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COMPLETE SPECIFICATION

(See Section 10, and rule 13)

WEARABLE DEVICE AND METHOD FOR GENERATING SOUND OF ANKLET BELLS

APPLICANT(S)

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The following specification particularly describes the invention and the manner in which it is to be performed:

BACKGROUND

Field of Invention

[001] Embodiments of the present invention generally relate to a wearable device and particularly to a wearable device and a method for generating a sound of anklet bells.

Description of Related Art

[002] Wearable Technology (WT) has become a viable means to assist in daily living that can be directly worn or attached to a person. Wearable technology can be integrated into communication networks and facilitates data personalization and remote monitoring. In the last decade, the ornamental industry has evolved with technological advancements and innovation. With the rise in digitization, users are more inclined to buy products that go beyond aesthetics. A smooth blend of IoT and fashion has led to smart products in the form of wearable pieces that can generate human-computer interaction and human-human interaction. With the advent of Wearable Technology (WT), many businesses and brands are manufacturing jewelry that functions beyond its inherent attributes, like health monitoring, motion monitoring, Global Positioning System (GPS) positioning, etc. using Bluetooth, Near Field Communication (NFC), and sensor technologies.

[003] In terms of the market, there are various smart jewelry products available that are related to a health monitoring provision, a navigation of a user, a measurement of environmental parameters, and safety features. The designs of such products range from smart rings, bangles, watches, bracelets, and headwear. However, basic ornamentation like an anklet bell, also known as ‘ghungroos’ in the Hindi language lacks such innovation. The anklet bells comprise small metallic bells strung together to form an anklet that is tied to the feet of Indian classical dancers for

rhythmic accompaniment. A string of anklet bells may comprise 50 to more than 200 metallic bells tied together. Even today, we use the traditional anklet bells which are old and exactly the same as we used 100 years ago. Although, the anklet bell looks pleasing and beautiful, however, they are comparatively heavy approximately ranging from 1 to 2.5 kilograms each per foot. This makes it difficult for dancers to perform. Also, the sound created by the bells of the anklet remains inaudible during mass events.

[004] There is thus a need for an improved and advanced wearable device for generating the sound of anklet bells that can administer the aforementioned limitations in a more efficient manner.

SUMMARY

[005] Embodiments in accordance with the present invention provide a wearable device for generating a sound of anklet bells. The wearable device comprising: a strap adapted to be worn around a leg of a user. The strap comprising: pressure sensors adapted to detect an amount of pressure applied by the user while performing a dance. The strap further comprising: motion sensors adapted to detect a movement data of a foot of the user. The strap further comprising: a processing unit connected to the pressure sensors and the motion sensor. The processing unit is configured to: receive the detected amount of pressure from the pressure sensor; receive the detected movement data from the motion sensor; compile the received amount of pressure, and the received movement data to create a specific sound note based on a dataset prestored in a memory; and actuate a sound generating unit to generate the sound of the anklet bells based on the created sound note.

[006] Embodiments in accordance with the present invention further provide a method of generating a sound of anklet bells using a wearable device. The method comprising steps of: detecting an amount of pressure applied by a user using pressure sensors while performing a dance;

detecting a movement data of a foot of the user using motion sensors; receiving the detected amount of pressure from the pressure sensors and the detected movement data from the motion sensors by a processing unit; compiling the received amount of pressure, and the received movement data to create a specific sound note based on a dataset prestored in a memory; and actuating a sound generating unit to generate the sound of the anklet bells based on the created sound note.

[007] Embodiments of the present invention may provide a number of advantages depending on their particular configuration. First, embodiments of the present application may provide a wearable device for generating a sound of anklet bells.

[008] Next, embodiments of the present application may provide a wearable device for generating a sound of anklet bells that is lightweight and portable.

[009] Next, embodiments of the present application may provide a wearable device for generating a sound of anklet bells that are easy to wear and easy to remove.

[0010] Next, embodiments of the present application may provide a wearable device for generating a sound of anklet bells that is sustainable in long run.

[0011] Next, embodiments of the present application may provide a wearable device for generating a sound of anklet bells that is easy to use and easy to understand.

[0012] Next, embodiments of the present application may provide a wearable device for generating a sound of ‘ghungroos’, a traditional Indian ornament wearable during a dance performance.

[0013] Next, embodiments of the present application may provide a smart ghungroos that are capable of generating musical sounds for mass audience.

[0014] These and other advantages will be apparent from the present application of the embodiments described herein.

[0015] The preceding is a simplified summary to provide an understanding of some embodiments of the present invention. This summary is neither an extensive nor exhaustive overview of the present invention and its various embodiments. The summary presents selected concepts of the embodiments of the present invention in a simplified form as an introduction to the more detailed description presented below. As will be appreciated, other embodiments of the present invention are possible utilizing, alone or in combination, one or more of the features set forth above or described in detail below.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] The above and still further features and advantages of embodiments of the present invention will become apparent upon consideration of the following detailed description of embodiments thereof, especially when taken in conjunction with the accompanying drawings, and wherein:

[0017] FIG. 1 illustrates a wearable device for generating a sound of anklet bells, according to an embodiment of the present invention;

[0018] FIG. 2 illustrates a block diagram of a processing unit of the wearable device for generating a sound of anklet bells, according to an embodiment of the present invention; and

[0019] FIG. 3 depicts a flowchart of a method of generating a sound of anklet bells using a wearable device, according to an embodiment of the

present invention.

[0020] The headings used herein are for organizational purposes only and are not meant to be used to limit the scope of the description or the claims. As used throughout this application, the word "may" is used in a permissive sense (*i.e.*, meaning having the potential to), rather than the mandatory sense (*i.e.*, meaning must). Similarly, the words “include”, “including”, and “includes” mean including but not limited to. To facilitate understanding, like reference numerals have been used, where possible, to designate like elements common to the figures. Optional portions of the figures may be illustrated using dashed or dotted lines, unless the context of usage indicates otherwise.

DETAILED DESCRIPTION

[0021] The following description includes the preferred best mode of one embodiment of the present invention. It will be clear from this description of the invention that the invention is not limited to these illustrated embodiments but that the invention also includes a variety of modifications and embodiments thereto. Therefore, the present description should be seen as illustrative and not limiting. While the invention is susceptible to various modifications and alternative constructions, it should be understood, that there is no intention to limit the invention to the specific form disclosed, but, on the contrary, the invention is to cover all modifications, alternative constructions, and equivalents falling within the scope of the invention as defined in the claims.

[0022] In any embodiment described herein, the open-ended terms "comprising", "comprises”, and the like (which are synonymous with "including", "having” and "characterized by") may be replaced by the respective partially closed phrases "consisting essentially of", “consists essentially of", and the like or the respective closed phrases "consisting of", "consists of”, the like.

[0023] As used herein, the singular forms “a”, “an”, and “the” designate both the singular and the plural, unless expressly stated to designate the singular only.

[0024] FIG. 1 illustrates a wearable device 100 for generating a sound of anklet bells, according to an embodiment of the present invention. In an embodiment of the present invention, the wearable device 100 may be worn by a user. The wearable device 100 may further simulate a sound of the anklet bells without the utilization of real anklet bells, in an embodiment of the present invention. In another embodiment of the present invention, the wearable device 100 may look like Ghungroos that is an ornament to wear while performing a dance in Indian culture. In an embodiment of the present invention, the wearable device 100 may be worn either on a right leg or on a left leg of the user. In another embodiment of the present invention, the user may wear a pair of the wearable device(s) 100 that may be worn on the right leg and the left leg of the user.

[0025] According to an embodiment of the present invention, the wearable device 100 may comprise a strap 102, pressure sensors 104a-104b (hereinafter referred as to the pressure sensors 104), motion sensors 106a-106b (hereinafter referred as to the motion sensors 106), a processing unit 108, a memory 110, a sound generating unit 112, a speaker 114, a communication network 116, and a power supply unit 118.

[0026] In an embodiment of the present invention, each of the wearable device 100 that may be worn on the right leg or the left leg of the user may comprise their own set of the strap 102, the pressure sensors 104, the motion sensors 106, the processing unit 108, the memory 110, the sound generating unit 112, the speaker 114, the communication network 116, and the power supply unit 118. Each set of the wearable device 100 may be configured to communicate with each other wirelessly to generate a

coordinated sound.

[0027] In an embodiment of the present invention, the strap 102 may be adapted to be worn by a user. The user may wear the strap 102 at a pre-defined location on a body, in an embodiment of the present invention. According to embodiments of the present invention, the pre-defined location on the body may be, but not limited to, a waist, an arm, a wrist, and so forth. In a preferred embodiment of the present invention, the user may wear the strap 102 around a leg. Embodiments of the present invention are intended to include or otherwise cover any location on the body part where the user may wear the strap 102, including known, related art, and/or later developed technologies.

[0028] In another embodiment of the present invention, the strap 102 may further be provided with attachment means that may secure the strap 102 around the leg of the user. According to embodiments of the present invention, the attachment means may be, but not limited to, a Velcro, a lace, a thread, a latch and lock, and so forth. Embodiments of the present invention are intended to include or otherwise cover any attachment means that may enable the user to secure the strap 102 around the leg, including known, related art, and/or later developed technologies. According to embodiments of the present invention, the strap 102 may be constructed of any material such as, but not limited to, a fabric material, a polymer material, a metallic material, and so forth. Embodiments of the present invention are intended to include or otherwise cover any material for the construction of the strap 102, including known, related art, and/or later developed technologies.

[0029] In an embodiment of the present invention, the pressure sensors 104 may be adapted to detect an amount of pressure applied by the user while performing the dance. The pressure sensors 104 may be arranged inside of the strap 102, in an embodiment of the present invention.

According to embodiments of the present invention, the pressure sensors 104 may be, but not limited to, a strain gauge pressure sensor, a capacitance pressure sensor, a solid-state pressure sensor, and so forth. In a preferred embodiment of the present invention, the pressure sensors 104 may be RP-C18.3-ST type pressure sensors. Embodiments of the present invention are intended to include or otherwise cover any type of the pressure sensors 104, including known, related art, and/or later developed technologies.

[0030] In an embodiment of the present invention, the motion sensors 106 may be adapted to detect a movement data of a foot of the user. The motion sensors 106 may be arranged inside of the strap 102, in an embodiment of the present invention. According to embodiments of the present invention, the motion sensors 106 may be, but not limited to, a Passive Infrared (PIR) motion sensor, a microwave motion sensor, a hybrid motion sensor, an accelerometer, a gyroscope, a magnetometer, and so forth. Embodiments of the present invention are intended to include or otherwise cover any type of the motion sensors 106, including known, related art, and/or later developed technologies.

[0031] According to embodiments of the present invention, the movement data of the foot of the user may be, but not limited to, a movement of the foot, an angle of the foot, a posture of the foot, a direction of the movement, a speed of the movement, and so forth. Embodiments of the present invention are intended to include or otherwise cover any movement data of the foot of the user that may be detected by the motion sensors 106, including known, related art, and/or later developed technologies.

[0032] In an embodiment of the present invention, the motion sensors 106 may sense a movement of the foot of the user in any direction. In a preferred embodiment of the present invention, the motion sensors 106

may sense the angle of the foot. In a preferred embodiment of the present invention, the motion sensors 106 may sense the movement of the foot of the user in a range from 110 degrees (°) to 360 degrees (°). In further embodiments of the present invention, the motion sensors 106 may sense any angle of the foot. In another embodiment of the present invention, the motion sensors 106 may operate on a voltage of 220 Volts (V) and on a frequency of 50 Hertz (Hz).

[0033] In an embodiment of the present invention, the processing unit 108 may be connected to the pressure sensors 104 and the motion sensors 106. The processing unit 108 may be configured for receiving the detected pressure and the detected movement data from the pressure sensors 104 and the motion sensors 106, respectively. The processing unit 108 may compile the received pressure and the received movement data to create a specific sound note. In an embodiment of the present invention, the processing unit 108 may determine an intensity and a rhythm of the sound note. For example, if the user's foot applies the pressure greater than a threshold value of the pressure and makes a fast movement, the processing unit 108 may select a first sound note with a high pitch and a rapid tempo. If the user's foot applies the pressure that is less than the threshold value of the pressure and makes a slower movement, the processing unit 108 may select a second sound note with a lower pitch and a slower tempo. The threshold value of the pressure may be prestored in the memory 110.

[0034] In an exemplary embodiment of the present invention, if the user may be performing a dance move that may involve alternating movements between the right leg and the left leg, then a processing unit 108 on each of the wearable device 100 may wirelessly coordinate along with the movement of the legs of the user to generate a sound note based on the produced movement of the legs of the user. Additionally, a cohesive and synchronized operation of both of the wearable device(s) 100 worn on the

right leg and the left leg of the user may produce a more dynamic and synchronized sound note that may accurately reflect the user's dance movements. The produced sound note by wearable device 100 may simulate the sound note produced by traditional anklet bells.

[0035] In an embodiment of the present invention, the processing unit 108 may be configured to execute computer-executable instructions stored in the memory 110 to generate an output relating to the wearable device 100. According to embodiments of the present invention, the memory 110 may be, but not limited to, a Random-Access Memory (RAM), a Static Random-Access Memory (SRAM), a Dynamic Random-Access Memory (DRAM), a Read-Only Memory (ROM), an Erasable Programmable Read-only Memory (EPROM), an Electrically Erasable Programmable Read-only Memory (EEPROM), a NAND Flash, a Secure Digital (SD) memory, a cache memory, a Hard Disk Drive (HDD), a Solid-State Drive (SSD), and so forth. Embodiments of the present invention are intended to include or otherwise cover any type of the memory 110, including known, related art, and/or later developed technologies. According to embodiments of the present invention, the processing unit 108 may be, but not limited to, a Programmable Logic Control (PLC) unit, a microprocessor, a development board, and so forth. Embodiments of the present invention are intended to include or otherwise cover any type of the processing unit 108 including known, related art, and/or later developed technologies. In an embodiment of the present invention, components of the processing unit 108 may be explained in conjunction with FIG. 2.

[0036] In an embodiment of the present invention, the sound generating unit 112 may be adapted to generate the sound of the anklet bells based on the created sound note. The generated sound of the anklet bells by the sound generating unit 112 may further be played back by the speaker 114, in an embodiment of the present invention. In an embodiment of the present invention, the generated sound of the anklet bells played back by

the speaker 114 may be audible to the user.

[0037] In an embodiment of the present invention, the sound generating unit 112 may be arranged inside the strap 102. The speaker 114 may be placed in an audible proximity of the user, in an embodiment of the present invention. In another embodiment of the present invention, the speaker 114 may be arranged inside the strap 102. In a further embodiment of the present invention, the speaker 114 may be arranged outside the strap 102. In yet another embodiment of the present invention, the speaker 114 may be placed at a separate location from the strap 102. In a further embodiment of the present invention, the wearable device 100 may further be used by the user without the utilization of the speaker 114.

[0038] According to embodiments of the present invention, the sound generating unit 112 may be, but not limited to, a motherboard sound chip, a sound card, and so forth. Embodiments of the present invention are intended to include or otherwise cover any type of the sound generating unit 112, including known, related art, and/or later developed technologies. According to embodiments of the present invention, the speaker 114 may be, but not limited to, a sound box, a boom box, an earphone, a headphone, an earbud, a Bluetooth-based speaker, and so forth. Embodiments of the present invention are intended to include or otherwise cover any type of the speaker 114, including known, related art, and/or later developed technologies.

[0039] In an embodiment of the present invention, the communication network 116 may enable the processing unit 108 to transmit the generated sound to the speaker 114. The transmission and/or the communication that may be facilitated using the communication network 116 may be generated and established by a communication link, in an embodiment of the present invention. According to embodiments of the present invention, the communication network 116 may be a wireless communication

network. The communication network 116 may be a wireless fidelity (Wi-Fi) communication network, a Bluetooth communication network, a millimeter waves communication network, an Ultra-High Frequency (UHF) communication network, and so forth. Embodiments of the present invention are intended to include or otherwise cover any type of the communication network 116, including known, related art, and/or later developed technologies.

[0040] In an embodiment of the present invention, the power supply unit 118 may be adapted to supply an operational power to the processing unit 108. In an embodiment of the present invention, the power supply unit 118 may comprise two batteries 120a-120b (hereinafter referred as to the batteries 120). In another embodiment of the present invention, the power supply unit 118 may comprise any number of the batteries 120. In a preferred embodiment of the present invention, the power supply unit 118 may provide the operational power from the batteries 120. In an embodiment of the present invention, the batteries 120 may be rechargeable. In another embodiment of the present invention, the batteries 120 may be non-rechargeable batteries. According to embodiments of the present invention, the batteries 120 that may supply the operational power be of any composition such as, but not limited to, a Nickel-Cadmium battery, a Nickel-Metal Hydride battery, a Zinc-Carbon battery, a Lithium-Ion battery, and so forth. Embodiments of the present invention are intended to include or otherwise cover any composition of the battery, including known, related art, and/or later developed technologies. The power supply unit 118 may be activated upon actuation of an activation button 122, in an embodiment of the present invention. In an embodiment of the present invention, the activation button 122 may be arranged on the strap 102.

[0041] FIG. 2 illustrates a block diagram of the processing unit 108 of the wearable device 100, according to an embodiment of the present

invention. The processing unit 108 may comprise programming instructions in form of programming modules such as a data receiving module 200, a data compilation module 202, and a sound generation module 204.

[0042] In an embodiment of the present invention, the data receiving module 200 may be configured to receive the detected amount of pressure from the pressure sensors 104. The data receiving module 200 may be configured to receive the detected movement data from the motion sensors 106, in an embodiment of the present invention. In an embodiment of the present invention, the data receiving module 200 may further be configured to transmit the received amount of pressure and the received movement data to the data compilation module 202.

[0043] In an embodiment of the present invention, the data compilation module 202 may be configured to compile the received amount of pressure, and the received movement data to create the specific sound note based on a dataset prestored in the memory 110. According to embodiments of the present invention, the movement data of the foot, but not limited to, the movement of the foot, the direction of the movement, the speed of the movement, and so forth. Embodiments of the present invention are intended to include or otherwise cover any movement data of the foot of the user that may be compiled by the data compilation module 202, including known, related art, and/or later developed technologies.

[0044] In an embodiment of the present invention, the data compilation module 202 may compile the received amount of pressure, and the received movement data and map the compiled data to a dataset stored in the memory 110. The dataset may be generated by using machine learning algorithms. The data compilation module 202 may be trained with the dataset by providing training data related to the pressure and the movement data correlated with prestored sound notes, in an embodiment

of the present invention. In an embodiment of the present invention, the machine learning algorithms may use the prestored dataset to determine the mapping between the received data and the sound notes, allowing it to generate the specific sound note.

[0045] In an exemplary scenario of the present invention, if the dataset stored in the memory 110 may have the mapping of a 'data X' with a 'sound note Y', then upon compilation, if the data compilation module 202 may compile the received data and returns it to the 'data X', then the data compilation module 202 may transmit a control signal to the sound generation module 204, indicating the generation of 'sound note Y'.

[0046] In an embodiment of the present invention, the sound notes that may be created upon the compilation of the amount of pressure, and the movement data may be, but not limited to, sa, re, ga, ma, pa, dha, ni, sa, and so forth. Embodiments of the present invention are intended to include or otherwise cover any sound notes that may be created upon the compilation of the amount of pressure, and the movement data by the data compilation module 202, including known, related art, and/or later developed technologies. Upon successful compilation and creation of sound note, the data compilation module 202 may transmit the control signal to the sound generation module 204.

[0047] In an embodiment of the present invention, the sound generation module 204 may be activated upon receipt of the control signal from the data compilation module 202. The sound generation module 204 may be configured to actuate the sound generating unit 112 to generate the sound of the anklet bells based on the created sound note, in an embodiment of the present invention. In a further embodiment of the present invention, the sound generation module 204 may further be configured to activate the speaker 114 to playback the generated the sound of the anklet bells. The sound of the anklet bells played back by the speaker 114 may be

audible to the user, in an embodiment of the present invention.

[0048] FIG. 3 depicts a flowchart of a method 300 of generating the sound of anklet bells using the wearable device 100, according to an embodiment of the present invention.

[0049] At step 302, the wearable device 100 may detect the amount of pressure applied by the user using the pressure sensors 104 while performing the dance.

[0050] At step 304, the wearable device 100 may detect the movement data of the foot of the user using the motion sensors 106.

[0051] At step 306, the wearable device 100 may receive the detected amount of pressure from the pressure sensors 104 and the detected movement data from the motion sensors 106 by the processing unit 108.

[0052] At step 308, the wearable device 100 may compile the received amount of pressure, and the received movement data to create the specific sound note based on the dataset prestored in the memory 110.

[0053] At step 310, the wearable device 100 may actuate the sound generating unit 112 to generate the sound of the anklet bells based on the created sound note.

[0054] At step 312, the wearable device 100 may transmit the generated sound to the speaker 114 through the communication network 116.

[0055] While the invention has been described in connection with what is presently considered to be the most practical and various embodiments, it is to be understood that the invention is not to be limited to the disclosed embodiments, but on the contrary, is intended to cover various modifications and equivalent arrangements included within the scope of the appended claims.

[0056] This written description uses examples to disclose the invention, including the best mode, and also to enable any person skilled in the art to practice the invention, including making and using any devices or systems and performing any incorporated methods. The patentable scope of the invention is defined in the claims, and may include other examples that occur to those skilled in the art. Such other examples are intended to be within the scope of the claims if they have structural elements that do not differ from the literal language of the claims, or if they include equivalent structural elements within substantial differences from the literal languages of the claims.

CLAIMS

I/We Claim:

1. A wearable device (100) for generating a sound of anklet bells, comprising:

a strap (102) adapted to be worn around a leg of a user, characterized in that the strap (102) comprises:

pressure sensors (104a-104b) adapted to detect an amount of pressure applied by the user while performing a dance;

motion sensors (106a-106b) adapted to detect a movement data of a foot of the user; and

a processing unit (108) connected to the pressure sensors (104a-104b) and the motion sensors (106a-106b), and configured to:

receive the detected amount of pressure from the pressure sensors (104a-104b);

receive the detected movement data from the motion sensors (106a-106b);

create a specific sound note based on a dataset prestored in a memory (110) by compiling the received amount of pressure, and the received movement data; and

generate the sound of the anklet bells based on the created sound note by actuating a sound generating unit (112).

2. The wearable device (100) as claimed in claim 1, wherein the processing unit (108) is configured to transmit the generated sound to a speaker (114) through a communication network (116).

3. The wearable device (100) as claimed in claim 1, comprising a power supply unit (118) to provide an operational power to the processing unit (108).

4. The wearable device (100) as claimed in claim 3, wherein the strap (102) comprises an activation button (122) to activate the power supply unit (118).

5. The wearable device (100) as claimed in claim 1, wherein the movement data is selected from a movement of the foot, a direction of the movement, a speed of the movement, or a combination thereof.

6. The wearable device (100) as claimed in claim 1, wherein the strap (102) is made of a material selected from a fabric, a polymer, a metal, or a combination thereof.

7. A method (300) of generating a sound of anklet bells using a wearable device (100), wherein the method (300) comprising steps of:

detecting an amount of pressure applied by a user using pressure sensors (104a-104b) while performing a dance;

detecting a movement data of a foot of the user using motion sensors (106a-106b);

receiving the detected amount of pressure from the pressure sensors (104a-104b) and the detected movement data from the motion sensors (106a-106b) by a processing unit (108);

compiling the received amount of pressure, and the received movement data to create a specific sound note based on a dataset prestored in a memory (110); and

actuating a sound generating unit (112) to generate the sound of the anklet bells based on the created sound note.

8. The method (300) as claimed in claim 7, comprising a step of transmitting the generated sound to a speaker (114) through a communication network (116).

9. The method (300) as claimed in claim 7, wherein the movement data is selected from a movement of the foot, a direction of the movement, a speed of the movement, or a combination thereof.

10. The method (300) as claimed in claim 7, wherein a power supply unit (118) provides an operational power to the processing unit (108).

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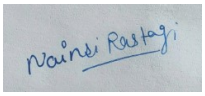

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WEARABLE DEVICE AND METHOD FOR GENERATING SOUND OF ANKLET BELLS

ABSTRACT

A wearable device (100) for generating a sound of anklet bells is disclosed. The wearable device (100) provides a strap (102) adapted to be worn around a leg of a user that comprises pressure sensors (104a-104b) and motion sensors (106a-106b) to detect an amount of pressure applied and a movement data of a foot of the user. The wearable device (100) compiles the movement data and the amount of pressure using machine learning algorithms and creates a specific sound note. The wearable device (100) further actuates a sound generating unit (112) and a speaker (114) to playback the sound of the anklet bells based on the created sound note. The wearable device (100) is lightweight, portable, and audible to a mass audience.

Claims: 10, Figures: 3

Figure 1 is selected.