user to select songs from the exercise playlist at step 28. The method 10 can also include the step 30 of receiving the pace value representative of the pace via the short range wireless transmission when the pace value changes and further receiving an exercise equipment identifier to enable maintenance or correlation of a playlist (for each user) for each piece of equipment the user uses. The method can also include the step 32 of capturing an image to correlate a piece of exercise equipment with a given user's playlist.

**[0018]** Note, using a short range wireless communication interface to enable a portable wireless device to communicate with exercise equipment in a fitness room might not be as trivial as it might seem. A user might need to select from a list of all objects in the fitness room that are equipped with RF transponders. For example, a fitness room 50 having treadmills 61, 62 and 63 in near proximity communicating respectively with portable wireless devices (such as music enabled cellular phones) 51, 52, and 53 would need to have a means for correlating exercise equipment with user playlists on the portable wireless devices to avoid confusion and interference among devices. One possible implementation can utilize exercise equipment identifiers that uniquely identify a piece of equipment (per exercise room location) and transmit the identifier as well as any pacing information. Thus, treadmill 61 can send a unique identifier via processor 56 and transmitter or transceiver 54 to portable wireless device 51. Likewise, treadmills 62 and 63 can send a unique identifier via processor 56 and transmitter or transceiver 54 to portable wireless devices 52 and 53 respectively. Another possible implementation within contemplation of the present invention can uti-

lize near field communications (NFC) that uses RFIDs that are attached to the exercise equipment or object. Yet another embodiment can capture an image of the object by the mobile device and then compare or correlate the image to the previously captured image and provide the exercise song list that has been previously linked to the image stored in the mobile device. The image capture scheme can operate similarly to receiving a unique identifier that makes one piece of equipment distinguishable from another. The image capture can also be used to distinguish one particular user or playlist for another. For example, a captured image of a pair of running shoes would bring up a song list that is linked to the image of such running shoes. An image capture of a cross-trainer shoe might bring up yet a different playlist for the very same user. A captured image for a stationary bike can bring up a song list for the stationary bike that was previously linked to the stationary bike image.

**[0019]** As noted above, embodiments herein can enable a user to select one or more songs to match the pace or tempo of the user. The song can be chosen so that the tempo of the song would reinforce the exercise movement of the user. In one embodiment, the song's current tempo can be adjusted to match or substantially match a desired heart rate or pace. Alternatively, the exercise equipment settings can be altered to enable the user to more closely match the pace of a particular song. In other words, a difficulty level setting can be made easier or harder in order to bring the user's pace more in-line with the particular pace of a song. The data associated with a particular song can include such pace or tempo information and can be part of the metadata within a song file. A device and system as contemplated can also track the correlation between songs used (and their tempo or pace) and the particular piece of exercise equipment. This allows the device to automatically load songs with the preferred tempo once the user starts exercising on the device. As a particular workout progresses and the pace changes, the automatically loaded and/or presented songs can change to correspond to the changed pace. Such as system can also provide a user with the ability to inspect an exercise log to adjust a desired playlist for future exercise. The log can also enable a user to manually assemble an exercise playlist that tracks the equipment's pace to the accuracy desired by the user. This can also assume the tracking and recording of some physiological information such as heart rate is being recorded or other physiological information.

**[0020]** FIG. 3 depicts an exemplary diagrammatic representation of a machine in the form of a computer system **200** within which a set of instructions, when executed, may cause the machine to perform any one or more of the methodologies discussed above. In some embodiments, the machine operates as a standalone device. In some embodiments, the machine may be connected (e.g., using a network) to other machines. In a networked deployment, the machine may operate in the capacity of a server or a client user machine in server-client user network environment, or as a peer machine in a peer-to-peer (or distributed) network environment. For example, the computer system can include a recipient device **201** and a sending device **250** or vice-versa.

**[0021]** The machine may comprise a server computer, a client user computer, a personal computer (PC), a tablet PC, personal digital assistant, a cellular phone, a laptop computer, a desktop computer, a control system, a network router, switch or bridge, or any machine capable of executing a set of instructions (sequential or otherwise) that specify actions to be taken by that machine, not to mention a mobile server. It will be understood that a device of the present disclosure includes broadly any electronic device that provides voice,

video or data communication. Further, while a single machine is illustrated, the term "machine" shall also be taken to include any collection of machines that individually or jointly execute a set (or multiple sets) of instructions to perform any one or more of the methodologies discussed herein.

**[0022]** The computer system **200** can include a controller or processor **202** (e.g., a central processing unit (CPU), a graphics processing unit (GPU), or both), a main memory **204** and a static memory **206**, which communicate with each other via a bus **208**. The computer system **200** may further include a presentation device such as a video display unit **210** (e.g., a liquid crystal display (LCD), a flat panel, a solid state display, or a cathode ray tube (CRT)). The computer system **200** may include an input device **212** (e.g., a keyboard), a cursor control device **214** (e.g., a mouse), a disk drive unit **216**, a signal generation device **218** (e.g., a speaker or remote control that can also serve as a presentation device) and a network interface device **220**. Of course, in the embodiments disclosed, many of these items are optional.

**[0023]** The disk drive unit **216** may include a machine-readable medium **222** on which is stored one or more sets of instructions (e.g., software **224**) embodying any one or more of the methodologies or functions described herein, including those methods illustrated above. The instructions **224** may also reside, completely or at least partially, within the main memory **204**, the static memory **206**, and/or within the processor **202** during execution thereof by the computer system **200**. The main memory **204** and the processor **202** also may constitute machine-readable media.

**[0024]** Dedicated hardware implementations including, but not limited to, application specific integrated circuits, programmable logic arrays and other hardware devices can likewise be constructed to implement the methods described herein. Applications that may include the apparatus and systems of various embodiments broadly include a variety of electronic and computer systems. Some embodiments implement functions in two or more specific interconnected hardware modules or devices with related control and data signals communicated between and through the modules, or as portions of an application-specific integrated circuit. Thus, the example system is applicable to software, firmware, and hardware implementations.

**[0025]** In accordance with various embodiments of the present invention, the methods described herein are intended for operation as software programs running on a computer processor. Furthermore, software implementations can include, but are not limited to, distributed processing or component/object distributed processing, parallel processing, or virtual machine processing can also be constructed to implement the methods described herein. Further note, implementations can also include neural network implementations, and ad hoc or mesh network implementations between communication devices.

**[0026]** The present disclosure contemplates a machine readable medium containing instructions **224**, or that which receives and executes instructions **224** from a propagated signal so that a device connected to a network environment **226** can send or receive voice, video or data, and to communicate over the network **226** using the instructions **224**. The instructions **224** may further be transmitted or received over a network **226** via the network interface device **220**.

**[0027]** While the machine-readable medium **222** is shown in an example embodiment to be a single medium, the term "machine-readable medium" should be taken to include a single medium or multiple media (e.g., a centralized or dis-

tributed database, and/or associated caches and servers) that store the one or more sets of instructions. The term “machine-readable medium” shall also be taken to include any medium that is capable of storing, encoding or carrying a set of instructions for execution by the machine and that cause the machine to perform any one or more of the methodologies of the present disclosure. The terms “program,” “software application,” and the like as used herein, are defined as a sequence of instructions designed for execution on a computer system. A program, computer program, or software application may include a subroutine, a function, a procedure, an object method, an object implementation, an executable application, an applet, a servlet, a source code, an object code, a shared library/dynamic load library and/or other sequence of instructions designed for execution on a computer system.

[0028] In light of the foregoing description, it should be recognized that embodiments in accordance with the present invention can be realized in hardware, software, or a combination of hardware and software. A network or system according to the present invention can be realized in a centralized fashion in one computer system or processor, or in a distributed fashion where different elements are spread across several interconnected computer systems or processors (such as a microprocessor and a DSP). Any kind of computer system, or other apparatus adapted for carrying out the functions described herein, is suited. A typical combination of hardware and software could be a general purpose computer system with a computer program that, when being loaded and executed, controls the computer system such that it carries out the functions described herein. Further note, the embodiments are not necessarily limited to song files, but can also include video files or multimedia files that can have a pace or tempo associated with such files.

[0029] In light of the foregoing description, it should also be recognized that embodiments in accordance with the present invention can be realized in numerous configurations contemplated to be within the scope and spirit of the claims. Additionally, the description above is intended by way of example only and is not intended to limit the present invention in any way, except as set forth in the following claims.

What is claimed is:

1. A method of music selection based on pace, comprising the steps of:

tracking a pace as used on an exercise equipment device;  
receiving a pace value representative of the pace via a short range wireless transmission at an audio output device;  
searching a media library within a memory on the audio output device for a media file with a pace closest to the pace value received; and  
presenting a media file having the pace closest to the pace value received.

2. The method of claim 1, wherein the method further comprises the step of automatically playing the media file if the pace closest to the pace value received is an exact match.

3. The method of claim 1, wherein the method further comprises the step of adjusting to the pace value the pace of a song serving as the media file having the pace closest to the pace value when the song is within a user settable range or percentage of the pace value received or alternatively adjusting a degree of difficulty level on the exercise equipment device to enable a user to easily match the pace value of the song serving as the media file.

4. The method of claim 3, wherein the method further comprises the step of playing a current song playing on the

audio output device when a song is not found within the user settable range or percentage of the pace value received.

5. The method of claim 1, wherein the method further comprises the step of playing the media file with the closest pace to the pace value received with an unaltered pace.

6. The method of claim 1, wherein the method further comprises the step of logging changes in pace and creating an exercise playlist substantially matching the changes in pace logged and enabling a user to select songs from the exercise playlist.

7. The method of claim 1, wherein the method further comprises the step of receiving the pace value representative of the pace via the short range wireless transmission when the pace value changes and further comprises receiving an exercise equipment identifier to enable maintenance of a playlist for each piece of equipment the user uses.

8. The method of claim 1, wherein the method further comprises the step of capturing an image to correlate a piece of exercise equipment with a given user's playlist.

9. A system of music selection based on pace, comprising:

a portable audio output device;

a short range wireless transceiver coupled to the portable audio output device; and

a processor coupled to the short range wireless transceiver and the portable audio output device, wherein the processor is programmed to:

track a pace as used on exercise equipment;  
receive a pace value representative of the pace via the short range wireless transceiver;  
search a music library within a memory on the portable audio output device for a media file having a pace closest to the pace value received; and  
play a media file having the pace closest to the pace value received.

10. The system of claim 9, wherein the processor is further programmed to automatically play the media file if the pace closest to the pace value received is an exact match.

11. The system of claim 9, wherein the processor is further programmed to adjust to the pace value the pace of a song serving as the media file having the pace closest to the pace value when the song is within a user settable range or percentage of the pace value received.

12. The system of claim 11, wherein the processor is further programmed to play a current song playing on the audio output device when a song is not found within the user settable range or percentage of the pace value received.

13. The system of claim 9, wherein the processor is further programmed to play the media file with the closest pace to the pace value received with an unaltered pace.

14. The system of claim 9, wherein the processor is further programmed to log changes in pace and create an exercise playlist substantially matching the changes in pace logged and enable a user to select songs from the exercise playlist.

15. The system of claim 9, wherein a song pace is kept in a song's metadata.

16. The system of claim 9, wherein receiving the pace value representative of the pace via the short range wireless transmission occurs when the pace value changes and the processor is further programmed to receive an exercise equipment identifier to enable maintenance of a playlist for each piece of equipment the user uses.

17. The system of claim 9, wherein the processor is further programmed to capture an image to correlate a piece of exercise equipment with a given user's playlist.



18. The system of claim 9, wherein the portable audio output device is a cellular phone, an MP3 player, a smart phone, or a personal digital assistant.

19. A portable wireless communication unit having a system of music selection based on a pace of an exercise equipment device, comprising:

- a short range wireless transceiver coupled to portable wireless communication unit; and

- a processor coupled to the short range wireless transceiver, wherein the processor is programmed to:

  - track a pace as used on the exercise equipment device, wherein the exercise equipment device further has an identifier;

  - receive a pace value representative of a pace currently used on the exercise equipment device and the exercise equipment identifier via the short range wireless transceiver;

  - search a music library within a memory on the portable audio output device for a media file having a pace closest to the pace value received; and

  - play a media file having the pace closest to the pace value received.

20. The portable communication unit of claim 9, wherein the processor is further programmed to:

- automatically play the media file if the pace closest to the pace value received is an exact match;

- adjust to the pace value the pace of a song serving as the media file having the pace closest to the pace value when the song is within a user settable range or percentage of the pace value received or play the media file with the closest pace to the pace value received with an unaltered pace; and

- play a current song playing on the audio output device when a song is not found within the user settable range or percentage of the pace value received.

21. A system of music selection based on a pace of an exercise equipment device, comprising:

- a processor operatively coupled to a audio output device, wherein the processor is programmed to:

  - receive information correlated to a particular user's music library on the audio output device;

  - track a pace as used on the exercise equipment device;

  - send a pace value representative of a pace currently used on the exercise equipment device to the audio output device;

  - search a music library within a memory on the portable audio output device for a media file having a pace closest to the pace value received; and

  - play a media file having the pace closest to the pace value received.

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