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(54) **MUSIC OF MOVEMENT: THE MANIPULATION OF MECHANICAL OBJECTS THROUGH SOUND**

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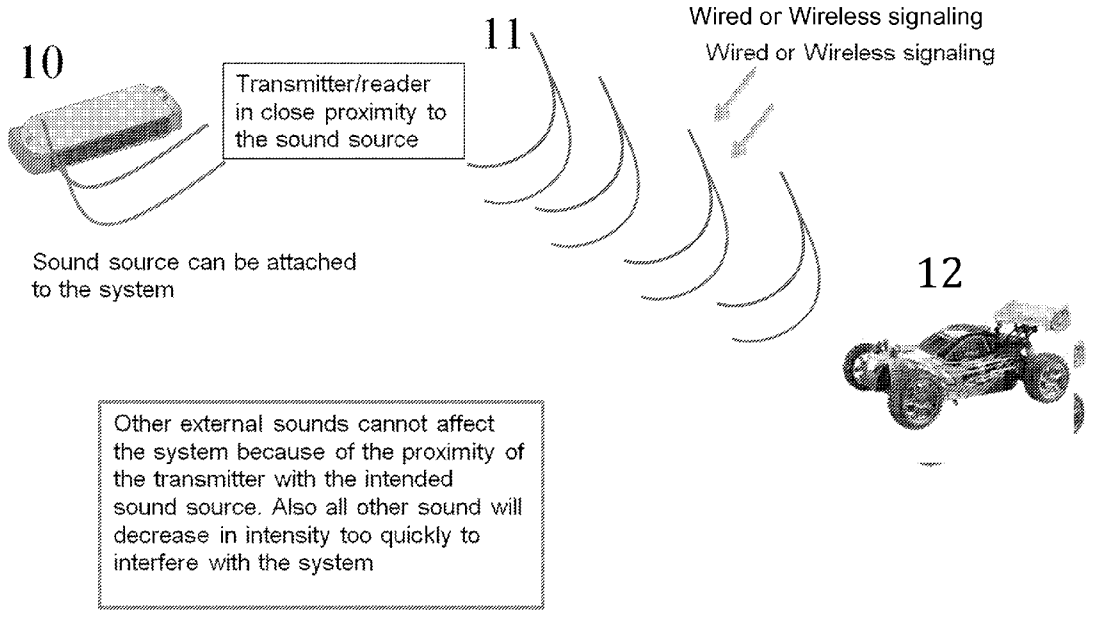
(57) **ABSTRACT**

Music of Movement enables the manipulation of a mechanical object with any sound source or electronic instrument that is plugged into the system. Objects will now be able to respond to natural sounds, thus increasing the usability of modern technology. Disabled persons will be able to operate mechanical objects they are not able to utilize through sound. Essentially this technology will give objects "ears" and enable they to respond appropriately to the sounds they "hear."



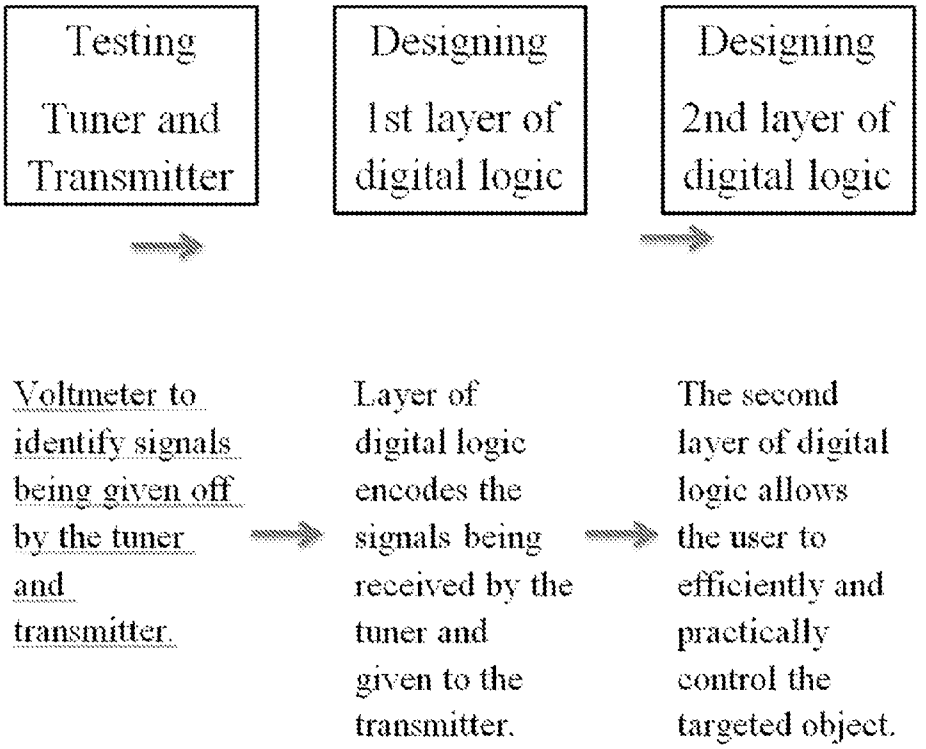
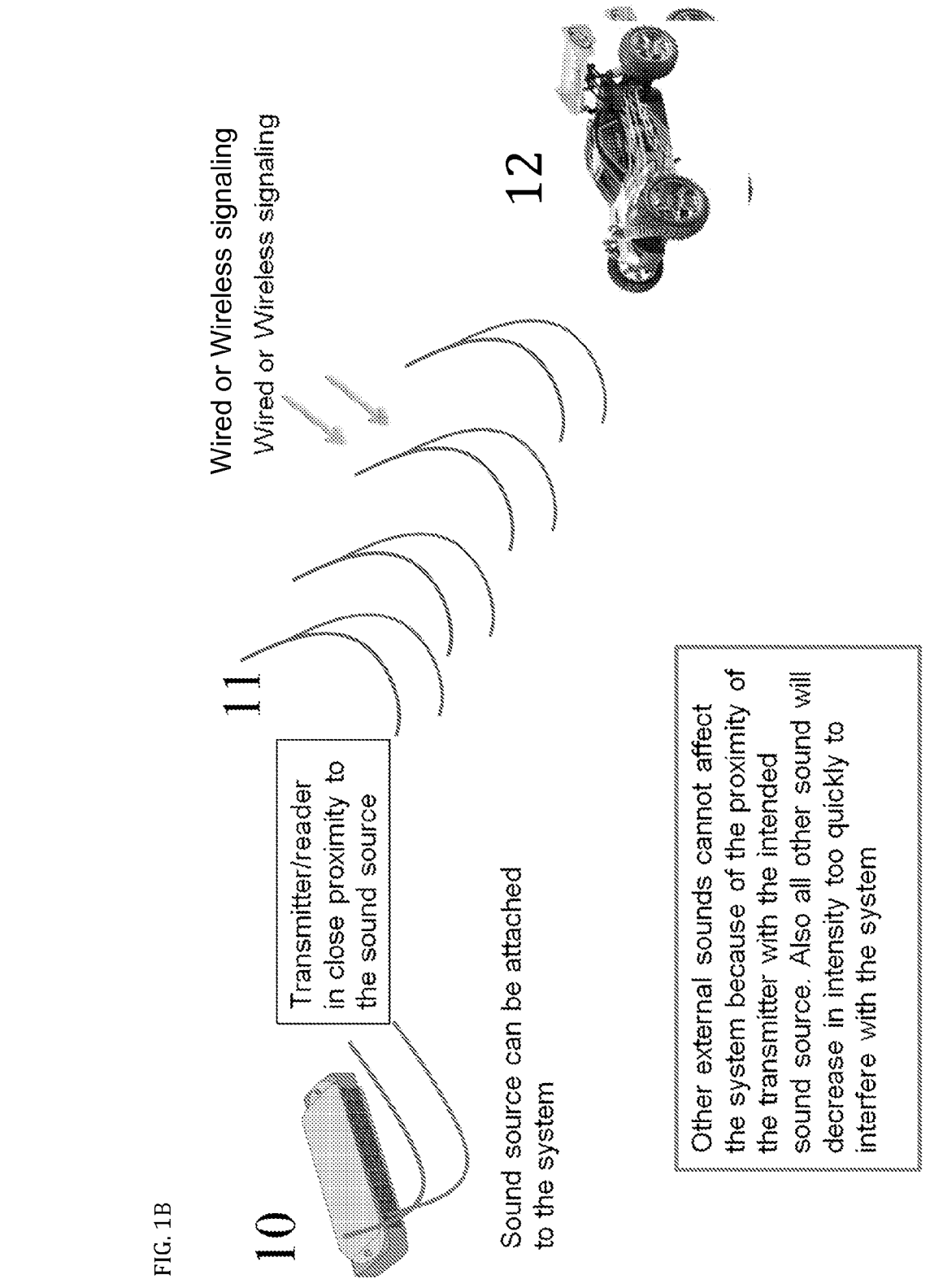

Testing
Tuner and Transmitter
Designing
1st layer of digital logic
Designing
2nd layer of digital logic
Voltmeter to identify signals being given off by the tuner and transmitter
Layer of digital logic encodes the signals being received by the tuner and given to the transmitter.
The second layer of digital logic allows the user to efficiently and practically control the targeted object.

FIG. 1A

FIG. 1B


10
Transmitter/reader in close proximity to the sound source
11
Wired or Wireless signaling
Wired or Wireless signaling
12
Sound source can be attached to the system
Other external sounds cannot affect the system because of the proximity of the transmitter with the intended sound source. Also all other sound will decrease in intensity too quickly to interfere with the system

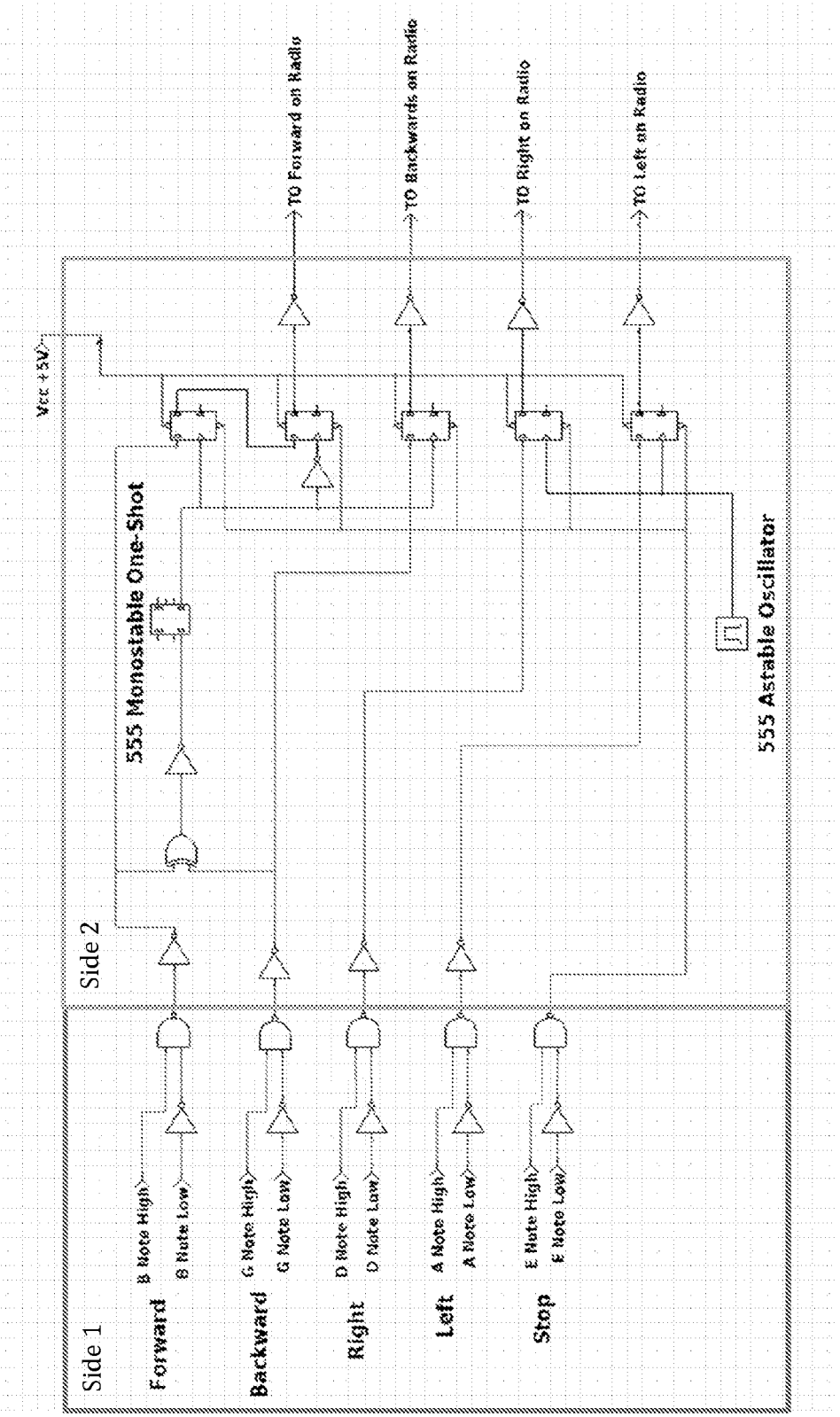

Vcc +5V
TO Forward on Radio
TO Backwards on Radio
TO Right on Radio
TO Left on Radio
555 Monostable One-Shot
555 Astable Oscillator
Side 2
Side 1
Forward
B Note High
B Note Low
Backward
G Note High
G Note Low
Right
D Note High
D Note Low
Left
A Note High
A Note Low
Stop
E Note High
E Note Low

FIG. 1C

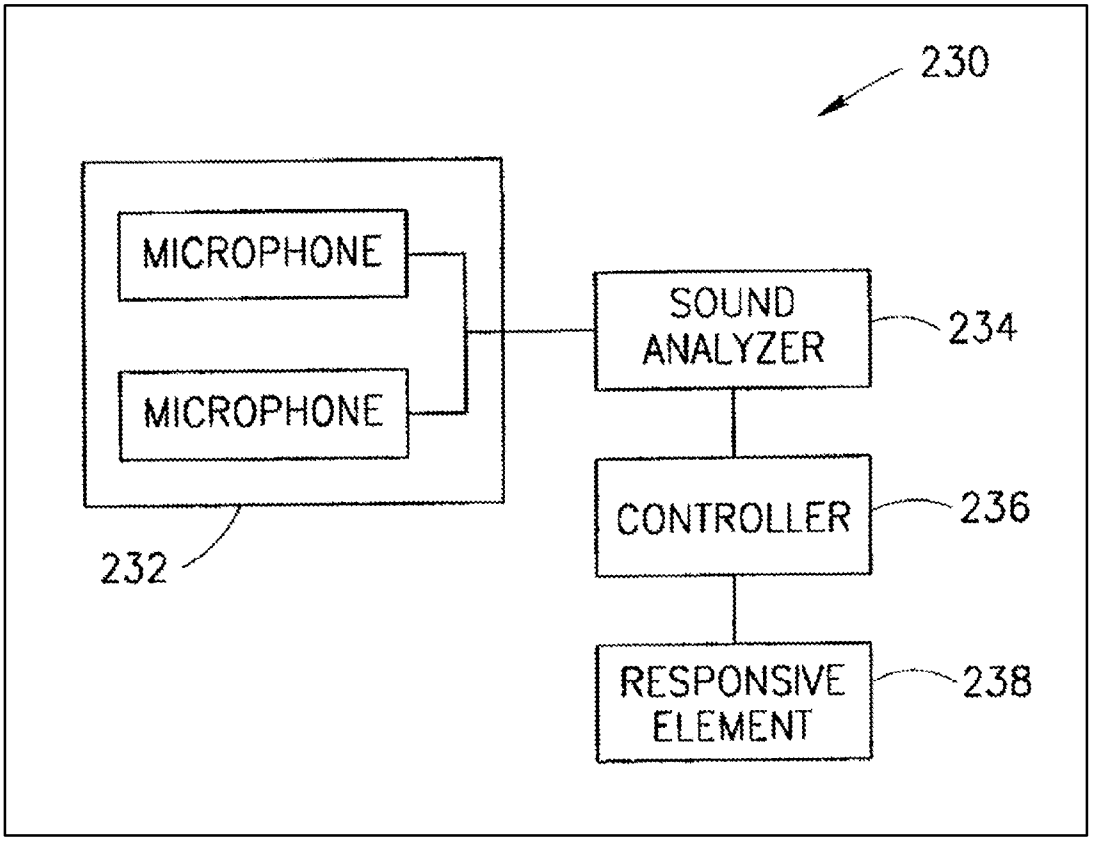

230
MICROPHONE
MICROPHONE
232
SOUND ANALYZER
234
CONTROLLER
236
RESPONSIVE ELEMENT
238

FIG. 2

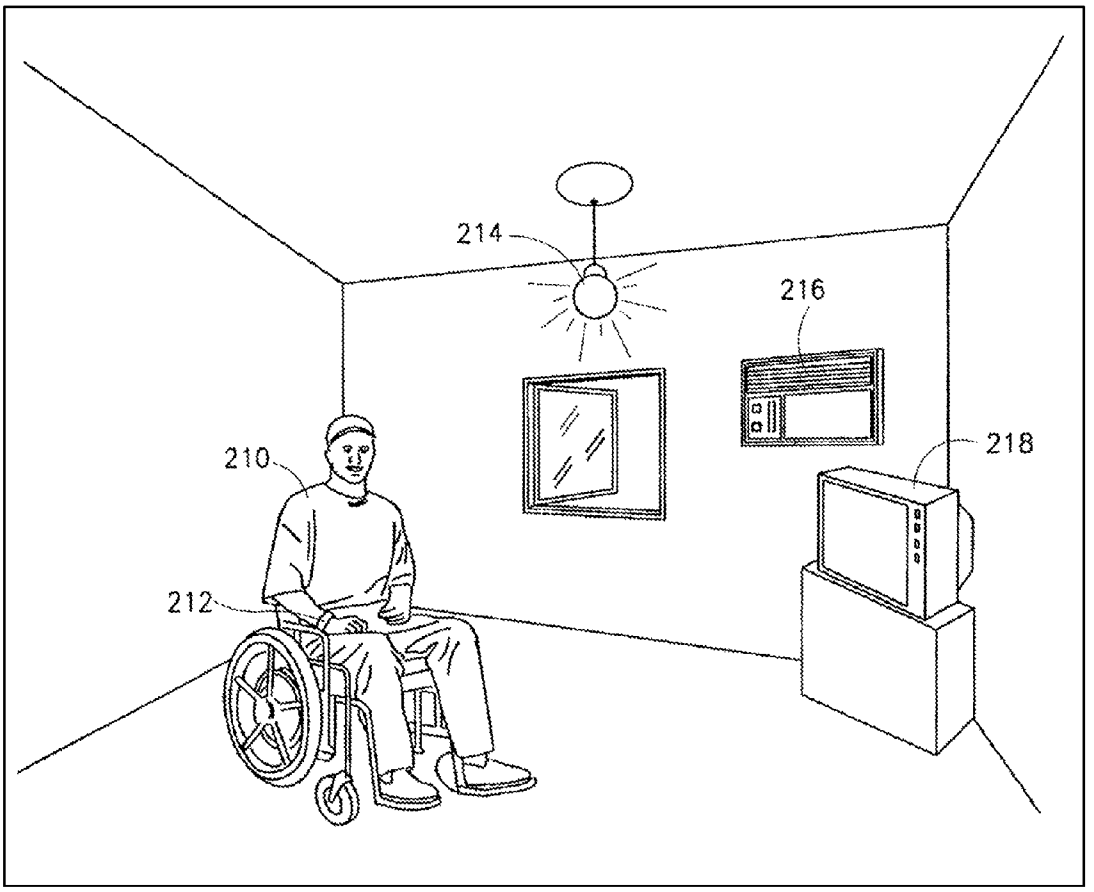


FIG. 3

MUSIC OF MOVEMENT: THE MANIPULATION OF MECHANICAL OBJECTS THROUGH SOUND

[0001] This application claims priority to Provisional Application Ser. 61/776,497 filed Mar. 11, 2013, the content of which is incorporated by reference.

BACKGROUND

[0002] Devices that perform certain functions in response the frequencies of the sound the system "hears" such as bells or voicing commands are known in the art. These devices are used, for example, in toys and appliances.

[0003] U.S. Pat. No. 5,209,695, "Sound Controllable Apparatus Particularly Useful in Controlling Toys and Robots", the disclosure of which is incorporated herein by reference, describes an apparatus for controlling a device according to different sound commands. The apparatus comprises a microphone, a processor and a control system. The apparatus is capable of interpreting different commands, which may be a word, combinations of words, beeps, handclaps and whistles.

[0004] U.S. Pat. No. 4,673,371, "Robot-Like Toy Vehicle", the disclosure of which is incorporated herein by reference, describes a robot-like toy that reverses the direction of its movement in response to a loud sound, such as a hand clap, or a call.

[0005] U.S. Pat. No. 4,231,184, "Remote-Control Doll Assembly", the disclosure of which is incorporated herein by reference, describes a doll that raises its arms and cries in responds to sounds made by squeezing a toy baby bottle or by squeezing a pressure-sensitive rattle.

[0006] U.S. Pat. No. 4,637,007, "Toy having a Melody-Making Mechanism of a Sound-Detection Type", the disclosure of which is incorporated herein by reference, describes a toy such as a stuffed doll, having a melody-making mechanism which responds to external sounds such as human voice or a hand clap.

[0007] These sound-control devices rely on sounds generated by a specific action of the user, for example, by pronouncing a word, clapping hands or squeezing a pressure-sensitive rattle.

[0008] U.S. Pat. No. 4,973,286, "Multiple Activation Crib Toy", the disclosure of which is incorporated herein by reference, describes a crib toy that provides musical output and predetermined motions of a plurality of cartoon-like figures. The crib toy contains several noise-producing apparatuses (a rattle, a horn button and a center button) that are an integral part of the crib toy. The crib toy is activated by sounds. The sounds may be ambient sounds or specific sounds produced by an infant manipulating the noise-producing apparatuses.

[0009] U.S. Pat. No. 4,207,696, "Sound Activated Mobile", the disclosure of which is incorporated herein by reference, describes a mobile that is activated by the sounds in its vicinity.

[0010] U.S. Pat. No. 4,640,034, "Mobile for Infants", the disclosure of which is incorporated herein by reference, describes a sound-producing mobile and cassette player that are activated by sounds from the crib, and respond with comforting voices via a loudspeaker and movement of the mobile.

[0011] These sound-control devices rely on ambient sound which may come from the baby, but may come from other sources as well, so their response is not necessarily specific to the baby.

[0012] Toys that respond to other toys are described for example in the above described U.S. Pat. No. 4,231,184, "Remote Control Doll Assembly" and U.S. Pat. No. 4,973,286, "Multiple Activation Crib Toy". U.S. Pat. No. 5,314,336, "Toy and Method Providing Audio Output Representative of Message Optically Sensed by the toy", the disclosure of which is incorporated herein by reference describes a toy capable of optically detecting and recognizing specific markings on objects, and articulating a word, a phrase or a sentence in response to the markings. In this way the toy may "read" and "speak". The markings may be visible codes, invisible codes or holograms.

[0013] Toys and devices that respond to sounds by body motion are described for example in U.S. Pat. No. 4,984,380, "Body-Motion Activated Crib Mobile", the disclosure of which is incorporated herein by reference, describes a mobile that is activated by an infant's motion, utilizing a passive infrared sensor detects the body motion.

[0014] Toys that respond to a direction a sound are described in U.S. Pat. No. 5,407,376, "Voice-Responsive Doll eye Mechanism", the disclosure of which is incorporated herein by reference, which describes a doll having a mechanism that provides eye rotation when a child speaks to the doll, to simulate a human response.

[0015] U.S. Pat. No. 7,183,929 describes a method of controlling at least one device by incidental sound produced by a living creature and including: attaching a sound-maker to a living creature so that the natural movements of the living creature will cause the sound-maker to emit a sound; receiving the sound by at least one device; and responding by some physical response to the sound, by the at least one device.

[0016] The difference between these patents and Music of Movements system is that the objects in these patents respond directly to the sound. This is ineffective since sound drops off extremely fast, intensity of sound is given by

$$I=P/4\pi r^2$$

where I is sound intensity, P is power and r the distance from the sound source. The intensity follows the inverse square law. Further, it will be harder for the frequency reader to accurately determine the notes if it is moving with the object as frequency will shift through the doppler effect. Music of Movement's system is more effective because it utilizes both sound waves and radio signals. The sound waves are detected over a short distance because the encoder will be close or connected to the sound source, which will then communicate to the object via wired or wireless radio signals effectively increasing range and accuracy. No other instance of such technology exists.

SUMMARY

[0017] In one aspect, the Music of Movement is a system that enables the manipulation of any mechanical object with any external sound source or an electronic instrument that is plugged into the system. Objects will now be able to respond to natural sounds, thus increasing the usability of modern technology. For example, disabled persons will be able to operate mechanical objects they are not able to utilize through the medium of sound like their wheel chair. Essentially this technology will give objects "ears" and enable these to respond appropriately to the sounds they "hear."

[0018] In another aspect, a system includes a natural sound source; an intermediate unit positioned near the natural sound source to capture and convert the natural sound source to a

command, the unit having a wireless transmitter to transmit the command; and a movable object with a receiver to receive the command and an actuator controlled by the command.

[0019] In a further aspect, a method to control a mechanical object includes generating sound using an external sound source or electronic instrument; placing an encoder near the sound source or electronic instrument to detect sound and to identify a command therefrom; transmitting and communicating the command to the mechanical object; and operating an actuator in the mechanical object to execute the command.

[0020] Advantages of the system may include one or more of the following. Music of Movement's system is more effective because it utilizes both sound waves and radio signals. The sound waves are detected over a short distance because the encoder will be close or connected to the sound source, which will then communicate to the object via radio signals effectively increasing range and accuracy.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] FIG. **1**A shows an exemplary process using the Music of Movement system.

[0022] FIG. **1**B shows an exemplary embodiment for controlling a toy car.

[0023] FIG. **1**C shows an exemplary intermediate circuit or module.

[0024] FIG. **2** shows an exemplary block diagram of the Music of Movement system.

[0025] FIG. **3** illustrates a disabled person wearing the Music of Movement on his wrist.

DESCRIPTION

[0026] Music of Movement is a system that enables the manipulation of any mechanical object with any external sound source or an electronic instrument that is plugged into the system. Objects will now be able to respond to natural sounds, thus increasing the usability of modern technology. For example, disabled persons will be able to operate mechanical objects they are not able to utilize through the medium of sound like their wheel chair. Essentially this technology will give objects "ears" and enable the objects to respond appropriately to the sounds they "hear."

[0027] Conventional systems communicate to the object directly through sound. This is ineffective since sound drops off extremely fast and it will be harder for the frequency reader to accurately determine the notes if it is moving with the object. Music of Movement's system is more effective because it utilizes both sound waves and radio signals. The sound waves are detected over a short distance because the encoder will be close or connected to the sound source, which will then communicate to the object via radio signals effectively increasing range and accuracy.

[0028] The Music of Movement system allows the user to effectively manipulate objects with any external sound source. The system has a mode in which a specific sound source is read and all other external sound sources are ignored, have a range of over 50 feet, and have a

[0029] As shown in FIG. **1**A, the tuner and radio transmitter were tested to determine the signals they were giving off, next a layer of digital logic was made to encode the tuner's and transmitter's signals. After, another layer of digital logic was added on to allow for the user to manipulate these signals and efficiently control the object being targeted. Final testing utilized an RC car as the object and a guitar, piano, human voice, and an iPhone as individual sound sources.

[0030] The Music of Movement allows for the manipulation of mechanical objects through any sound source, the applications of this technology are infinite especially in case of Disabled people who will be able to operate object like their wheelchairs through sounds they produce through an instrument like a harmonica.

[0031] FIG. **1**B shows an exemplary embodiment for controlling a toy car, while FIG. **1**C shows an exemplary intermediate circuit or module. In FIG. **1**B, Object **1** is an external sound source: can be anything that can produce a natural sound. Object **11** is an intermediate circuit or module. This Circuit decodes the frequency of the sound heard from the source and translates it into a command. As shown in FIG. **1**C, there are 2 parts to this Circuit, Side **1**, the base circuit and Side **2**, the customization. Side **1** is the part of the circuit that will always be needed and Side **2** is the part customized to control the targeted object in the most practical way possible. Thus, in the toy car embodiment, Side **2** is a circuit for controlling forward, backward, right and left turn functions of the toy car. For a wheelchair embodiment, the same functions can be used. For a toy plane, the functions would differ to allow the plane to climb and to land, for example. Object **12** represents a targeted object that responds through wired or wireless medium of control, such as radio signal. This object can be anything directly or indirectly controlled by electricity.

[0032] In one embodiment, electrical signals generated by a tuner are used to control an RC Car for the object. The system uses a guitar and voice to produce a variety of notes. In this experiment, guitar notes B, G, D, A and E are detected and used to control an object. In the following table, 1 indicates an on condition or logic high and 0 indicates an off condition or logic low:

Notes	B Light is on		G Light is on		D Light is on		A Light is on		E Light is on	
B	1	0	0	1	1	1	0	1	1	1
G	0	1	1	0	0	0	1	1	0	1
D	1	1	0	0	1	0	0	1	1	1
A	0	1	1	1	0	1	1	0	0	0
E	1	1	0	1	1	1	0	0	1	0

[0033] This logic table was then adapted using hard-wired digital logic circuits to translate the digital signals from notes on a guitar to a simple high and low which would eventually control the car. This simplified the manipulation of the outputs the tuner gave. To simplify the output, an inverted AND chip was used to get 1 on the outputs that gave a 1 0 (seen as the highlighted cells) and a 0 for all the other output combinations. Essentially five different outputs that turned on when a certain note was detected were given. The theory of coming up with a circuit that could control any object with any external sound was taking shape.

[0034] The next step to this circuit was customization. Depending on the object being targeted, the circuit must be customized to optimize the effectiveness of the system. For example, hitting a note constantly just to get a car to move forward is not effective. This second layer of digital logic also paired the notes with specific commands on the radio controller used to control the car. The guitar has five tuned strings

that give the following notes, B, G, D, A, and E. The guitar tuner would pick up on these five notes and indicate if that string was in tune or not in tune. Each note was mapped to one command sent to the radio controlled car. The B note moved the car forward, the G note moved the car backwards, the D note turned the front wheels right, and the A note turned the front wheels left. Initially, once a note on the guitar was played the car performed the action and then stopped once the note ended. This worked fine for turning right and left, but it was desired that once a forward or backward command was issued it would continue in that motion until a subsequent command was sent to either go backwards or stop. A second layer of logic was developed to latch the forward and backward commands. The customization done by the second layer of digital logic includes keeping the car moving for a longer duration if the note for moving forward or backward is hit. Unlike the forward and backward movement, the car turns left or right for as long as the user is playing the note. This gives the user direct control of the turning radius as a continuously played note will keep the car turning, while intermittent notes only turn the car for a short time and thus widening the turn radius.

[0035] The second layer of logic customization was done using two 555 chips and four D flip-flops, one for each of the four movements. The first 555 chip is set up in a one shot mode. The output of the one shot controls the clock of two of the four D flip flops which control forward and backward commands. This set up allows the car to move forward or backward continuously by playing just one note. The second 555 chip is set up in a stable mode. The second chip controls the clocks of the other two D flip-flops that latch the right and left turning movement. This set up allows the user to directly control the turning radius. The outputs of the D flip-flops connect to the radio controller of the RC car. Rather than physical inputs to the radio controller via hand movements using joysticks, the outputs go directly into the radio as electrical signals and the radio converts them into the proper radio signals transmitted to the car.

[0036] The last part of the system is the stop command, the E note. The fifth output coming from the tuner connects directly to all four D flip-flops reset pins, making sure they all turn off when the note is hit. The notes can be easily rearranged to initialize different responses from the car by simply reassigning the wires to different inputs.

[0037] The first half of the circuit diagram shows the portion of the circuit that encodes the output of the guitar tuner's circuit. The second half is the portion of the circuit that is customized for the use of the radio controlled car as inputs to the radio transmitter. Music of Movement has great potential as it adds a whole new dimension of control. It can customize a system to control any object they like with any external sound source. The pitch and frequency of sound can be differentiated in numerous ways. The ability to distinguish between pitches and frequencies allows the system to have a large amount of different inputs that can trigger an equal amount of large outputs. This technology can be used to create and control numerous things.

[0038] Possible uses include and are not limited to:

[0039] Armed Force Aid: Currently the military uses robots to investigate hostile situations. Often times these hostile situations are in foreign countries. By integrating Music of Movement into these robots, the robot will be able to hear the frequency of the threat's voice, thus allowing the robot to detect the level of aggression and act accordingly.

[0040] Animal Research: There are animals that are difficult to get close to because of the danger level. Researches could send in robots to more closely observe these animals. By equipping these robots with Music of Movement, the robot will be able to hear the frequency of the animals voice, thus being able to understand its mood and act appropriately.

[0041] Monitoring systems: This system can recognize frequencies of distress calls such as yelling or crying, and then send a signal for help. These monitoring systems will be extremely useful for aiding elderly people, disabled individuals, infants and people working in a machine shop.

[0042] Disabled aid: By using an instrument such as a harmonica, disabled persons can use everyday items they previously couldn't such as remotes, wheelchairs, and doors. Also disabled individuals that no longer have the ability to use many electronics for leisure, with this system they will be able to play things like video games again through an instrument such as a harmonica.

[0043] Reference is now made to FIG. **2** which is a schematic representation of the manner of operation of preferred embodiments of the invention, by a block diagram **230**. Block diagram **230** comprises four basic components: a receiving component **232**, a sound analyzer **234**, a controller **236**, and a responsive element **238**.

[0044] Receiving component **232** may comprise a single receiver, a stereo (or quadrate) receiver, or a receiver comprising a single microphone that has an angular dependence. Such a receiver may be able to determine one or two angular axes of orientation. Alternatively or additionally, sound analyzer **234** may be able to determine one, two or three-dimensional position in space. Preferably, the determinations are of cylindrical coordinates (i.e., pitch, yaw and distance).

[0045] Sound analyzer **234** and controller **236** may be embodied in a single unit, for example in a microprocessor. In a preferred embodiment of the invention, the sound frequencies are selected to be in relatively noise free frequency bands. Alternatively or additionally, the frequency is above 10 kHz. Alternatively or additionally, the frequency is above 12 kHz.

[0046] Sound analyzer **234** preferably includes a band-pass filter for these frequencies. Preferably, the filter is at an entrance to sound analyzer **234**, so that most of sound analyzer **234** does not draw power when an "out of band" sound is received by receiver **232**. Preferably, sound analyzer **234** includes a noise filter for rejecting sounds at levels similar to and/or below ambient sound levels. Preferably sound analyzer **234** self-calibrates by determining ambient sound levels when it is first turned on and/or if it is not used for a significant period of time.

[0047] Responsive element **238** may include a motor for providing a physical response by motion, a speaker for providing a physical response by audio output, a lighting device for providing a physical response by light and an on/off switch. In a preferred embodiment of the invention, controller **236** modulates a supply of power to responsive element **238**, to effect the desired response. For example, controller **236** may switch on power to a motor which rotates wheels on a wheeled toy.

[0048] As described herein above, sound analyzer may discriminate several different sounds and parameters of these sounds, including different sound sources, sound directions, sound amplitudes, sound pitches, sound motion, preferably by Doppler analysis, distance, preferably utilizing a constant amplitude sound source or by comparing the relative amplitudes of different frequency bands, each of which is differen-

tially attenuated by the atmosphere, motion rate and/or absolute location. In a preferred embodiment of the invention, controller **236** includes a logic element which maintains an internal state and controls responsive element **238** differentially responsive to the state. Thus, different responses and/or magnitude of responses may be affected for a same sound source, depending on the internal state.

[0049] In one example, controller **236** includes a state machine. In an example of a "run-away car", a first rattle will make the car move away, a second rattle will make it move faster and a third (and possibly subsequent) rattle will make the car go in circles surrounding the noise source. Alternatively or additionally, the logic may include a functional dependency, for example, the speed of the car may be a function of the sound amplitude. Alternatively or additionally, the logic may include measurements of time, for example the car will start slowing down after 30 seconds and/or will stop and/or flash lights if no sound is detected for 1 minute. Alternatively or additionally, the logic may respond to parameters of the toy, for example battery level and length of time activated. Alternatively or additionally, combinations of the above logics may be provided. In a preferred embodiment of the invention, the toy may include one or more switches, such as dip switches, to select different logics. Alternatively or additionally, the toy may include a memory, for example, the toy determines a distance to a sound maker and then advances that distance, even if the sound maker ceases from creating sounds.

[0050] FIG. **3** illustrates an invalid person **210** wearing a sound-making bracelet **212** on his wrist. In a preferred embodiment of the invention, one or more devices in the house include microphones and sound analyzers to detect and analyze sounds from sound maker **212** and respond accordingly. Preferably, the sound analyzers discern if sound maker **212** is approaching or going away and/or a distance to sound maker **212**. For example, lights **214**, an air conditioner **216** and a TV **218** are turned on as invalid person **210** enters a room, and lights **214**, air conditioner **216** and TV **218** are turned off as invalid person **210** leaves the room. Sound maker **212** will know the weather conditions and will turn-on or turn-off objects accordingly.

[0051] In some preferred embodiment, a plurality of sound-makers is available for different times of the day and for different seasons. For example, on a winter night, invalid person **210** will have on him a sound-maker that will turn on lights, a heater, and a television. But during a summer day, invalid person **210** will have on him a sound-maker that will turn on an air-conditioner or a fan and a music system, or a computer. Alternatively or additionally, the sound responsive devices may be programmed to respond differently depending on time of day and/or date.

[0052] It should be noted that the sound makers of the preferred embodiments of the invention are not limited to rattles, bells, squeaky devices, pressure-sensitive instruments, or battery operated beepers. Other sound makers, such as whistles, thimbles, triangles, small drums and others as known in the art, may be advantageously employed.

[0053] In some preferred embodiments the sound maker may be a rattle anklet as described. Alternatively, it may be a rattle bracelet. The anklet or bracelet may have a stretchable band. Alternatively, they may clasp the wrist or ankle, possibly as a soft (cloth coated) spring clip. Alternatively, they fit with a band like that of a wrist watch. In some preferred embodiments, the sound maker may be a pendant. In some preferred embodiments, the sound maker may be sewn onto an article of clothing such as to the infant's socks, to the infant's sleeve or to the infant's pants. In some preferred embodiment the sound maker may be attached to an article of clothing by a safety pin, held by a clip such as a tie clip, hung on a button, or worn as a pin. Alternatively or additionally, the sound maker may include a plurality of hard objects inside a cavity. Alternatively or additionally, the sound maker may include crinkle material. Alternatively or additionally, the sound maker may include tines which generate a substantially single frequency sound.

[0054] Preferably, the sounds of the sound makers are pleasant or at least not irksome to people and/or to pets. In some preferred embodiments the sounds of the sound makers are inaudible to humans. In some preferred embodiments the sounds of the sound makers are inaudible to humans as well as to pets. In a preferred embodiment of the invention, inaudible sounds comprise infra sounds, at frequencies below human and/or pet hearing ability. Alternatively or additionally, inaudible sounds comprise ultrasonic sound, above human hearing abilities and/or above pet hearing abilities. Preferably, the terms infra-sound and ultra-sound reflect the hearing abilities of a 20 year old healthy human male. Alternatively, the frequencies may be selected to be outside of a child's hearing range. Alternatively or additionally, the sound frequencies may be selected to suit an older person. In a preferred embodiment of the invention, the sound wave is carried in the atmosphere. Alternatively or additionally, the sound is carried in a liquid, for example in bath devices. Alternatively or additionally, the sound may be carried by solids, for example through a floor.

[0055] It should be noted that the invention is not limited to the devices described here. Other devices capable of responding to an electrical signal may be advantageously employed, by modulating the electrical signals responsive to the sounds.

[0056] The devices may be activity centers, dolls, device animals, stuffed animals, device cars, device trucks, device airplanes, device helicopters, device trains, device boats, device puppets, device appliances, device computers, device music systems, device cameras, device TV, device radios, device tape players.

[0057] The response of the devices may be by sounds, such as in pronouncing a word, a combination of words, crying, laughing, giggling, singing, playing a melody, ringing, whistling, various engine and motor sounds such as of cars, trains, helicopters, airplanes, horn sounds, animal sounds such as the singing of birds, hooting, barking, meowing, purring, mooing, other animal sounds and other sounds in general.

[0058] Alternatively or additionally, the response of the devices may be by flashing lights of one or several colors, or by blinking of lights wherein the light source may comprise light bulbs of different kinds, or laser light of one or several colors.

[0059] Alternatively, or additionally, the response may be a musical piece.

[0060] Alternatively or additionally, the response of the devices may be by movement, such as by a stuffed animal raising its arms, a toy puppy wagging its tail, a Jack in the Box jumping out and swaying, a car running, a robot moving and turning, a toy doll or a toy animal turning its head, moving its arms or walking, a ball rolling.

[0061] In some preferred embodiments the sound maker and the responding toy are bought together, for example, a mobile and a rattle anklet that operates it, or a singing moon-

and star-studded placard and a rattle bracelet that operates it. In other preferred embodiments the responding devices have a frequency-band filter and a tuning button so that they can be tuned to operate with existing or homemade sound makers.

[0062] It should be noted that the invention is not limited to the specific electrical appliances and lighting described here turning on and off. Other electrical appliances and electrical systems may be advantageously activated.

[0063] The invention described herein is not limited to the particular preferred embodiment described herein, nor for those embodiments, to particular elements described. The limits of the protected invention are defined by the following claims. In the claims, the terms "comprising", "comprises", "including" "includes" or the like means "including but not necessarily limited to."

What is claimed is:

1. A system, comprising:
- a natural sound source;
- an intermediate unit positioned near the natural sound source to capture and convert the natural sound source to a command, the unit having a transmitter to transmit the command; and
- a movable object with a receiver to receive the command and an actuator to drive the movable object in response to the command.

2. The system of claim **1**, wherein the mechanical object comprises a wheelchair.

3. The system of claim **1**, wherein a specific sound source is processed and all other external sound sources are ignored.

4. The system of claim **1**, comprising a tuner and radio transmitter working with the encoder and a controller receiving the tuner's and transmitter's signals to allow a user to control the object.

5. The system of claim **1**, wherein an individual operates one or more mechanical objects through the medium of sound from a wheelchair.

6. The system of claim **1**, wherein the encoder discriminates different sounds and parameters of the sounds, including different sound sources, sound directions, sound amplitudes, sound pitches, sound motion.

7. The system of claim **1**, comprising a Doppler analyzer or distance analyzer.

8. The system of claim **1**, wherein the intermediate unit comprises a base circuit and a customized circuit, where the customized circuit is tailored to control the movable object.

9. The system of claim **1**, comprising a constant amplitude sound source

10. The system of claim **1**, comprising a noise filter for rejecting sounds at levels similar to and/or below ambient sound levels.

11. A method to control a mechanical object, comprising
- generating sound using an external sound source or electronic instrument;
- placing an encoder near the sound source or electronic instrument to detect sound and to identify a command therefrom;
- transmitting and communicating the command to the mechanical object; and
- operating an actuator in the mechanical object to execute the command.

12. The method of claim **11**, wherein the mechanical object comprises a wheelchair.

13. The method of claim **11**, wherein a specific sound source is processed and all other external sound sources are ignored.

14. The method of claim **11**, wherein an individual operates one or more mechanical objects through the medium of sound from a wheelchair.

15. The method of claim **11**, wherein the encoder discriminates different sounds and parameters of the sounds, including different sound sources, sound directions, sound amplitudes, sound pitches, sound motion.

16. The method of claim **11**, comprising analyzing Doppler shift in the sound.

17. The method of claim **11**, comprising analyzing distance from the sound.

18. The method of claim **11**, comprising a constant amplitude sound source

19. The method of claim **11**, comprising comparing relative amplitudes of different frequency bands, each of which is differentially attenuated by the atmosphere, motion rate, or absolute location.

20. A system to control a mechanical object, comprising:
- an external sound source or electronic instrument;
- an encoder near the sound source or electronic instrument to detect sound and to identify a command therefrom;
- a wireless transceiver coupled to the decoder for communicating the command to the mechanical object;
- a wireless receiver on the mechanical object to receive the command; and
- an actuator in the mechanical object to execute the command.

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