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Samsung v. Zophonos
IPR2026-00084
Exhibit 1004

Doc Code: TRACK1.REQ
Document Description: TrackOne Request

PTO/SB/424 (12-11)

CERTIFICATION AND REQUEST FOR PRIORITIZED EXAMINATION UNDER 37 CFR 1.102(e) (Page 1 of 1)

First Named Inventor:	Levaughn Denton	Nonprovisional Application Number (if known):	
Title of Invention:	MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS		

APPLICANT HEREBY CERTIFIES THE FOLLOWING AND REQUESTS PRIORITIZED EXAMINATION FOR THE ABOVE-IDENTIFIED APPLICATION.

1. The processing fee set forth in 37 CFR 1.17(i), the prioritized examination fee set forth in 37 CFR 1.17(c), and if not already paid, the publication fee set forth in 37 CFR 1.18(d) have been filed with the request. The basic filing fee, search fee, examination fee, and any required excess claims and application size fees are filed with the request or have been already been paid.

2. The application contains or is amended to contain no more than four independent claims and no more than thirty total claims, and no multiple dependent claims.

3. The applicable box is checked below:

I. ☑ Original Application (Track One) - Prioritized Examination under § 1.102(e)(1)

i. (a) The application is an original nonprovisional utility application filed under 35 U.S.C. 111(a). This certification and request is being filed with the utility application via EFS-Web.

---OR---

(b) The application is an original nonprovisional plant application filed under 35 U.S.C. 111(a). This certification and request is being filed with the plant application in paper.

ii. An executed oath or declaration under 37 CFR 1.63 is filed with the application.

II. ☐ Request for Continued Examination - Prioritized Examination under § 1.102(e)(2)

i. A request for continued examination has been filed with, or prior to, this form.
ii. If the application is a utility application, this certification and request is being filed via EFS-Web.
iii. The application is an original nonprovisional utility application filed under 35 U.S.C. 111(a), or is a national stage entry under 35 U.S.C. 371.
iv. This certification and request is being filed prior to the mailing of a first Office action responsive to the request for continued examination.
v. No prior request for continued examination has been granted prioritized examination status under 37 CFR 1.102(e)(2).

Signature /David Postolski/	Date October 17, 2019
Name (Print/Typed) David Postolski	Practitioner Registration Number 67547

Note: *Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required in accordance with 37 CFR 1.33 and 11.18. Please see 37 CFR 1.4(d) for the form of the signature. If necessary, submit multiple forms for more than one signature, see below*.*

☐ *Total of _____ forms are submitted.

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9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

ABSTRACT

The systems and methods described relate to the concept that smart devices can be used to 1) sense various types of phenomena like sound, blue light exposure, RF and microwave radiation, and 2) in real-time analyze, report and/or control outputs (e.g., displays or speakers). The systems are configurable and use standard computing devices, such as wearable electronics, tablet computers, and mobile phones to measure various frequency bands across multiple points, allowing a single user to visualize and/or adjust environmental conditions.

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CLAIMS

What is claimed is:

1. A system comprising:

an audio control source;

at least one cluster of at least one computing device,

the at least one computing device including:

a sound sensing mechanism, configured to sense a noise; and

a wireless transceiver, configured to wirelessly transmit and receive data from the audio control source;

at least one output device, including:

a power source for operating the output device;

a speaker for outputting sound; and

a communication mechanism, for receiving electronic information from the audio control source; and

the audio control source, in electronic communication the at least one cluster and the at least one output device, the audio control source including:

a memory, containing computer-executable instructions for connecting to the at least one cluster, and varying an output of the at least one output device, providing an interface; and

a processor, for executing the computer-executable instructions,

wherein the computer-executable instructions include:

identifying one or more sounds within the noise;

isolating the one or more sounds;

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determining is one or more of the one or more sounds includes a frequency outside of a predetermined threshold;

if one or more of the one or more sounds includes the frequency outside of the predetermined threshold, altering the one or more of the one or more sounds so that the frequency does not fall outside of the predetermined threshold; and

outputting the one or more sounds on the at least one output device.

2. The system as recited in claim 1, further comprising:

an interfacing mechanism, the interfacing mechanism including:

a network adapter, configured to transmit and receive electronic information through both wired and wireless communication; and

at least one input mechanism, configured to:

manipulate the interfacing mechanism; and

vary the output of the at least one output device.

3. The system as recited in claim 1, wherein the sound-sensing mechanism is an omnidirectional transducer.

4. The system as recited in claim 1, wherein the sound-sensing mechanism is selected from the group consisting of: an ultrasonic transducer; an infrasonic transducer: and a microwave transducer.

5. The system as recited in claim 4, wherein the sensed noise includes infrasonic or ultrasonic soundwaves.

6. The system as recited in claim 1, wherein the predetermined threshold equates to a frequency determined to pose a risk of harm to a user's hearing capabilities.

7. The system as recited in claim 1, wherein the computer-executable instructions further include:

if one or more of the one or more sounds includes the frequency outside of the predetermined threshold, notifying a user, via a notification, that one or more of the one or more sounds includes the frequency outside of the predetermined threshold.

8. The system as recited in claim 1, wherein the computer-executable instructions further include steps selected from the group consisting of: panning the sensed noise; and equalizing the sensed noise.

9. The system as recited in claim 1, further comprising:

an in-ear device, wherein an audio output of the in-ear device auto-adjusts based on signal energy sensed within a cluster or surrounding clusters.

10. The system as recited in claim 1, wherein the altering the one or more of the one or more sounds so that the frequency does not fall outside of the predetermined threshold is performed automatically.

11. A method of altering sensed noise prior to outputting the sensed noise, comprising:

providing at least one audio control source;

providing at least one cluster of at least one computing device, the at least one computing device including:

a sound sensing mechanism, configured to sense a noise;

a wireless transceiver, configured to wirelessly transmit and receive data from the audio control source;

at least one output device, including:

a power source for operating the output device;

a speaker for outputting sound; and

a communication mechanism, for receiving electronic information from the audio control source; and

the audio control source, in electronic communication the at least one cluster and the at least one output device, the audio control source including:

a memory, containing computer-executable instructions for connecting to the at least one cluster, and varying an output of the at least one output device, providing an interface; and

a processor, for executing the computer-executable instructions;

identifying one or more sounds within the noise;

isolating the one or more sounds;

determining is one or more of the one or more sounds includes a frequency outside of a predetermined threshold;

if one or more of the one or more sounds includes the frequency outside of the predetermined threshold, altering the one or more of the one or more sounds so that the frequency does not fall outside of the predetermined threshold; and

outputting the one or more sounds on the at least one output device.

12. The method as recited in claim 11, wherein the at least one computing device further includes:

an interfacing mechanism, the interfacing mechanism including:

a network adapter, configured to transmit and receive electronic information through both wired and wireless communication; and

at least one input mechanism, configured to:

manipulate the interfacing mechanism; and

vary the output of the at least one output device.

13. The method as recited in claim 11, wherein the sound-sensing mechanism is selected from the group consisting of: an omnidirectional transducer; an ultrasonic transducer; an infrasonic transducer; an electro-optical transducer; and a microwave transducer.

14. The method as recited in claim 13, wherein the sensed noise includes infrasonic, ultrasonic, visible, or radio waves.

15. The method as recited in claim 11, wherein the predetermined threshold equates to a frequency determined to pose a risk of harm to a user's hearing capabilities.

16. The method as recited in claim 11, further comprising:

if one or more of the one or more sounds includes the frequency outside of the predetermined threshold, notifying a user, via a notification, that one or more of the one or more sounds includes the frequency outside of the predetermined threshold.

17. The method as recited in claim 11, further comprising:

panning the sensed noise.

18. The method as recited in claim 11, further comprising:

adding one or more audio effects to the sensed noise.

19. The method as recited in claim 11, further comprising:

equalizing the sensed noise.

20. The method as recited in claim 11, wherein the altering the one or more of the one or more sounds so that the frequency does not fall outside of the predetermined threshold is performed automatically.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Non-Provisional Patent Application Entitled :

MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS

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MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS

INVENTOR

Levaughn Denton

CLAIM OF PRIORITY

This application is a Continuation Application of U.S Application No. 16/421,141 filed May 23, 2019 which is a Continuation In Part of U.S. Non-Provisional Patent Application No. 16/155,919, filed October 10, 2018, which is a Continuation of U.S. Non-Provisional Patent Application No. 14/862,304, filed September 23, 2015, which claims priority from U.S. Patent Provisional Application No.: 62/054,286, filed on September 23, 2014, the contents of which are hereby fully incorporated by reference.

FIELD OF THE EMBODIMENTS

The invention and its embodiments relate to audio manipulation and sound management systems, particularly for home audio systems, public address systems, sound reinforcement systems, vehicle audio systems, ultrasonic transducers, infrasonic transducers, electro-optical transducers, microwave transducers, and associated software for these applications.

BACKGROUND OF THE EMBODIMENTS

Each year sound companies spend billions of dollars on audio technologies and audio research to find new ways to improve audio quality in performance settings. Very often sound systems are designed to be used in a specific environment. For example, in a vehicle or private

room setting, audio manipulation and output quality techniques and technologies are either prescriptive or adaptive – neither of which require the need for audio engineering professionals. However, in other situations such as at a concert venue, a wide array of audio professionals must be employed. This can include monitor engineers, system technicians, and front-of-house engineers. These professionals operate mixing consoles and audio control units to produce desirable, high-quality audio output.

Whether prescriptive or adaptive, manned or unmanned, perceived sound quality is a function of complex transducer-based technologies and acoustic treatment that are typically controlled, managed and manipulated by humans, and/or audio software and hardware. As such, both human and physical capital are required to produce first-rate sound quality. However, even when the necessary human and capital has been spent, it can still be very difficult to effectively manage audio outputs in real-time. This is due to improper calibrations of signal propagation and signal degradation, as well as unwanted harmonics and soundwave reflections.

Particularly in an outdoor setting, single-source sound systems typically produce an intermittent mix of unintelligible sounds and echoes due to a given venue's size and openness. A popular solution for addressing the echo issue is to utilize distributed sound systems. Traditional distributed sound systems are less susceptible to sound variance than single source systems. However, even when these distributed systems are used, temperature gradients and wind can still steer sound in undesirable ways.

Another issue related to the size of a performance venue is when audio and video fall out of sync. As live musical performances become more and more elaborate by including digital art and screens on-stage, it is becoming increasingly difficult to reliably sync audio and video in large venues, due to highly reverberant surfaces and long decay times.

Also impacting audio intelligibility during a live performance is crowd noise. At a live event, it is not uncommon for crowds to generate noise approaching 105dB. When this occurs, audio engineers must manipulate the supporting sound system output so that the performance audio remains 5-8 decibels higher than the noise generated by crowd. This action results in performance sound being broadcast above 110 dB, the range where the volume of sound begins to pose danger to human listeners. Frequently, audio system operators find it difficult to granularly control the loud perception of a given individual listener while managing loudness perception for the remainder of the audience. In a case where an audio quality trade-off decision has to be made, a common industry practice is to execute a remediation plan that favors the majority of listeners while the minority of listeners are forced to suffer through it.

In other instances, when various pieces of audio equipment are slightly, or completely out-of-phase, it can be difficult for audio system operators to correct these out-of-phase issues in a short period of time.

A myriad of audio functions are necessary to provide a dynamic range of audio playback and fidelity. To meet heightened demands and address new challenges, the devices of today will not only have to handle traditional telephony voice communication and low-fidelity voice recording, but also, these devices must be capable of incorporating new hardware and software to create new functions and applications such as sensing infrasonic, ultrasonic, blue light and millimeter wave exposure and reporting, and in some cases, autonomous manipulation of audio outputs. Further, such demands create the need to process signals using 'low-loss' methods by moving much of the processing function away from hardware and into software optimized to do so.

Review of related technology:

Line6, Inc. has created a 'smart mixing system' for non-wearable ubiquitous computing devices that enables wireless and touchscreen control of live sound system components. This is accomplished via a wired connection between standard audio hardware and a proprietary physical interface. While this system integrates and controls live sound system components via touchscreen devices, it unfortunately relies on audio engineers to operate it, and does not incorporate a listener-centric way to autonomously solve audio issues experienced by an audience.

United States Patent No.: 5,668,884 pertains to an audio enhancement system and method of use with a sound system for producing primary sound from at least one main loudspeaker located at a main position. The audio enhancement system comprises at least one wireless transmitter, time delay circuitry, and plural augmented sound producing subsystems. Each sound subsystem is a portable unit arranged to be carried by a person located remote from the main loudspeaker and includes a wireless receiver and an associated transducer device, e.g., a pair of stereo headphones. The transmitter broadcasts an electrical signal which is representative of the electrical input signal provided to the main loudspeaker. The broadcast signal is received by the receiver and is demodulated and amplified to drive the transducer so that it produces augmented sound substantially in synchronism with the sound arriving from the main loudspeaker. To achieve that end the time delay circuitry delays the electrical signal which is provided to the transducer for a predetermined period of time corresponding generally to the time period it takes for the primary sound to propagate through the air from the main loudspeaker to the remote location at which the person is located.

United States Patent No.: 7,991,171 pertains to a method and apparatus for processing an audio signal in multiple audio frequency bands while minimizing undesirable changes in tonal

qualities of the audio signal by determining an initial gain adjustment factor for each audio frequency band resulting from the application of an audio processing technique. A final gain adjustment factor for each band is selected from a corresponding set of weighted or unweighted initial gain adjustment factors. The set of initial gain adjustment factors from which the final gain adjustment factor for a specified audio frequency band is obtained is derived from other audio frequency bands that have the frequency of the specified band as a harmonic frequency. Changes in audio signal level within one audio frequency band thereby affect the signal level of harmonic frequencies to decrease relative changes in volume between a fundamental frequency and its harmonics.

United States Patent No.: 8,315,398 pertains to a method of adjusting a loudness of an audio signal may include receiving an electronic audio signal and using one or more processors to process at least one channel of the audio signal to determine a loudness of a portion of the audio signal. This processing may include processing the channel with a plurality of approximation filters that can approximate a plurality of auditory filters that further approximate a human hearing system. In addition, the method may include computing at least one gain based at least in part on the determined loudness to cause a loudness of the audio signal to remain substantially constant for a period of time. Moreover, the method may include applying the gain to the electronic audio signal.

United States Patent No.: 8,452,432 pertains to a user-friendly system for real time performance and user modification of one or more previously recorded musical compositions facilitates user involvement in the creative process of a new composition that reflects the user's personal style and musical tastes. Such a system may be implemented in a small portable electronic device such as a handheld smartphone that includes a stored library of musical

material including original and alternative versions of each of several different components of a common original musical composition, and a graphic user interface that allows the user to select at different times while that original composition is being performed, which versions of which components are to be incorporated to thereby create in real time a new performance that includes elements of the original performance, preferably enhanced at various times with user selected digital sound effects including stuttering and filtering. The system may also optionally comprise a visualizer module that renders a visual animation that is responsive to at least the rhythm and amplitude of the system's audio output, not only for entertainment value but also to provide visual feedback for the user.

United States Patent No.: 8,594,319 pertains to methods and apparatuses for adjusting audio content when more multiple audio objects are directed toward a single audio output device. The amplitude, white noise content, and frequencies can be adjusted to enhance overall sound quality or make content of certain audio objects more intelligible. Audio objects are classified by a class category, by which they can be assigned class specific processing. Audio objects classes can also have a rank. The rank of an audio object's class is used to give priority to or apply specific processing to audio objects in the presence of other audio objects of different classes.

United States Patent Publication No.: 2007/0217623 pertains to a real-time processing apparatus capable of controlling power consumption without performing complex arithmetic processing and requiring a special memory resource. The real-time processing apparatus includes an audio encoder that performs a signal processing in real time on an audio signal, a second audio encoder that performs the signal processing with a smaller throughput in real time on the audio, an audio execution step number notification unit that measures step number showing a level of the throughput in the signal processing by operating the 1st audio encoder or second

audio encoder, and an audio visual system control unit that executes control so that the first audio encoder operates when the measured step number is less than a threshold value provided beforehand and the second audio encoder operates when the step number is equal to or greater than the threshold value.

United States Patent Publication No.: 2011/0134278 pertains to an image/audio data sensing module incorporated in a case of an electronic apparatus. The image/audio data sensing module comprises: at least one image sensor, for sensing an image datum; a plurality of audio sensors, for sensing at least one audio datum; a processor, for processing the image datum and the audio datum according to a control instruction set to generate a processed image data stream and at least one processed audio data stream, and combining the processed image data stream and the processed audio data stream to generate an output data stream following a transceiver interface standard; a transceiver interface, for receiving the control instruction set and transmitting the output data stream via a multiplexing process; and a circuit board, wherein the image sensor, the audio sensors and the transceiver interface are coupled to the circuit board, and the processor is provided on the circuit board.

United States Patent Publication No.: 2013/0044131 pertains to a method for revealing changes in settings of an analog control console, the method comprising: receiving a captured image of the analog control console; creating a composite image by superimposing the captured image and a live image of the analog control console; and displaying the composite image.

United States Patent Publication No.: 2013/0294618 pertains to a method and devices of sound volume management and control in the attended areas. According to the proposed method and system variants the sound reproducing system comprises: sounding mode appointment device, central station for audio signal transmittance; one or more peripheral stations for audio

signal reception and playback; appliance for listener's location recognition; computing device for performing calculation concerning sounding parameters at the points of each listener's location and for performing calculation of controlling parameters for system tuning. The system can be operated wirelessly and can compose a local network.

Various devices are known in the art. However, their structure and means of operation are substantially different from the present invention. Such devices fail to provide a device that can help develop a participant's knowledge in a multitude of different subject areas, while simultaneously engaging the participant physically. At least one embodiment of this invention is presented in the drawings below and will be described in more detail herein.

SUMMARY OF THE EMBODIMENTS

According to an aspect of the present invention, a system is provided. The system includes an audio control source; at least one cluster of at least one computing device, the at least one computing device including: a sound sensing mechanism, configured to sense a noise; and a wireless transceiver, configured to wirelessly transmit and receive data from the audio control source. The system further includes at least one output device, including: a power source for operating the output device; a speaker for outputting sound; and a communication mechanism, for receiving electronic information from the audio control source. The system additionally includes the audio control source, in electronic communication the at least one cluster and the at least one output device, the audio control source including: a memory, containing computer-executable instructions for connecting to the at least one cluster, and varying an output of the at least one output device, providing an interface; and a processor, for executing the computer-executable instructions, wherein the computer-executable instructions include: identifying one or

more sounds within the noise; isolating the one or more sounds; determining is one or more of the one or more sounds includes a frequency outside of a predetermined threshold; if one or more of the one or more sounds includes the frequency outside of the predetermined threshold, altering the one or more of the one or more sounds so that the frequency does not fall outside of the predetermined threshold; and outputting the one or more sounds on the at least one output device.

It is an object of the present invention to provide the system, wherein the system further includes an interfacing mechanism, the interfacing mechanism including: a network adapter, configured to transmit and receive electronic information through both wired and wireless communication; and at least one input mechanism, configured to: manipulate the interfacing mechanism; and vary the output of the at least one output device.

It is an object of the present invention to provide the system, wherein the sound-sensing mechanism is an omnidirectional transducer.

It is an object of the present invention to provide the system, wherein the sound-sensing mechanism is selected from the group consisting of an ultrasonic transducer and an infrasonic transducer.

It is an object of the present invention to provide the system, wherein energy sensing mechanisms is selected from the group consisting of a microwave transducer; and an electro-optical transducer.

It is an object of the present invention to provide the system, wherein the sensed noise includes infrasonic or ultrasonic soundwaves.

It is an object of the present invention to provide the system, wherein the predetermined threshold equates to a frequency determined to pose a risk of harm to a human's body (e.g. a

retina and blue lights from screens, loud noise and a user's hearing capabilities, RF exposure limits and electrosensitivity, millimeter waves and cell growth or heart variability.

It is an object of the present invention to provide the system, wherein the computer-executable instructions further include: if one or more of the one or more sounds includes the frequency outside of the predetermined threshold, notifying a user, via a notification, that one or more of the one or more sounds includes the frequency outside of the predetermined threshold.

It is an object of the present invention to provide the system, wherein the notification is an audible notification.

It is an object of the present invention to provide the system, wherein the system further includes an in-ear device, wherein an audio output of the in-ear device auto-adjusts based on signal energy sensed within a cluster or surrounding clusters.

It is an object of the present invention to provide the system, wherein the computer-executable instructions further include panning the sensed noise.

It is an object of the present invention to provide the system, wherein the computer-executable instructions further include adding one or more audio effects to the sensed noise.

It is an object of the present invention to provide the system, wherein the computer-executable instructions further include equalizing the sensed noise.

It is an object of the present invention to provide the system, wherein the altering the one or more of the one or more sounds so that the frequency does not fall outside of the predetermined threshold is performed automatically.

It is an object of the present invention to provide the system wherein the system is further configured to sense and/or analyze infra/ultra-sonic waves (e.g., mm waves), visible light (e.g.

smart devices that have sensors that sense blue light from electronic screens and/or analyze and report prolonged exposure to the blue light) and radio waves.

According to another aspect of the present invention, a method of altering sensed noise prior to outputting the sensed noise is provided. The method includes providing at least one audio control source and providing at least one cluster of at least one computing device, the at least one computing device including: a sound sensing mechanism, configured to sense a noise; and a wireless transceiver, configured to wirelessly transmit and receive data from the audio control source; at least one output device, including: a power source for operating the output device; a speaker for outputting sound; and a communication mechanism, for receiving electronic information from the audio control source; and the audio control source, in electronic communication the at least one cluster and the at least one output device, the audio control source including: a memory, containing computer-executable instructions for connecting to the at least one cluster, and varying an output of the at least one output device, providing an interface; and a processor, for executing the computer-executable instructions. The method further includes identifying one or more sounds within the noise; isolating the one or more sounds; determining is one or more of the one or more sounds includes a frequency outside of a predetermined threshold; if one or more of the one or more sounds includes the frequency outside of the predetermined threshold, altering the one or more of the one or more sounds so that the frequency does not fall outside of the predetermined threshold; and outputting the one or more sounds on the at least one output device.

It is an object of the present invention to provide the method, wherein the at least one computing device further includes: an interfacing mechanism, the interfacing mechanism including: a network adapter, configured to transmit and receive electronic information through

both wired and wireless communication; and at least one input mechanism, configured to: manipulate the interfacing mechanism; and vary the output of the at least one output device.

It is an object of the present invention to provide the method, wherein the sound-sensing mechanism is an omnidirectional transducer.

It is an object of the present invention to provide the method, wherein the predetermined threshold equates to a frequency determined to pose a risk of harm to a user's hearing capabilities.

It is an object of the present invention to provide the method, wherein the method further includes, if one or more of the one or more sounds includes the frequency outside of the predetermined threshold, notifying a user, via a notification, that one or more of the one or more sounds includes the frequency outside of the predetermined threshold.

It is an object of the present invention to provide the method, wherein the notification is an audible notification.

It is an object of the present invention to provide the method, wherein the method further includes panning the sensed noise.

It is an object of the present invention to provide the method, wherein the method further includes adding one or more audio effects to the sensed noise.

It is an object of the present invention to provide the method, wherein the method further includes equalizing the sensed noise.

It is an object of the present invention to provide the method, wherein the altering the one or more of the one or more sounds so that the frequency does not fall outside of the predetermined threshold is performed automatically.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows a schematic view of an embodiment of one cluster of the present invention with some interfaced devices.

FIG. 2 shows a schematic view of how interfaced devices create a sound fingerprint.

FIG. 3 shows an illustration of an embodiment of the system of the present invention engaging in inter-cluster, cluster-to-audio control source; and cluster-to-cluster data sharing.

FIG. 4 shows a flow chart outlining an embodiment of the method of the present invention.

FIGs. 5-6 show a flow chart outlining an embodiment of the method of the present invention.

FIG. 7A shows an illustration showing an embodiment of the present invention located in an automobile.

FIG. 7B shows an illustration showing an embodiment of the present invention located in an indoor theatre.

FIG. 7C shows an illustration showing an embodiment of the present invention located in an outdoor stadium.

FIG. 8 shows a flow chart outlining an embodiment of the method of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The preferred embodiments of the present invention will now be described with reference to the drawings. Identical elements in the various figures are identified with the same reference numerals.

Reference will now be made in detail to each embodiment of the present invention. Such embodiments are provided by way of explanation of the present invention, which is not intended to be limited thereto. In fact, those of ordinary skill in the art may appreciate upon reading the present specification and viewing the present drawings that various modifications and variations can be made thereto.

As a threshold matter, it should be noted that whenever the phrases "microphone" or "microphone-equipped" are used, it is intended to mean any device that is capable of detecting sound, not merely microphones. For example, a high-performance low frequency antenna connected to a software-defined radio may be used to input sound observations into the system, or a piezo-electric diagraph may be used to measure the vibrations the correspond to a given sound. These examples are provided to give greater clarity as to what the term "microphone" should be interpreted as, and not construed as a limiting example.

The system of the present invention operates by integrating clusters of various computing devices and wearable computers with sound management techniques and methods so that various sound "fingerprints" can be developed and used to visualize how sound is being perceived in micro-areas within a larger venue. In various embodiments, the system of the present invention can be integrated into an individual's home, vehicle audio system, concert venues, and other locations where sound is played. In addition, the system's components allow for the present invention to be scaled to accommodate sound management and monitoring control within the largest of venues such as stadiums and other sports arenas.

Due to the devices that are integrated into the system having the ability to sense the frequency and magnitude of audio signals, a sound fingerprint (summary) can be generated from deterministic methods. These fingerprints are then communicated to an audio control source and

can subsequently be processed and used to communicate with external applications and things such as third-party sound databases. However, the purpose of this system is not to be confused. In addition to the sound fingerprinting ability of the present invention, it is also capable of utilizing a series of methods to sense and control audio output in various venues.

In an alternative embodiment, the present invention is located in a train or airport station that has an intercom system that functions poorly when noisy crowds are present. If an audio control source within these facilities is able to autonomously collect audio data via a series of integrated devices, then with the present invention, the same audio control source can adjust system outputs accordingly in order to make important intercom announcements intelligible. In yet another embodiment, a user can enter in EQ parameters in their integrated computing device to ensure that both the audio perceived by them, and the audio perceived by their device is in accordance with some predetermined parameters/settings. While many short-range wireless technologies can be used with the present invention, preferably one or more of the following technologies will be used: ANT+, Bluetooth, cellular, IEEE 802.15.4, IEEE 802.22, ISA 100a, Infrared, ISM (band), NFC, RFID, WPAN, UWS, WI-FI, Wireless HART, Wireless HD/USB, ZigBee, or Z-wave.

In yet another preferred embodiment, various in-ear systems may be integrated into the present invention, software-defined and/or cognitive-defined based in-ear transceivers can be used to wirelessly communicate with an audio control source and thus, the output of such an in-ear monitor can be autonomously adjusted after sensing audio output. A given output can be adjusted according to what is sensed within specified location or what is sensed at external clusters. Similarly, to a software-defined and/or cognitive-defined based in-ear transceivers, an in-ear monitor system for use with the present invention will preferably comprise hardware such

as, earphones, at least one body pack receiver, at least one mixer and at least one transmitter. These functions can also be adjusted and controlled via the audio control source of the present invention.

According to an embodiment, the functions of the present invention include sensing and isolating frequency bands associated with musical instruments/human voices in the following order: midrange, highs, and lows. According to an embodiment, the functions further include separating like frequencies (panning). According to an embodiment, the functions additionally include balancing the volume, controlling the dynamic range of the frequencies sensed (compression), performing subtractive and additive equalization, and/or adding audio effects to provide additional depth and texture.

Loud noises can often lead to stress and hearing loss. For example, certain frequencies and volumes can cause stress in pets, and loud music and other forms of loud sounds have put approximately 1.1 billion young people at risk of suffering from hearing loss. Furthermore, military veterans are 30% more likely to suffer from severe hearing loss than non-veterans. In fact, according to the DoD's Hearing Center for Excellence (HCE), hearing loss is the most-widespread injury among returning veterans, driving hearing loss payments to exceed $2 billion in 2016. The present invention provides for an interdisciplinary and technologically advanced approach to hearing loss prevention.

It is important to note that noise pollution not only produces negative health outcomes for humans, but also, can produce negative outcomes for pets. Loud noises and obtrusive, artificial light negatively affect pets such as cats and dogs, and can eventually lead to abnormal behaviors, like excessive whining, trembling, barking and panting. These behaviors are a result of the pets trying to cope with the stress tied to phenomena within their environment, and if left unchecked,

can cause panic disorders such as, e.g., separation anxiety, which is not healthy for both pet owners and pets. It is therefore an object of the present invention to provide a method wherein at least one sound and/or light sensing device can be affixed or integrated into a pet wearable (e.g. dog collar). In another embodiment of the present invention, pet products w/ smart units that sense and analyze frequencies across a wide range of frequency bands (See FIG. 9) may be configured in order to alert pet owners of: loud and/or obtrusive noises, harmful artificial lights, or any other unhealthily or uncomfortable environmental disturbance. These pet products w/ smart units work together via the mobile-to-mobile network (as described herein) to expose, report on and explain certain behaviors like excessive barking, whining, trembling and panting. Alerts can be shown via an integrated LED or LCD display on pet products/wearables, pet owner smartphones, smartwatches (and other wearable), and can display warning messages. Warning messages may include: "too loud for pet," "painful and/or uncomfortable environment," or mood or behavioral-related messages such as "environment making pet unhappy," or "environment likely to cause barking." As show in FIG. 10, a pet collar may be located on the pet and configured to sense noise or other conditions close to the pet's ears and eyes. Smart units may be located on the pet's ankle as a bracelet which may be configured to sense noise or other conditions that are close to the ground. The pet smart unit may be configured to be sensitive to faint vibrations possibly due to low frequency sounds or physical disturbances close or in the ground.

Hearing loss can be considered an inevitable cost of military exercises and war. However, real-time alerts using mobile devices creates an opportunity to implement preventative measures, ultimately reducing hazardous exposure time and thus injury. Study considerations

include, data sets, hearing loss incidents among veterans (on the rise), current preventative measures, gear, and equipment such as jet engines and other inherently noisy machinery.

In summary, various embodiments of the present invention are in response to the DoD commitment to reduce the number of military personnel that suffer from hearing loss injury by 1) analyzing hazardous sounds in real-time 2) alerting service members using wearable mobile devices (new preventative technique).

According to an embodiment, the present invention provides for a mobile cluster-based apparatus that analyzes, reports, and controls outputs based on a range of inputs over a swath of frequency bands, with distinct applications including sound output control, hazardous millimeter-wave, blue light or RF detection and reporting, and ultrasonic and infrasonic wave detection and reporting. In a blue light sensing application, a wearable in close proximity to a user's retina (e.g. located on a collar of a smart jacket) can measure prolonged blue light retina exposure and report the issue back to the user.

According to an embodiment, the apparatus is configurable and uses standard computing devices, such as wearables, tablets, and mobile phones, to measure various frequency bands across multiple points, allowing a single user to visualize and adjust sound output, and in some cases, detect and report hazardous signals.

Each year, sound companies spend billions of dollars on audio technologies and audio research to find new ways to improve audio quality in performance settings. Proposed is an apparatus and method that creatively tackles the issue of poor audio quality and sound perception across various spaces by integrating consumer-based mobile devices, wearable computers and sound management systems. The ubiquitous computing devices in this method and apparatus senses soundwaves, associates sensed audio levels with specific clusters (locations), predicts

whether or not an audio-related issue is likely to occur within a specific cluster (for instance, predicts if an echo is likely to occur), and adjusts audio intensity (and related EQs) accordingly to improve audio output quality.

Key features of the Mobile Cluster-Based Audio Adjusting Method and Apparatus include:

• User/listener-based sound management and control

• Scalable platform that can incorporate future tech - that is, new functionalities can be added because the method and apparatus is designed to seamlessly integrate additional components including, but not limited to, software applications such as a 'sound preference' application that sets user-based sound perception settings on a mobile device or wearable computer.

• Integrates with existing audio hardware and software - such as in-ear systems, mixer boards and other related audio consoles

• Autonomous audio sensing

• Can be configured, manufactured and sold across different industries (e.g. automobile or audio electronic industries)

• Can be used in sound fingerprint and music publishing/performance applications (e.g. in a performance venue, fingerprint data can be sent directly to music publishing entities from the described clusters

• Can interface with various communication offerings such as e-mail, SMS, and visual screens (for instance, communicative updates can be sent with sensed audio measurements. A specific example – an SMS that reads a "too loud in section A'/cluster A)

• Can support a fixed or unfixed number of "sensing units"

Audio Control Source & Computing Device Single device

Developments in science and engineering, and specifically, artificial intelligence, augmented reality, hologram technology, cloud computing and wireless engineering, are all expected to shift a smart device's feature set, and how a smart device communicates with both the user (interface) and the network (including other smart devices). Therefore, it is understood that as technology advances, certain smart devices described in the system of the present embodiments will either become obsolete (e.g. smartphones) and/or will not be heavily relied upon by users to perform certain functions. Thus, according to an embodiment, the system is considered modular because system functions can be distributed across several devices as well as integrated into a single device (e.g. as the physical and software nature of these devices evolve, the salient functions of the Audio Control Source and the Computing Device can be integrated into a single device).

Highlighting Long-Range Technologies

As highlighted in the present description, smart devices within the system can interact with each other using short-range technologies (such as Wi-Fi and Bluetooth), however, it is understood that there are certain limitations associated with many short-range technologies (e.g. poor security, bandwidth and suboptimal data exchange within peer network(s)). Since optimality is a core focus, smart devices can also employ long-range protocols (as described in the LTE and IMT-2020 specification) to exchange data. Doing so can allow the system to leverage cloud computing and cloud storage capabilities. Thus, according to an embodiment, a device within the present system can also feature a shared radio front end for a software defined radio, further reducing the physical IoT communication barrier between networks and

devices, and further allowing flexible and efficient 'switching' between short-range and long-range technologies.

Referring to FIG. 1, an embodiment of one cluster 101 of the present invention with some interfaced devices. Specifically, three embodiments of at least one computing device 102 are shown; wearable glasses, wearable watch, and a smartphone. It should be noted that while these three devices are listed as exemplary examples, any device with a sound sensing mechanism 150 and a way to transmit any recorded data is suitable for use as one of said at least one computing devices 102. According to an embodiment, the sound sensing apparatus may be an omnidirectional transducer, an ultrasonic transducer, an infrasonic transducer, a microwave transducer, and/or any other suitable sound sensing apparatus, while maintaining spirit of the present invention. The sound sensing mechanisms of at least one computing device 102 will be able convert perceived sounds into electronic signals so that the recorded information may be transmitted to neighboring clusters 101, or an audio control source (See FIG. 3), as desired. This data will be transmitted using either one or a combination of short-range wireless technologies, namely, ANT+, Bluetooth, cellular, IEEE 802.15.4, IEEE 802.22, ISA 100a, Infrared, ISM (band), NFC, RFID, WPAN, UWS, WI-FI, Wireless HART, Wireless HD/USB, ZigBee, or Z-wave. Preferably, transducers integrated into these computing devices have an output signal that is fed into the input of an analog-to-digital converter ("ADC") and can incorporate software and cognitive-defined radios to broaden the selection of compatible wireless communication interfaces and limit radio component footprints. According to an embodiment, the at least one computing device 102 includes one or more wireless transceivers 155.

FIG. 2 shows a schematic view of how interfaced devices create a sound fingerprint. The sound transmission of the audio energy 109 sensed by the at least one computing device 102

propagates through air and is received by at least one computing device 102 using the transmission path outlined in Figure 2.

Assuming that Figure 2 depicts audio transmission in an indoor setting, at specified time intervals, each computing device measures the sound pressure level (SPL) and sound power level (SWL):

$$SPL = SWL + 10\log[\frac{Q_\theta}{4\pi r^2} + \frac{4}{R_C}]$$

Where:

SPL = Sound pressure level dB

SWL = Sound power level = $10\ \log_{10}(W/\ W_{ref})$

W is the total sound power radiated from a source with respect to a reference power (W_{ref}) dBW re 10^{-12} Watts.

r = distance from source m

Q_θ = directivity factor of the source in the direction of r

S = total surface area of a room m^2

α_{av} = average absorption coefficient in a room

R_C = room constant = $\frac{S\alpha_{av}}{1-\alpha_{av}}\ m^2$

Over time, each computing device in Figure 2 detects differences in pressure (i.e. change in pressure vs. time) and converts the differences into an electrical signal. A Fast Fourier Transform is implemented (locally or in a cloud) to measure the relative amplitudes of the frequencies 'sensed' and to perform other frequency domain analyses.

It is important to note that in any given indoor environment, R_C, α_{av}, and S can be predetermined and made available to each computing device, approximated or deemed negligible. Also note that each computing device in Figure 2 has a microphone. Computing devices may also obtain sound observations via a high-performance low frequency antenna.

Turning to Fig. 3 an illustration of an embodiment of the system of the present invention engaging in intra-cluster, cluster-to-audio control source; and cluster-to-cluster data sharing. Here, each cluster has a given location 110 (i.e. specified location) to accurately isolate and associate the sensed data. In one embodiment, the present invention is able to adjust a given output device 160 based on its proximity to a given location 110 of a cluster. In alternative embodiments, output devices 160 can be adjusted based on their proximity to more than one cluster. Devices in each cluster can either communicate directly to each other or an audio control source 111, devices within a cluster can communicate to a single device within that cluster which can serve as a gateway to other clusters and/or audio control source 111. In some embodiments, the present invention further comprising an in-ear monitoring device 112. According to an embodiment, the output devices 160 may include a power source 165 (such as, e.g., a battery or other suitable power source 160), a speaker 170, a communication mechanism 175 (such as, e.g., a wired and/or wireless transceiver), and/or any other suitable mechanisms (as shown in FIG. 1). According to an embodiment, the audio control source 111 includes a memory 180, a processor 182, an interface mechanism 184, and/or at least one input mechanism 186. According to an embodiment, the interface mechanism 184 is a graphical user interface with a display (e.g., a touch screen display). According to an embodiment, the at least one output device 160 is located within said at least one cluster 101, such that said audio control source 111 may alter the power supplied to said speaker 170 in real-time.

The embodiment depicted here shows devices that sense audio signal energy within the confines of a single cluster and then sends data directly to an audio control unit and other clusters. Therefore, not only can these computing devices wirelessly share sensed data with each other, but, also, data can be shared with an audio control source 111 (for audio output

management purposes) and other devices in other clusters. Depending on the audio signal energy sensed within a specific cluster(s), audio control source 111 adjusts any connected output devices in either a single cluster, or multiple clusters to ensure high quality/fidelity output.

FIG. 4 shows a flow chart outlining an embodiment of the method of the present invention. Here, method 200 is comprised of a number of steps. In step 201, initially, both desired and undesired audio output signals are sensed and subsequently analyzed. In step 202, the method proceeds to determine whether or not the input signals match a set of predefined thresholds. If there is only negligible output audio, that is, if the audio within an environment is outside of a specified frequency range, the method proceeds to step 203 where the devices in each cluster operate in sleep mode. If there is indeed sensible audio output, the method proceeds to step 204 where the present invention determines if the predefined threshold or EQ setting is breached. If this threshold is breached, the method moves to step 205 where the first device that sensed the breach will (preferably, wirelessly) communicate its signal measurements to other devices within its cluster and the receiving device will conduct the same audio measurements to confirm the threshold breach. Preferably, step 205 is repeated amongst all of the devices within a single cluster, to provide more robust data sets. Once the breach confirmation stage is completed, in step 206, the present invention moved to step 207 where at least one computing device is chosen to communicate the breach to. Finally, in step 208, when the present invention, via the audio control source, adjusts audio levels at the at least one output device to transform undesired audio outputs to desired audio outputs.

Referring now to FIGs. 5-6, a flowchart 300 of an embodiment of the present invention is illustratively depicted, in accordance with an embodiment of the present invention.

According to an embodiment, the present invention isolates and/or separates sounds within band, reports findings of those sounds to a cloud-based system for audio signal processing (if necessary), and sends control commands to one or more commercial mixing consoles and/or audio control sources to alter the audio output (if necessary), and then communicate with apparatus devices to share and confirm sensed audio findings (if necessary). According to an embodiment, these sounds are associated with different frequencies and/or are associated with one or more instruments.

At step 305, audio/noise is sensed by one or more audio sensing devices. According to an embodiment, the one or more sensing devices are microphones.

At steps 310-315, the volume between the sensed audio is balanced. That is, one or more instruments and/or frequencies are identified and isolated from the sensed audio (at step 310), and the signal amplitude of each instrument is manipulated using a mixing console/audio source (at step 315). It is noted, however, that, at step 310, the identified sounds need not always be instruments. The sounds may be any suitable identifiable sounds, while maintaining the spirit of the present invention.

According to an embodiment, the present system may sense different types of phenomena (e.g., it may sense audio using an audio transducer such as a microphone, it may include a smartwatch and/or other similar device that may be able to sense ultrasonic waves using an ultrasonic transducer, and/or the system may incorporate one or more various suitable types of transducers). According to an embodiment, the system may be configured to sense environmental phenomena outside of the acoustic frequency range by using a variety of transducers. In those cases, the underlying functionality of the system generally remains the

same, regardless of the input phenomena sensed. The system may measure the intensity of an acoustic wave, ultrasonic wave, infrasonic wave, and/or any other suitable waves.

According to an embodiment, the system may incorporate various input/output functions/details, such as those shown in Table 1. According to an embodiment, the system is configured to sense, analyze, and/or control audio outputs.

SYSTEM INPUT	SYSTEM FUNCTION	OUTPUT
Network Interface: Sense audible sounds via mic or comparable audio sensing transducer	Apparatus will isolate/separate sounds within band, report findings to cloud-based system for audio signal processing (if necessary), send control commands to commercial mixing console and/or audio control source to	Network Interface Configured to: Control mixing console(s) and/or an audio control source(s) via physical or SDR-based transceiver(s)**

	alter audio output (if necessary) and communicate with apparatus devices to share and confirm sensed audio findings (if necessary)	
20 - 40 Hz	Sub Bass *(Piano, Synthesizer Strings)	kHz: 125/134 MHz: 13.56/ 600/ 800/850/900/1700/1800/1900 2100/2200/L700/U700/2300/2400/2500/2700/3500/5200/ 5700/whitespaces between 54 and 860/ GHz:3.6/4.9/5/5.9 /24 to 300 300 GHz to 430 THz
40 - 160 Hz	Bass Band (Drums, Strings, Winds, Vocals, Piano, Synthesizer)	
160 - 300 Hz	Upper Bass Band (Drums, Strings, Winds, Vocals, Piano, Synthesizer)	
300 - 800 Hz	Low-Mid Band (Drums, Strings, Winds, Vocals, Piano, Synthesizer)	
800 - 2.5 kHz	Mid-Range Band (Drums, Strings, Winds, Vocals, Piano, Synthesizer)	
2.5- 5 kHz	Upper Mid Band (Drums, Strings, Winds, Vocals, Piano, Synthesizer)	
5 - 10 kHz	High Frequency Band (Drums - including Cymbals, Synthesizer)	
10 - 20 kHz	Ultra-High Freq Bands (Hi-Hat, Cymbals, Hiss)	

Table 1

It is also noted that the present invention may further have implications in sensing and analyzing millimeter waves, which the human ear cannot hear. Higher-frequency millimeter-waves can possibly have adverse effects on human health. According to an embodiment, the present system can (as shown in Table 2), in real-time, detect and report harmful, high-energy level millimeter waves, which are included in many 5G deployment plans.

SYSTEM INPUT	SYSTEM FUNCTION	OUTPUT
Network Interface: Sense millimeter-waves via a mmWave transducer	Apparatus will detect, analyze, measure and/or report harmful millimeter-waves across several environments	Network Interface Configured to: Report/share data via physical or SDR-based transceiver(s)**
24 to 300 GHz	Identify and measure millimeter-wave characteristics	kHz: 125/134 MHz: 13.56/ 600/ 800/850/900/ 1700/1800/1900 2100/2200/L700/U700/2300/ 2400/2500/2700/3500/5200/5700/ whitespaces between 54 and 860/ GHz:3.6/4.9/5/5.9 /24 to 300 300 GHz to 430 THz

Table 2

Weaponized infrasonic and ultrasonic devices with highly directional energy transmissions can produce both psychological and physical effects on humans. In addition, blue light (short wavelength) emitted from displays is harmful to the retina. For this reason, a light sensing transducer is a part of the apparatus described herein. According to an embodiment, the present system can, in real-time, detect and report harmful infrasonic and ultrasonic devices in weaponized scenarios. According to an embodiment, the apparatus described can (as shown in

Table 3), in real-time, detect and report harmful infrasonic and ultrasonic devices in weaponized scenarios.

SYSTEM INPUT	SYSTEM FUNCTION	OUTPUT
Network Interface: Sense infrasonic, ultrasonic waves, and/or light waves via an ultrasonic, infrasonic or electro-optical transducer	Apparatus will detect, analyze, measure and/or report on harmful ultrasonic or infrasonic waves across several environments	Network Interface Configured to: Report/share data via physical or SDR-based transceiver(s)

18.9 Hz, 0.3 Hz, 7 Hz and 9 Hz 700 kHz to 3.6 MHz 20 to 200 kHz 400 – 770 THz	Identify and measure ultrasonic, infrasonic or visible wave characteristics	kHz: 125/134 MHz: 13.56/ 600/ 800/850/900/1700/1800/1900 2100/2200/L700/U700/ 2300/2400/2500/2700/3500/5200/5700/whitespaces between 54 and 860/ GHz:3.6/4.9/5/5.9 /24 to 300 300 GHz to 430 THz

Table 3

At step 320, it is determined whether the sensed audio includes any audio in frequencies that have been predetermined to be hazardous to human ears. According to an embodiment, if audio in the hazardous range has been detected, then one or more users are notified, at step 325. The notification may take the form of a visual notification, an audible notification, and/or any other suitable form of notification. It is noted, however, that, if automatically corrected, the user need not always be notified.

According to an embodiment, at step 330, the dynamic range of the sensed audio (compressed or limiting) is controlled by sending audio data to a mixing console/audio source or cloud-based system that can identify and mitigate sudden peaks in a sensed audio stream to help sound(s) sit consistently in an audio mix (accomplished by removing sudden peaks). Altering the dynamic range may also be used to eliminate any audio in the predetermined hazardous

range. At step 335, the audio is panned. That is, like frequencies in the sensed audio are separated.

At step 340, effects that add depth and texture to audio outputs are added and, at step 345, equalization is added using subtractive and/or additive equalization techniques.

According to an embodiment, at step 350, automation is generated that predicts environmental conditions based on sensed data (like echoes and audio wind steers) and, at step 355, volume changes and audio effects are autonomously programmed, accordingly.

According to an embodiment, the present invention includes acoustic band applications. Consumer products, such as, e.g., wearables, smartphones, and other portable computing devices autonomously control sound output(s) in private spaces (e.g. cars and homes) and public spaces (e.g. transport stations and theater/concert venues). According to an embodiment, the present system senses audible sounds via a mic or comparable audio sensing transducer and isolates/separates sounds within certain bands, reports findings to cloud-based system(s) for audio signal processing, sends control commands to a commercial mixing console and/or audio control source to alter audio output, and communicates with cluster devices to share and confirm sensed audio findings. According to an embodiment, the present system outputs to control mixing console(s) and/or an audio control source(s) via physical or SDR-based transceiver(s).

According to an embodiment, the present system senses and analyzes audio frequencies across clusters to adjust and control audio output and perceived sound at a given locale. In order to achieve high-quality sound and sound equalization of a sonic presentation, a sound system's audio output levels are autonomously adjusted via a central audio mixing source using intelligent tell-tale frequency characteristics gathered from clusters comprised of smart devices and/or wearable computers.

According to an embodiment, the audio signal data obtained within clusters enables a system integrated mixing console to manage audio output based on detailed frequency descriptions of acoustic properties and characteristics across a venue, room, or vehicle. According to an embodiment, the present system incorporates a modular structure so that components can be added and expand as consumer needs grow.

According to an embodiment, the present system provides for an apparatus that is configured to adjust and control audio output signal levels across multiple cluster locales using computing devices such as smartphones and/or wearable computers; a wireless transmission platform; transceivers - software-defined, cognitive-defined and/or hardware- defined; wireless microphones; in-ear monitors - software-defined, cognitive-defined and/or hardware-defined; and a central audio mixing source.

According to an embodiment, the apparatus of the present invention may include, but is not limited to, the following functions:

- Balancing the volume between sensed audio. For example, isolating instruments based on frequency and manipulating the signal amplitude of each instrument using a mixing console/audio source.
- Controlling the dynamic range of the sensed audio (compress or limiting) by sending audio data to a mixing console/audio source or cloud-based system that can identify and mitigate sudden peaks in a sensed audio stream to help sounds sit consistently in an audio mix (accomplished by removing sudden peaks).
- Panning.
- Adding effects that add depth and texture to audio outputs.
- Equalization using subtractive/additive equalization techniques.

- Automation that 1) predicts environmental conditions based on sensed data (like echoes and audio wind steers) and 2) autonomously programs volume changes and audio effects accordingly.

Referring to Figs. 7A-7C, various embodiments of the present invention implemented in an automobile, an indoor theatre, and an outdoor stadium, respectively, are shown. While these venues are particularly suited for the present invention to be implemented in any venue in which there are multiple listeners.

In a preferred embodiment, the sound sensing mechanisms (preferably, transducers) used within each "sensing" computer/device outputs an output signal that is fed into the input of an ADC. In the configurations described in Figure 7A, 7B and 7C, a single-ended ADC interface can be used effectively since ADCs and the transducer source are both located on the same integrated circuit board. However, since fully differential interfaces have performance gains over single-ended inputs due to its inherent noise rejection characteristics, using a fully-directional interface instead of a single-ended interface may be desirable.

FIG. 8 shows a flow chart outlining an embodiment of the method of the present invention. Here, method 400 is comprised of a number of steps. According to an embodiment, the method as shown and described in FIG. 8 showcases the method steps of a system that measures the intensity of phenomena and its purpose is to sense, analyze, report, and, in some cases, control invisible phenomena. These invisible phenomena can include, e.g., ultrasonic waves, audio waves, infrasonic waves, mm waves etc. (using ultrasonic transducers, infrasonic transducers, microwave transducers, among others, and associated software for these applications).

As in method 200 of FIG. 4, initially, both desired and undesired audio output signals are sensed and subsequently analyzed. It is then determined whether or not the input signals match a set of predefined thresholds. If there is only negligible output audio, that is, if the audio within an environment is outside of a specified frequency range, the devices in each cluster operate in sleep mode, step 402. If there is indeed sensible audio output, the method proceeds to step 401 where the present invention determines if the predefined threshold or EQ setting is breached. If this threshold is not breached, the device operates in sleep mode 402. If this threshold is breached, the method moves on to step 403, where it is determined whether the device has a navigation unit. According to an embodiment, devices in the system can auto-awaken out of sleep mode based on the location of the device (e.g. when a user walks into a concert venue, the system will begin measuring surrounding signal energy).

If the device does not have a navigation unit, the method moves to step 404, where a breach severity measurement is determined. Once the breach severity measurement is determined, the method moves to step 405, where it is determined whether there is an onset issue.

If there is an onset issue, the method moves to step 406, in which any data and/or findings are reported and/or displayed. Once the data and/or findings are reported and/or displayed, the device returns to sleep mode, step 402.

If there is not an onset issue, the method moves to step 407, wherein a time window is calculated at which any sensed data was determined to be unacceptable. Once this time window is calculated, the method moves to step 408, wherein breaches within the calculated time window are collected and/or analyzed. Once the breaches within the calculated time window are collected and/or analyzed, the method moves to step 409, wherein it is determined whether there

were consistent breaches during the time window. If there were consistent breaches during the time window, the method moves to step 406. If there were not consistent breaches during the time window, the device goes back to sleep mode, step 402.

If the device has a navigation unit, the method moves to step 410, wherein breach severity measurements with the device's location are determined. Once the breach severity measurements with the device's location are determined, the method moves to step 411, wherein it is determined whether the device's location at the time of the breach lessened the severity of the breach. If the device's location at the time of the breach did not lessen the severity, the method moves to step 405, wherein it is determined whether there is an onset issue. If the device's location at the time of the breach did lessen the severity, the method moves to step 412, wherein an analysis takes place in which location and machine learning insights are factored into the threshold breach calculations. The method then moves to step 413, where it is determined if the breach is still an issue. If the breach is still an issue, the method moves to step 405, wherein it is determined whether there is an onset issue. If the breach is not still an issue, the device goes back to sleep mode, step 402.

According to an embodiment, environmental measurements may be skewed depending on the device's location (e.g., in a bag, in a pocket, etc.). According to an embodiment, the location of the device is detected, and, in these cases, the system will either account for signal degradation in the measurement or disable environmental measurements based on predefined thresholds. According to an embodiment, smart devices (e.g., smartphones, etc.) will use an accelerometer and/or light sensor and/or a temperature sensor to detect whether or not the smart device is directly exposed to phenomena (i.e. whether or not the device is in a bag or pocket).

When introducing elements of the present disclosure or the embodiment(s) thereof, the articles "a," "an," and "the" are intended to mean that there are one or more of the elements. Similarly, the adjective "another," when used to introduce an element, is intended to mean one or more elements. The terms "including" and "having" are intended to be inclusive such that there may be additional elements other than the listed elements.

While the disclosure refers to exemplary embodiments, it will be understood by those skilled in the art that various changes may be made, and equivalents may be substituted for elements thereof without departing from the scope of the disclosure. In addition, many modifications will be appreciated by those skilled in the art to adapt a particular instrument, situation or material to the teachings of the disclosure without departing from the spirit thereof. Therefore, it is intended that the disclosure not be limited to the particular embodiments disclosed.

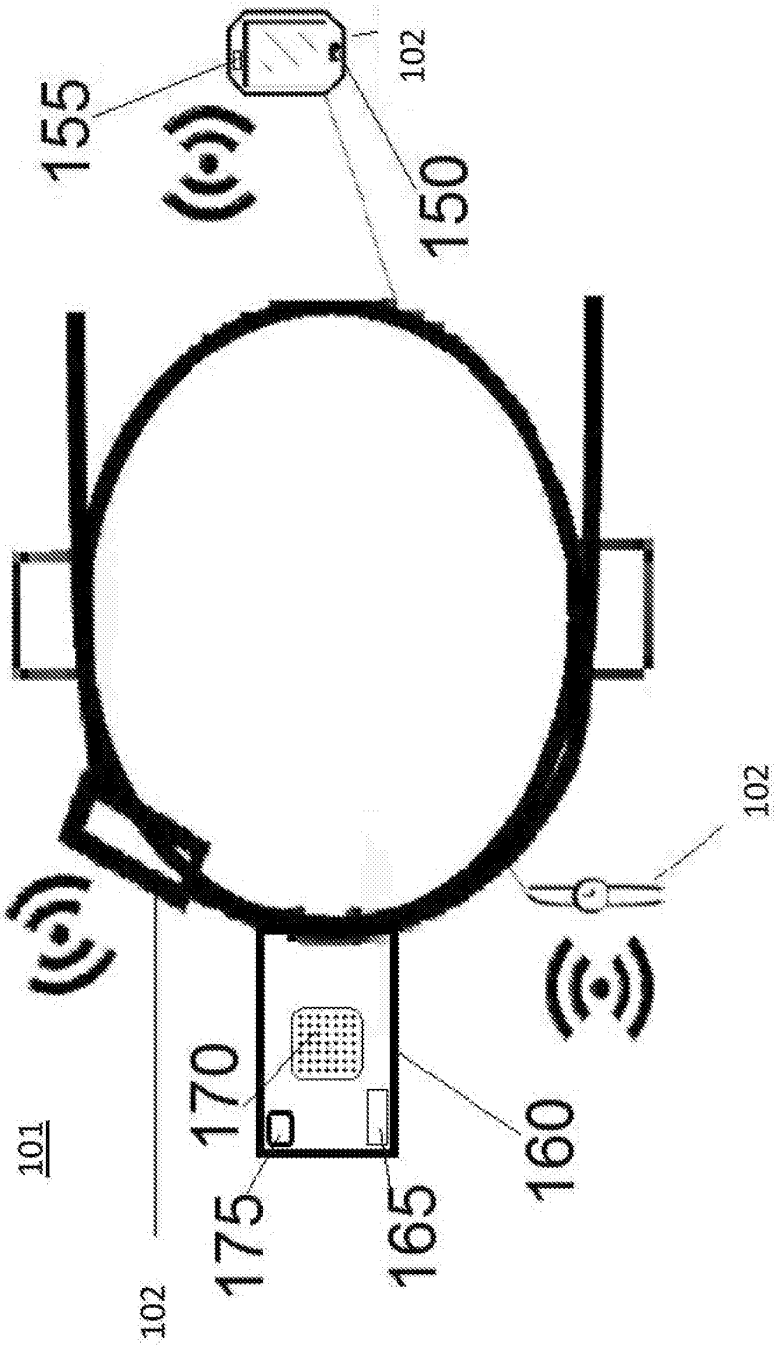


FIG. 1

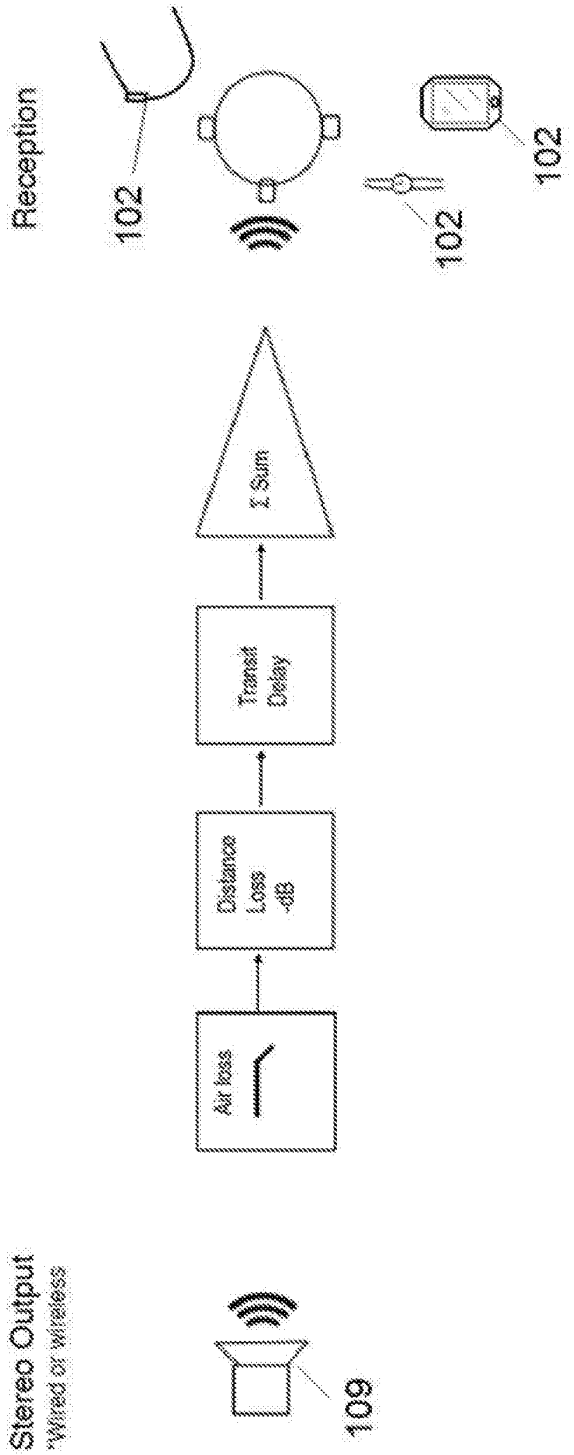

Reception
102
102
102
Σ Sum
Transit Delay
Distance Loss dB
Air loss
Stereo Output
*Wired or wireless
109

FIG. 2

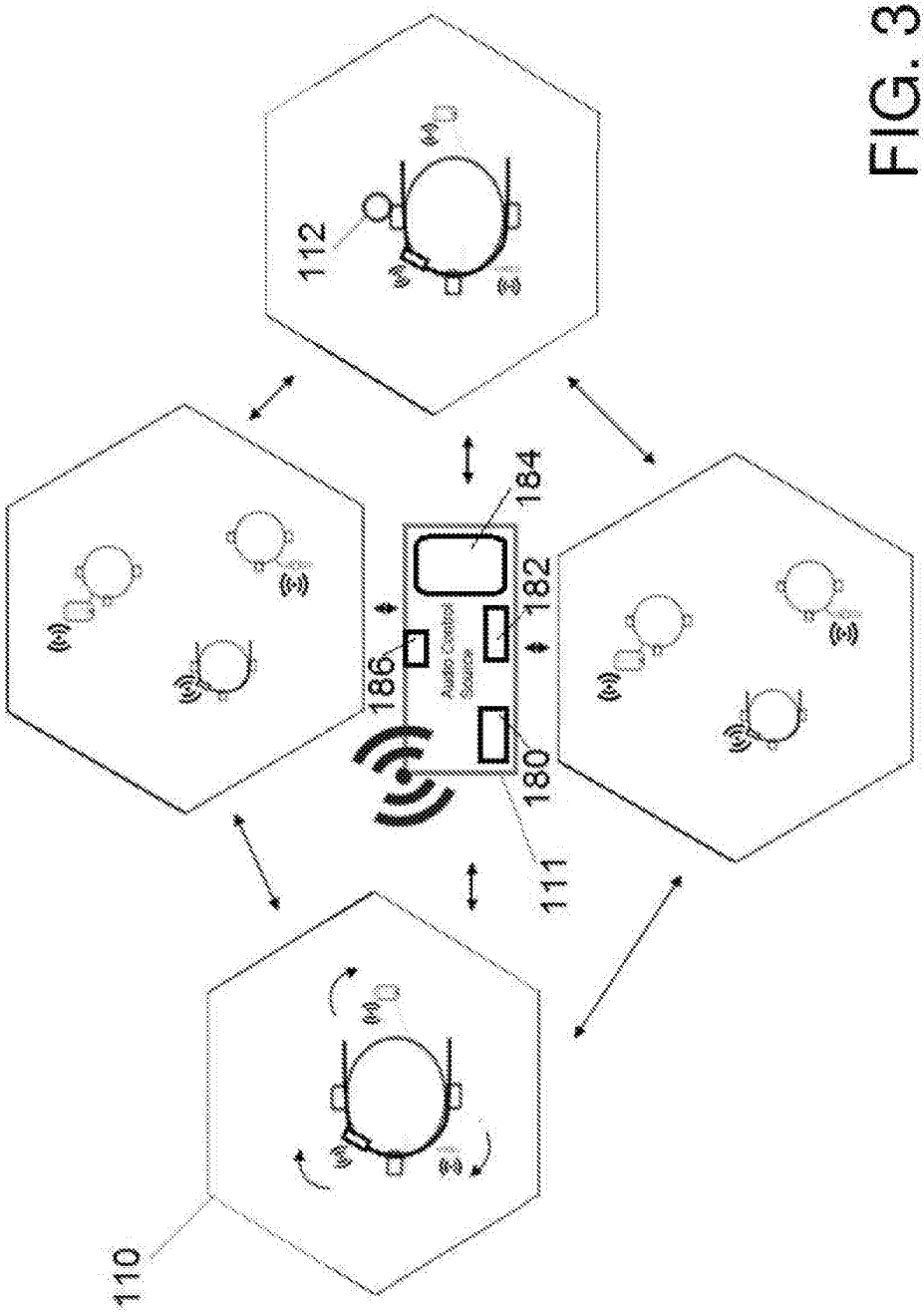


FIG. 3

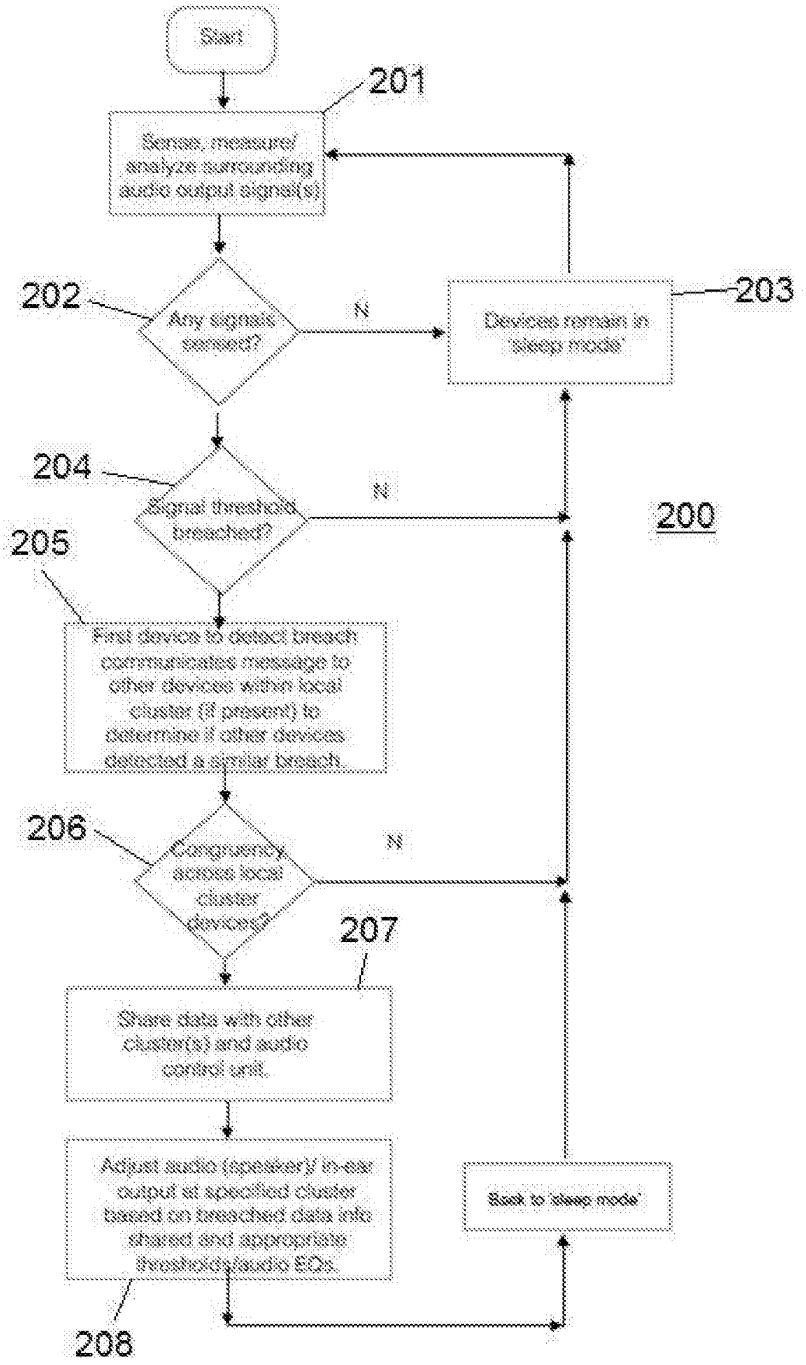

Start
201
Senses, measures/ analyzes surrounding audio output signal(s)
202
Any signals sensed?
N
Devices remain in sleep mode
203
204
Signal thresholds breached?
N
200
205
First device to detect breach communicates message to other devices within local cluster (if present) to determine if other devices detected a similar breach
206
Congruency across local cluster devices?
N
207
Share data with other cluster(s) and audio control unit.
Adjust audio (speaker)/ in-ear output at specified cluster based on breached data info shared and appropriate thresholds/audio EQs.
Back to sleep mode
208

FIG. 4

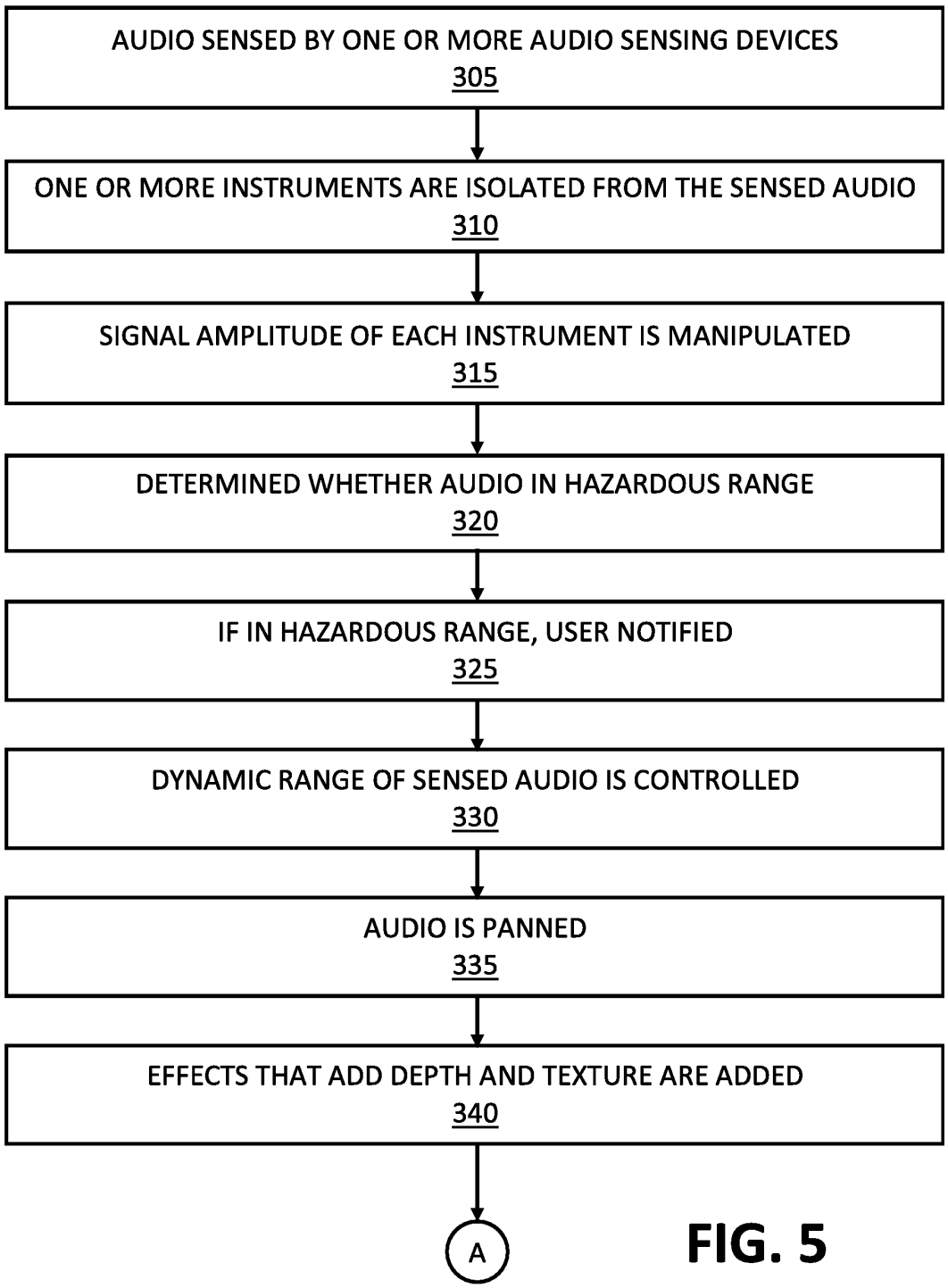

300
AUDIO SENSED BY ONE OR MORE AUDIO SENSING DEVICES
305
ONE OR MORE INSTRUMENTS ARE ISOLATED FROM THE SENSED AUDIO
310
SIGNAL AMPLITUDE OF EACH INSTRUMENT IS MANIPULATED
315
DETERMINED WHETHER AUDIO IN HAZARDOUS RANGE
320
IF IN HAZARDOUS RANGE, USER NOTIFIED
325
DYNAMIC RANGE OF SENSED AUDIO IS CONTROLLED
330
AUDIO IS PANNED
335
EFFECTS THAT ADD DEPTH AND TEXTURE ARE ADDED
340
A

FIG. 5

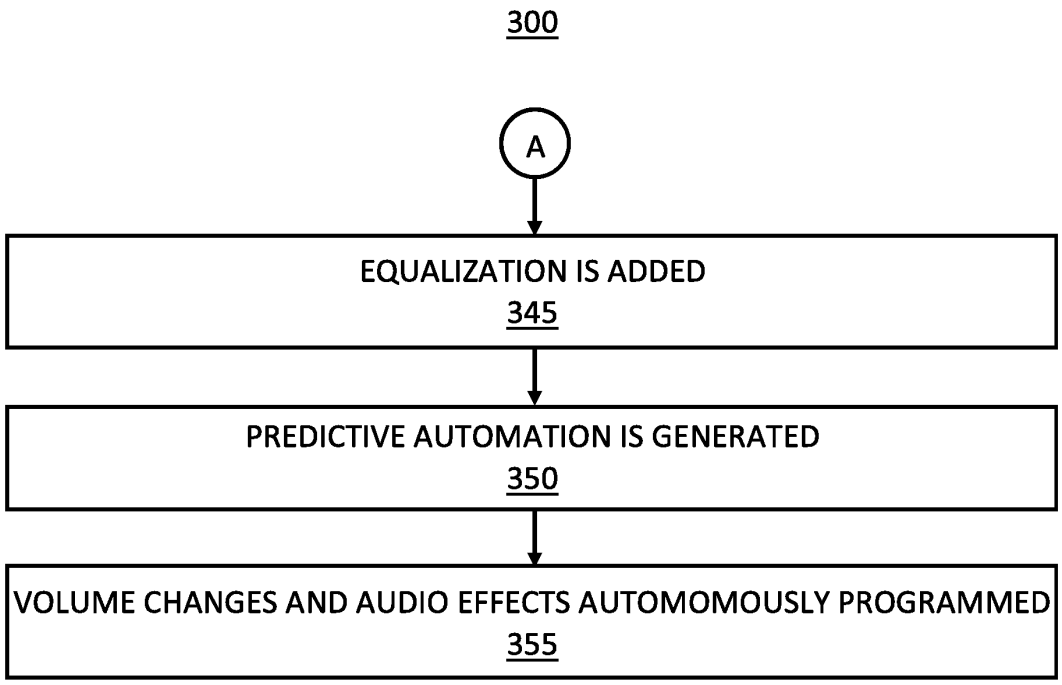

300
A
EQUALIZATION IS ADDED
345
PREDICTIVE AUTOMATION IS GENERATED
350
VOLUME CHANGES AND AUDIO EFFECTS AUTOMOMOUSLY PROGRAMMED
355

FIG. 6

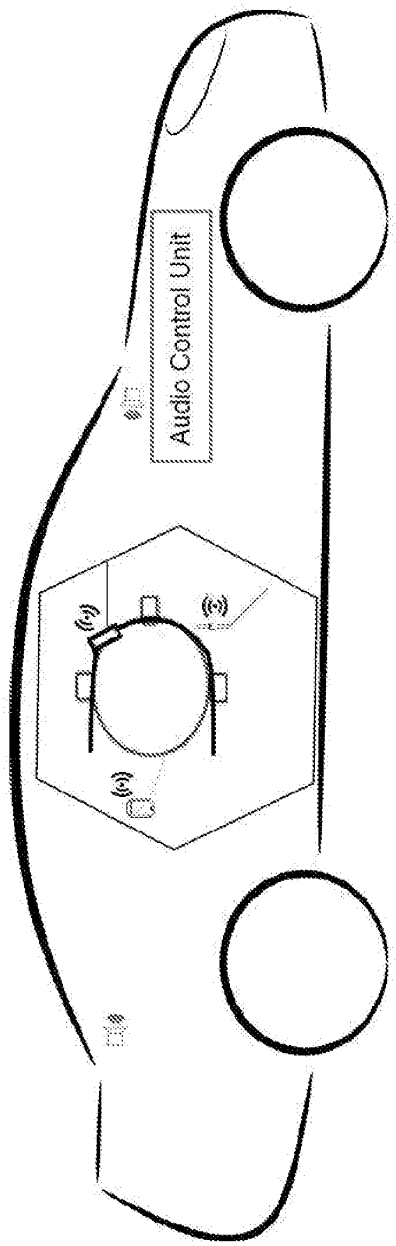
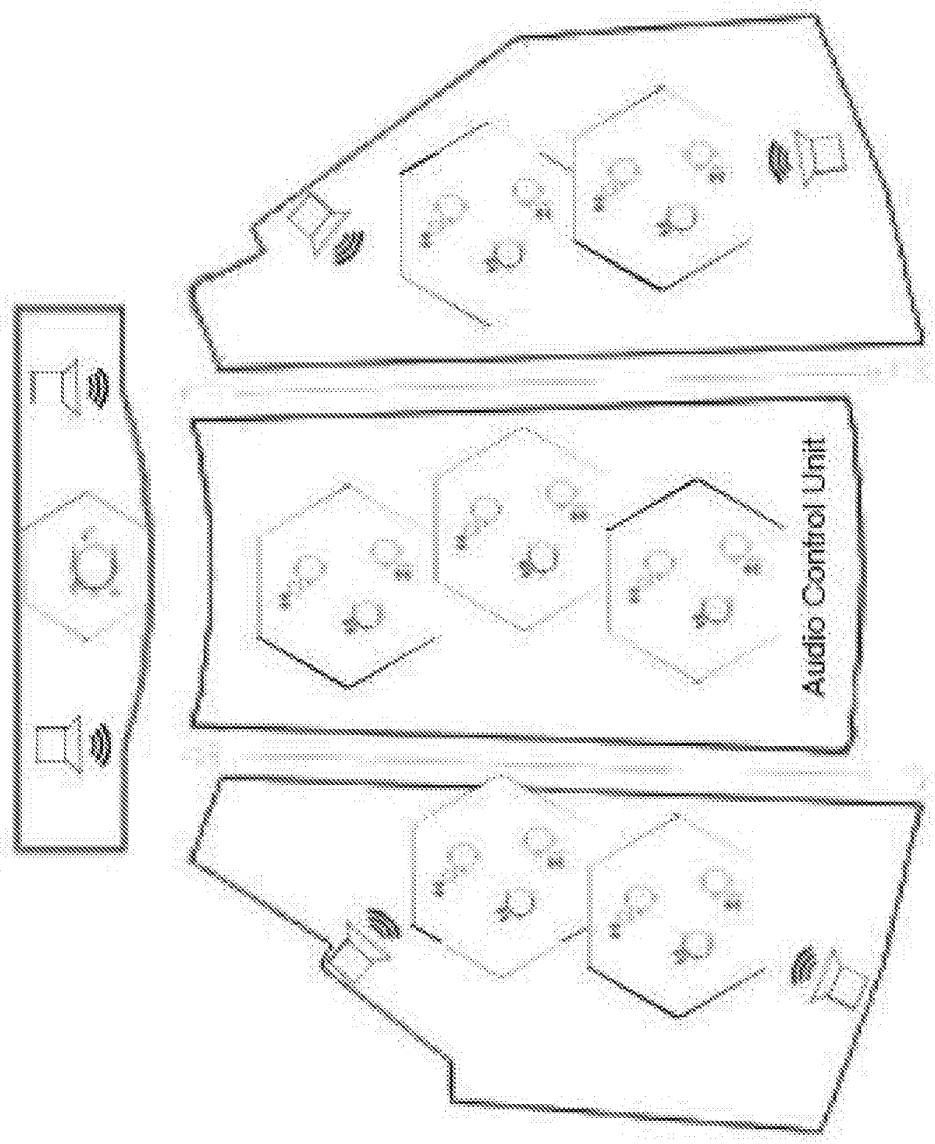


FIG. 7A

FIG. 7B



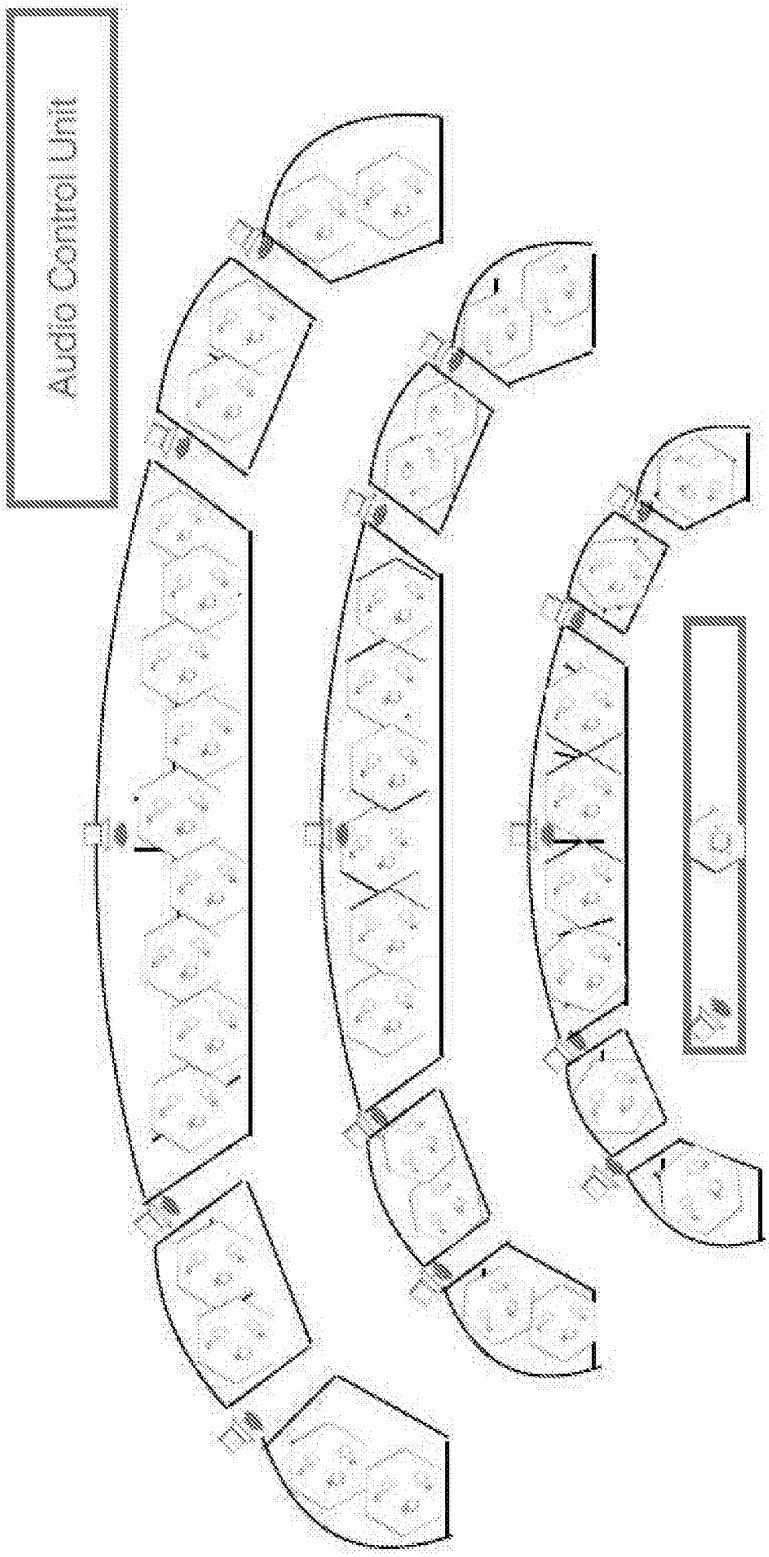
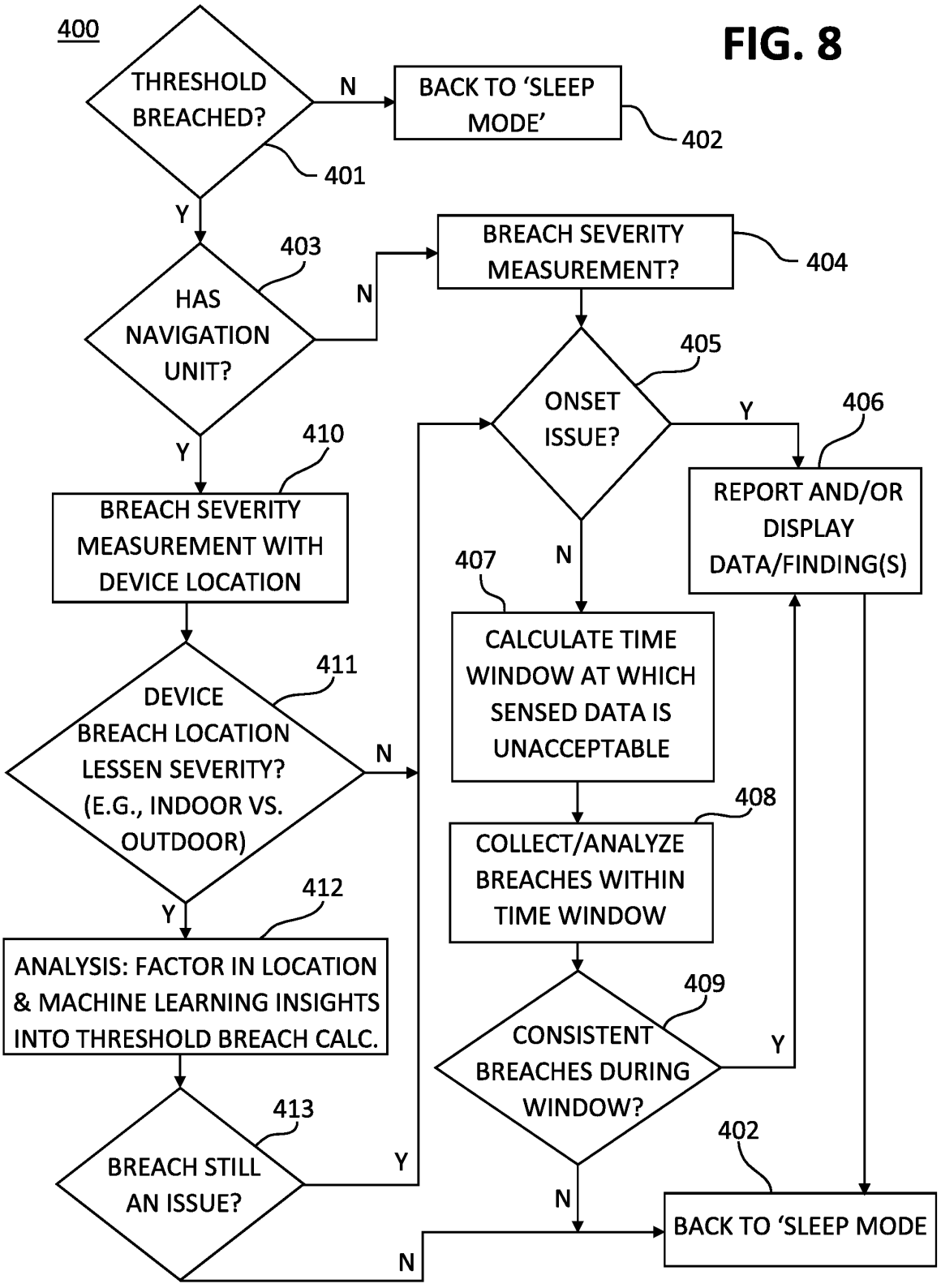


FIG. 7C

FIG. 8


400
THRESHOLD BREACHED?
401
N
BACK TO 'SLEEP MODE'
402
Y
403
HAS NAVIGATION UNIT?
N
BREACH SEVERITY MEASUREMENT?
404
Y
410
BREACH SEVERITY MEASUREMENT WITH DEVICE LOCATION
405
ONSET ISSUE?
Y
406
REPORT AND/OR DISPLAY DATA/FINDING(S)
N
407
CALCULATE TIME WINDOW AT WHICH SENSED DATA IS UNACCEPTABLE
411
DEVICE BREACH LOCATION LESSEN SEVERITY? (E.G., INDOOR VS. OUTDOOR)
N
408
COLLECT/ANALYZE BREACHES WITHIN TIME WINDOW
Y
412
ANALYSIS: FACTOR IN LOCATION & MACHINE LEARNING INSIGHTS INTO THRESHOLD BREACH CALC.
409
CONSISTENT BREACHES DURING WINDOW?
Y
413
BREACH STILL AN ISSUE?
Y
N
402
BACK TO 'SLEEP MODE
N

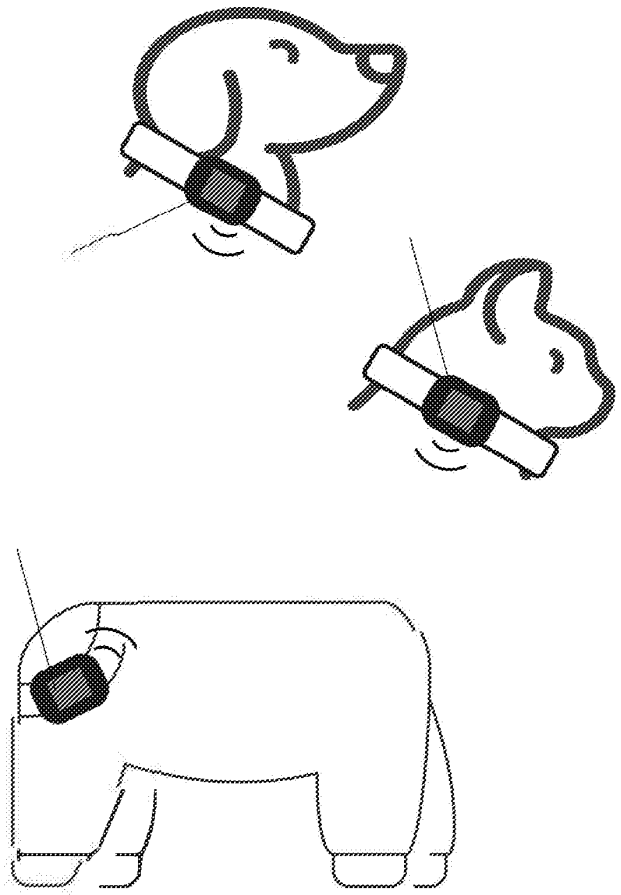


FIG. 9

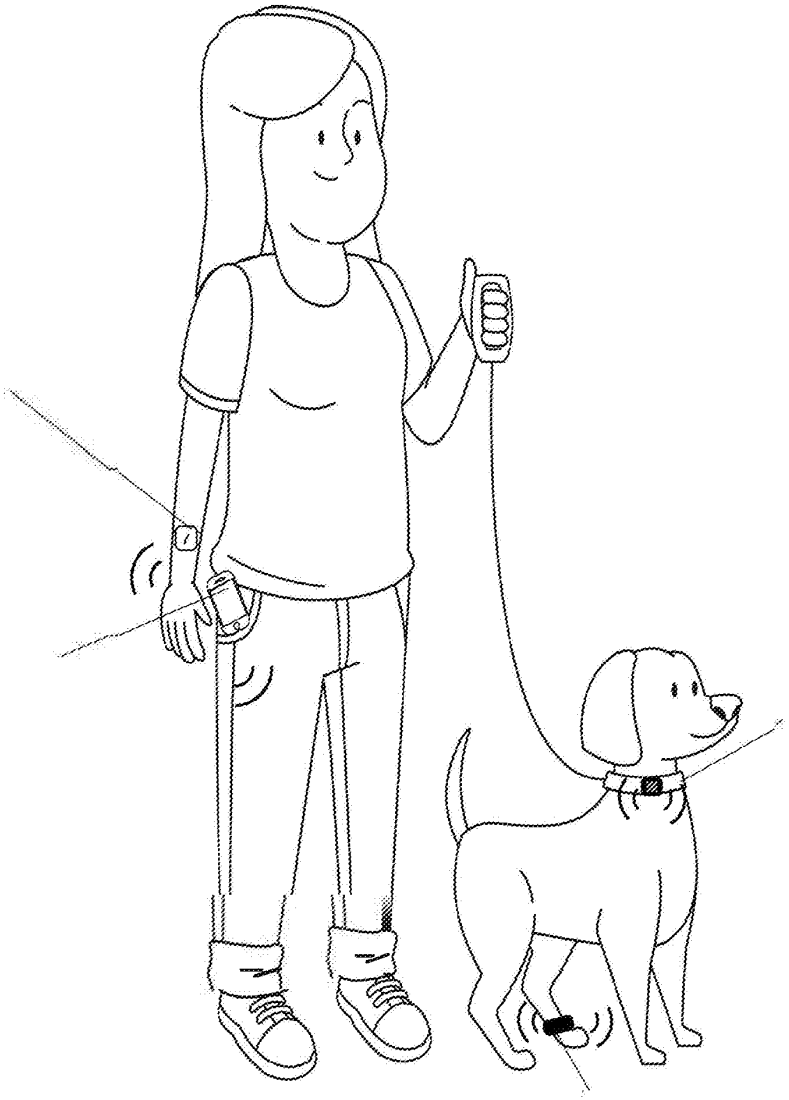


FIG. 10

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	2305LD01 UTL1USCON2
	Application Number	
Title of Invention	MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2:

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 — Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Levaughn		Denton	

Residence Information (Select One) ● US Residency Non US Residency Active US Military Service

City	Baisley Park	State/Province	NY	Country of Residence	US

Mailing Address of Inventor:

Address 1	160-21 118th Rd		
Address 2			
City	Baisley Park	**State/Province**	NY
Postal Code	11434	**Country**	US

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	75207		
Email Address		Add Email	Remove Email

Application Information:

Title of the Invention	MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS		
Attorney Docket Number	2305LD01 UTL1USCON2	**Small Entity Status Claimed**	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	10	**Suggested Figure for Publication (if any)**	

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	2305LD01 UTL1USCON2
	Application Number	
Title of Invention	MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	● Customer Number	US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	75207		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	Continuation of	16421141	2019-05-23

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	2305LD01 UTL1USCON2
	Application Number	
Title of Invention	MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS	

Prior Application Status	Abandoned		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
16421141	Continuation in part of	16155919	2018-10-10
Prior Application Status	Patented		Remove

Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
16155919	Continuation of	14862304	2015-09-23	10127005	2018-11-13

Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
14862304	Claims benefit of provisional	62054286	2014-09-23

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button. Add

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)[i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Remove

Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[i] (if applicable)

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button. Add

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	2305LD01 UTL1USCON2
	Application Number	
Title of Invention	MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS	

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	2305LD01 UTL1USCON2
	Application Number	
Title of Invention	MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS	

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1 Remove

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

Assignee	Legal Representative under 35 U.S.C. 117	Joint Inventor
Person to whom the inventor is obligated to assign.	Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here. ☐

Prefix	**Given Name**	Middle Name	**Family Name**	Suffix

Mailing Address Information For Applicant:

Address 1			
Address 2			
City		**State/Province**	
Country		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button. Add

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	2305LD01 UTL1USCON2
	Application Number	
Title of Invention	MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS	

Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

Remove

If the Assignee or Non-Applicant Assignee is an Organization check here. ☐

Prefix	**Given Name**	Middle Name	**Family Name**	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1			
Address 2			
City		**State/Province**	
Country i		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button. Add

Signature:

Remove

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). **However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).**

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/David Postolski/			Date (YYYY-MM-DD)	2019-10-17
First Name	David	Last Name	Postolski	Registration Number	67547

Additional Signature may be generated within this form by selecting the Add button. Add

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	2305LD01 UTL1USCON2
	Application Number	
Title of Invention	MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS	

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1 The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3 A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent CooperationTreaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Doc Code: MES.GIB
Document Description: Certification of Micro Entity Status (Gross Income Basis)

PTO/SB/15A (07-14)

CERTIFICATION OF MICRO ENTITY STATUS
(GROSS INCOME BASIS)

Application Number or Control Number (if applicable):	Patent Number (if applicable):
First Named Inventor: Levaughn Denton	Title of Invention: MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS AN ASSAILANT

The applicant hereby certifies the following—

(1) **SMALL ENTITY REQUIREMENT –** The applicant qualifies as a small entity as defined in 37 CFR 1.27.

(2) **APPLICATION FILING LIMIT –** Neither the applicant nor the inventor nor a joint inventor has been named as the inventor or a joint inventor on more than four previously filed U.S. patent applications, excluding provisional applications and international applications under the Patent Cooperation Treaty (PCT) for which the basic national fee under 37 CFR 1.492(a) was not paid, and also excluding patent applications for which the applicant has assigned all ownership rights, or is obligated to assign all ownership rights, as a result of the applicant's previous employment.

(3) **GROSS INCOME LIMIT ON APPLICANTS AND INVENTORS –** Neither the applicant nor the inventor nor a joint inventor, in the calendar year preceding the calendar year in which the applicable fee is being paid, had a gross income, as defined in section 61(a) of the Internal Revenue Code of 1986 (26 U.S.C. 61(a)), exceeding the "Maximum Qualifying Gross Income" reported on the USPTO Web site at http://www.uspto.gov/patents/law/micro_entity.jsp which is equal to three times the median household income for that preceding calendar year, as most recently reported by the Bureau of the Census.

(4) **GROSS INCOME LIMIT ON PARTIES WITH AN "OWNERSHIP INTEREST" –** Neither the applicant nor the inventor nor a joint inventor has assigned, granted, or conveyed, nor is under an obligation by contract or law to assign, grant, or convey, a license or other ownership interest in the application concerned to an entity that, in the calendar year preceding the calendar year in which the applicable fee is being paid, had a gross income, as defined in section 61(a) of the Internal Revenue Code of 1986, exceeding the "Maximum Qualifying Gross Income" reported on the USPTO Web site at http://www.uspto.gov/patents/law/micro_entity.jsp which is equal to three times the median household income for that preceding calendar year, as most recently reported by the Bureau of the Census.

SIGNATURE by an authorized party set forth in 37 CFR 1.33(b)

Signature	/David Postolski/				
Name	David Postolski				
Date		Telephone		Registration No.	67547

☐ There is more than one inventor and I am one of the inventors who are jointly identified as the applicant. The required additional certification form(s) signed by the other joint inventor(s) are included with this form.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS
First Named Inventor/Applicant Name:	Levaughn Denton
Filer:	David D. Postolski/Miriam Moore
Attorney Docket Number:	2305LD01UTL1USCON2

Filed as Micro Entity

Filing Fees for Track I Prioritized Examination - Nonprovisional Application under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
BASIC FILING FEE-UTILITY	3011	1	75	75
UTILITY SEARCH FEE	3111	1	165	165
UTILITY EXAMINATION FEE	3311	1	190	190
REQUEST FOR PRIORITIZED EXAMINATION	3817	1	1000	1000
Pages:				
Claims:				
Miscellaneous-Filing:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
PUBL. FEE- EARLY, VOLUNTARY, OR NORMAL	1504	1	0	0
PROCESSING FEE, EXCEPT PROV. APPLS.	3830	1	35	35
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**1465**

Electronic Acknowledgement Receipt

EFS ID:	37490565
Application Number:	16656259
International Application Number:	
Confirmation Number:	7312
Title of Invention:	MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS
First Named Inventor/Applicant Name:	Levaughn Denton
Customer Number:	75207
Filer:	David D. Postolski/Miriam Moore
Filer Authorized By:	David D. Postolski
Attorney Docket Number:	2305LD01UTL1USCON2
Receipt Date:	17-OCT-2019
Filing Date:	
Time Stamp:	17:33:21
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$1465
RAM confirmation Number	E20190GH35025165
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	TrackOne Request	Track1.pdf	140370 70aea6e50c1744ed674b90e9294a208f01134bba	no	2
Warnings:					
Information:					
2		2305LD01UTL1USCON2_191010_Application_FINAL.pdf	352117 5bf7655c78fedfbd3b76c43cf2fc15e229902c55	yes	44

Multipart Description/PDF files in .zip description

Document Description	Start	End
Abstract	44	44
Claims	38	43
Specification	1	37

Warnings:					
Information:					
3	Drawings-only black and white line drawings	Figures.pdf	1348321 d3e7a49990c94cd600013aa6868bef070e27c84a	no	11
Warnings:					
Information:					
4	Application Data Sheet	ADS.pdf	1256047 a4ba473ed995fac2930413463724a5a03f25ceb9	no	8
Warnings:					
Information:					
5	Certification of Micro Entity (Gross Income Basis)	MicroEntity.pdf	119778 0f35d3fe252eec43f556de8ee8da5ecc842f9d9d	no	2

Warnings:					
Information:					
6	Fee Worksheet (SB06)	fee-info.pdf	40243 907649c7533c8b2a98286972c792a173b4a3f438	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	3256876		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Doc Code: PA..
Document Description: Power of Attorney

PTO/AIA/82A (07-13)
Approved for use through 11/30/2014. OMB 0651-0051
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5, unless the application number and filing date are identified in the Power of Attorney by Applicant form. If neither form PTO/AIA/82A nor form PTO/AIA82B identifies the application to which the Power of Attorney is directed, the Power of Attorney will not be recognized in the application.

Application Number	New Application
Filing Date	Herewith
First Named Inventor	Levaughn Denton
Title	Multi-Frequency Sensing Method and Apparatus Using Mobile-Based Clusters
Art Unit	Unassigned
Examiner Name	Unassigned
Attorney Docket Number	2305LD01UTL1USCIP

SIGNATURE of Applicant or Patent Practitioner

Signature	/David Postolski/	Date (Optional)	
Name	David Postolski	Registration Number	67547
Title (if Applicant is a juristic entity)			
Applicant Name (if Applicant is a juristic entity)			

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.

☐ *Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Doc Code: PA..
Document Description: Power of Attorney

PTO/AIA/82B (07-13)
Approved for use through 11/30/2014. OMB 0651-0051
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number

POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in either the attached transmittal letter or the boxes below.

Application Number	Filing Date

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)

☑ I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above: 75207

OR

☐ I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

Please recognize or change the correspondence address for the application identified in the attached transmittal letter or the boxes above to:

☑ The address associated with the above-mentioned Customer Number

OR

☐ The address associated with Customer Number:

OR

Firm or Individual Name					
Address					
City		State		Zip	
Country					
Telephone		Email			

I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

☑ Inventor or Joint Inventor (title not required below)

☐ Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)

☐ Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)

☐ Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature	/Levaughn Denton/	Date (Optional)	10/5/2018
Name	Levaughn Denton		
Title			

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.

☐ Total of forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Electronic Acknowledgement Receipt

EFS ID:	37490743
Application Number:	16656259
International Application Number:	
Confirmation Number:	7312
Title of Invention:	MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS
First Named Inventor/Applicant Name:	Levaughn Denton
Customer Number:	75207
Filer:	David D. Postolski/Miriam Moore
Filer Authorized By:	David D. Postolski
Attorney Docket Number:	2305LD01 UTL1USCON2
Receipt Date:	17-OCT-2019
Filing Date:	
Time Stamp:	17:43:30
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Oath or Declaration filed	2305LD01UTL1USCIP_DEC.pdf	150415 a19e38f4b11965c18330105ee8b92c05c7b6ac28	no	2

Warnings:

Information:					
2	Power of Attorney	2305LD01UTL1USCIP_POA.pdf	147153 2d19d71e630d2a2939b741391b40e9432947e973	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	297568	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/AIA/01 (06-12)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	Multi-Frequency Sensing Method and Apparatus Using Mobile-Based Clusters

As the below named inventor, I hereby declare that:

This declaration is directed to:

- [■] The attached application, or
- [ ] United States application or PCT international application number _____

  filed on _____.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

LEGAL NAME OF INVENTOR

Inventor: Levaughn Denton Date (Optional): 10/5/2018

Signature: _____

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/656,259	10/17/2019	Levaughn Denton	2305LD01 UTL1USCON2

CONFIRMATION NO. 7312

75207
Gearhart Law LLC
41 River Road
Suite 1A
Summit, NJ 07901

FORMALITIES LETTER

OC000000112369315

Date Mailed: 11/05/2019

NOTICE TO FILE CORRECTED APPLICATION PAPERS

Filing Date Granted

An application number and filing date have been accorded to this application. The application is informal since it does not comply with the regulations for the reason(s) indicated below. Applicant is given **TWO MONTHS** from the date of this Notice within which to correct the informalities indicated below. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

The required item(s) identified below must be timely submitted to avoid abandonment:

- Replacement drawings in compliance with 37 CFR 1.84 and 37 CFR 1.121(d) are required. The drawings submitted are not acceptable because:
  - The drawings submitted to the Office are not electronically reproducible because portions of figures 4, 7B and 7C are missing and/or blurry.
  - The application contains a section in the specification containing the brief description of the figures, but is missing the description of Figure(s) **9 and 10** as required by 37 CFR 1.74 and 37 CFR 1.77(b)(9). A brief description of each drawing figure presented is required to satisfy this requirement.
    - To add a brief description of a figure, a proper substitute specification in compliance with 37 CFR 1.121(b)(3) and 1.125, providing a brief description of each drawing figure presented, must be submitted. See also 37 CFR 1.77(b)(9).

  Note: If applicant wishes to delete the undescribed figure, replacement sheets must be submitted to renumber the figure(s) consecutively.

Applicant is cautioned that correction of the above items may cause the specification and drawings page count to exceed 100 pages. If the specification and drawings exceed 100 pages, applicant will need to submit the required application size fee.

Replies must be received in the USPTO within the set time period or must include a proper Certificate of Mailing or Transmission under 37 CFR 1.8 with a mailing or transmission date within the set time period. For more information and a suggested format, see Form PTO/SB/92 and MPEP 512.

Replies should be mailed to:

Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

Registered users of EFS-Web may alternatively submit their reply to this notice via EFS-Web, including a copy of this Notice and selecting the document description "Applicant response to Pre-Exam Formalities Notice". https://sportal.uspto.gov/authenticate/AuthenticateUserLocalEPF.html

For more information about EFS-Web please call the USPTO Electronic Business Center at 1-866-217-9197 or visit our website at http://www.uspto.gov/ebc.

If you are not using EFS-Web to submit your reply, you must include a copy of this notice.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/elbanaybanay/

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 16/656,259

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	75
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	165
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	190
TOTAL CLAIMS (37 CFR 1.16(i))	20 minus 20 =	*			OR	x 25 =	0.00
INDEPENDENT CLAIMS (37 CFR 1.16(h))	2 minus 3 =	*				x 115 =	0.00
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						0.00
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	430

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE($)	ADDITIONAL FEE($)	OR	RATE($)	ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
16/656,259	10/17/2019	2654	430	2305LD01 UTL1USCON2	20	2

CONFIRMATION NO. 7312

FILING RECEIPT

75207
Gearhart Law LLC
41 River Road
Suite 1A
Summit, NJ 07901

OC000000112389314

Date Mailed: 11/05/2019

Receipt is acknowledged of this non-provisional utility patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF FIRST INVENTOR, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection.

Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections provided that the request is grantable.

Inventor(s)

Levaughn Denton, Baisley Park, NY;

Applicant(s)

Levaughn Denton, Baisley Park, NY;

Power of Attorney: The patent practitioners associated with Customer Number 75207

Domestic Priority data as claimed by applicant

This application is a CON of 16/421,141 05/23/2019
which is a CIP of 16/155,919 10/10/2018 ABN
which is a CON of 14/862,304 09/23/2015 PAT 10127005
which claims benefit of 62/054,286 09/23/2014

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 11/04/2019

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 16/656,259**

Projected Publication Date: To Be Determined - pending completion of Corrected Papers

Non-Publication Request: No

Early Publication Request: No

**** MICRO ENTITY ****

Title

MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS

Preliminary Class

381

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

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Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

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technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

Electronic Acknowledgement Receipt

EFS ID:	38217305
Application Number:	16656259
International Application Number:	
Confirmation Number:	7312
Title of Invention:	MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS
First Named Inventor/Applicant Name:	Levaughn Denton
Customer Number:	75207
Filer:	David D. Postolski/Miriam Moore
Filer Authorized By:	David D. Postolski
Attorney Docket Number:	2305LD01UTL1USCON2
Receipt Date:	06-JAN-2020
Filing Date:	17-OCT-2019
Time Stamp:	18:34:35
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Drawings-other than black and white line drawings	Replacement_Figures.pdf	2214951 c818e4f8ec9d7bf30177f130156011ed5b2fde31	no	11

Warnings:

Information:					
2	Applicant Response to Pre-Exam Formalities Notice	Response.pdf	462979 261e7b478f9e65c981141d060921f73b00e2708e	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	2677930	

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

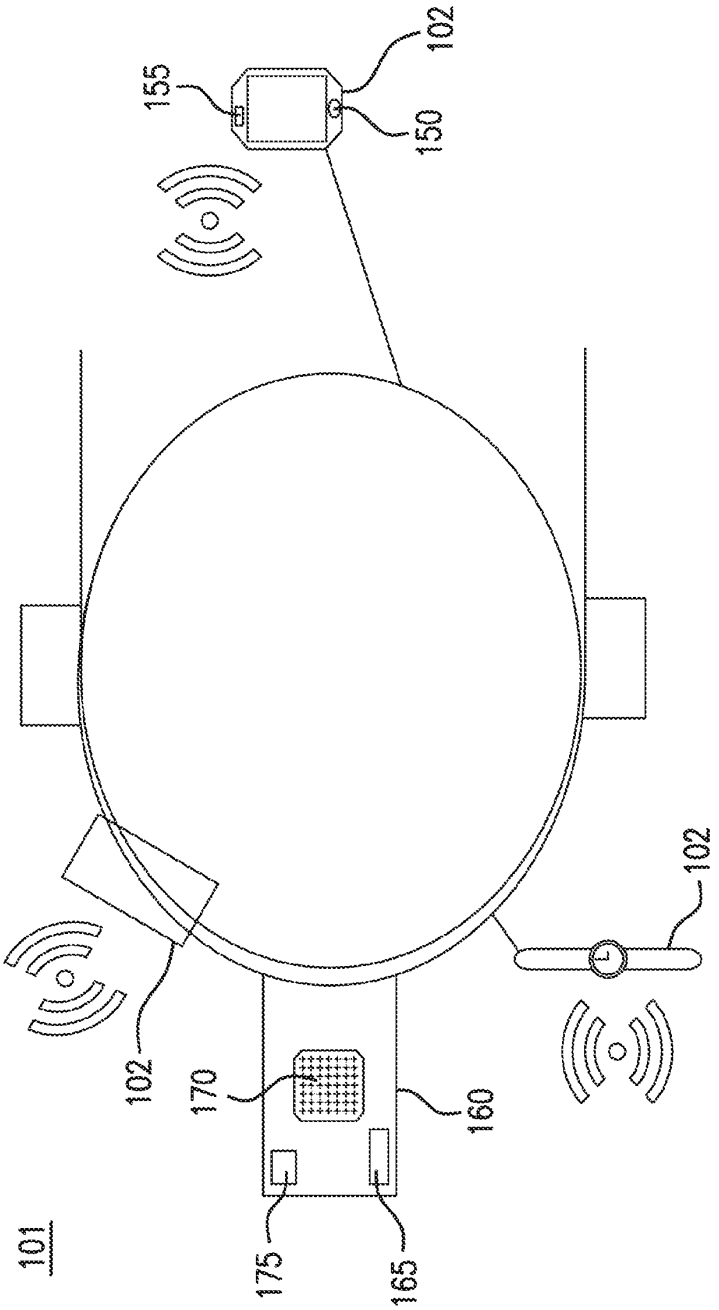

FIG. 1

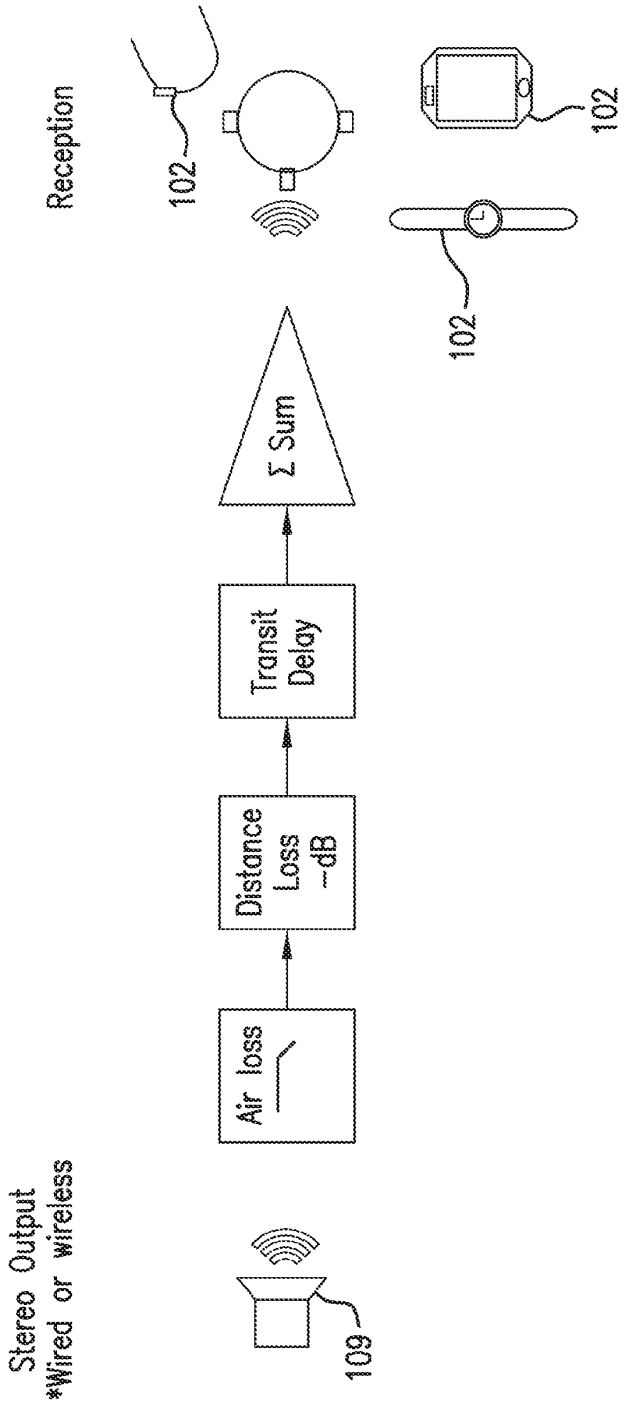
Stereo Output
*Wired or wireless
109
Air loss
Distance Loss -dB
Transit Delay
Σ Sum
Reception
102
102
102

FIG. 2

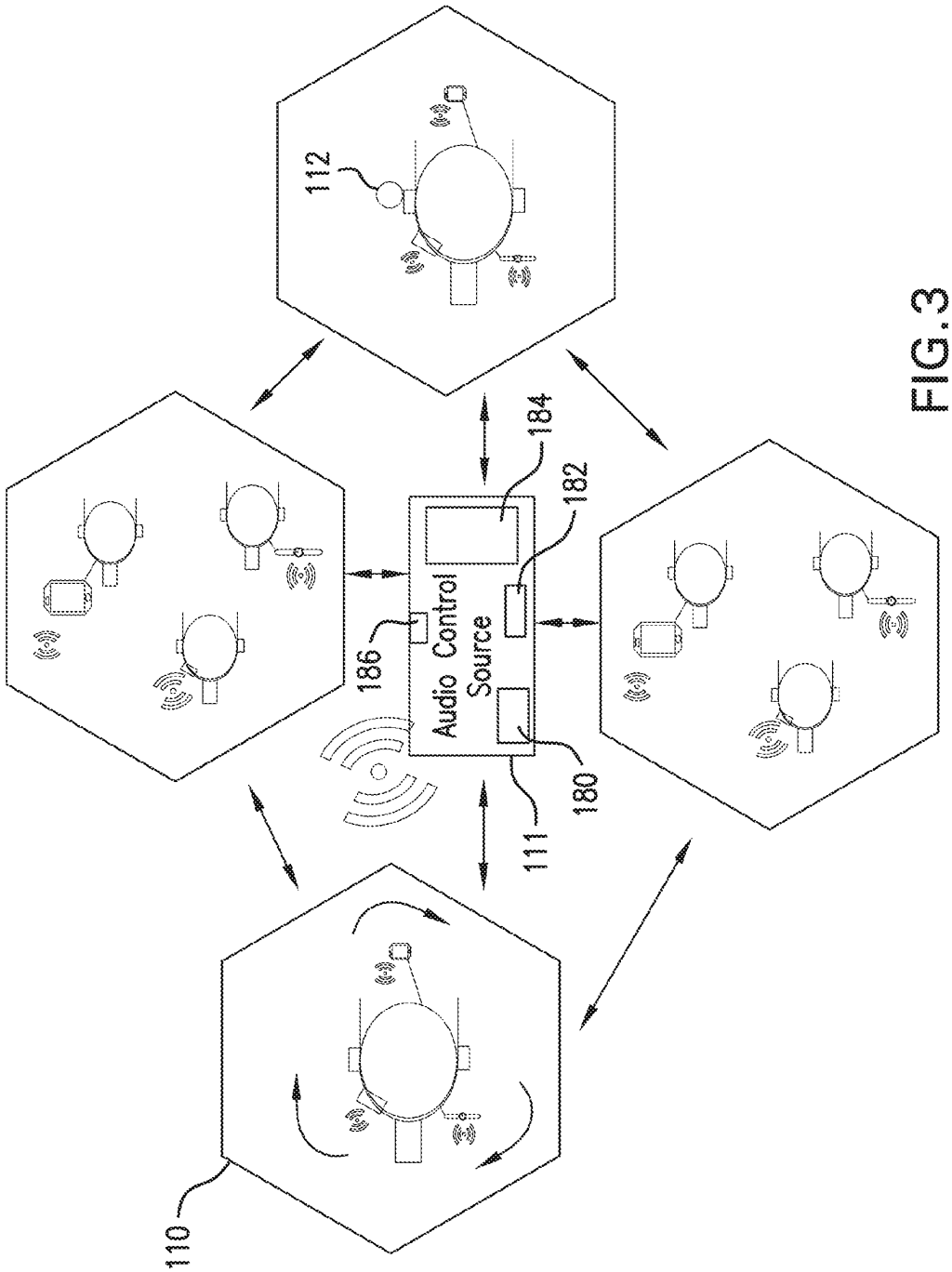

FIG.3

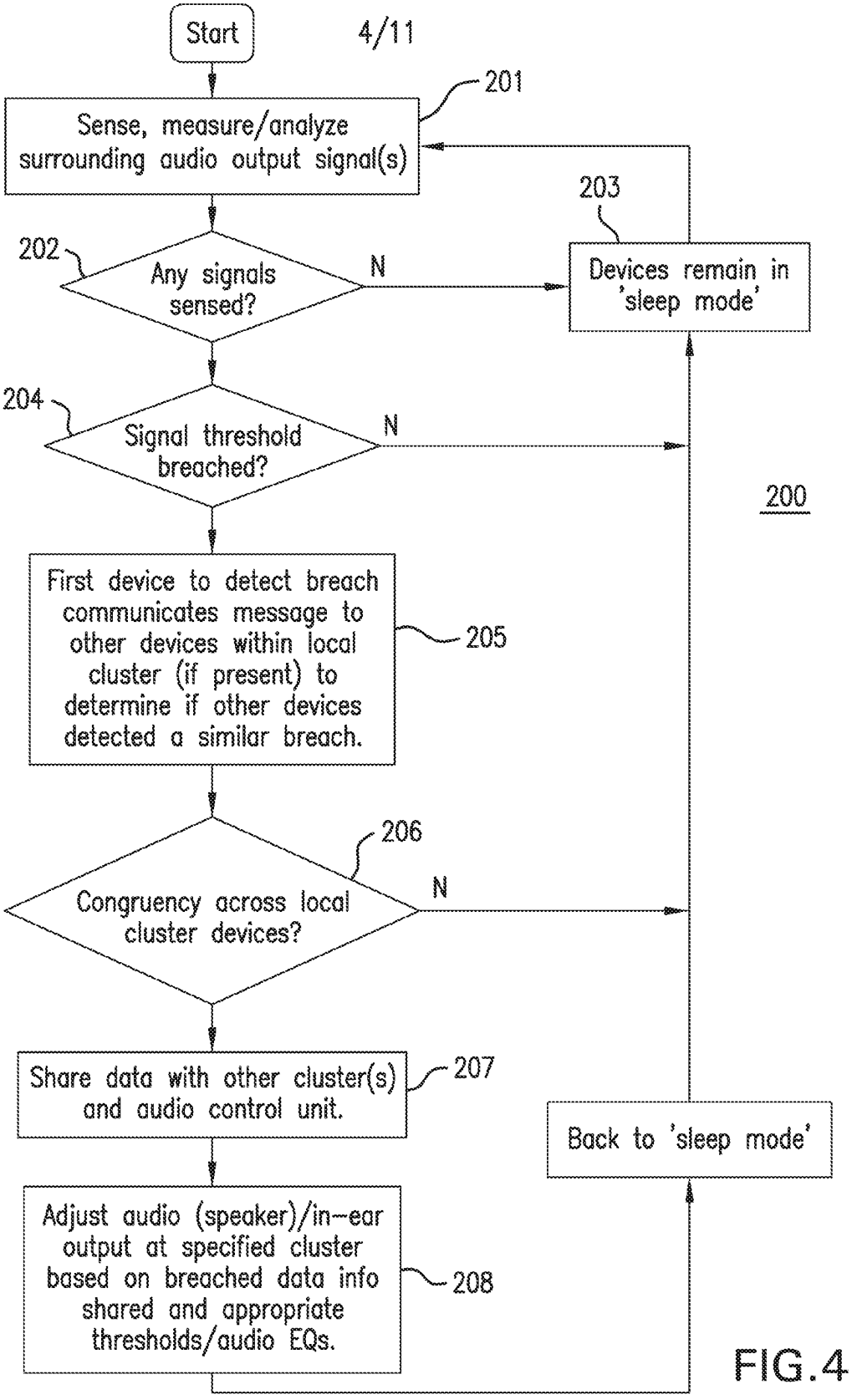
Start
201
Sense, measure/analyze surrounding audio output signal(s)
203
202
Any signals sensed?
N
Devices remain in 'sleep mode'
204
Signal threshold breached?
N
200
First device to detect breach communicates message to other devices within local cluster (if present) to determine if other devices detected a similar breach.
205
206
Congruency across local cluster devices?
N
Share data with other cluster(s) and audio control unit.
207
Back to 'sleep mode'
Adjust audio (speaker)/in-ear output at specified cluster based on breached data info shared and appropriate thresholds/audio EQs.
208

FIG.4

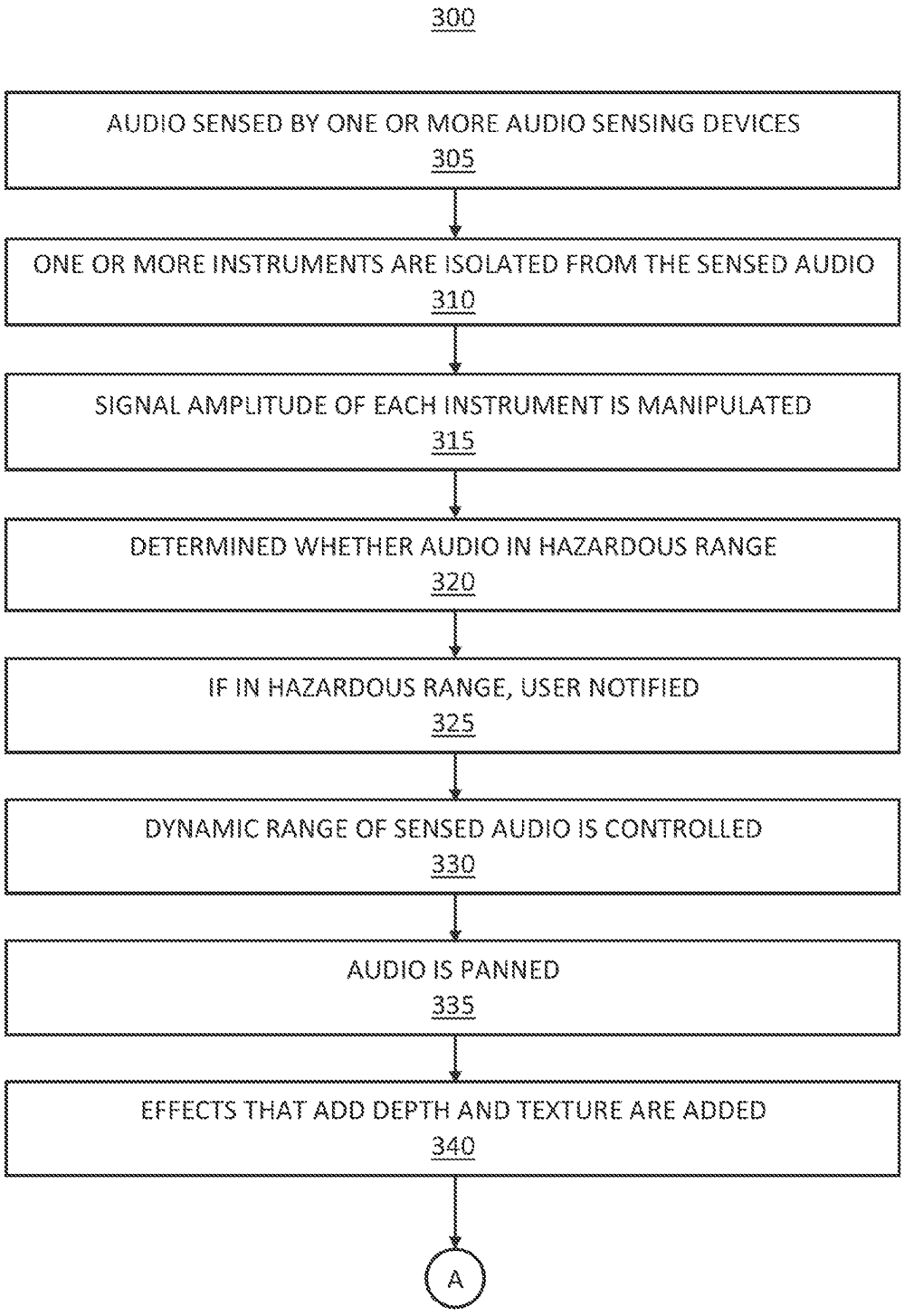
300
AUDIO SENSED BY ONE OR MORE AUDIO SENSING DEVICES
305
ONE OR MORE INSTRUMENTS ARE ISOLATED FROM THE SENSED AUDIO
310
SIGNAL AMPLITUDE OF EACH INSTRUMENT IS MANIPULATED
315
DETERMINED WHETHER AUDIO IN HAZARDOUS RANGE
320
IF IN HAZARDOUS RANGE, USER NOTIFIED
325
DYNAMIC RANGE OF SENSED AUDIO IS CONTROLLED
330
AUDIO IS PANNED
335
EFFECTS THAT ADD DEPTH AND TEXTURE ARE ADDED
340
A

FIG.5

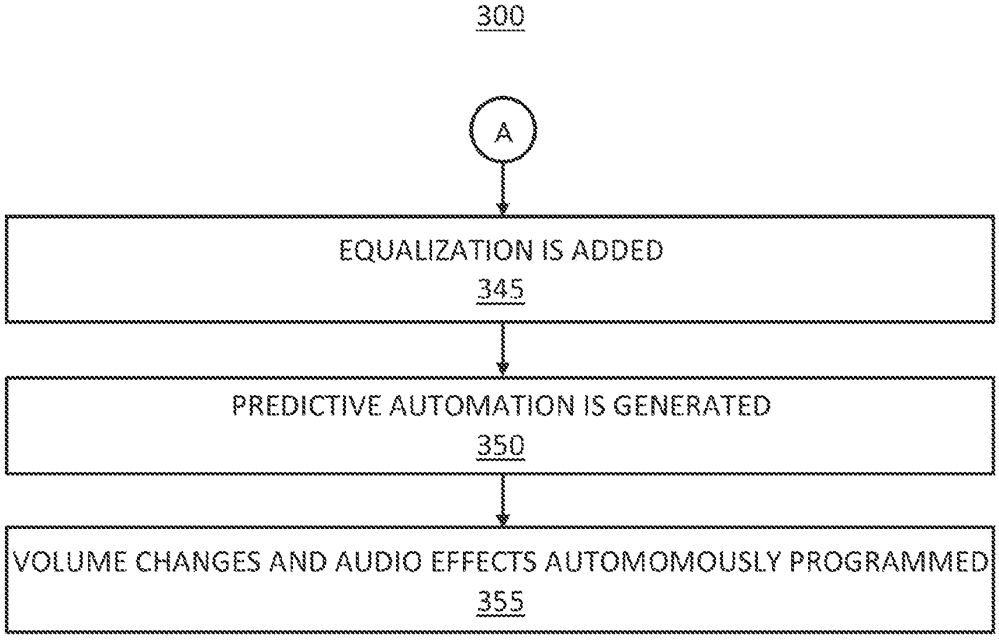
300
A
EQUALIZATION IS ADDED
345
PREDICTIVE AUTOMATION IS GENERATED
350
VOLUME CHANGES AND AUDIO EFFECTS AUTOMOMOUSLY PROGRAMMED
355

FIG.6

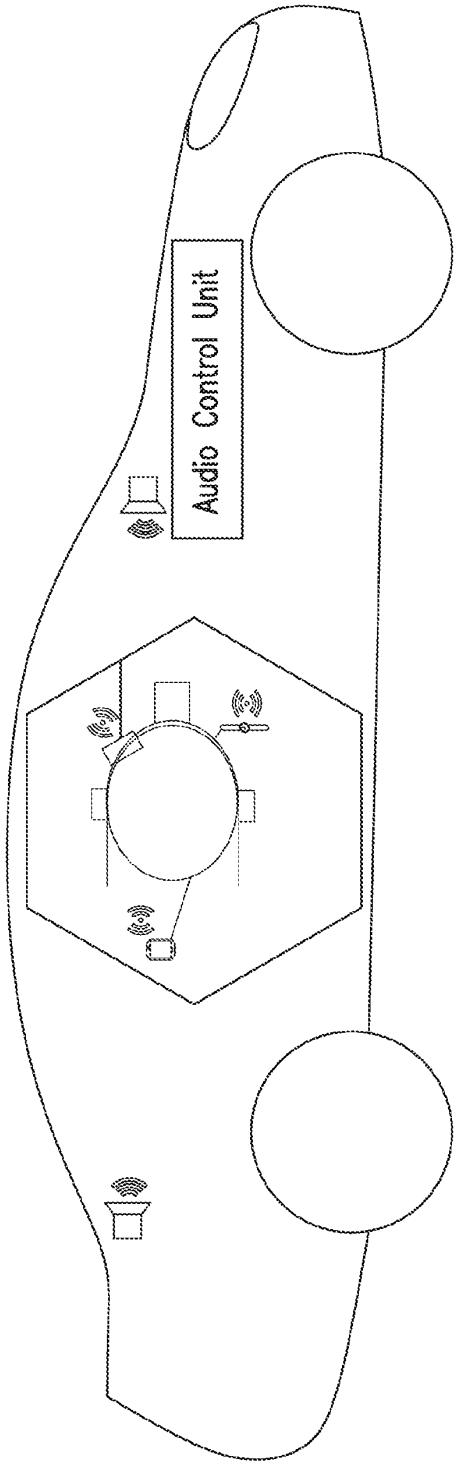

FIG. 7A

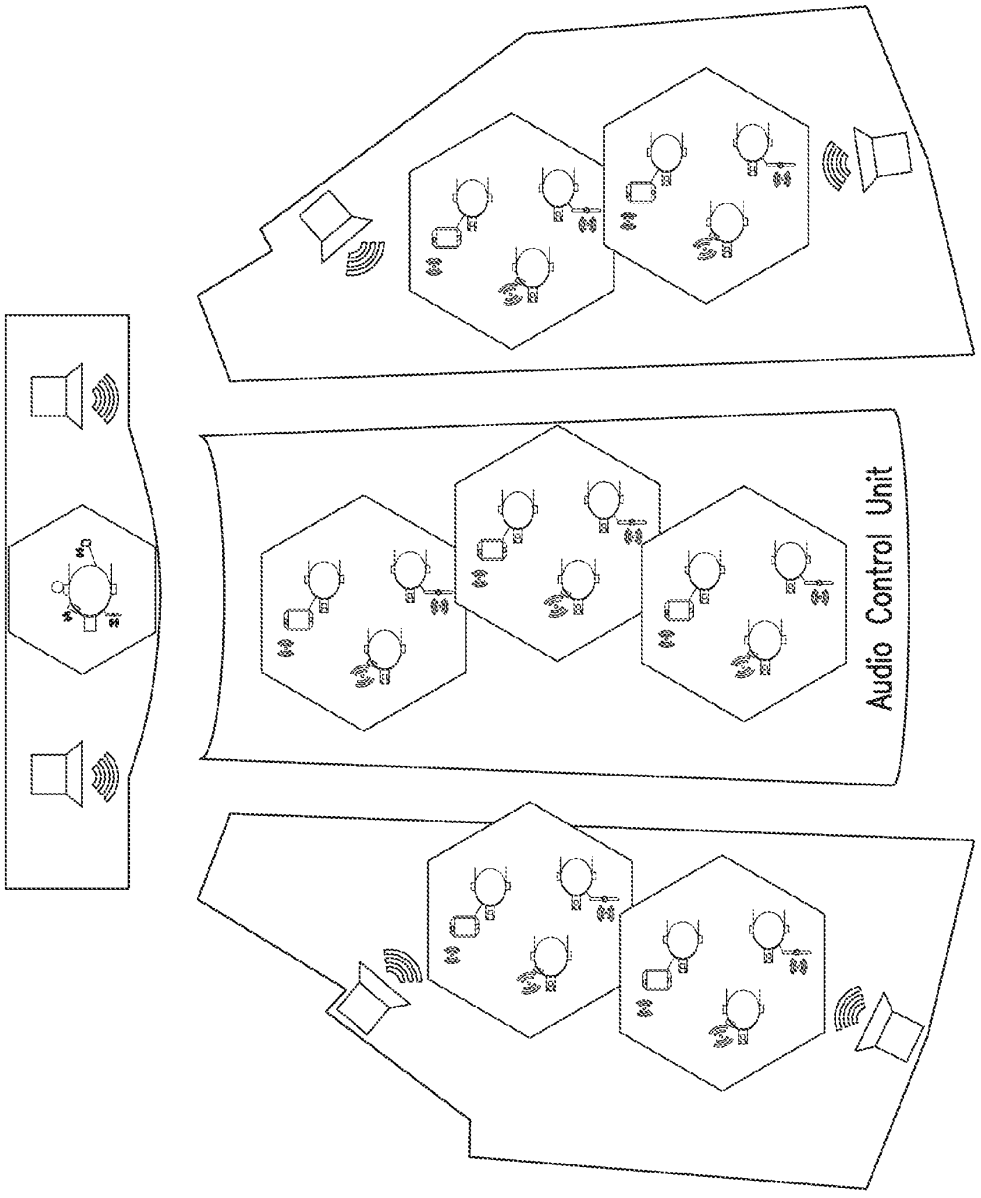

FIG.7B

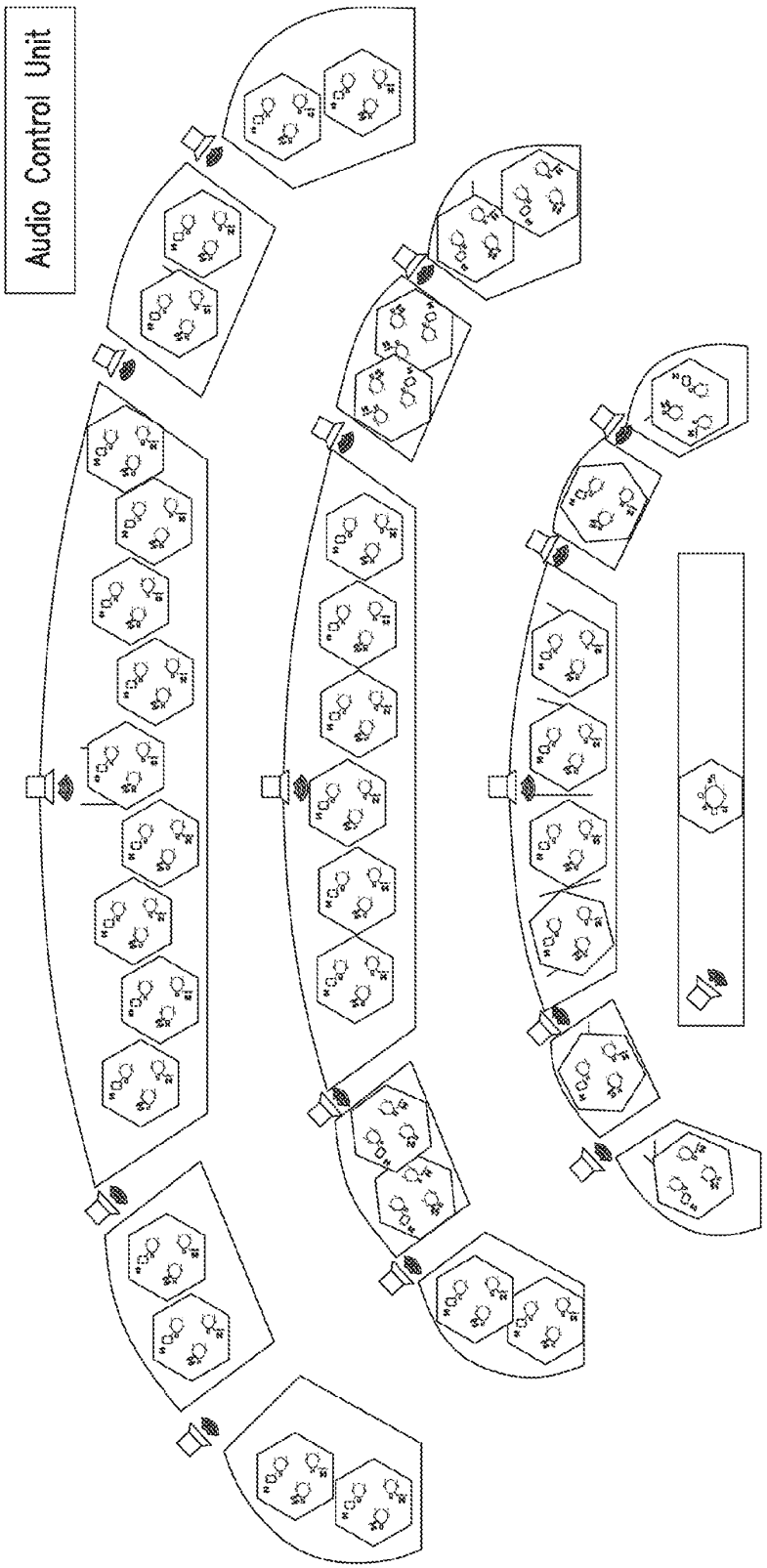

FIG. 7C

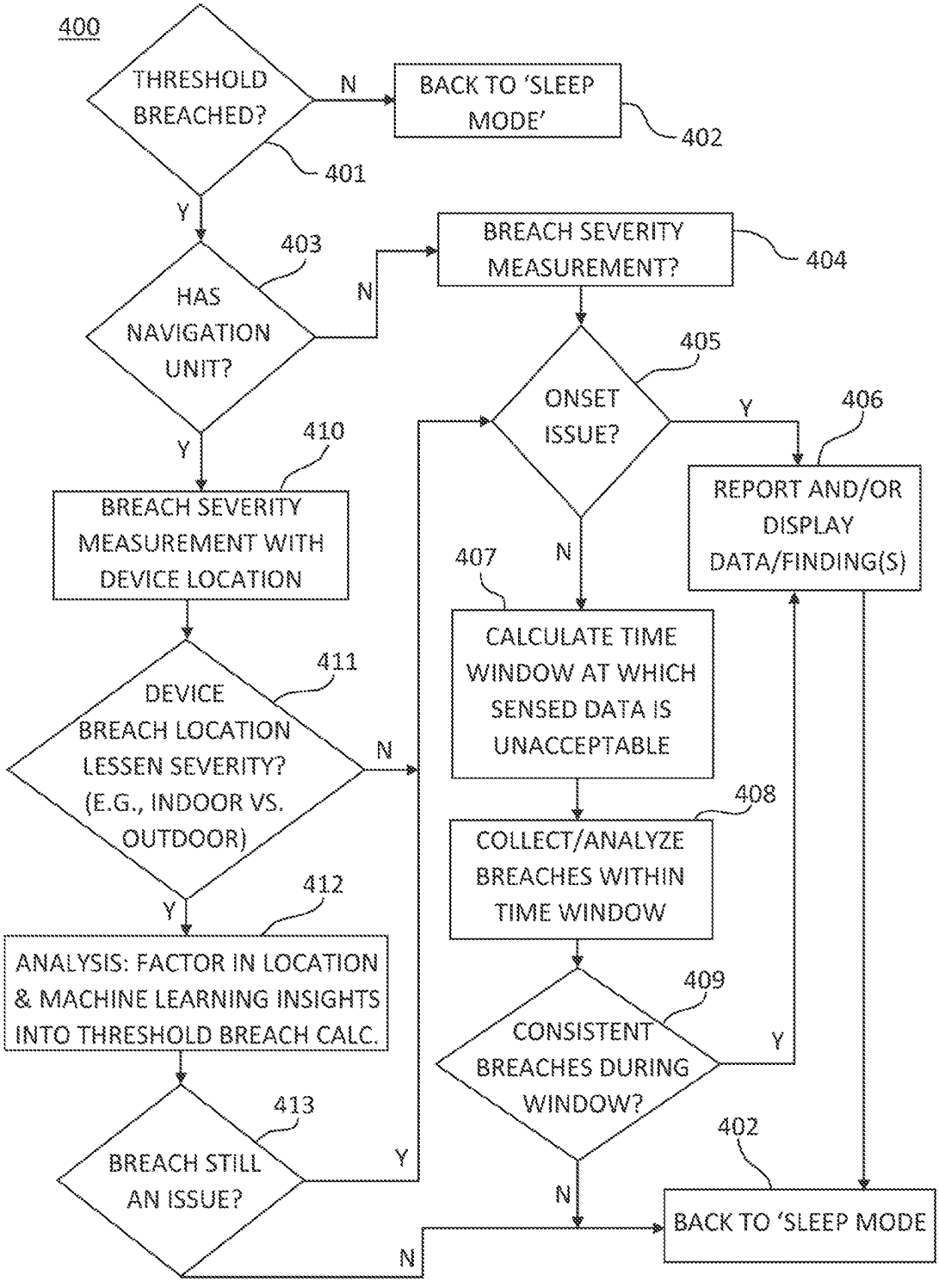
400
THRESHOLD BREACHED?
N
BACK TO 'SLEEP MODE'
402
401
Y
403
HAS NAVIGATION UNIT?
N
BREACH SEVERITY MEASUREMENT?
404
Y
405
ONSET ISSUE?
Y
406
REPORT AND/OR DISPLAY DATA/FINDING(S)
410
BREACH SEVERITY MEASUREMENT WITH DEVICE LOCATION
N
407
CALCULATE TIME WINDOW AT WHICH SENSED DATA IS UNACCEPTABLE
411
DEVICE BREACH LOCATION LESSEN SEVERITY? (E.G., INDOOR VS. OUTDOOR)
N
408
COLLECT/ANALYZE BREACHES WITHIN TIME WINDOW
Y
412
ANALYSIS: FACTOR IN LOCATION & MACHINE LEARNING INSIGHTS INTO THRESHOLD BREACH CALC.
409
CONSISTENT BREACHES DURING WINDOW?
Y
413
BREACH STILL AN ISSUE?
Y
402
N
BACK TO 'SLEEP MODE
N

FIG.8

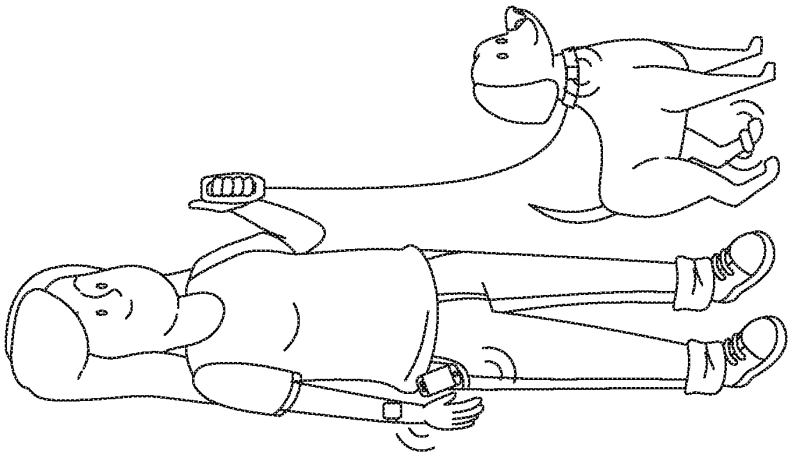

FIG.10

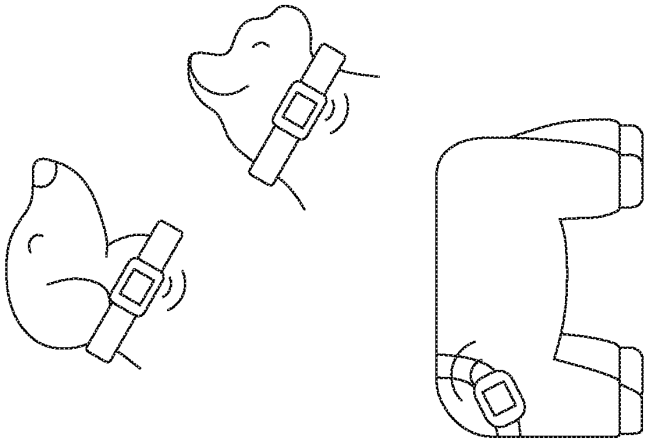

FIG.9

IN THE UNITED STATES PATENT DESIGNATED/ELECTED OFFICE (DO/EO/US)

In Re Patent Application of: **Levaughn Denton**		:	
Conf. No.:	7312	:	Group Art Unit: 2654
Appln. No.:	16/656,259	:	Examiner:
Filing Date:	October 17, 2019	:	Attorney Docket No.: 2305LD01UTL1USCON2

Title: MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS

RESPONSE TO NOTICE TO FILE CORRECTED APPLICATION PAPERS

This is in response to the Notice to File Corrected Application Papers dated November 5, 2019 ("Notice"), giving a two-month period for reply. This reply is timely as submitted. No fees are deemed necessary in connection with the filing of this Response. However, if any additional fee is required or has been overpaid, authorization is hereby given to charge/credit the amount of such fee to Deposit Account No. 60-1818. The Applicant respectfully requests that the Examiner enter the following amendments, without prejudice, to the above-identified application:

Remarks begin on page 2.

REMARKS

Applicant submits Figures 1-10 contained on Replacement Sheets 1-11. No new matter is added with this submission.

Applicant believes that the foregoing submissions correct the defects outlined in the Notice.

Respectfully Submitted,

/David D. Postolski/

David D. Postolski, Esq.
Attorney for Applicants
Reg. No. 67,547

Gearhart Law, LLC
Innovation Plaza, Suite 1A
41 River Road, Summit NJ 07901
T (908) 273 0700 F (908) 273 0711

DocCode – SCORE

SCORE Placeholder Sheet for IFW Content

Application Number: 16656259 Document Date: 01/06/2020

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Since this was an electronic submission, there is no physical artifact folder, no artifact folder is recorded in PALM, and no paper documents or physical media exist. The TIFF images in the IFW record were created from the original documents that are stored in SCORE.

- Drawing

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- USPTO employees may access SCORE content via DAV or via the SCORE web page.
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Form Revision Date: March 1, 2019

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Alexandria, Virginia 22313-1450
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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/656,259	10/17/2019	Levaughn Denton	2305LD01UTL1USCON2

CONFIRMATION NO. 7312

75207
Gearhart Law LLC
41 River Road
Suite 1A
Summit, NJ 07901

FORMALITIES LETTER

OC000000113824807

Date Mailed: 01/10/2020

NOTICE OF INCOMPLETE REPLY (NONPROVISIONAL)

Filing Date Granted

The U.S. Patent and Trademark Office has received your reply on 01/06/2020 to the NOTICE TO FILE CORRECTED APPLICATION PAPERS (Notice) mailed 11/05/2019 and it has been entered into the application. The reply, however, is not a complete reply for the reason(s) listed below. A complete reply must be timely filed to prevent ABANDONMENT of the above-identified application. Replies should be mailed to: Mail Stop Missing Parts, Commissioner for Patents, P.O.Box 1450, Alexandria VA 22313-1450.

The period for reply continues to run from the date of the Notice mailed 11/05/2019. Applicant must submit all required items and pay any fees required below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the appropriate extension fee under the provisions of 37 CFR 1.136(a).

Applicant's reply to the Notice mailed on 11/05/2019 was received in the U.S. Patent and Trademark Office on 01/06/2020, after the expiration of the two month period for reply set forth in the Notice. The application will become abandoned unless applicant obtains an extension of the period for reply, as above. The petition must be accompanied by the appropriate fee as set forth in 37 CFR 1.17 (see the current fees below). The date on which the reply, the petition, and the fee have been filed is the date of the reply and also the date for purposes of determining the period of extension and the corresponding amount of the fee due. The expiration of the time period is determined by the amount of the fee paid. Applicant is advised that extensions may not be granted under 37 CFR 1.136(a) for more than FIVE MONTHS beyond the time period set in the Notice.

The items listed below were received untimely:
- The drawings received 01/06/2020.

Items Required to Avoid Abandonment:

The required items noted below SHOULD be filed along with any items required above.

The application is informal since it does not comply with the regulations for the reason(s) indicated below.

The required item(s) identified below must be timely submitted to avoid abandonment:

- Replacement drawings in compliance with 37 CFR 1.84 and 37 CFR 1.121(d) are required. The drawings submitted are not acceptable because:
  - The application contains a section in the specification containing the brief description of the figures, but is missing the description of Figure(s) **9, 10** as required by 37 CFR 1.74 and 37 CFR 1.77(b)(9). A brief description of each drawing figure presented is required to satisfy this requirement.

- To add a brief description of a figure, a proper substitute specification in compliance with 37 CFR 1.121(b)(3) and 1.125, providing a brief description of each drawing figure presented, must be submitted. See also 37 CFR 1.77(b)(9).

Note: If applicant wishes to delete the undescribed figure, replacement sheets must be submitted to renumber the figure(s) consecutively.

Applicant is cautioned that correction of the above items may cause the specification and drawings page count to exceed 100 pages. If the specification and drawings exceed 100 pages, applicant will need to submit the required application size fee.

Mail date of Notice:	11/05/2019
Last date that extension may be obtained: (Note: The petition and fee must be received by this date, or include a proper certificate of mailing under 37 CFR 1.8 with a date on or before this date, and extend the time to include this date.)	06/05/2020

Length of Extension of Time	Fee under 37 CFR 1.17(a) effective March 19, 2013		
(response due on or before)	Undiscounted	Small Entity	Micro Entity
One Month (02/05/2020)	$200	$100	$50
Two Months (03/05/2020)	$600	$300	$150
Three Months (04/05/2020)	$1400	$700	$350
Four Months (05/05/2020)	$2200	$1100	$550
Five Months (06/05/2020)	$3000	$1500	$750

Replies must be received in the USPTO within the set time period or must include a proper Certificate of Mailing or Transmission under 37 CFR 1.8 with a mailing or transmission date within the set time period. For more information and a suggested format, see Form PTO/SB/92 and MPEP 512.

Replies should be mailed to:

Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

Registered users of EFS-Web may alternatively submit their reply to this notice via EFS-Web, including a copy of this Notice and selecting the document description "Applicant response to Pre-Exam Formalities Notice". https://sportal.uspto.gov/authenticate/AuthenticateUserLocalEPF.html

For more information about EFS-Web please call the USPTO Electronic Business Center at 1-866-217-9197 or visit our website at http://www.uspto.gov/ebc.

If you are not using EFS-Web to submit your reply, you must include a copy of this notice.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/agizaw/

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 16/656,259

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	75
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	165
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	190
TOTAL CLAIMS (37 CFR 1.16(i))	20 minus 20 =	*			OR	x 25 =	0.00
INDEPENDENT CLAIMS (37 CFR 1.16(h))	2 minus 3 =	*				x 115 =	0.00
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						0.00
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	430

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE($)	ADDITIONAL FEE($)	OR	RATE($)	ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Patent Application of: Levaughn Denton			
Conf. No.:	7312	Group Art Unit:	2654
Appln. No.:	16/656,259	Examiner:	Not Yet Assigned
Filing Date:	10-17-2019	Attorney Docket No.:	2305LD01UTL1USCON2

Title: MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS

RESPONSE TO NOTICE OF INCOMPLETE REPLY
WITH SUBSTITUTE SPECIFICATION

Mail Stop: Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In response to the Notice of Incomplete Reply mailed on January 10, 2020, attached herewith is a substitute specification (Marked-Up and Clean versions). The substitute specification includes a brief description of Figures 9 and 10 as required by the Notice to File Corrected Application Papers dated November 5, 2019. No new matter has been added.

Entry of this document should complete all the filing formalities and fully satisfy all requirements. Examination and allowance of this application in due course are respectfully solicited.

Applicant submits herewith a five-month extension of time along with the required $750 fee.

No additional fees are believed due. However, the Commissioner is hereby authorized to charge any fee (or credit any overpayment) associated for this filing to Deposit Account No. 601818.

Respectfully Submitted,

/David Postolski/

David Postolski, Esq.
Reg. No. 67547
Attorney for Applicants

Date: May 27, 2020

ABSTRACT

The systems and methods described relate to the concept that smart devices can be used to 1) sense various types of phenomena like sound, blue light exposure, RF and microwave radiation, and 2) in real-time analyze, report and/or control outputs (e.g., displays or speakers). The systems are configurable and use standard computing devices, such as wearable electronics, tablet computers, and mobile phones to measure various frequency bands across multiple points, allowing a single user to visualize and/or adjust environmental conditions.

Electronic Patent Application Fee Transmittal

Application Number:	16656259
Filing Date:	17-Oct-2019
Title of Invention:	MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS
First Named Inventor/Applicant Name:	Levaughn Denton
Filer:	David D. Postolski/Kristin Bennett
Attorney Docket Number:	2305LD01UTL1USCON2

Filed as Micro Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension - 5 months with $0 paid	3255	1	750	750
Miscellaneous:				
		Total in USD ($)		**750**

Electronic Acknowledgement Receipt

EFS ID:	39553247
Application Number:	16656259
International Application Number:	
Confirmation Number:	7312
Title of Invention:	MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS
First Named Inventor/Applicant Name:	Levaughn Denton
Customer Number:	75207
Filer:	David D. Postolski/Kristin Bennett
Filer Authorized By:	David D. Postolski
Attorney Docket Number:	2305LD01UTL1USCON2
Receipt Date:	27-MAY-2020
Filing Date:	17-OCT-2019
Time Stamp:	16:52:12
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Applicant Response to Pre-Exam Formalities Notice	2305LD01UTL1USCON2_Response_to_Notice_of_Incomplete_Reply.pdf	126145 f72af87a15ca6e6bd7e355deecf78ae501d99b93	no	2

Warnings:

Information:					
2		2305LD01UTL1USCON2_191010_Application_Clean.pdf	426590 d6bf54150e2dcec05ff20a3d8ba5b4dae885f02e	yes	44

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Abstract	44	44
	Claims	38	43
	Specification	1	37

Warnings:
Information:

3		2305LD01UTL1USCON2_191010_Application_Marked_up.pdf	426699 89334da3dcaaf62016a8b65f5d5beff87a077162	yes	44

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Abstract	44	44
	Claims	36	43
	Specification	1	35

Warnings:
Information:

4	Fee Worksheet (SB06)	fee-info.pdf	30978 0a33d35cd299635ac8ace25e167167f2a03546ae	no	2

Warnings:	
Information:	
Total Files Size (in bytes):	1010412

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

CLAIMS

What is claimed is:

1. A system comprising:

an audio control source;

at least one cluster of at least one computing device,

the at least one computing device including:

a sound sensing mechanism, configured to sense a noise; and

a wireless transceiver, configured to wirelessly transmit and receive data from the audio control source;

at least one output device, including:

a power source for operating the output device;

a speaker for outputting sound; and

a communication mechanism, for receiving electronic information from the audio control source; and

the audio control source, in electronic communication the at least one cluster and the at least one output device, the audio control source including:

a memory, containing computer-executable instructions for connecting to the at least one cluster, and varying an output of the at least one output device, providing an interface; and

a processor, for executing the computer-executable instructions,

wherein the computer-executable instructions include:

identifying one or more sounds within the noise;

isolating the one or more sounds;

determining is one or more of the one or more sounds includes a frequency outside of a predetermined threshold;

if one or more of the one or more sounds includes the frequency outside of the predetermined threshold, altering the one or more of the one or more sounds so that the frequency does not fall outside of the predetermined threshold; and

outputting the one or more sounds on the at least one output device.

2. The system as recited in claim 1, further comprising:

an interfacing mechanism, the interfacing mechanism including:

a network adapter, configured to transmit and receive electronic information through both wired and wireless communication; and

at least one input mechanism, configured to:

manipulate the interfacing mechanism; and

vary the output of the at least one output device.

3. The system as recited in claim 1, wherein the sound-sensing mechanism is an omnidirectional transducer.

4. The system as recited in claim 1, wherein the sound-sensing mechanism is selected from the group consisting of: an ultrasonic transducer; an infrasonic transducer: and a microwave transducer.

5. The system as recited in claim 4, wherein the sensed noise includes infrasonic or ultrasonic soundwaves.

6. The system as recited in claim 1, wherein the predetermined threshold equates to a frequency determined to pose a risk of harm to a user's hearing capabilities.

7. The system as recited in claim 1, wherein the computer-executable instructions further include:

if one or more of the one or more sounds includes the frequency outside of the predetermined threshold, notifying a user, via a notification, that one or more of the one or more sounds includes the frequency outside of the predetermined threshold.

8. The system as recited in claim 1, wherein the computer-executable instructions further include steps selected from the group consisting of: panning the sensed noise; and equalizing the sensed noise.

9. The system as recited in claim 1, further comprising:

an in-ear device, wherein an audio output of the in-ear device auto-adjusts based on signal energy sensed within a cluster or surrounding clusters.

10. The system as recited in claim 1, wherein the altering the one or more of the one or more sounds so that the frequency does not fall outside of the predetermined threshold is performed automatically.

11. A method of altering sensed noise prior to outputting the sensed noise, comprising:

providing at least one audio control source;

providing at least one cluster of at least one computing device, the at least one computing device including:

a sound sensing mechanism, configured to sense a noise;

a wireless transceiver, configured to wirelessly transmit and receive data from the audio control source;

at least one output device, including:

a power source for operating the output device;

a speaker for outputting sound; and

a communication mechanism, for receiving electronic information from the audio control source; and

the audio control source, in electronic communication the at least one cluster and the at least one output device, the audio control source including:

a memory, containing computer-executable instructions for connecting to the at least one cluster, and varying an output of the at least one output device, providing an interface; and

a processor, for executing the computer-executable instructions;

identifying one or more sounds within the noise;

isolating the one or more sounds;

determining is one or more of the one or more sounds includes a frequency outside of a predetermined threshold;

if one or more of the one or more sounds includes the frequency outside of the predetermined threshold, altering the one or more of the one or more sounds so that the frequency does not fall outside of the predetermined threshold; and

outputting the one or more sounds on the at least one output device.

12. The method as recited in claim 11, wherein the at least one computing device further includes:

an interfacing mechanism, the interfacing mechanism including:

a network adapter, configured to transmit and receive electronic information through both wired and wireless communication; and

at least one input mechanism, configured to:

manipulate the interfacing mechanism; and

vary the output of the at least one output device.

13. The method as recited in claim 11, wherein the sound-sensing mechanism is selected from the group consisting of: an omnidirectional transducer; an ultrasonic transducer; an infrasonic transducer; an electro-optical transducer; and a microwave transducer.

14. The method as recited in claim 13, wherein the sensed noise includes infrasonic, ultrasonic, visible, or radio waves.

15. The method as recited in claim 11, wherein the predetermined threshold equates to a frequency determined to pose a risk of harm to a user's hearing capabilities.

16. The method as recited in claim 11, further comprising:

if one or more of the one or more sounds includes the frequency outside of the predetermined threshold, notifying a user, via a notification, that one or more of the one or more sounds includes the frequency outside of the predetermined threshold.

17. The method as recited in claim 11, further comprising:

panning the sensed noise.

18. The method as recited in claim 11, further comprising:

adding one or more audio effects to the sensed noise.

19. The method as recited in claim 11, further comprising:

equalizing the sensed noise.

20. The method as recited in claim 11, wherein the altering the one or more of the one or more sounds so that the frequency does not fall outside of the predetermined threshold is performed automatically.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Non-Provisional Patent Application Entitled :

MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS

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Attorney Docket No. 2305 LD 01 UTL 1 US CON2

MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS

INVENTOR

Levaughn Denton

CLAIM OF PRIORITY

This application is a Continuation Application of U.S Application No. 16/421,141 filed May 23, 2019 which is a Continuation In Part of U.S. Non-Provisional Patent Application No. 16/155,919, filed October 10, 2018, which is a Continuation of U.S. Non-Provisional Patent Application No. 14/862,304, filed September 23, 2015, which claims priority from U.S. Patent Provisional Application No.: 62/054,286, filed on September 23, 2014, the contents of which are hereby fully incorporated by reference.

FIELD OF THE EMBODIMENTS

The invention and its embodiments relate to audio manipulation and sound management systems, particularly for home audio systems, public address systems, sound reinforcement systems, vehicle audio systems, ultrasonic transducers, infrasonic transducers, electro-optical transducers, microwave transducers, and associated software for these applications.

BACKGROUND OF THE EMBODIMENTS

Each year sound companies spend billions of dollars on audio technologies and audio research to find new ways to improve audio quality in performance settings. Very often sound systems are designed to be used in a specific environment. For example, in a vehicle or private

room setting, audio manipulation and output quality techniques and technologies are either prescriptive or adaptive – neither of which require the need for audio engineering professionals. However, in other situations such as at a concert venue, a wide array of audio professionals must be employed. This can include monitor engineers, system technicians, and front-of-house engineers. These professionals operate mixing consoles and audio control units to produce desirable, high-quality audio output.

Whether prescriptive or adaptive, manned or unmanned, perceived sound quality is a function of complex transducer-based technologies and acoustic treatment that are typically controlled, managed and manipulated by humans, and/or audio software and hardware. As such, both human and physical capital are required to produce first-rate sound quality. However, even when the necessary human and capital has been spent, it can still be very difficult to effectively manage audio outputs in real-time. This is due to improper calibrations of signal propagation and signal degradation, as well as unwanted harmonics and soundwave reflections.

Particularly in an outdoor setting, single-source sound systems typically produce an intermittent mix of unintelligible sounds and echoes due to a given venue's size and openness. A popular solution for addressing the echo issue is to utilize distributed sound systems. Traditional distributed sound systems are less susceptible to sound variance than single source systems. However, even when these distributed systems are used, temperature gradients and wind can still steer sound in undesirable ways.

Another issue related to the size of a performance venue is when audio and video fall out of sync. As live musical performances become more and more elaborate by including digital art and screens on-stage, it is becoming increasingly difficult to reliably sync audio and video in large venues, due to highly reverberant surfaces and long decay times.

Also impacting audio intelligibility during a live performance is crowd noise. At a live event, it is not uncommon for crowds to generate noise approaching 105dB. When this occurs, audio engineers must manipulate the supporting sound system output so that the performance audio remains 5-8 decibels higher than the noise generated by crowd. This action results in performance sound being broadcast above 110 dB, the range where the volume of sound begins to pose danger to human listeners. Frequently, audio system operators find it difficult to granularly control the loud perception of a given individual listener while managing loudness perception for the remainder of the audience. In a case where an audio quality trade-off decision has to be made, a common industry practice is to execute a remediation plan that favors the majority of listeners while the minority of listeners are forced to suffer through it.

In other instances, when various pieces of audio equipment are slightly, or completely out-of-phase, it can be difficult for audio system operators to correct these out-of-phase issues in a short period of time.

A myriad of audio functions are necessary to provide a dynamic range of audio playback and fidelity. To meet heightened demands and address new challenges, the devices of today will not only have to handle traditional telephony voice communication and low-fidelity voice recording, but also, these devices must be capable of incorporating new hardware and software to create new functions and applications such as sensing infrasonic, ultrasonic, blue light and millimeter wave exposure and reporting, and in some cases, autonomous manipulation of audio outputs. Further, such demands create the need to process signals using 'low-loss' methods by moving much of the processing function away from hardware and into software optimized to do so.

Review of related technology:

Line6, Inc. has created a 'smart mixing system' for non-wearable ubiquitous computing devices that enables wireless and touchscreen control of live sound system components. This is accomplished via a wired connection between standard audio hardware and a proprietary physical interface. While this system integrates and controls live sound system components via touchscreen devices, it unfortunately relies on audio engineers to operate it, and does not incorporate a listener-centric way to autonomously solve audio issues experienced by an audience.

United States Patent No.: 5,668,884 pertains to an audio enhancement system and method of use with a sound system for producing primary sound from at least one main loudspeaker located at a main position. The audio enhancement system comprises at least one wireless transmitter, time delay circuitry, and plural augmented sound producing subsystems. Each sound subsystem is a portable unit arranged to be carried by a person located remote from the main loudspeaker and includes a wireless receiver and an associated transducer device, e.g., a pair of stereo headphones. The transmitter broadcasts an electrical signal which is representative of the electrical input signal provided to the main loudspeaker. The broadcast signal is received by the receiver and is demodulated and amplified to drive the transducer so that it produces augmented sound substantially in synchronism with the sound arriving from the main loudspeaker. To achieve that end the time delay circuitry delays the electrical signal which is provided to the transducer for a predetermined period of time corresponding generally to the time period it takes for the primary sound to propagate through the air from the main loudspeaker to the remote location at which the person is located.

United States Patent No.: 7,991,171 pertains to a method and apparatus for processing an audio signal in multiple audio frequency bands while minimizing undesirable changes in tonal

qualities of the audio signal by determining an initial gain adjustment factor for each audio frequency band resulting from the application of an audio processing technique. A final gain adjustment factor for each band is selected from a corresponding set of weighted or unweighted initial gain adjustment factors. The set of initial gain adjustment factors from which the final gain adjustment factor for a specified audio frequency band is obtained is derived from other audio frequency bands that have the frequency of the specified band as a harmonic frequency. Changes in audio signal level within one audio frequency band thereby affect the signal level of harmonic frequencies to decrease relative changes in volume between a fundamental frequency and its harmonics.

United States Patent No.: 8,315,398 pertains to a method of adjusting a loudness of an audio signal may include receiving an electronic audio signal and using one or more processors to process at least one channel of the audio signal to determine a loudness of a portion of the audio signal. This processing may include processing the channel with a plurality of approximation filters that can approximate a plurality of auditory filters that further approximate a human hearing system. In addition, the method may include computing at least one gain based at least in part on the determined loudness to cause a loudness of the audio signal to remain substantially constant for a period of time. Moreover, the method may include applying the gain to the electronic audio signal.

United States Patent No.: 8,452,432 pertains to a user-friendly system for real time performance and user modification of one or more previously recorded musical compositions facilitates user involvement in the creative process of a new composition that reflects the user's personal style and musical tastes. Such a system may be implemented in a small portable electronic device such as a handheld smartphone that includes a stored library of musical

material including original and alternative versions of each of several different components of a common original musical composition, and a graphic user interface that allows the user to select at different times while that original composition is being performed, which versions of which components are to be incorporated to thereby create in real time a new performance that includes elements of the original performance, preferably enhanced at various times with user selected digital sound effects including stuttering and filtering. The system may also optionally comprise a visualizer module that renders a visual animation that is responsive to at least the rhythm and amplitude of the system's audio output, not only for entertainment value but also to provide visual feedback for the user.

United States Patent No.: 8,594,319 pertains to methods and apparatuses for adjusting audio content when more multiple audio objects are directed toward a single audio output device. The amplitude, white noise content, and frequencies can be adjusted to enhance overall sound quality or make content of certain audio objects more intelligible. Audio objects are classified by a class category, by which they can be assigned class specific processing. Audio objects classes can also have a rank. The rank of an audio object's class is used to give priority to or apply specific processing to audio objects in the presence of other audio objects of different classes.

United States Patent Publication No.: 2007/0217623 pertains to a real-time processing apparatus capable of controlling power consumption without performing complex arithmetic processing and requiring a special memory resource. The real-time processing apparatus includes an audio encoder that performs a signal processing in real time on an audio signal, a second audio encoder that performs the signal processing with a smaller throughput in real time on the audio, an audio execution step number notification unit that measures step number showing a level of the throughput in the signal processing by operating the 1st audio encoder or second

audio encoder, and an audio visual system control unit that executes control so that the first audio encoder operates when the measured step number is less than a threshold value provided beforehand and the second audio encoder operates when the step number is equal to or greater than the threshold value.

United States Patent Publication No.: 2011/0134278 pertains to an image/audio data sensing module incorporated in a case of an electronic apparatus. The image/audio data sensing module comprises: at least one image sensor, for sensing an image datum; a plurality of audio sensors, for sensing at least one audio datum; a processor, for processing the image datum and the audio datum according to a control instruction set to generate a processed image data stream and at least one processed audio data stream, and combining the processed image data stream and the processed audio data stream to generate an output data stream following a transceiver interface standard; a transceiver interface, for receiving the control instruction set and transmitting the output data stream via a multiplexing process; and a circuit board, wherein the image sensor, the audio sensors and the transceiver interface are coupled to the circuit board, and the processor is provided on the circuit board.

United States Patent Publication No.: 2013/0044131 pertains to a method for revealing changes in settings of an analog control console, the method comprising: receiving a captured image of the analog control console; creating a composite image by superimposing the captured image and a live image of the analog control console; and displaying the composite image.

United States Patent Publication No.: 2013/0294618 pertains to a method and devices of sound volume management and control in the attended areas. According to the proposed method and system variants the sound reproducing system comprises: sounding mode appointment device, central station for audio signal transmittance; one or more peripheral stations for audio

signal reception and playback; appliance for listener's location recognition; computing device for performing calculation concerning sounding parameters at the points of each listener's location and for performing calculation of controlling parameters for system tuning. The system can be operated wirelessly and can compose a local network.

Various devices are known in the art. However, their structure and means of operation are substantially different from the present invention. Such devices fail to provide a device that can help develop a participant's knowledge in a multitude of different subject areas, while simultaneously engaging the participant physically. At least one embodiment of this invention is presented in the drawings below and will be described in more detail herein.

SUMMARY OF THE EMBODIMENTS

According to an aspect of the present invention, a system is provided. The system includes an audio control source; at least one cluster of at least one computing device, the at least one computing device including: a sound sensing mechanism, configured to sense a noise; and a wireless transceiver, configured to wirelessly transmit and receive data from the audio control source. The system further includes at least one output device, including: a power source for operating the output device; a speaker for outputting sound; and a communication mechanism, for receiving electronic information from the audio control source. The system additionally includes the audio control source, in electronic communication the at least one cluster and the at least one output device, the audio control source including: a memory, containing computer-executable instructions for connecting to the at least one cluster, and varying an output of the at least one output device, providing an interface; and a processor, for executing the computer-executable instructions, wherein the computer-executable instructions include: identifying one or

more sounds within the noise; isolating the one or more sounds; determining is one or more of the one or more sounds includes a frequency outside of a predetermined threshold; if one or more of the one or more sounds includes the frequency outside of the predetermined threshold, altering the one or more of the one or more sounds so that the frequency does not fall outside of the predetermined threshold; and outputting the one or more sounds on the at least one output device.

It is an object of the present invention to provide the system, wherein the system further includes an interfacing mechanism, the interfacing mechanism including: a network adapter, configured to transmit and receive electronic information through both wired and wireless communication; and at least one input mechanism, configured to: manipulate the interfacing mechanism; and vary the output of the at least one output device.

It is an object of the present invention to provide the system, wherein the sound-sensing mechanism is an omnidirectional transducer.

It is an object of the present invention to provide the system, wherein the sound-sensing mechanism is selected from the group consisting of an ultrasonic transducer and an infrasonic transducer.

It is an object of the present invention to provide the system, wherein energy sensing mechanisms is selected from the group consisting of a microwave transducer; and an electro-optical transducer.

It is an object of the present invention to provide the system, wherein the sensed noise includes infrasonic or ultrasonic soundwaves.

It is an object of the present invention to provide the system, wherein the predetermined threshold equates to a frequency determined to pose a risk of harm to a human's body (e.g. a

retina and blue lights from screens, loud noise and a user's hearing capabilities, RF exposure limits and electrosensitivity, millimeter waves and cell growth or heart variability.

It is an object of the present invention to provide the system, wherein the computer-executable instructions further include: if one or more of the one or more sounds includes the frequency outside of the predetermined threshold, notifying a user, via a notification, that one or more of the one or more sounds includes the frequency outside of the predetermined threshold.

It is an object of the present invention to provide the system, wherein the notification is an audible notification.

It is an object of the present invention to provide the system, wherein the system further includes an in-ear device, wherein an audio output of the in-ear device auto-adjusts based on signal energy sensed within a cluster or surrounding clusters.

It is an object of the present invention to provide the system, wherein the computer-executable instructions further include panning the sensed noise.

It is an object of the present invention to provide the system, wherein the computer-executable instructions further include adding one or more audio effects to the sensed noise.

It is an object of the present invention to provide the system, wherein the computer-executable instructions further include equalizing the sensed noise.

It is an object of the present invention to provide the system, wherein the altering the one or more of the one or more sounds so that the frequency does not fall outside of the predetermined threshold is performed automatically.

It is an object of the present invention to provide the system wherein the system is further configured to sense and/or analyze infra/ultra-sonic waves (e.g., mm waves), visible light (e.g.

smart devices that have sensors that sense blue light from electronic screens and/or analyze and report prolonged exposure to the blue light) and radio waves.

According to another aspect of the present invention, a method of altering sensed noise prior to outputting the sensed noise is provided. The method includes providing at least one audio control source and providing at least one cluster of at least one computing device, the at least one computing device including: a sound sensing mechanism, configured to sense a noise; and a wireless transceiver, configured to wirelessly transmit and receive data from the audio control source; at least one output device, including: a power source for operating the output device; a speaker for outputting sound; and a communication mechanism, for receiving electronic information from the audio control source; and the audio control source, in electronic communication the at least one cluster and the at least one output device, the audio control source including: a memory, containing computer-executable instructions for connecting to the at least one cluster, and varying an output of the at least one output device, providing an interface; and a processor, for executing the computer-executable instructions. The method further includes identifying one or more sounds within the noise; isolating the one or more sounds; determining is one or more of the one or more sounds includes a frequency outside of a predetermined threshold; if one or more of the one or more sounds includes the frequency outside of the predetermined threshold, altering the one or more of the one or more sounds so that the frequency does not fall outside of the predetermined threshold; and outputting the one or more sounds on the at least one output device.

It is an object of the present invention to provide the method, wherein the at least one computing device further includes: an interfacing mechanism, the interfacing mechanism including: a network adapter, configured to transmit and receive electronic information through

both wired and wireless communication; and at least one input mechanism, configured to: manipulate the interfacing mechanism; and vary the output of the at least one output device.

It is an object of the present invention to provide the method, wherein the sound-sensing mechanism is an omnidirectional transducer.

It is an object of the present invention to provide the method, wherein the predetermined threshold equates to a frequency determined to pose a risk of harm to a user's hearing capabilities.

It is an object of the present invention to provide the method, wherein the method further includes, if one or more of the one or more sounds includes the frequency outside of the predetermined threshold, notifying a user, via a notification, that one or more of the one or more sounds includes the frequency outside of the predetermined threshold.

It is an object of the present invention to provide the method, wherein the notification is an audible notification.

It is an object of the present invention to provide the method, wherein the method further includes panning the sensed noise.

It is an object of the present invention to provide the method, wherein the method further includes adding one or more audio effects to the sensed noise.

It is an object of the present invention to provide the method, wherein the method further includes equalizing the sensed noise.

It is an object of the present invention to provide the method, wherein the altering the one or more of the one or more sounds so that the frequency does not fall outside of the predetermined threshold is performed automatically.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows a schematic view of an embodiment of one cluster of the present invention with some interfaced devices.

FIG. 2 shows a schematic view of how interfaced devices create a sound fingerprint.

FIG. 3 shows an illustration of an embodiment of the system of the present invention engaging in inter-cluster, cluster-to-audio control source; and cluster-to-cluster data sharing.

FIG. 4 shows a flow chart outlining an embodiment of the method of the present invention.

FIGs. 5-6 show a flow chart outlining an embodiment of the method of the present invention.

FIG. 7A shows an illustration showing an embodiment of the present invention located in an automobile.

FIG. 7B shows an illustration showing an embodiment of the present invention located in an indoor theatre.

FIG. 7C shows an illustration showing an embodiment of the present invention located in an outdoor stadium.

FIG. 8 shows a flow chart outlining an embodiment of the method of the present invention.

FIG. 9 shows an embodiment of the present invention used in association with a pet.

FIG. 10 shows an embodiment of the present invention used in association with a pet collar.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The preferred embodiments of the present invention will now be described with reference to the drawings. Identical elements in the various figures are identified with the same reference numerals.

Reference will now be made in detail to each embodiment of the present invention. Such embodiments are provided by way of explanation of the present invention, which is not intended to be limited thereto. In fact, those of ordinary skill in the art may appreciate upon reading the present specification and viewing the present drawings that various modifications and variations can be made thereto.

As a threshold matter, it should be noted that whenever the phrases "microphone" or "microphone-equipped" are used, it is intended to mean any device that is capable of detecting sound, not merely microphones. For example, a high-performance low frequency antenna connected to a software-defined radio may be used to input sound observations into the system, or a piezo-electric diagraph may be used to measure the vibrations the correspond to a given sound. These examples are provided to give greater clarity as to what the term "microphone" should be interpreted as, and not construed as a limiting example.

The system of the present invention operates by integrating clusters of various computing devices and wearable computers with sound management techniques and methods so that various sound "fingerprints" can be developed and used to visualize how sound is being perceived in micro-areas within a larger venue. In various embodiments, the system of the present invention can be integrated into an individual's home, vehicle audio system, concert venues, and other locations where sound is played. In addition, the system's components allow for the present

invention to be scaled to accommodate sound management and monitoring control within the largest of venues such as stadiums and other sports arenas.

Due to the devices that are integrated into the system having the ability to sense the frequency and magnitude of audio signals, a sound fingerprint (summary) can be generated from deterministic methods. These fingerprints are then communicated to an audio control source and can subsequently be processed and used to communicate with external applications and things such as third-party sound databases. However, the purpose of this system is not to be confused. In addition to the sound fingerprinting ability of the present invention, it is also capable of utilizing a series of methods to sense and control audio output in various venues.

In an alternative embodiment, the present invention is located in a train or airport station that has an intercom system that functions poorly when noisy crowds are present. If an audio control source within these facilities is able to autonomously collect audio data via a series of integrated devices, then with the present invention, the same audio control source can adjust system outputs accordingly in order to make important intercom announcements intelligible. In yet another embodiment, a user can enter in EQ parameters in their integrated computing device to ensure that both the audio perceived by them, and the audio perceived by their device is in accordance with some predetermined parameters/settings. While many short-range wireless technologies can be used with the present invention, preferably one or more of the following technologies will be used: ANT+, Bluetooth, cellular, IEEE 802.15.4, IEEE 802.22, ISA 100a, Infrared, ISM (band), NFC, RFID, WPAN, UWS, WI-FI, Wireless HART, Wireless HD/USB, ZigBee, or Z-wave.

In yet another preferred embodiment, various in-ear systems may be integrated into the present invention, software-defined and/or cognitive-defined based in-ear transceivers can be

used to wirelessly communicate with an audio control source and thus, the output of such an in-ear monitor can be autonomously adjusted after sensing audio output. A given output can be adjusted according to what is sensed within specified location or what is sensed at external clusters. Similarly, to a software-defined and/or cognitive-defined based in-ear transceivers, an in-ear monitor system for use with the present invention will preferably comprise hardware such as, earphones, at least one body pack receiver, at least one mixer and at least one transmitter. These functions can also be adjusted and controlled via the audio control source of the present invention.

According to an embodiment, the functions of the present invention include sensing and isolating frequency bands associated with musical instruments/human voices in the following order: midrange, highs, and lows. According to an embodiment, the functions further include separating like frequencies (panning). According to an embodiment, the functions additionally include balancing the volume, controlling the dynamic range of the frequencies sensed (compression), performing subtractive and additive equalization, and/or adding audio effects to provide additional depth and texture.

Loud noises can often lead to stress and hearing loss. For example, certain frequencies and volumes can cause stress in pets, and loud music and other forms of loud sounds have put approximately 1.1 billion young people at risk of suffering from hearing loss. Furthermore, military veterans are 30% more likely to suffer from severe hearing loss than non-veterans. In fact, according to the DoD's Hearing Center for Excellence (HCE), hearing loss is the most-widespread injury among returning veterans, driving hearing loss payments to exceed $2 billion in 2016. The present invention provides for an interdisciplinary and technologically advanced approach to hearing loss prevention.

It is important to note that noise pollution not only produces negative health outcomes for humans, but also, can produce negative outcomes for pets. Loud noises and obtrusive, artificial light negatively affect pets such as cats and dogs, and can eventually lead to abnormal behaviors, like excessive whining, trembling, barking and panting. These behaviors are a result of the pets trying to cope with the stress tied to phenomena within their environment, and if left unchecked, can cause panic disorders such as, e.g., separation anxiety, which is not healthy for both pet owners and pets. It is therefore an object of the present invention to provide a method wherein at least one sound and/or light sensing device can be affixed or integrated into a pet wearable (e.g. dog collar). In another embodiment of the present invention, pet products w/ smart units that sense and analyze frequencies across a wide range of frequency bands (See FIG. 9) may be configured in order to alert pet owners of: loud and/or obtrusive noises, harmful artificial lights, or any other unhealthily or uncomfortable environmental disturbance. These pet products w/ smart units work together via the mobile-to-mobile network (as described herein) to expose, report on and explain certain behaviors like excessive barking, whining, trembling and panting. Alerts can be shown via an integrated LED or LCD display on pet products/wearables, pet owner smartphones, smartwatches (and other wearable), and can display warning messages. Warning messages may include: “too loud for pet,” “painful and/or uncomfortable environment,” or mood or behavioral-related messages such as “environment making pet unhappy,” or “environment likely to cause barking.” As show in FIG. 10, a pet collar may be located on the pet and configured to sense noise or other conditions close to the pet’s ears and eyes. Smart units may be located on the pet’s ankle as a bracelet which may be configured to sense noise or other conditions that are close to the ground. The pet smart unit may be configured to be sensitive to

faint vibrations possibly due to low frequency sounds or physical disturbances close or in the ground.

Hearing loss can be considered an inevitable cost of military exercises and war. However, real-time alerts using mobile devices creates an opportunity to implement preventative measures, ultimately reducing hazardous exposure time and thus injury. Study considerations include, data sets, hearing loss incidents among veterans (on the rise), current preventative measures, gear, and equipment such as jet engines and other inherently noisy machinery. In summary, various embodiments of the present invention are in response to the DoD commitment to reduce the number of military personnel that suffer from hearing loss injury by 1) analyzing hazardous sounds in real-time 2) alerting service members using wearable mobile devices (new preventative technique).

According to an embodiment, the present invention provides for a mobile cluster-based apparatus that analyzes, reports, and controls outputs based on a range of inputs over a swath of frequency bands, with distinct applications including sound output control, hazardous millimeter-wave, blue light or RF detection and reporting, and ultrasonic and infrasonic wave detection and reporting. In a blue light sensing application, a wearable in close proximity to a user's retina (e.g. located on a collar of a smart jacket) can measure prolonged blue light retina exposure and report the issue back to the user.

According to an embodiment, the apparatus is configurable and uses standard computing devices, such as wearables, tablets, and mobile phones, to measure various frequency bands across multiple points, allowing a single user to visualize and adjust sound output, and in some cases, detect and report hazardous signals.

Each year, sound companies spend billions of dollars on audio technologies and audio research to find new ways to improve audio quality in performance settings. Proposed is an apparatus and method that creatively tackles the issue of poor audio quality and sound perception across various spaces by integrating consumer-based mobile devices, wearable computers and sound management systems. The ubiquitous computing devices in this method and apparatus senses soundwaves, associates sensed audio levels with specific clusters (locations), predicts whether or not an audio-related issue is likely to occur within a specific cluster (for instance, predicts if an echo is likely to occur), and adjusts audio intensity (and related EQs) accordingly to improve audio output quality.

Key features of the Mobile Cluster-Based Audio Adjusting Method and Apparatus include:

• User/listener-based sound management and control

• Scalable platform that can incorporate future tech - that is, new functionalities can be added because the method and apparatus is designed to seamlessly integrate additional components including, but not limited to, software applications such as a 'sound preference' application that sets user-based sound perception settings on a mobile device or wearable computer.

• Integrates with existing audio hardware and software - such as in-ear systems, mixer boards and other related audio consoles

• Autonomous audio sensing

• Can be configured, manufactured and sold across different industries (e.g. automobile or audio electronic industries)

• Can be used in sound fingerprint and music publishing/performance applications (e.g. in a performance venue, fingerprint data can be sent directly to music publishing entities from the described clusters

• Can interface with various communication offerings such as e-mail, SMS, and visual screens (for instance, communicative updates can be sent with sensed audio measurements. A specific example – an SMS that reads a "too loud in section A'/cluster A)

• Can support a fixed or unfixed number of "sensing units"

Audio Control Source & Computing Device Single device

Developments in science and engineering, and specifically, artificial intelligence, augmented reality, hologram technology, cloud computing and wireless engineering, are all expected to shift a smart device's feature set, and how a smart device communicates with both the user (interface) and the network (including other smart devices). Therefore, it is understood that as technology advances, certain smart devices described in the system of the present embodiments will either become obsolete (e.g. smartphones) and/or will not be heavily relied upon by users to perform certain functions. Thus, according to an embodiment, the system is considered modular because system functions can be distributed across several devices as well as integrated into a single device (e.g. as the physical and software nature of these devices evolve, the salient functions of the Audio Control Source and the Computing Device can be integrated into a single device).

Highlighting Long-Range Technologies

As highlighted in the present description, smart devices within the system can interact with each other using short-range technologies (such as Wi-Fi and Bluetooth), however, it is understood that there are certain limitations associated with many short-range technologies (e.g.

poor security, bandwidth and suboptimal data exchange within peer network(s)). Since optimality is a core focus, smart devices can also employ long-range protocols (as described in the LTE and IMT-2020 specification) to exchange data. Doing so can allow the system to leverage cloud computing and cloud storage capabilities. Thus, according to an embodiment, a device within the present system can also feature a shared radio front end for a software defined radio, further reducing the physical IoT communication barrier between networks and devices, and further allowing flexible and efficient 'switching' between short-range and long-range technologies.

Referring to FIG. 1, an embodiment of one cluster 101 of the present invention with some interfaced devices. Specifically, three embodiments of at least one computing device 102 are shown; wearable glasses, wearable watch, and a smartphone. It should be noted that while these three devices are listed as exemplary examples, any device with a sound sensing mechanism 150 and a way to transmit any recorded data is suitable for use as one of said at least one computing devices 102. According to an embodiment, the sound sensing apparatus may be an omnidirectional transducer, an ultrasonic transducer, an infrasonic transducer, a microwave transducer, and/or any other suitable sound sensing apparatus, while maintaining spirit of the present invention. The sound sensing mechanisms of at least one computing device 102 will be able convert perceived sounds into electronic signals so that the recorded information may be transmitted to neighboring clusters 101, or an audio control source (See FIG. 3), as desired. This data will be transmitted using either one or a combination of short-range wireless technologies, namely, ANT+, Bluetooth, cellular, IEEE 802.15.4, IEEE 802.22, ISA 100a, Infrared, ISM (band), NFC, RFID, WPAN, UWS, WI-FI, Wireless HART, Wireless HD/USB, ZigBee, or Z-wave. Preferably, transducers integrated into these computing devices have an output signal that

is fed into the input of an analog-to-digital converter ("ADC") and can incorporate software and cognitive-defined radios to broaden the selection of compatible wireless communication interfaces and limit radio component footprints. According to an embodiment, the at least one computing device 102 includes one or more wireless transceivers 155.

FIG. 2 shows a schematic view of how interfaced devices create a sound fingerprint. The sound transmission of the audio energy 109 sensed by the at least one computing device 102 propagates through air and is received by at least one computing device 102 using the transmission path outlined in Figure 2.

Assuming that Figure 2 depicts audio transmission in an indoor setting, at specified time intervals, each computing device measures the sound pressure level (SPL) and sound power level (SWL):

$$SPL = SWL + 10\log[\frac{Q_\theta}{4\pi r^2} + \frac{4}{R_C}]$$

Where:

SPL = Sound pressure level dB

SWL = Sound power level = $10\ \log_{10}(W/\ W_{ref})$

W is the total sound power radiated from a source with respect to a reference power (W_{ref}) dBW re 10^{-12} Watts.

r = distance from source m

Q_θ = directivity factor of the source in the direction of r

S = total surface area of a room m^2

α_{av} = average absorption coefficient in a room

R_C = room constant = $\frac{S\alpha_{av}}{1-\alpha_{av}}\ m^2$

Over time, each computing device in Figure 2 detects differences in pressure (i.e. change in pressure vs. time) and converts the differences into an electrical signal. A Fast Fourier

Transform is implemented (locally or in a cloud) to measure the relative amplitudes of the frequencies 'sensed' and to perform other frequency domain analyses.

It is important to note that in any given indoor environment, R_C, α_{av}, and S can be predetermined and made available to each computing device, approximated or deemed negligible. Also note that each computing device in Figure 2 has a microphone. Computing devices may also obtain sound observations via a high-performance low frequency antenna.

Turning to Fig. 3 an illustration of an embodiment of the system of the present invention engaging in intra-cluster, cluster-to-audio control source; and cluster-to-cluster data sharing. Here, each cluster has a given location 110 (i.e. specified location) to accurately isolate and associate the sensed data. In one embodiment, the present invention is able to adjust a given output device 160 based on its proximity to a given location 110 of a cluster. In alternative embodiments, output devices 160 can be adjusted based on their proximity to more than one cluster. Devices in each cluster can either communicate directly to each other or an audio control source 111, devices within a cluster can communicate to a single device within that cluster which can serve as a gateway to other clusters and/or audio control source 111. In some embodiments, the present invention further comprising an in-ear monitoring device 112. According to an embodiment, the output devices 160 may include a power source 165 (such as, e.g., a battery or other suitable power source 160), a speaker 170, a communication mechanism 175 (such as, e.g., a wired and/or wireless transceiver), and/or any other suitable mechanisms (as shown in FIG. 1). According to an embodiment, the audio control source 111 includes a memory 180, a processor 182, an interface mechanism 184, and/or at least one input mechanism 186. According to an embodiment, the interface mechanism 184 is a graphical user interface with a display (e.g., a touch screen display). According to an embodiment, the at least one output device 160 is located

within said at least one cluster 101, such that said audio control source 111 may alter the power supplied to said speaker 170 in real-time.

The embodiment depicted here shows devices that sense audio signal energy within the confines of a single cluster and then sends data directly to an audio control unit and other clusters. Therefore, not only can these computing devices wirelessly share sensed data with each other, but, also, data can be shared with an audio control source 111 (for audio output management purposes) and other devices in other clusters. Depending on the audio signal energy sensed within a specific cluster(s), audio control source 111 adjusts any connected output devices in either a single cluster, or multiple clusters to ensure high quality/fidelity output.

FIG. 4 shows a flow chart outlining an embodiment of the method of the present invention. Here, method 200 is comprised of a number of steps. In step 201, initially, both desired and undesired audio output signals are sensed and subsequently analyzed. In step 202, the method proceeds to determine whether or not the input signals match a set of predefined thresholds. If there is only negligible output audio, that is, if the audio within an environment is outside of a specified frequency range, the method proceeds to step 203 where the devices in each cluster operate in sleep mode. If there is indeed sensible audio output, the method proceeds to step 204 where the present invention determines if the predefined threshold or EQ setting is breached. If this threshold is breached, the method moves to step 205 where the first device that sensed the breach will (preferably, wirelessly) communicate its signal measurements to other devices within its cluster and the receiving device will conduct the same audio measurements to confirm the threshold breach. Preferably, step 205 is repeated amongst all of the devices within a single cluster, to provide more robust data sets. Once the breach confirmation stage is completed, in step 206, the present invention moved to step 207 where at least one computing device is

chosen to communicate the breach to. Finally, in step 208, when the present invention, via the audio control source, adjusts audio levels at the at least one output device to transform undesired audio outputs to desired audio outputs.

Referring now to FIGs. 5-6, a flowchart 300 of an embodiment of the present invention is illustratively depicted, in accordance with an embodiment of the present invention.

According to an embodiment, the present invention isolates and/or separates sounds within band, reports findings of those sounds to a cloud-based system for audio signal processing (if necessary), and sends control commands to one or more commercial mixing consoles and/or audio control sources to alter the audio output (if necessary), and then communicate with apparatus devices to share and confirm sensed audio findings (if necessary). According to an embodiment, these sounds are associated with different frequencies and/or are associated with one or more instruments.

At step 305, audio/noise is sensed by one or more audio sensing devices. According to an embodiment, the one or more sensing devices are microphones.

At steps 310-315, the volume between the sensed audio is balanced. That is, one or more instruments and/or frequencies are identified and isolated from the sensed audio (at step 310), and the signal amplitude of each instrument is manipulated using a mixing console/audio source (at step 315). It is noted, however, that, at step 310, the identified sounds need not always be instruments. The sounds may be any suitable identifiable sounds, while maintaining the spirit of the present invention.

According to an embodiment, the present system may sense different types of phenomena (e.g., it may sense audio using an audio transducer such as a microphone, it may include a smartwatch and/or other similar device that may be able to sense ultrasonic waves using an

ultrasonic transducer, and/or the system may incorporate one or more various suitable types of transducers). According to an embodiment, the system may be configured to sense environmental phenomena outside of the acoustic frequency range by using a variety of transducers. In those cases, the underlying functionality of the system generally remains the same, regardless of the input phenomena sensed. The system may measure the intensity of an acoustic wave, ultrasonic wave, infrasonic wave, and/or any other suitable waves.

According to an embodiment, the system may incorporate various input/output functions/details, such as those shown in Table 1. According to an embodiment, the system is configured to sense, analyze, and/or control audio outputs.

SYSTEM INPUT	SYSTEM FUNCTION	OUTPUT Network Interface Configured to:

Network Interface: Sense audible sounds via mic or comparable audio sensing transducer	Apparatus will isolate/separate sounds within band, report findings to cloud-based system for audio signal processing (if necessary), send control commands to commercial mixing console and/or audio control source to alter audio output (if necessary) and communicate with apparatus devices to share and confirm sensed audio findings (if necessary)	Control mixing console(s) and/or an audio control source(s) via physical or SDR-based transceiver(s)**
20 - 40 Hz	Sub Bass *(Piano, Synthesizer Strings)	kHz: 125/134 MHz: 13.56/ 600/ 800/850/900/1700/1800/1900 2100/2200/L700/U700/2300/2400/2500/2700/3500/5200/ 5700/whitespaces between 54 and 860/ GHz:3.6/4.9/5/5.9 /24 to 300 300 GHz to 430 THz
40 - 160 Hz	Bass Band (Drums, Strings, Winds, Vocals, Piano, Synthesizer)	
160 - 300 Hz	Upper Bass Band (Drums, Strings, Winds, Vocals, Piano, Synthesizer)	
300 - 800 Hz	Low-Mid Band (Drums, Strings, Winds, Vocals, Piano, Synthesizer)	
800 - 2.5 kHz	Mid-Range Band (Drums, Strings, Winds, Vocals, Piano, Synthesizer)	
2.5- 5 kHz	Upper Mid Band (Drums, Strings, Winds, Vocals, Piano, Synthesizer)	
5 - 10 kHz	High Frequency Band (Drums - including Cymbals, Synthesizer)	
10 - 20 kHz	Ultra-High Freq Bands (Hi-Hat, Cymbals, Hiss)	

Table 1

It is also noted that the present invention may further have implications in sensing and analyzing millimeter waves, which the human ear cannot hear. Higher-frequency millimeter-

waves can possibly have adverse effects on human health. According to an embodiment, the present system can (as shown in Table 2), in real-time, detect and report harmful, high-energy level millimeter waves, which are included in many 5G deployment plans.

SYSTEM INPUT	SYSTEM FUNCTION	OUTPUT
Network Interface: Sense millimeter-waves via a mmWave transducer	Apparatus will detect, analyze, measure and/or report harmful millimeter-waves across several environments	Network Interface Configured to: Report/share data via physical or SDR-based transceiver(s)**
24 to 300 GHz	Identify and measure millimeter-wave characteristics	kHz: 125/134 MHz: 13.56/ 600/ 800/850/900/ 1700/1800/1900 2100/2200/L700/U700/2300/ 2400/2500/2700/3500/5200/5700/ whitespaces between 54 and 860/ GHz:3.6/4.9/5/5.9 /24 to 300 300 GHz to 430 THz

5

Table 2

Weaponized infrasonic and ultrasonic devices with highly directional energy transmissions can produce both psychological and physical effects on humans. In addition, blue

light (short wavelength) emitted from displays is harmful to the retina. For this reason, a light sensing transducer is a part of the apparatus described herein. According to an embodiment, the present system can, in real-time, detect and report harmful infrasonic and ultrasonic devices in weaponized scenarios. According to an embodiment, the apparatus described can (as shown in Table 3), in real-time, detect and report harmful infrasonic and ultrasonic devices in weaponized scenarios.

SYSTEM INPUT	SYSTEM FUNCTION	OUTPUT
Network Interface: Sense infrasonic, ultrasonic	Apparatus will detect, analyze, measure and/or	Network Interface Configured to:

waves, and/or light waves via an ultrasonic, infrasonic or electro-optical transducer	report on harmful ultrasonic or infrasonic waves across several environments	Report/share data via physical or SDR-based transceiver(s)
18.9 Hz, 0.3 Hz, 7 Hz and 9 Hz 700 kHz to 3.6 MHz 20 to 200 kHz 400 – 770 THz	Identify and measure ultrasonic, infrasonic or visible wave characteristics	kHz: 125/134 MHz: 13.56/ 600/ 800/850/900/1700/1800/1900 2100/2200/L700/U700/ 2300/2400/2500/2700/3500/5200/5700/whitespaces between 54 and 860/ GHz:3.6/4.9/5/5.9 /24 to 300 300 GHz to 430 THz

Table 3

At step 320, it is determined whether the sensed audio includes any audio in frequencies that have been predetermined to be hazardous to human ears. According to an embodiment, if audio in the hazardous range has been detected, then one or more users are notified, at step 325. The notification may take the form of a visual notification, an audible notification, and/or any other suitable form of notification. It is noted, however, that, if automatically corrected, the user need not always be notified.

According to an embodiment, at step 330, the dynamic range of the sensed audio (compressed or limiting) is controlled by sending audio data to a mixing console/audio source or

cloud-based system that can identify and mitigate sudden peaks in a sensed audio stream to help sound(s) sit consistently in an audio mix (accomplished by removing sudden peaks). Altering the dynamic range may also be used to eliminate any audio in the predetermined hazardous range. At step 335, the audio is panned. That is, like frequencies in the sensed audio are separated.

At step 340, effects that add depth and texture to audio outputs are added and, at step 345, equalization is added using subtractive and/or additive equalization techniques.

According to an embodiment, at step 350, automation is generated that predicts environmental conditions based on sensed data (like echoes and audio wind steers) and, at step 355, volume changes and audio effects are autonomously programmed, accordingly.

According to an embodiment, the present invention includes acoustic band applications. Consumer products, such as, e.g., wearables, smartphones, and other portable computing devices autonomously control sound output(s) in private spaces (e.g. cars and homes) and public spaces (e.g. transport stations and theater/concert venues). According to an embodiment, the present system senses audible sounds via a mic or comparable audio sensing transducer and isolates/separates sounds within certain bands, reports findings to cloud-based system(s) for audio signal processing, sends control commands to a commercial mixing console and/or audio control source to alter audio output, and communicates with cluster devices to share and confirm sensed audio findings. According to an embodiment, the present system outputs to control mixing console(s) and/or an audio control source(s) via physical or SDR-based transceiver(s).

According to an embodiment, the present system senses and analyzes audio frequencies across clusters to adjust and control audio output and perceived sound at a given locale. In order to achieve high-quality sound and sound equalization of a sonic presentation, a sound system's

audio output levels are autonomously adjusted via a central audio mixing source using intelligent tell-tale frequency characteristics gathered from clusters comprised of smart devices and/or wearable computers.

According to an embodiment, the audio signal data obtained within clusters enables a system integrated mixing console to manage audio output based on detailed frequency descriptions of acoustic properties and characteristics across a venue, room, or vehicle. According to an embodiment, the present system incorporates a modular structure so that components can be added and expand as consumer needs grow.

According to an embodiment, the present system provides for an apparatus that is configured to adjust and control audio output signal levels across multiple cluster locales using computing devices such as smartphones and/or wearable computers; a wireless transmission platform; transceivers - software-defined, cognitive-defined and/or hardware- defined; wireless microphones; in-ear monitors - software-defined, cognitive-defined and/or hardware-defined; and a central audio mixing source.

According to an embodiment, the apparatus of the present invention may include, but is not limited to, the following functions:

- Balancing the volume between sensed audio. For example, isolating instruments based on frequency and manipulating the signal amplitude of each instrument using a mixing console/audio source.
- Controlling the dynamic range of the sensed audio (compress or limiting) by sending audio data to a mixing console/audio source or cloud-based system that can identify and mitigate sudden peaks in a sensed audio stream to help sounds sit consistently in an audio mix (accomplished by removing sudden peaks).

- Panning.
- Adding effects that add depth and texture to audio outputs.
- Equalization using subtractive/additive equalization techniques.
- Automation that 1) predicts environmental conditions based on sensed data (like echoes and audio wind steers) and 2) autonomously programs volume changes and audio effects accordingly.

Referring to Figs. 7A-7C, various embodiments of the present invention implemented in an automobile, an indoor theatre, and an outdoor stadium, respectively, are shown. While these venues are particularly suited for the present invention to be implemented in any venue in which there are multiple listeners.

In a preferred embodiment, the sound sensing mechanisms (preferably, transducers) used within each "sensing" computer/device outputs an output signal that is fed into the input of an ADC. In the configurations described in Figure 7A, 7B and 7C, a single-ended ADC interface can be used effectively since ADCs and the transducer source are both located on the same integrated circuit board. However, since fully differential interfaces have performance gains over single-ended inputs due to its inherent noise rejection characteristics, using a fully-directional interface instead of a single-ended interface may be desirable.

FIG. 8 shows a flow chart outlining an embodiment of the method of the present invention. Here, method 400 is comprised of a number of steps. According to an embodiment, the method as shown and described in FIG. 8 showcases the method steps of a system that measures the intensity of phenomena and its purpose is to sense, analyze, report, and, in some cases, control invisible phenomena. These invisible phenomena can include, e.g., ultrasonic waves, audio waves, infrasonic waves, mm waves etc. (using ultrasonic transducers, infrasonic

transducers, microwave transducers, among others, and associated software for these applications).

As in method 200 of FIG. 4, initially, both desired and undesired audio output signals are sensed and subsequently analyzed. It is then determined whether or not the input signals match a set of predefined thresholds. If there is only negligible output audio, that is, if the audio within an environment is outside of a specified frequency range, the devices in each cluster operate in sleep mode, step 402. If there is indeed sensible audio output, the method proceeds to step 401 where the present invention determines if the predefined threshold or EQ setting is breached. If this threshold is not breached, the device operates in sleep mode 402. If this threshold is breached, the method moves on to step 403, where it is determined whether the device has a navigation unit. According to an embodiment, devices in the system can auto-awaken out of sleep mode based on the location of the device (e.g. when a user walks into a concert venue, the system will begin measuring surrounding signal energy).

If the device does not have a navigation unit, the method moves to step 404, where a breach severity measurement is determined. Once the breach severity measurement is determined, the method moves to step 405, where it is determined whether there is an onset issue.

If there is an onset issue, the method moves to step 406, in which any data and/or findings are reported and/or displayed. Once the data and/or findings are reported and/or displayed, the device returns to sleep mode, step 402.

If there is not an onset issue, the method moves to step 407, wherein a time window is calculated at which any sensed data was determined to be unacceptable. Once this time window is calculated, the method moves to step 408, wherein breaches within the calculated time window

are collected and/or analyzed. Once the breaches within the calculated time window are collected and/or analyzed, the method moves to step 409, wherein it is determined whether there were consistent breaches during the time window. If there were consistent breaches during the time window, the method moves to step 406. If there were not consistent breaches during the time window, the device goes back to sleep mode, step 402.

If the device has a navigation unit, the method moves to step 410, wherein breach severity measurements with the device's location are determined. Once the breach severity measurements with the device's location are determined, the method moves to step 411, wherein it is determined whether the device's location at the time of the breach lessened the severity of the breach. If the device's location at the time of the breach did not lessen the severity, the method moves to step 405, wherein it is determined whether there is an onset issue. If the device's location at the time of the breach did lessen the severity, the method moves to step 412, wherein an analysis takes place in which location and machine learning insights are factored into the threshold breach calculations. The method then moves to step 413, where it is determined if the breach is still an issue. If the breach is still an issue, the method moves to step 405, wherein it is determined whether there is an onset issue. If the breach is not still an issue, the device goes back to sleep mode, step 402.

According to an embodiment, environmental measurements may be skewed depending on the device's location (e.g., in a bag, in a pocket, etc.). According to an embodiment, the location of the device is detected, and, in these cases, the system will either account for signal degradation in the measurement or disable environmental measurements based on predefined thresholds. According to an embodiment, smart devices (e.g., smartphones, etc.) will use an

accelerometer and/or light sensor and/or a temperature sensor to detect whether or not the smart device is directly exposed to phenomena (i.e. whether or not the device is in a bag or pocket).

When introducing elements of the present disclosure or the embodiment(s) thereof, the articles "a," "an," and "the" are intended to mean that there are one or more of the elements. Similarly, the adjective "another," when used to introduce an element, is intended to mean one or more elements. The terms "including" and "having" are intended to be inclusive such that there may be additional elements other than the listed elements.

While the disclosure refers to exemplary embodiments, it will be understood by those skilled in the art that various changes may be made, and equivalents may be substituted for elements thereof without departing from the scope of the disclosure. In addition, many modifications will be appreciated by those skilled in the art to adapt a particular instrument, situation or material to the teachings of the disclosure without departing from the spirit thereof. Therefore, it is intended that the disclosure not be limited to the particular embodiments disclosed.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Non-Provisional Patent Application Entitled :

MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS

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MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS

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CLAIM OF PRIORITY

This application is a Continuation Application of U.S Application No. 16/421,141 filed May 23, 2019 which is a Continuation In Part of U.S. Non-Provisional Patent Application No. 16/155,919, filed October 10, 2018, which is a Continuation of U.S. Non-Provisional Patent Application No. 14/862,304, filed September 23, 2015, which claims priority from U.S. Patent Provisional Application No.: 62/054,286, filed on September 23, 2014, the contents of which are hereby fully incorporated by reference.

FIELD OF THE EMBODIMENTS

The invention and its embodiments relate to audio manipulation and sound management systems, particularly for home audio systems, public address systems, sound reinforcement systems, vehicle audio systems, ultrasonic transducers, infrasonic transducers, electro-optical transducers, microwave transducers, and associated software for these applications.

BACKGROUND OF THE EMBODIMENTS

Each year sound companies spend billions of dollars on audio technologies and audio research to find new ways to improve audio quality in performance settings. Very often sound systems are designed to be used in a specific environment. For example, in a vehicle or private

room setting, audio manipulation and output quality techniques and technologies are either prescriptive or adaptive – neither of which require the need for audio engineering professionals. However, in other situations such as at a concert venue, a wide array of audio professionals must be employed. This can include monitor engineers, system technicians, and front-of-house engineers. These professionals operate mixing consoles and audio control units to produce desirable, high-quality audio output.

Whether prescriptive or adaptive, manned or unmanned, perceived sound quality is a function of complex transducer-based technologies and acoustic treatment that are typically controlled, managed and manipulated by humans, and/or audio software and hardware. As such, both human and physical capital are required to produce first-rate sound quality. However, even when the necessary human and capital has been spent, it can still be very difficult to effectively manage audio outputs in real-time. This is due to improper calibrations of signal propagation and signal degradation, as well as unwanted harmonics and soundwave reflections.

Particularly in an outdoor setting, single-source sound systems typically produce an intermittent mix of unintelligible sounds and echoes due to a given venue's size and openness. A popular solution for addressing the echo issue is to utilize distributed sound systems. Traditional distributed sound systems are less susceptible to sound variance than single source systems. However, even when these distributed systems are used, temperature gradients and wind can still steer sound in undesirable ways.

Another issue related to the size of a performance venue is when audio and video fall out of sync. As live musical performances become more and more elaborate by including digital art and screens on-stage, it is becoming increasingly difficult to reliably sync audio and video in large venues, due to highly reverberant surfaces and long decay times.

Also impacting audio intelligibility during a live performance is crowd noise. At a live event, it is not uncommon for crowds to generate noise approaching 105dB. When this occurs, audio engineers must manipulate the supporting sound system output so that the performance audio remains 5-8 decibels higher than the noise generated by crowd. This action results in performance sound being broadcast above 110 dB, the range where the volume of sound begins to pose danger to human listeners. Frequently, audio system operators find it difficult to granularly control the loud perception of a given individual listener while managing loudness perception for the remainder of the audience. In a case where an audio quality trade-off decision has to be made, a common industry practice is to execute a remediation plan that favors the majority of listeners while the minority of listeners are forced to suffer through it.

In other instances, when various pieces of audio equipment are slightly, or completely out-of-phase, it can be difficult for audio system operators to correct these out-of-phase issues in a short period of time.

A myriad of audio functions are necessary to provide a dynamic range of audio playback and fidelity. To meet heightened demands and address new challenges, the devices of today will not only have to handle traditional telephony voice communication and low-fidelity voice recording, but also, these devices must be capable of incorporating new hardware and software to create new functions and applications such as sensing infrasonic, ultrasonic, blue light and millimeter wave exposure and reporting, and in some cases, autonomous manipulation of audio outputs. Further, such demands create the need to process signals using 'low-loss' methods by moving much of the processing function away from hardware and into software optimized to do so.

Review of related technology:

Line6, Inc. has created a 'smart mixing system' for non-wearable ubiquitous computing devices that enables wireless and touchscreen control of live sound system components. This is accomplished via a wired connection between standard audio hardware and a proprietary physical interface. While this system integrates and controls live sound system components via touchscreen devices, it unfortunately relies on audio engineers to operate it, and does not incorporate a listener-centric way to autonomously solve audio issues experienced by an audience.

United States Patent No.: 5,668,884 pertains to an audio enhancement system and method of use with a sound system for producing primary sound from at least one main loudspeaker located at a main position. The audio enhancement system comprises at least one wireless transmitter, time delay circuitry, and plural augmented sound producing subsystems. Each sound subsystem is a portable unit arranged to be carried by a person located remote from the main loudspeaker and includes a wireless receiver and an associated transducer device, e.g., a pair of stereo headphones. The transmitter broadcasts an electrical signal which is representative of the electrical input signal provided to the main loudspeaker. The broadcast signal is received by the receiver and is demodulated and amplified to drive the transducer so that it produces augmented sound substantially in synchronism with the sound arriving from the main loudspeaker. To achieve that end the time delay circuitry delays the electrical signal which is provided to the transducer for a predetermined period of time corresponding generally to the time period it takes for the primary sound to propagate through the air from the main loudspeaker to the remote location at which the person is located.

United States Patent No.: 7,991,171 pertains to a method and apparatus for processing an audio signal in multiple audio frequency bands while minimizing undesirable changes in tonal

qualities of the audio signal by determining an initial gain adjustment factor for each audio frequency band resulting from the application of an audio processing technique. A final gain adjustment factor for each band is selected from a corresponding set of weighted or unweighted initial gain adjustment factors. The set of initial gain adjustment factors from which the final gain adjustment factor for a specified audio frequency band is obtained is derived from other audio frequency bands that have the frequency of the specified band as a harmonic frequency. Changes in audio signal level within one audio frequency band thereby affect the signal level of harmonic frequencies to decrease relative changes in volume between a fundamental frequency and its harmonics.

United States Patent No.: 8,315,398 pertains to a method of adjusting a loudness of an audio signal may include receiving an electronic audio signal and using one or more processors to process at least one channel of the audio signal to determine a loudness of a portion of the audio signal. This processing may include processing the channel with a plurality of approximation filters that can approximate a plurality of auditory filters that further approximate a human hearing system. In addition, the method may include computing at least one gain based at least in part on the determined loudness to cause a loudness of the audio signal to remain substantially constant for a period of time. Moreover, the method may include applying the gain to the electronic audio signal.

United States Patent No.: 8,452,432 pertains to a user-friendly system for real time performance and user modification of one or more previously recorded musical compositions facilitates user involvement in the creative process of a new composition that reflects the user's personal style and musical tastes. Such a system may be implemented in a small portable electronic device such as a handheld smartphone that includes a stored library of musical

material including original and alternative versions of each of several different components of a common original musical composition, and a graphic user interface that allows the user to select at different times while that original composition is being performed, which versions of which components are to be incorporated to thereby create in real time a new performance that includes elements of the original performance, preferably enhanced at various times with user selected digital sound effects including stuttering and filtering. The system may also optionally comprise a visualizer module that renders a visual animation that is responsive to at least the rhythm and amplitude of the system's audio output, not only for entertainment value but also to provide visual feedback for the user.

United States Patent No.: 8,594,319 pertains to methods and apparatuses for adjusting audio content when more multiple audio objects are directed toward a single audio output device. The amplitude, white noise content, and frequencies can be adjusted to enhance overall sound quality or make content of certain audio objects more intelligible. Audio objects are classified by a class category, by which they can be assigned class specific processing. Audio objects classes can also have a rank. The rank of an audio object's class is used to give priority to or apply specific processing to audio objects in the presence of other audio objects of different classes.

United States Patent Publication No.: 2007/0217623 pertains to a real-time processing apparatus capable of controlling power consumption without performing complex arithmetic processing and requiring a special memory resource. The real-time processing apparatus includes an audio encoder that performs a signal processing in real time on an audio signal, a second audio encoder that performs the signal processing with a smaller throughput in real time on the audio, an audio execution step number notification unit that measures step number showing a level of the throughput in the signal processing by operating the 1st audio encoder or second

audio encoder, and an audio visual system control unit that executes control so that the first audio encoder operates when the measured step number is less than a threshold value provided beforehand and the second audio encoder operates when the step number is equal to or greater than the threshold value.

United States Patent Publication No.: 2011/0134278 pertains to an image/audio data sensing module incorporated in a case of an electronic apparatus. The image/audio data sensing module comprises: at least one image sensor, for sensing an image datum; a plurality of audio sensors, for sensing at least one audio datum; a processor, for processing the image datum and the audio datum according to a control instruction set to generate a processed image data stream and at least one processed audio data stream, and combining the processed image data stream and the processed audio data stream to generate an output data stream following a transceiver interface standard; a transceiver interface, for receiving the control instruction set and transmitting the output data stream via a multiplexing process; and a circuit board, wherein the image sensor, the audio sensors and the transceiver interface are coupled to the circuit board, and the processor is provided on the circuit board.

United States Patent Publication No.: 2013/0044131 pertains to a method for revealing changes in settings of an analog control console, the method comprising: receiving a captured image of the analog control console; creating a composite image by superimposing the captured image and a live image of the analog control console; and displaying the composite image.

United States Patent Publication No.: 2013/0294618 pertains to a method and devices of sound volume management and control in the attended areas. According to the proposed method and system variants the sound reproducing system comprises: sounding mode appointment device, central station for audio signal transmittance; one or more peripheral stations for audio

signal reception and playback; appliance for listener's location recognition; computing device for performing calculation concerning sounding parameters at the points of each listener's location and for performing calculation of controlling parameters for system tuning. The system can be operated wirelessly and can compose a local network.

Various devices are known in the art. However, their structure and means of operation are substantially different from the present invention. Such devices fail to provide a device that can help develop a participant's knowledge in a multitude of different subject areas, while simultaneously engaging the participant physically. At least one embodiment of this invention is presented in the drawings below and will be described in more detail herein.

SUMMARY OF THE EMBODIMENTS

According to an aspect of the present invention, a system is provided. The system includes an audio control source; at least one cluster of at least one computing device, the at least one computing device including: a sound sensing mechanism, configured to sense a noise; and a wireless transceiver, configured to wirelessly transmit and receive data from the audio control source. The system further includes at least one output device, including: a power source for operating the output device; a speaker for outputting sound; and a communication mechanism, for receiving electronic information from the audio control source. The system additionally includes the audio control source, in electronic communication the at least one cluster and the at least one output device, the audio control source including: a memory, containing computer-executable instructions for connecting to the at least one cluster, and varying an output of the at least one output device, providing an interface; and a processor, for executing the computer-executable instructions, wherein the computer-executable instructions include: identifying one or

more sounds within the noise; isolating the one or more sounds; determining is one or more of the one or more sounds includes a frequency outside of a predetermined threshold; if one or more of the one or more sounds includes the frequency outside of the predetermined threshold, altering the one or more of the one or more sounds so that the frequency does not fall outside of the predetermined threshold; and outputting the one or more sounds on the at least one output device.

It is an object of the present invention to provide the system, wherein the system further includes an interfacing mechanism, the interfacing mechanism including: a network adapter, configured to transmit and receive electronic information through both wired and wireless communication; and at least one input mechanism, configured to: manipulate the interfacing mechanism; and vary the output of the at least one output device.

It is an object of the present invention to provide the system, wherein the sound-sensing mechanism is an omnidirectional transducer.

It is an object of the present invention to provide the system, wherein the sound-sensing mechanism is selected from the group consisting of an ultrasonic transducer and an infrasonic transducer.

It is an object of the present invention to provide the system, wherein energy sensing mechanisms is selected from the group consisting of a microwave transducer; and an electro-optical transducer.

It is an object of the present invention to provide the system, wherein the sensed noise includes infrasonic or ultrasonic soundwaves.

It is an object of the present invention to provide the system, wherein the predetermined threshold equates to a frequency determined to pose a risk of harm to a human's body (e.g. a

retina and blue lights from screens, loud noise and a user's hearing capabilities, RF exposure limits and electrosensitivity, millimeter waves and cell growth or heart variability.

It is an object of the present invention to provide the system, wherein the computer-executable instructions further include: if one or more of the one or more sounds includes the frequency outside of the predetermined threshold, notifying a user, via a notification, that one or more of the one or more sounds includes the frequency outside of the predetermined threshold.

It is an object of the present invention to provide the system, wherein the notification is an audible notification.

It is an object of the present invention to provide the system, wherein the system further includes an in-ear device, wherein an audio output of the in-ear device auto-adjusts based on signal energy sensed within a cluster or surrounding clusters.

It is an object of the present invention to provide the system, wherein the computer-executable instructions further include panning the sensed noise.

It is an object of the present invention to provide the system, wherein the computer-executable instructions further include adding one or more audio effects to the sensed noise.

It is an object of the present invention to provide the system, wherein the computer-executable instructions further include equalizing the sensed noise.

It is an object of the present invention to provide the system, wherein the altering the one or more of the one or more sounds so that the frequency does not fall outside of the predetermined threshold is performed automatically.

It is an object of the present invention to provide the system wherein the system is further configured to sense and/or analyze infra/ultra-sonic waves (e.g., mm waves), visible light (e.g.

smart devices that have sensors that sense blue light from electronic screens and/or analyze and report prolonged exposure to the blue light) and radio waves.

According to another aspect of the present invention, a method of altering sensed noise prior to outputting the sensed noise is provided. The method includes providing at least one audio control source and providing at least one cluster of at least one computing device, the at least one computing device including: a sound sensing mechanism, configured to sense a noise; and a wireless transceiver, configured to wirelessly transmit and receive data from the audio control source; at least one output device, including: a power source for operating the output device; a speaker for outputting sound; and a communication mechanism, for receiving electronic information from the audio control source; and the audio control source, in electronic communication the at least one cluster and the at least one output device, the audio control source including: a memory, containing computer-executable instructions for connecting to the at least one cluster, and varying an output of the at least one output device, providing an interface; and a processor, for executing the computer-executable instructions. The method further includes identifying one or more sounds within the noise; isolating the one or more sounds; determining is one or more of the one or more sounds includes a frequency outside of a predetermined threshold; if one or more of the one or more sounds includes the frequency outside of the predetermined threshold, altering the one or more of the one or more sounds so that the frequency does not fall outside of the predetermined threshold; and outputting the one or more sounds on the at least one output device.

It is an object of the present invention to provide the method, wherein the at least one computing device further includes: an interfacing mechanism, the interfacing mechanism including: a network adapter, configured to transmit and receive electronic information through

both wired and wireless communication; and at least one input mechanism, configured to: manipulate the interfacing mechanism; and vary the output of the at least one output device.

It is an object of the present invention to provide the method, wherein the sound-sensing mechanism is an omnidirectional transducer.

It is an object of the present invention to provide the method, wherein the predetermined threshold equates to a frequency determined to pose a risk of harm to a user's hearing capabilities.

It is an object of the present invention to provide the method, wherein the method further includes, if one or more of the one or more sounds includes the frequency outside of the predetermined threshold, notifying a user, via a notification, that one or more of the one or more sounds includes the frequency outside of the predetermined threshold.

It is an object of the present invention to provide the method, wherein the notification is an audible notification.

It is an object of the present invention to provide the method, wherein the method further includes panning the sensed noise.

It is an object of the present invention to provide the method, wherein the method further includes adding one or more audio effects to the sensed noise.

It is an object of the present invention to provide the method, wherein the method further includes equalizing the sensed noise.

It is an object of the present invention to provide the method, wherein the altering the one or more of the one or more sounds so that the frequency does not fall outside of the predetermined threshold is performed automatically.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows a schematic view of an embodiment of one cluster of the present invention with some interfaced devices.

FIG. 2 shows a schematic view of how interfaced devices create a sound fingerprint.

FIG. 3 shows an illustration of an embodiment of the system of the present invention engaging in inter-cluster, cluster-to-audio control source; and cluster-to-cluster data sharing.

FIG. 4 shows a flow chart outlining an embodiment of the method of the present invention.

FIGs. 5-6 show a flow chart outlining an embodiment of the method of the present invention.

FIG. 7A shows an illustration showing an embodiment of the present invention located in an automobile.

FIG. 7B shows an illustration showing an embodiment of the present invention located in an indoor theatre.

FIG. 7C shows an illustration showing an embodiment of the present invention located in an outdoor stadium.

FIG. 8 shows a flow chart outlining an embodiment of the method of the present invention.

FIG. 9 shows an embodiment of the present invention used in association with a pet.

FIG. 10 shows an embodiment of the present invention used in association with a pet collar.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The preferred embodiments of the present invention will now be described with reference to the drawings. Identical elements in the various figures are identified with the same reference numerals.

Reference will now be made in detail to each embodiment of the present invention. Such embodiments are provided by way of explanation of the present invention, which is not intended to be limited thereto. In fact, those of ordinary skill in the art may appreciate upon reading the present specification and viewing the present drawings that various modifications and variations can be made thereto.

As a threshold matter, it should be noted that whenever the phrases "microphone" or "microphone-equipped" are used, it is intended to mean any device that is capable of detecting sound, not merely microphones. For example, a high-performance low frequency antenna connected to a software-defined radio may be used to input sound observations into the system, or a piezo-electric diagraph may be used to measure the vibrations the correspond to a given sound. These examples are provided to give greater clarity as to what the term "microphone" should be interpreted as, and not construed as a limiting example.

The system of the present invention operates by integrating clusters of various computing devices and wearable computers with sound management techniques and methods so that various sound "fingerprints" can be developed and used to visualize how sound is being perceived in micro-areas within a larger venue. In various embodiments, the system of the present invention can be integrated into an individual's home, vehicle audio system, concert venues, and other locations where sound is played. In addition, the system's components allow for the present

invention to be scaled to accommodate sound management and monitoring control within the largest of venues such as stadiums and other sports arenas.

Due to the devices that are integrated into the system having the ability to sense the frequency and magnitude of audio signals, a sound fingerprint (summary) can be generated from deterministic methods. These fingerprints are then communicated to an audio control source and can subsequently be processed and used to communicate with external applications and things such as third-party sound databases. However, the purpose of this system is not to be confused. In addition to the sound fingerprinting ability of the present invention, it is also capable of utilizing a series of methods to sense and control audio output in various venues.

In an alternative embodiment, the present invention is located in a train or airport station that has an intercom system that functions poorly when noisy crowds are present. If an audio control source within these facilities is able to autonomously collect audio data via a series of integrated devices, then with the present invention, the same audio control source can adjust system outputs accordingly in order to make important intercom announcements intelligible. In yet another embodiment, a user can enter in EQ parameters in their integrated computing device to ensure that both the audio perceived by them, and the audio perceived by their device is in accordance with some predetermined parameters/settings. While many short-range wireless technologies can be used with the present invention, preferably one or more of the following technologies will be used: ANT+, Bluetooth, cellular, IEEE 802.15.4, IEEE 802.22, ISA 100a, Infrared, ISM (band), NFC, RFID, WPAN, UWS, WI-FI, Wireless HART, Wireless HD/USB, ZigBee, or Z-wave.

In yet another preferred embodiment, various in-ear systems may be integrated into the present invention, software-defined and/or cognitive-defined based in-ear transceivers can be

used to wirelessly communicate with an audio control source and thus, the output of such an in-ear monitor can be autonomously adjusted after sensing audio output. A given output can be adjusted according to what is sensed within specified location or what is sensed at external clusters. Similarly, to a software-defined and/or cognitive-defined based in-ear transceivers, an in-ear monitor system for use with the present invention will preferably comprise hardware such as, earphones, at least one body pack receiver, at least one mixer and at least one transmitter. These functions can also be adjusted and controlled via the audio control source of the present invention.

According to an embodiment, the functions of the present invention include sensing and isolating frequency bands associated with musical instruments/human voices in the following order: midrange, highs, and lows. According to an embodiment, the functions further include separating like frequencies (panning). According to an embodiment, the functions additionally include balancing the volume, controlling the dynamic range of the frequencies sensed (compression), performing subtractive and additive equalization, and/or adding audio effects to provide additional depth and texture.

Loud noises can often lead to stress and hearing loss. For example, certain frequencies and volumes can cause stress in pets, and loud music and other forms of loud sounds have put approximately 1.1 billion young people at risk of suffering from hearing loss. Furthermore, military veterans are 30% more likely to suffer from severe hearing loss than non-veterans. In fact, according to the DoD's Hearing Center for Excellence (HCE), hearing loss is the most-widespread injury among returning veterans, driving hearing loss payments to exceed $2 billion in 2016. The present invention provides for an interdisciplinary and technologically advanced approach to hearing loss prevention.

It is important to note that noise pollution not only produces negative health outcomes for humans, but also, can produce negative outcomes for pets. Loud noises and obtrusive, artificial light negatively affect pets such as cats and dogs, and can eventually lead to abnormal behaviors, like excessive whining, trembling, barking and panting. These behaviors are a result of the pets trying to cope with the stress tied to phenomena within their environment, and if left unchecked, can cause panic disorders such as, e.g., separation anxiety, which is not healthy for both pet owners and pets. It is therefore an object of the present invention to provide a method wherein at least one sound and/or light sensing device can be affixed or integrated into a pet wearable (e.g. dog collar). In another embodiment of the present invention, pet products w/ smart units that sense and analyze frequencies across a wide range of frequency bands (See FIG. 9) may be configured in order to alert pet owners of: loud and/or obtrusive noises, harmful artificial lights, or any other unhealthily or uncomfortable environmental disturbance. These pet products w/ smart units work together via the mobile-to-mobile network (as described herein) to expose, report on and explain certain behaviors like excessive barking, whining, trembling and panting. Alerts can be shown via an integrated LED or LCD display on pet products/wearables, pet owner smartphones, smartwatches (and other wearable), and can display warning messages. Warning messages may include: "too loud for pet," "painful and/or uncomfortable environment," or mood or behavioral-related messages such as "environment making pet unhappy," or "environment likely to cause barking." As show in FIG. 10, a pet collar may be located on the pet and configured to sense noise or other conditions close to the pet's ears and eyes. Smart units may be located on the pet's ankle as a bracelet which may be configured to sense noise or other conditions that are close to the ground. The pet smart unit may be configured to be sensitive to

faint vibrations possibly due to low frequency sounds or physical disturbances close or in the ground.

Hearing loss can be considered an inevitable cost of military exercises and war. However, real-time alerts using mobile devices creates an opportunity to implement preventative measures, ultimately reducing hazardous exposure time and thus injury. Study considerations include, data sets, hearing loss incidents among veterans (on the rise), current preventative measures, gear, and equipment such as jet engines and other inherently noisy machinery. In summary, various embodiments of the present invention are in response to the DoD commitment to reduce the number of military personnel that suffer from hearing loss injury by 1) analyzing hazardous sounds in real-time 2) alerting service members using wearable mobile devices (new preventative technique).

According to an embodiment, the present invention provides for a mobile cluster-based apparatus that analyzes, reports, and controls outputs based on a range of inputs over a swath of frequency bands, with distinct applications including sound output control, hazardous millimeter-wave, blue light or RF detection and reporting, and ultrasonic and infrasonic wave detection and reporting. In a blue light sensing application, a wearable in close proximity to a user's retina (e.g. located on a collar of a smart jacket) can measure prolonged blue light retina exposure and report the issue back to the user.

According to an embodiment, the apparatus is configurable and uses standard computing devices, such as wearables, tablets, and mobile phones, to measure various frequency bands across multiple points, allowing a single user to visualize and adjust sound output, and in some cases, detect and report hazardous signals.

Each year, sound companies spend billions of dollars on audio technologies and audio research to find new ways to improve audio quality in performance settings. Proposed is an apparatus and method that creatively tackles the issue of poor audio quality and sound perception across various spaces by integrating consumer-based mobile devices, wearable computers and sound management systems. The ubiquitous computing devices in this method and apparatus senses soundwaves, associates sensed audio levels with specific clusters (locations), predicts whether or not an audio-related issue is likely to occur within a specific cluster (for instance, predicts if an echo is likely to occur), and adjusts audio intensity (and related EQs) accordingly to improve audio output quality.

Key features of the Mobile Cluster-Based Audio Adjusting Method and Apparatus include:

• User/listener-based sound management and control

• Scalable platform that can incorporate future tech - that is, new functionalities can be added because the method and apparatus is designed to seamlessly integrate additional components including, but not limited to, software applications such as a 'sound preference' application that sets user-based sound perception settings on a mobile device or wearable computer.

• Integrates with existing audio hardware and software - such as in-ear systems, mixer boards and other related audio consoles

• Autonomous audio sensing

• Can be configured, manufactured and sold across different industries (e.g. automobile or audio electronic industries)

• Can be used in sound fingerprint and music publishing/performance applications (e.g. in a performance venue, fingerprint data can be sent directly to music publishing entities from the described clusters

• Can interface with various communication offerings such as e-mail, SMS, and visual screens (for instance, communicative updates can be sent with sensed audio measurements. A specific example – an SMS that reads a "too loud in section A'/cluster A)

• Can support a fixed or unfixed number of "sensing units"

Audio Control Source & Computing Device Single device

Developments in science and engineering, and specifically, artificial intelligence, augmented reality, hologram technology, cloud computing and wireless engineering, are all expected to shift a smart device's feature set, and how a smart device communicates with both the user (interface) and the network (including other smart devices). Therefore, it is understood that as technology advances, certain smart devices described in the system of the present embodiments will either become obsolete (e.g. smartphones) and/or will not be heavily relied upon by users to perform certain functions. Thus, according to an embodiment, the system is considered modular because system functions can be distributed across several devices as well as integrated into a single device (e.g. as the physical and software nature of these devices evolve, the salient functions of the Audio Control Source and the Computing Device can be integrated into a single device).

Highlighting Long-Range Technologies

As highlighted in the present description, smart devices within the system can interact with each other using short-range technologies (such as Wi-Fi and Bluetooth), however, it is understood that there are certain limitations associated with many short-range technologies (e.g.

poor security, bandwidth and suboptimal data exchange within peer network(s)). Since optimality is a core focus, smart devices can also employ long-range protocols (as described in the LTE and IMT-2020 specification) to exchange data. Doing so can allow the system to leverage cloud computing and cloud storage capabilities. Thus, according to an embodiment, a device within the present system can also feature a shared radio front end for a software defined radio, further reducing the physical IoT communication barrier between networks and devices, and further allowing flexible and efficient 'switching' between short-range and long-range technologies.

Referring to FIG. 1, an embodiment of one cluster 101 of the present invention with some interfaced devices. Specifically, three embodiments of at least one computing device 102 are shown; wearable glasses, wearable watch, and a smartphone. It should be noted that while these three devices are listed as exemplary examples, any device with a sound sensing mechanism 150 and a way to transmit any recorded data is suitable for use as one of said at least one computing devices 102. According to an embodiment, the sound sensing apparatus may be an omnidirectional transducer, an ultrasonic transducer, an infrasonic transducer, a microwave transducer, and/or any other suitable sound sensing apparatus, while maintaining spirit of the present invention. The sound sensing mechanisms of at least one computing device 102 will be able convert perceived sounds into electronic signals so that the recorded information may be transmitted to neighboring clusters 101, or an audio control source (See FIG. 3), as desired. This data will be transmitted using either one or a combination of short-range wireless technologies, namely, ANT+, Bluetooth, cellular, IEEE 802.15.4, IEEE 802.22, ISA 100a, Infrared, ISM (band), NFC, RFID, WPAN, UWS, WI-FI, Wireless HART, Wireless HD/USB, ZigBee, or Z-wave. Preferably, transducers integrated into these computing devices have an output signal that

is fed into the input of an analog-to-digital converter ("ADC") and can incorporate software and cognitive-defined radios to broaden the selection of compatible wireless communication interfaces and limit radio component footprints. According to an embodiment, the at least one computing device 102 includes one or more wireless transceivers 155.

FIG. 2 shows a schematic view of how interfaced devices create a sound fingerprint. The sound transmission of the audio energy 109 sensed by the at least one computing device 102 propagates through air and is received by at least one computing device 102 using the transmission path outlined in Figure 2.

Assuming that Figure 2 depicts audio transmission in an indoor setting, at specified time intervals, each computing device measures the sound pressure level (SPL) and sound power level (SWL):

$$SPL = SWL + 10\log[\frac{Q_\theta}{4\pi r^2} + \frac{4}{R_C}]$$

Where:

SPL = Sound pressure level dB

SWL = Sound power level = $10\ \log_{10}(W/\ W_{ref})$

W is the total sound power radiated from a source with respect to a reference power (W_{ref}) dBW re 10^{-12} Watts.

r = distance from source m

Q_θ = directivity factor of the source in the direction of r

S = total surface area of a room m^2

α_{av} = average absorption coefficient in a room

R_C = room constant = $\frac{S\alpha_{av}}{1-\alpha_{av}}\ m^2$

Over time, each computing device in Figure 2 detects differences in pressure (i.e. change in pressure vs. time) and converts the differences into an electrical signal. A Fast Fourier

Transform is implemented (locally or in a cloud) to measure the relative amplitudes of the frequencies 'sensed' and to perform other frequency domain analyses.

It is important to note that in any given indoor environment, R_C, α_{av}, and S can be predetermined and made available to each computing device, approximated or deemed negligible. Also note that each computing device in Figure 2 has a microphone. Computing devices may also obtain sound observations via a high-performance low frequency antenna.

Turning to Fig. 3 an illustration of an embodiment of the system of the present invention engaging in intra-cluster, cluster-to-audio control source; and cluster-to-cluster data sharing. Here, each cluster has a given location 110 (i.e. specified location) to accurately isolate and associate the sensed data. In one embodiment, the present invention is able to adjust a given output device 160 based on its proximity to a given location 110 of a cluster. In alternative embodiments, output devices 160 can be adjusted based on their proximity to more than one cluster. Devices in each cluster can either communicate directly to each other or an audio control source 111, devices within a cluster can communicate to a single device within that cluster which can serve as a gateway to other clusters and/or audio control source 111. In some embodiments, the present invention further comprising an in-ear monitoring device 112. According to an embodiment, the output devices 160 may include a power source 165 (such as, e.g., a battery or other suitable power source 160), a speaker 170, a communication mechanism 175 (such as, e.g., a wired and/or wireless transceiver), and/or any other suitable mechanisms (as shown in FIG. 1). According to an embodiment, the audio control source 111 includes a memory 180, a processor 182, an interface mechanism 184, and/or at least one input mechanism 186. According to an embodiment, the interface mechanism 184 is a graphical user interface with a display (e.g., a touch screen display). According to an embodiment, the at least one output device 160 is located

within said at least one cluster 101, such that said audio control source 111 may alter the power supplied to said speaker 170 in real-time.

The embodiment depicted here shows devices that sense audio signal energy within the confines of a single cluster and then sends data directly to an audio control unit and other clusters. Therefore, not only can these computing devices wirelessly share sensed data with each other, but, also, data can be shared with an audio control source 111 (for audio output management purposes) and other devices in other clusters. Depending on the audio signal energy sensed within a specific cluster(s), audio control source 111 adjusts any connected output devices in either a single cluster, or multiple clusters to ensure high quality/fidelity output.

FIG. 4 shows a flow chart outlining an embodiment of the method of the present invention. Here, method 200 is comprised of a number of steps. In step 201, initially, both desired and undesired audio output signals are sensed and subsequently analyzed. In step 202, the method proceeds to determine whether or not the input signals match a set of predefined thresholds. If there is only negligible output audio, that is, if the audio within an environment is outside of a specified frequency range, the method proceeds to step 203 where the devices in each cluster operate in sleep mode. If there is indeed sensible audio output, the method proceeds to step 204 where the present invention determines if the predefined threshold or EQ setting is breached. If this threshold is breached, the method moves to step 205 where the first device that sensed the breach will (preferably, wirelessly) communicate its signal measurements to other devices within its cluster and the receiving device will conduct the same audio measurements to confirm the threshold breach. Preferably, step 205 is repeated amongst all of the devices within a single cluster, to provide more robust data sets. Once the breach confirmation stage is completed, in step 206, the present invention moved to step 207 where at least one computing device is

chosen to communicate the breach to. Finally, in step 208, when the present invention, via the audio control source, adjusts audio levels at the at least one output device to transform undesired audio outputs to desired audio outputs.

Referring now to FIGs. 5-6, a flowchart 300 of an embodiment of the present invention is illustratively depicted, in accordance with an embodiment of the present invention.

According to an embodiment, the present invention isolates and/or separates sounds within band, reports findings of those sounds to a cloud-based system for audio signal processing (if necessary), and sends control commands to one or more commercial mixing consoles and/or audio control sources to alter the audio output (if necessary), and then communicate with apparatus devices to share and confirm sensed audio findings (if necessary). According to an embodiment, these sounds are associated with different frequencies and/or are associated with one or more instruments.

At step 305, audio/noise is sensed by one or more audio sensing devices. According to an embodiment, the one or more sensing devices are microphones.

At steps 310-315, the volume between the sensed audio is balanced. That is, one or more instruments and/or frequencies are identified and isolated from the sensed audio (at step 310), and the signal amplitude of each instrument is manipulated using a mixing console/audio source (at step 315). It is noted, however, that, at step 310, the identified sounds need not always be instruments. The sounds may be any suitable identifiable sounds, while maintaining the spirit of the present invention.

According to an embodiment, the present system may sense different types of phenomena (e.g., it may sense audio using an audio transducer such as a microphone, it may include a smartwatch and/or other similar device that may be able to sense ultrasonic waves using an

ultrasonic transducer, and/or the system may incorporate one or more various suitable types of transducers). According to an embodiment, the system may be configured to sense environmental phenomena outside of the acoustic frequency range by using a variety of transducers. In those cases, the underlying functionality of the system generally remains the same, regardless of the input phenomena sensed. The system may measure the intensity of an acoustic wave, ultrasonic wave, infrasonic wave, and/or any other suitable waves.

According to an embodiment, the system may incorporate various input/output functions/details, such as those shown in Table 1. According to an embodiment, the system is configured to sense, analyze, and/or control audio outputs.

SYSTEM INPUT	SYSTEM FUNCTION	OUTPUT Network Interface Configured to:

Network Interface: Sense audible sounds via mic or comparable audio sensing transducer	Apparatus will isolate/separate sounds within band, report findings to cloud-based system for audio signal processing (if necessary), send control commands to commercial mixing console and/or audio control source to alter audio output (if necessary) and communicate with apparatus devices to share and confirm sensed audio findings (if necessary)	Control mixing console(s) and/or an audio control source(s) via physical or SDR-based transceiver(s)**
20 - 40 Hz	Sub Bass *(Piano, Synthesizer Strings)	kHz: 125/134 MHz: 13.56/ 600/ 800/850/900/1700/1800/1900 2100/2200/L700/U700/2300/2400/2500/2700/3500/5200/ 5700/whitespaces between 54 and 860/ GHz:3.6/4.9/5/5.9 /24 to 300 300 GHz to 430 THz
40 - 160 Hz	Bass Band (Drums, Strings, Winds, Vocals, Piano, Synthesizer)	
160 - 300 Hz	Upper Bass Band (Drums, Strings, Winds, Vocals, Piano, Synthesizer)	
300 - 800 Hz	Low-Mid Band (Drums, Strings, Winds, Vocals, Piano, Synthesizer)	
800 - 2.5 kHz	Mid-Range Band (Drums, Strings, Winds, Vocals, Piano, Synthesizer)	
2.5- 5 kHz	Upper Mid Band (Drums, Strings, Winds, Vocals, Piano, Synthesizer)	
5 - 10 kHz	High Frequency Band (Drums - including Cymbals, Synthesizer)	
10 - 20 kHz	Ultra-High Freq Bands (Hi-Hat, Cymbals, Hiss)	

Table 1

It is also noted that the present invention may further have implications in sensing and analyzing millimeter waves, which the human ear cannot hear. Higher-frequency millimeter-

waves can possibly have adverse effects on human health. According to an embodiment, the present system can (as shown in Table 2), in real-time, detect and report harmful, high-energy level millimeter waves, which are included in many 5G deployment plans.

SYSTEM INPUT	SYSTEM FUNCTION	OUTPUT
Network Interface: Sense millimeter-waves via a mmWave transducer	Apparatus will detect, analyze, measure and/or report harmful millimeter-waves across several environments	Network Interface Configured to: Report/share data via physical or SDR-based transceiver(s)**
24 to 300 GHz	Identify and measure millimeter-wave characteristics	kHz: 125/134 MHz: 13.56/ 600/ 800/850/900/ 1700/1800/1900 2100/2200/L700/U700/2300/ 2400/2500/2700/3500/5200/5700/ whitespaces between 54 and 860/ GHz:3.6/4.9/5/5.9 /24 to 300 300 GHz to 430 THz

5

Table 2

Weaponized infrasonic and ultrasonic devices with highly directional energy transmissions can produce both psychological and physical effects on humans. In addition, blue

light (short wavelength) emitted from displays is harmful to the retina. For this reason, a light sensing transducer is a part of the apparatus described herein. According to an embodiment, the present system can, in real-time, detect and report harmful infrasonic and ultrasonic devices in weaponized scenarios. According to an embodiment, the apparatus described can (as shown in Table 3), in real-time, detect and report harmful infrasonic and ultrasonic devices in weaponized scenarios.

SYSTEM INPUT	SYSTEM FUNCTION	OUTPUT
Network Interface: Sense infrasonic, ultrasonic	Apparatus will detect, analyze, measure and/or	Network Interface Configured to:

waves, and/or light waves via an ultrasonic, infrasonic or electro-optical transducer	report on harmful ultrasonic or infrasonic waves across several environments	Report/share data via physical or SDR-based transceiver(s)
18.9 Hz, 0.3 Hz, 7 Hz and 9 Hz 700 kHz to 3.6 MHz 20 to 200 kHz 400 – 770 THz	Identify and measure ultrasonic, infrasonic or visible wave characteristics	kHz: 125/134 MHz: 13.56/ 600/ 800/850/900/1700/1800/1900 2100/2200/L700/U700/ 2300/2400/2500/2700/3500/5200/5700/whitespaces between 54 and 860/ GHz:3.6/4.9/5/5.9 /24 to 300 300 GHz to 430 THz

Table 3

At step 320, it is determined whether the sensed audio includes any audio in frequencies that have been predetermined to be hazardous to human ears. According to an embodiment, if audio in the hazardous range has been detected, then one or more users are notified, at step 325. The notification may take the form of a visual notification, an audible notification, and/or any other suitable form of notification. It is noted, however, that, if automatically corrected, the user need not always be notified.

According to an embodiment, at step 330, the dynamic range of the sensed audio (compressed or limiting) is controlled by sending audio data to a mixing console/audio source or

cloud-based system that can identify and mitigate sudden peaks in a sensed audio stream to help sound(s) sit consistently in an audio mix (accomplished by removing sudden peaks). Altering the dynamic range may also be used to eliminate any audio in the predetermined hazardous range. At step 335, the audio is panned. That is, like frequencies in the sensed audio are separated.

At step 340, effects that add depth and texture to audio outputs are added and, at step 345, equalization is added using subtractive and/or additive equalization techniques.

According to an embodiment, at step 350, automation is generated that predicts environmental conditions based on sensed data (like echoes and audio wind steers) and, at step 355, volume changes and audio effects are autonomously programmed, accordingly.

According to an embodiment, the present invention includes acoustic band applications. Consumer products, such as, e.g., wearables, smartphones, and other portable computing devices autonomously control sound output(s) in private spaces (e.g. cars and homes) and public spaces (e.g. transport stations and theater/concert venues). According to an embodiment, the present system senses audible sounds via a mic or comparable audio sensing transducer and isolates/separates sounds within certain bands, reports findings to cloud-based system(s) for audio signal processing, sends control commands to a commercial mixing console and/or audio control source to alter audio output, and communicates with cluster devices to share and confirm sensed audio findings. According to an embodiment, the present system outputs to control mixing console(s) and/or an audio control source(s) via physical or SDR-based transceiver(s).

According to an embodiment, the present system senses and analyzes audio frequencies across clusters to adjust and control audio output and perceived sound at a given locale. In order to achieve high-quality sound and sound equalization of a sonic presentation, a sound system's

audio output levels are autonomously adjusted via a central audio mixing source using intelligent tell-tale frequency characteristics gathered from clusters comprised of smart devices and/or wearable computers.

According to an embodiment, the audio signal data obtained within clusters enables a system integrated mixing console to manage audio output based on detailed frequency descriptions of acoustic properties and characteristics across a venue, room, or vehicle. According to an embodiment, the present system incorporates a modular structure so that components can be added and expand as consumer needs grow.

According to an embodiment, the present system provides for an apparatus that is configured to adjust and control audio output signal levels across multiple cluster locales using computing devices such as smartphones and/or wearable computers; a wireless transmission platform; transceivers - software-defined, cognitive-defined and/or hardware- defined; wireless microphones; in-ear monitors - software-defined, cognitive-defined and/or hardware-defined; and a central audio mixing source.

According to an embodiment, the apparatus of the present invention may include, but is not limited to, the following functions:

- Balancing the volume between sensed audio. For example, isolating instruments based on frequency and manipulating the signal amplitude of each instrument using a mixing console/audio source.
- Controlling the dynamic range of the sensed audio (compress or limiting) by sending audio data to a mixing console/audio source or cloud-based system that can identify and mitigate sudden peaks in a sensed audio stream to help sounds sit consistently in an audio mix (accomplished by removing sudden peaks).

- Panning.
- Adding effects that add depth and texture to audio outputs.
- Equalization using subtractive/additive equalization techniques.
- Automation that 1) predicts environmental conditions based on sensed data (like echoes and audio wind steers) and 2) autonomously programs volume changes and audio effects accordingly.

Referring to Figs. 7A-7C, various embodiments of the present invention implemented in an automobile, an indoor theatre, and an outdoor stadium, respectively, are shown. While these venues are particularly suited for the present invention to be implemented in any venue in which there are multiple listeners.

In a preferred embodiment, the sound sensing mechanisms (preferably, transducers) used within each "sensing" computer/device outputs an output signal that is fed into the input of an ADC. In the configurations described in Figure 7A, 7B and 7C, a single-ended ADC interface can be used effectively since ADCs and the transducer source are both located on the same integrated circuit board. However, since fully differential interfaces have performance gains over single-ended inputs due to its inherent noise rejection characteristics, using a fully-directional interface instead of a single-ended interface may be desirable.

FIG. 8 shows a flow chart outlining an embodiment of the method of the present invention. Here, method 400 is comprised of a number of steps. According to an embodiment, the method as shown and described in FIG. 8 showcases the method steps of a system that measures the intensity of phenomena and its purpose is to sense, analyze, report, and, in some cases, control invisible phenomena. These invisible phenomena can include, e.g., ultrasonic waves, audio waves, infrasonic waves, mm waves etc. (using ultrasonic transducers, infrasonic

transducers, microwave transducers, among others, and associated software for these applications).

As in method 200 of FIG. 4, initially, both desired and undesired audio output signals are sensed and subsequently analyzed. It is then determined whether or not the input signals match a set of predefined thresholds. If there is only negligible output audio, that is, if the audio within an environment is outside of a specified frequency range, the devices in each cluster operate in sleep mode, step 402. If there is indeed sensible audio output, the method proceeds to step 401 where the present invention determines if the predefined threshold or EQ setting is breached. If this threshold is not breached, the device operates in sleep mode 402. If this threshold is breached, the method moves on to step 403, where it is determined whether the device has a navigation unit. According to an embodiment, devices in the system can auto-awaken out of sleep mode based on the location of the device (e.g. when a user walks into a concert venue, the system will begin measuring surrounding signal energy).

If the device does not have a navigation unit, the method moves to step 404, where a breach severity measurement is determined. Once the breach severity measurement is determined, the method moves to step 405, where it is determined whether there is an onset issue.

If there is an onset issue, the method moves to step 406, in which any data and/or findings are reported and/or displayed. Once the data and/or findings are reported and/or displayed, the device returns to sleep mode, step 402.

If there is not an onset issue, the method moves to step 407, wherein a time window is calculated at which any sensed data was determined to be unacceptable. Once this time window is calculated, the method moves to step 408, wherein breaches within the calculated time window

are collected and/or analyzed. Once the breaches within the calculated time window are collected and/or analyzed, the method moves to step 409, wherein it is determined whether there were consistent breaches during the time window. If there were consistent breaches during the time window, the method moves to step 406. If there were not consistent breaches during the time window, the device goes back to sleep mode, step 402.

If the device has a navigation unit, the method moves to step 410, wherein breach severity measurements with the device's location are determined. Once the breach severity measurements with the device's location are determined, the method moves to step 411, wherein it is determined whether the device's location at the time of the breach lessened the severity of the breach. If the device's location at the time of the breach did not lessen the severity, the method moves to step 405, wherein it is determined whether there is an onset issue. If the device's location at the time of the breach did lessen the severity, the method moves to step 412, wherein an analysis takes place in which location and machine learning insights are factored into the threshold breach calculations. The method then moves to step 413, where it is determined if the breach is still an issue. If the breach is still an issue, the method moves to step 405, wherein it is determined whether there is an onset issue. If the breach is not still an issue, the device goes back to sleep mode, step 402.

According to an embodiment, environmental measurements may be skewed depending on the device's location (e.g., in a bag, in a pocket, etc.). According to an embodiment, the location of the device is detected, and, in these cases, the system will either account for signal degradation in the measurement or disable environmental measurements based on predefined thresholds. According to an embodiment, smart devices (e.g., smartphones, etc.) will use an

accelerometer and/or light sensor and/or a temperature sensor to detect whether or not the smart device is directly exposed to phenomena (i.e. whether or not the device is in a bag or pocket).

When introducing elements of the present disclosure or the embodiment(s) thereof, the articles "a," "an," and "the" are intended to mean that there are one or more of the elements. Similarly, the adjective "another," when used to introduce an element, is intended to mean one or more elements. The terms "including" and "having" are intended to be inclusive such that there may be additional elements other than the listed elements.

While the disclosure refers to exemplary embodiments, it will be understood by those skilled in the art that various changes may be made, and equivalents may be substituted for elements thereof without departing from the scope of the disclosure. In addition, many modifications will be appreciated by those skilled in the art to adapt a particular instrument, situation or material to the teachings of the disclosure without departing from the spirit thereof. Therefore, it is intended that the disclosure not be limited to the particular embodiments disclosed.

CLAIMS

What is claimed is:

1. A system comprising:

an audio control source;

at least one cluster of at least one computing device,

the at least one computing device including:

a sound sensing mechanism, configured to sense a noise; and

a wireless transceiver, configured to wirelessly transmit and receive data from the audio control source;

at least one output device, including:

a power source for operating the output device;

a speaker for outputting sound; and

a communication mechanism, for receiving electronic information from the audio control source; and

the audio control source, in electronic communication the at least one cluster and the at least one output device, the audio control source including:

a memory, containing computer-executable instructions for connecting to the at least one cluster, and varying an output of the at least one output device, providing an interface; and

a processor, for executing the computer-executable instructions,

wherein the computer-executable instructions include:

identifying one or more sounds within the noise;

isolating the one or more sounds;

determining is one or more of the one or more sounds includes a frequency outside of a predetermined threshold;

if one or more of the one or more sounds includes the frequency outside of the predetermined threshold, altering the one or more of the one or more sounds so that the frequency does not fall outside of the predetermined threshold; and

outputting the one or more sounds on the at least one output device.

2. The system as recited in claim 1, further comprising:

an interfacing mechanism, the interfacing mechanism including:

a network adapter, configured to transmit and receive electronic information through both wired and wireless communication; and

at least one input mechanism, configured to:

manipulate the interfacing mechanism; and

vary the output of the at least one output device.

3. The system as recited in claim 1, wherein the sound-sensing mechanism is an omnidirectional transducer.

4. The system as recited in claim 1, wherein the sound-sensing mechanism is selected from the group consisting of: an ultrasonic transducer; an infrasonic transducer: and a microwave transducer.

5. The system as recited in claim 4, wherein the sensed noise includes infrasonic or ultrasonic soundwaves.

6. The system as recited in claim 1, wherein the predetermined threshold equates to a frequency determined to pose a risk of harm to a user's hearing capabilities.

7. The system as recited in claim 1, wherein the computer-executable instructions further include:

if one or more of the one or more sounds includes the frequency outside of the predetermined threshold, notifying a user, via a notification, that one or more of the one or more sounds includes the frequency outside of the predetermined threshold.

8. The system as recited in claim 1, wherein the computer-executable instructions further include steps selected from the group consisting of: panning the sensed noise; and equalizing the sensed noise.

9. The system as recited in claim 1, further comprising:

an in-ear device, wherein an audio output of the in-ear device auto-adjusts based on signal energy sensed within a cluster or surrounding clusters.

10. The system as recited in claim 1, wherein the altering the one or more of the one or more sounds so that the frequency does not fall outside of the predetermined threshold is performed automatically.

11. A method of altering sensed noise prior to outputting the sensed noise, comprising:

providing at least one audio control source;

providing at least one cluster of at least one computing device, the at least one computing device including:

a sound sensing mechanism, configured to sense a noise;

a wireless transceiver, configured to wirelessly transmit and receive data from the audio control source;

at least one output device, including:

a power source for operating the output device;

a speaker for outputting sound; and

a communication mechanism, for receiving electronic information from the audio control source; and

the audio control source, in electronic communication the at least one cluster and the at least one output device, the audio control source including:

a memory, containing computer-executable instructions for connecting to the at least one cluster, and varying an output of the at least one output device, providing an interface; and

a processor, for executing the computer-executable instructions;

identifying one or more sounds within the noise;

isolating the one or more sounds;

determining is one or more of the one or more sounds includes a frequency outside of a predetermined threshold;

if one or more of the one or more sounds includes the frequency outside of the predetermined threshold, altering the one or more of the one or more sounds so that the frequency does not fall outside of the predetermined threshold; and

outputting the one or more sounds on the at least one output device.

12. The method as recited in claim 11, wherein the at least one computing device further includes:

an interfacing mechanism, the interfacing mechanism including:

a network adapter, configured to transmit and receive electronic information through both wired and wireless communication; and

at least one input mechanism, configured to:

manipulate the interfacing mechanism; and

vary the output of the at least one output device.

13. The method as recited in claim 11, wherein the sound-sensing mechanism is selected from the group consisting of: an omnidirectional transducer; an ultrasonic transducer; an infrasonic transducer; an electro-optical transducer; and a microwave transducer.

14. The method as recited in claim 13, wherein the sensed noise includes infrasonic, ultrasonic, visible, or radio waves.

15. The method as recited in claim 11, wherein the predetermined threshold equates to a frequency determined to pose a risk of harm to a user's hearing capabilities.

16. The method as recited in claim 11, further comprising:

if one or more of the one or more sounds includes the frequency outside of the predetermined threshold, notifying a user, via a notification, that one or more of the one or more sounds includes the frequency outside of the predetermined threshold.

17. The method as recited in claim 11, further comprising:

panning the sensed noise.

18. The method as recited in claim 11, further comprising:

adding one or more audio effects to the sensed noise.

19. The method as recited in claim 11, further comprising:

equalizing the sensed noise.

20. The method as recited in claim 11, wherein the altering the one or more of the one or more sounds so that the frequency does not fall outside of the predetermined threshold is performed automatically.

ABSTRACT

The systems and methods described relate to the concept that smart devices can be used to 1) sense various types of phenomena like sound, blue light exposure, RF and microwave radiation, and 2) in real-time analyze, report and/or control outputs (e.g., displays or speakers). The systems are configurable and use standard computing devices, such as wearable electronics, tablet computers, and mobile phones to measure various frequency bands across multiple points, allowing a single user to visualize and/or adjust environmental conditions.

Electronic Patent Application Fee Transmittal

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First Named Inventor/Applicant Name:	Levaughn Denton
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Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension - 5 months with $0 paid	3255	1	750	750
Miscellaneous:				
		Total in USD ($)		**750**

Electronic Acknowledgement Receipt

EFS ID:	39555171
Application Number:	16656259
International Application Number:	
Confirmation Number:	7312
Title of Invention:	MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS
First Named Inventor/Applicant Name:	Levaughn Denton
Customer Number:	75207
Filer:	David D. Postolski/Kristin Bennett
Filer Authorized By:	David D. Postolski
Attorney Docket Number:	2305LD01UTL1USCON2
Receipt Date:	27-MAY-2020
Filing Date:	17-OCT-2019
Time Stamp:	18:50:40
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$750
RAM confirmation Number	E20205QI52045698
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Fee Worksheet (SB06)	fee-info.pdf	30978 8b15ffa7810285753bdfa3793709fe3f9e9ef77e	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	30978		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.
National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 16/656,259

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	75
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	165
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	190
TOTAL CLAIMS (37 CFR 1.16(i))	20 minus 20 =	*			OR	x 25 =	0.00
INDEPENDENT CLAIMS (37 CFR 1.16(h))	2 minus 3 =	*				x 115 =	0.00
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						0.00
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	430

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE($)	ADDITIONAL FEE($)	OR	RATE($)	ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
16/656,259	10/17/2019	2654	430	2305LD01UTL1USCON2	20	2

CONFIRMATION NO. 7312

UPDATED FILING RECEIPT

75207
Gearhart Law LLC
41 River Road
Suite 1A
Summit, NJ 07901

OC000000117313278

Date Mailed: 05/29/2020

Receipt is acknowledged of this non-provisional utility patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF FIRST INVENTOR, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection.

Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections provided that the request is grantable.

Inventor(s)

Levaughn Denton, Baisley Park, NY;

Applicant(s)

Levaughn Denton, Baisley Park, NY;

Power of Attorney: The patent practitioners associated with Customer Number 75207

Domestic Priority data as claimed by applicant

This application is a CON of 16/421,141 05/23/2019 PAT 10656906
which is a CIP of 16/155,919 10/10/2018 ABN
which is a CON of 14/862,304 09/23/2015 PAT 10127005
which claims benefit of 62/054,286 09/23/2014

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 11/04/2019

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 16/656,259**

Projected Publication Date: 09/03/2020

Non-Publication Request: No

Early Publication Request: No

**** MICRO ENTITY ****

Title

MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS

Preliminary Class

381

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

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For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific

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LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

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NOT GRANTED

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PTO/SB/08a (01-10)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	16656259
Filing Date	2019-10-17
First Named Inventor	Levaughn Denton
Art Unit	2688
Examiner Name	THANG V. TRAN
Attorney Docket Number	2305LD01UTL1USCON2

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	10127005	B2	2018-11-13	Levaughn Denton	
	2	8073160	B1	2011-12-06	Adobe Systems Inc.	
	3	8452432	B2	2013-05-28	Brian Transeau	
	4	7991171	B1	2011-08-02	Gary C. Snow	
	5	8594319	B2	2013-11-26	Dolby International, AB	
	6	8315398	B2	2012-11-10	Themis Katsianos	
	7	5668884	A	1997-09-16	Clair Bros. Audio Enterprises, Inc.	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16656259
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	Art Unit	2688
	Examiner Name	THANG V. TRAN
	Attorney Docket Number	2305LD01UTL1USCON2

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20190050194	A1	2019-02-14	Zophonos, Inc.	
	2	20040076305	A1	2004-04-22	Shure, Inc.	
	3	20040240676	A1	2004-12-02	Panasonic Intellectual Property Corp.	
	4	20050160270	A1	2005-07-21	Black Hills Media, Inc.	
	5	20060067550	A1	2006-03-30	Sivantos GmbH	
	6	20060082458	A1	2006-04-20	Symbol Technologies, LLC	
	7	20070217623	A1	2007-09-20	Panasonic Corp.	
	8	20090003620	A1	2009-01-01	Apple, Inc.	
	9	20090076825	A1	2009-03-19	Bionica Corp.	
	10	20100329471	A1	2010-12-30	Dunn, et al.	

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16656259
	Filing Date	2019-10-17
	First Named Inventor	Levaughn Denton
	Art Unit	2688
	Examiner Name	THANG V. TRAN
	Attorney Docket Number	2305LD01UTL1USCON2

	11	20090058611	A1	2009-03-05	Panasonic Corp.	
	12	20100329471	A1	2010-12-30	Manufacturing Resources International Inc.	
	13	20110134278	A1	2011-06-09	Alcor Micro Corp.	
	14	20120189140	A1	2012-07-26	Apple, Inc.	
	15	20130044131	A1	2013-02-21	Moheb Milad	
	16	20130064380	A1	2013-03-14	Apple, Inc.	
	17	20130294618	A1	2013-11-07	Mikhail Lyubachev	
	18	20110134278	A1	2011-07-09	Alcor Micro Corp.	
	19	20070217623	A1	2007-09-20	Noriyuki Harada	
	20	20130044131	A1	2013-02-21	Moheb Milad	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16656259
	Filing Date	2019-10-17
	First Named Inventor	Levaughn Denton
	Art Unit	2688
	Examiner Name	THANG V. TRAN
	Attorney Docket Number	2305LD01UTL1USCON2

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2]	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	2016049130	WO	A1	2016-03-31	Levaughn Denton		
	2	1971035	EP	B2	2014-08-20	Harman International Industries		

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NON-PATENT LITERATURE DOCUMENTS Remove

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	International Search Report, dated January 29, 2016, for corresponding PCT Application Number PCT/US15/51638, International Filing Date September 23, 2015, consisting of 2 Pages.	
	2	International Preliminary Report on Patentability, dated March 28, 2017, for corresponding PCT Application Number PCT/US15/51638, International Filing Date September 23, 2015, consisting of 7 Pages.	
	3	Written Opinion of the International Searching Authority, dated January 29, 2016, for corresponding PCT Application Number PCT/US15/51638, International Filing Date September 23, 2015, consisting of 6 Pages.	

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Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16656259
	Filing Date	2019-10-17
	First Named Inventor	Levaughn Denton
	Art Unit	2688
	Examiner Name	THANG V. TRAN
	Attorney Docket Number	2305LD01UTL1USCON2

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/David Postolski/	Date (YYYY-MM-DD)	2020-06-08
Name/Print	David Postolski	Registration Number	67547

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

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5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
31 March 2016 (31.03.2016)

WIPO | PCT

(10) International Publication Number
WO 2016/049130 A1

(51) International Patent Classification:
H03G 3/20 (2006.01)

(21) International Application Number:
PCT/US2015/051638

(22) International Filing Date:
23 September 2015 (23.09.2015)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
62/054,286 23 September 2014 (23.09.2014) US
14/862,304 23 September 2015 (23.09.2015) US

(72) Inventor; and
(71) Applicant : DENTON, Levaughn [US/US]; 160-21 118th Rd, Baisley Park, New York 11434 (US).

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(81) Designated States *(unless otherwise indicated, for every kind of national protection available):* AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

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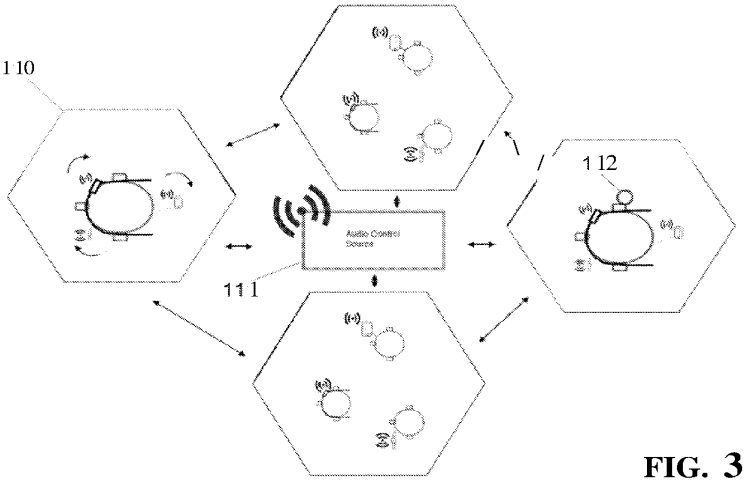

FIG. 3

(57) Abstract: The mobile cluster-based audio adjusting method and apparatus provides for a highly configurable sound management apparatus and process that combines standard computing devices such as laptops, tablets, and mobile phones to measure various aspects of sound waves across multiple points, allowing a single user to visualize and adjust sound output accordingly.

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"MOBILE CLUSTER-BASED AUDIO ADJUSTING METHOD AND APPARATUS"

INVENTOR

Levaughn Denton

CLAIM OF PRIORITY

This application claims priority of the U.S. utility application number 14/862,304 filed on September 23, 2015 and U.S. provisional patent application number 62/054,286 filed on September 23, 2014, the contents of both of which are fully incorporated herein by reference.

FIELD OF THE EMBODIMENTS

The invention and its embodiments relate to audio manipulation and sound management systems, particularly for home audio systems, public address systems, sound reinforcement systems, vehicle audio systems, and associated software for these applications.

BACKGROUND OF THE EMBODIMENTS

Each year sound companies spend billions of dollars on audio technologies and audio research to find new ways to improve audio quality in performance settings. Very often sound systems are designed to be used in a specific environment. For example, in a vehicle or private room setting, audio manipulation and output quality techniques and technologies are either prescriptive or adaptive - neither of which require the need for audio engineering professionals. However, in other situations such as at a concert venue, a wide array of audio professionals must be employed. This can include monitor engineers, system technicians, and front-of-house

engineers. These professionals operate mixing consoles and audio control units to produce desirable, high-quality audio output.

Whether prescriptive or adaptive, manned or unmanned, perceived sound quality is a function of complex transducer-based technologies and acoustic treatment that are typically controlled, managed and manipulated by humans, and/or audio software and hardware. As such, both human and physical capital are required to produce first-rate sound quality. However, even when the necessary human and capital has been spent, it can still be very difficult to effectively manage audio outputs in real-time. This is due to improper calibrations of signal propagation and signal degradation, as well as unwanted harmonics and soundwave reflections.

Particularly in an outdoor settings, single-source sound systems typically produce an intermittent mix of unintelligible sounds and echoes due to a given venue's size and openness. A popular solution for addressing the echo issue is to utilize distributed sound systems. Traditional distributed sound systems are less susceptible to sound variance than single source systems. However, even when these distributed systems are used, temperature gradients and wind can still steer sound in undesirable ways.

Another issue related to the size of a performance venue is when audio and video fall out of sync. As live musical performances become more and more elaborate by including digital art and screens on-stage, it is becoming increasingly difficult to reliably sync audio and video in large venues, due to highly reverberant surfaces and long decay times.

Also impacting audio intelligibility during a live performance is crowd noise. At a live event, it is not uncommon for crowds to generate noise approaching 105dB. When this occurs, audio engineers must manipulate the supporting sound system output so that the performance audio remains 5-8 decibels higher than the noise generated by crowd. This action results in

performance sound being broadcast above 110 dB, the range where the volume of sound begins to pose danger to human listeners. Frequently, audio system operators find it difficult to granularly control the loud perception of a given individual listener while managing loudness perception for the remainder of the audience. In a case where an audio quality trade-off decision has to be made, a common industry practice is to execute a remediation plan that favors the majority of listeners while the minority of listeners are forced to suffer through it.

A myriad of audio functions are necessary to provide a dynamic range of audio playback and fidelity. To meet the increasing needs and address new challenges, the devices of today will not only have to handle traditional telephony voice communication and low-fidelity voice recording, but also, these devices must be capable of incorporating new hardware and software to create new functions and applications. Further, such demands create the need to process signals using 'low-loss' methods by moving much of the processing function away from hardware and into software optimized to do so.

In other instances, when various pieces of audio equipment are slightly, or completely out-of-phase, it can be difficult for audio system operators to correct these out-of-phase issues in a short period of time.

Review of related technology:

Line6, Inc. has created a 'smart mixing system' for non-wearable ubiquitous computing devices that enables wireless and touchscreen control of live sound system components. This is accomplished via a wired connection between standard audio hardware and a proprietary physical interface. While this system integrates and controls live sound system components via touchscreen devices, it unfortunately relies on audio engineers to operate it, and does not

incorporate a listener-centric way to autonomously solve audio issues experienced by an audience.

United States Patent No.: 5,668,884 pertains to an audio enhancement system and method of use with a sound system for producing primary sound from at least one main loudspeaker located at a main position. The audio enhancement system comprises at least one wireless transmitter, time delay circuitry, and plural augmented sound producing subsystems. Each sound subsystem is a portable unit arranged to be carried by a person located remote from the main loudspeaker and includes a wireless receiver and an associated transducer device, e.g., a pair of stereo headphones. The transmitter broadcasts an electrical signal which is representative of the electrical input signal provided to the main loudspeaker. The broadcast signal is received by the receiver and is demodulated and amplified to drive the transducer so that it produces augmented sound substantially in synchronism with the sound arriving from the main loudspeaker. To achieve that end the time delay circuitry delays the electrical signal which is provided to the transducer for a predetermined period of time corresponding generally to the time period it takes for the primary sound to propagate through the air from the main loudspeaker to the remote location at which the person is located.

United States Patent No.: 7,991,171 pertains to a method and apparatus for processing an audio signal in multiple audio frequency bands while minimizing undesirable changes in tonal qualities of the audio signal by determining an initial gain adjustment factor for each audio frequency band resulting from the application of an audio processing technique. A final gain adjustment factor for each band is selected from a corresponding set of weighted or unweighted initial gain adjustment factors. The set of initial gain adjustment factors from which the final gain adjustment factor for a specified audio frequency band is obtained is derived from other audio

frequency bands that have the frequency of the specified band as a harmonic frequency. Changes in audio signal level within one audio frequency band thereby affect the signal level of harmonic frequencies to decrease relative changes in volume between a fundamental frequency and its harmonics.

United States Patent No.: 8,315,398 pertains to a method of adjusting a loudness of an audio signal may include receiving an electronic audio signal and using one or more processors to process at least one channel of the audio signal to determine a loudness of a portion of the audio signal. This processing may include processing the channel with a plurality of approximation filters that can approximate a plurality of auditory filters that further approximate a human hearing system. In addition, the method may include computing at least one gain based at least in part on the determined loudness to cause a loudness of the audio signal to remain substantially constant for a period of time. Moreover, the method may include applying the gain to the electronic audio signal.

United States Patent No.: 8,452,432 pertains to a user-friendly system for real time performance and user modification of one or more previously recorded musical compositions facilitates user involvement in the creative process of a new composition that reflects the user's personal style and musical tastes. Such a system may be implemented in a small portable electronic device such as a handheld smartphone that includes a stored library of musical material including original and alternative versions of each of several different components of a common original musical composition, and a graphic user interface that allows the user to select at different times while that original composition is being performed, which versions of which components are to be incorporated to thereby create in real time a new performance that includes elements of the original performance, preferably enhanced at various times with user selected

digital sound effects including stuttering and filtering. The system may also optionally comprise a visualizer module that renders a visual animation that is responsive to at least the rhythm and amplitude of the system's audio output, not only for entertainment value but also to provide visual feedback for the user.

United States Patent No.: 8,594,319 pertains to methods and apparatuses for adjusting audio content when more multiple audio objects are directed toward a single audio output device. The amplitude, white noise content, and frequencies can be adjusted to enhance overall sound quality or make content of certain audio objects more intelligible. Audio objects are classified by a class category, by which they are can be assigned class specific processing. Audio objects classes can also have a rank. The rank of an audio objects class is used to give priority to or apply specific processing to audio objects sin the presence of other audio objects of different classes.

United States Patent Publication No.: 2007/0217623 pertains to a real-time processing apparatus capable of controlling power consumption without performing complex arithmetic processing and requiring a special memory resource. The real-time processing apparatus includes an audio encoder that performs a signal processing in real time on an audio signal, a second audio encoder that performs the signal processing With a smaller throughput in real time on the audio, an audio execution step number notification unit that measures step number showing a level of the throughput in the signal processing by operating the 1st audio encoder or second audio encoder, and an audio visual system control unit that executes control so that the first audio encoder operates When the measured step number is less than a threshold value provided beforehand and the second audio encoder operates when the step number is equal to or greater than the threshold value.

United States Patent Publication No.: 2011/0134278 pertains to an image/audio data sensing module incorporated in a case of an electronic apparatus. The image/audio data sensing module comprises: at least one image sensor, for sensing an image datum; a plurality of audio sensors, for sensing at least one audio datum; a processor, for processing the image datum and the audio datum according to a control instruction set to generate a processed image data stream and at least one processed audio data stream, and combining the processed image data stream and the processed audio data stream to generate an output data stream following a transceiver interface standard; a transceiver interface, for receiving the control instruction set and transmitting the output data stream via a multiplexing process; and a circuit board, wherein the image sensor, the audio sensors and the transceiver interface are coupled to the circuit board, and the processor is provided on the circuit board.

United States Patent Publication No.: 2013/0044131 pertains to a method for revealing changes in settings of an analogue control console, the method comprising: receiving a captured image of the analogue control console; creating a composite image by superimposing the captured image and a live image of the analogue control console; and displaying the composite image.

United States Patent Publication No.: 2013/0294618 pertains to a method and devices of sound volume management and control in the attended areas. According to the proposed method and system variants the sound reproducing system comprises: sounding mode appointment device, central station for audio signal transmittance; one or more peripheral stations for audio signal reception and playback; appliance for listener's location recognition; computing device for performing calculation concerning sounding parameters at the points of each listener's location

and for performing calculation of controlling parameters for system tuning. The system can be operated wirelessly and can compose a local network.

Various devices are known in the art. However, their structure and means of operation are substantially different from the present invention. Such devices fail to provide a device that can help develop a participant's knowledge in a multitude of different subject areas, while simultaneously engaging the participant physically. At least one embodiment of this invention is presented in the drawings below, and will be described in more detail herein.

SUMMARY OF THE EMBODIMENTS

The present invention provides for a system comprising: at least one cluster of at least one computing device, said at least one computing device being equipped with: a sound sensing mechanism, capable of monitoring the amplitude and frequency of desirable and undesirable signals, a wireless transceiver, capable of wirelessly transmitting and receiving data from a audio control source, said data comprising at least one characteristic of at least one sound fingerprint; at least one output device, comprising: a power source for operating the device, a speaker for outputting sound, a communication mechanism, for receiving electronic information from said audio control source; said audio control source, in electronic communication said at least one cluster and said at least one output device, said audio control source comprising: a memory, containing computer-executable instructions for connecting to said at least one cluster, processing said at least one characteristic of at least sound fingerprint, visualizing said at least one sound fingerprint, varying the output of said at least one output device, providing an interface, a processor, for executing said computer-executable instruction, a interfacing mechanism, comprising: a network adapter, capable of transmitting and receiving electronic

information through both wired and wireless communication; a display, for showing said interface and said at least one visualized sound fingerprint, at least one input mechanism, for manipulating said interface, and varying said output of said at least one output device.

The present invention also contemplates embodiments where said sound-sensing mechanism is an omnidirectional transducer, as well as embodiments where said display and said at least one input mechanism are one-in-the-same. The present invention may utilize short-range wireless technologies selected from the group consisting of: ANT+, Bluetooth®, cellular, IEEE 802.15.4, IEEE 802.22, ISA 100A, infrared, ISM, NFC, RFID, WPAN, UWS, Wi-Fi®, Wireless HART, Wireless HD/USB, ZigBee® and Z-wave®, and may employ an analog-to-digital converter, said analog-to-digital converter featuring an input structure selected from the group consisting of: fully-differential, pseudo-differential, wide input common mode, and single-ended. The present invention may also employ at least one audio codec, at least one application processor, and at least one baseband processor, software-defined radios, superheterodyne architecture radios, direct conversion architecture, or some combination thereof.

In yet another embodiment, the present invention uses a software-based radio, wherein said software-based radio isolates RF frequencies, said at least one computing device relays those frequencies to said audio control unit, wherein said audio control unit ensures that predetermined frequency thresholds are not breached. Further, the present invention may operate where electronic communications between said at least one computing device, said at least one cluster, said at least one output device, and said audio control unit are sent and received using an ambient backscatter techniques. The audio control source may employ a touch-sensitized screen as its input device, and when said at least one output device is located within said at least one

cluster, such that said audio control source may alter the power supplied to said speaker in real-time.

Additionally, the present invention provides for a method of maintaining consistent sound across, comprising the steps of: providing at least one cluster of at least one computing device, said at least one computing device being equipped with: a sound sensing mechanism, capable of monitoring the amplitude and frequency of ambient noise, a desired signal, and an undesired signal, a wireless transceiver, capable of wirelessly transmitting and receiving data from an audio control source, said data comprising at least one characteristic of at least one sound fingerprint; at least one output device, comprising: a power source for operating the device, a speaker for outputting sound, a communication mechanism, for receiving electronic information from said audio control source; said audio control source, in electronic communication said at least one cluster and said at least one output device, said audio control source comprising: a memory, containing computer-executable instructions for connecting to said at least one cluster, processing said at least one characteristic of at least sound fingerprint, visualizing said at least one sound fingerprint, varying the output of said at least one output device, providing an interface, a processor, for executing said computer-executable instruction, a interfacing mechanism, comprising: a network adapter, capable of transmitting and receiving electronic information through both wired and wireless communication; a display, for showing said interface and said at least one visualized sound fingerprint, at least one input mechanism, for manipulating said interface, and varying said output of said at least one output device; sensing, measuring, and analyzing, by said at least one computing device, surrounding audio output signals; determining, by said at least one computing device, whether a qualifying signal has been sensed; identifying and categorizing said measurements, by said at least one computing device;

determining, by said at least one computing device, whether said measurements breach a predetermined threshold; communicating, to other clusters, if present, and said audio control source, said breach; determining, by said other clusters, if present, and said audio control source if a second breach has occurred; adjusting, by said audio control source, based on said communicated measurements. In some embodiments, the method adjusts the at least one output device automatically based on predetermined values.

In an alternative embodiment, the present invention is capable of providing a visualized interface for user and/or listener-based sound management and control. It provides for a scalable platform that is future-proofed in the sense that it can incorporate devices that have yet-to-be invented as it uses standard protocols to seamlessly integrate additional components. This integration is supported with a dynamic software companion that mediates the system. A sound fingerprint, for the purposes of this disclosure comprises at least a frequency, intensity, and amplitude, but may also contain special-purpose sound information, salient to that specific application.

For example, the present invention can utilize a "sound preference" application. In one embodiment, this application sets user-based sound perception settings on a mobile device or wearable computer. There, the software can integrate with existing audio hardware and software, such as, but not limited to in-ear systems, mixer boards and other related audio mixing consoles. When the present invention integrates a device that is equipped with a microphone, the system is capable of autonomous audio sensing. That is, the microphone-equipped device will "listen" to sound and when sound of appropriate qualities are "heard", the system will begin providing metrics as to the nature of that sound. Preferably, the present invention will employ standardized protocols, allowing it to be industry-agnostic.

The present invention can be used to create sound fingerprints and used in conjunction with music publishing/performance applications. One way in which the present invention can be used in conjunction with a separate system is that it could relay fingerprint data directly to a music publishing entity in real-time. In an alternative embodiment, the present invention can relay information via various communication offerings such as e-mail, SMS, and visual screens. In another preferred embodiment, the present invention can have devices interface with it randomly, or can be configured to accept a predetermined number of "sensing" units.

Preferably, the present invention will incorporate commercial ubiquitous devices and wearable computers from a listening audience, and as such, does not need intervention from listeners or audio professionals such as a front-of-house engineer to operate. In short, each listening device (i.e. smartphone, tablet, wearable, laptop, etc.) that has interfaced with the system is able to 1) serve as a reasonable approximation of a human ear (audio) response 2) "sense" (measure) sounds within a frequency response range of: 20Hz to 20kHz, and 3) provide visualized metrics based on these measurements.

In an alternative embodiment, the present invention interfaces with a cluster of ubiquitous computing devices and wearable computers, all used to collaboratively sense and analyze the signal characteristics of undesired sound(s). These devices can then wirelessly transmit their findings to a central audio mixing source where acoustic-fingerprint observations can be visualized and audio output is controlled. This embodiment can ultimately reduce the amount of audio professionals needed in a live performance environment, improve the music-listening experience for an audience at a micro-level; and create additional opportunities in the acoustic-fingerprint commercial landscape.

In yet another preferred embodiment, various in-ear systems may be integrated into the present invention, software-defined and/or cognitive-defined based in-ear transceivers can be used to wirelessly communicate with a audio control source and thus, the output of such an in-ear monitor can be autonomously adjusted after sensing audio output. A given output can be adjusted according to what is sensed within specified location or what is sensed at external clusters. Similarly to a software-defined and/or cognitive-defined based in-ear transceivers, an in-ear monitor system for use with the present invention will preferably comprise hardware such as, earphones, at least one body pack receiver, at least one mixer and at least one transmitter. These functions can also be adjusted and controlled via the audio control source of the present invention.

Not only does the use of system wide software-defined and/or cognitive-defined radios create the opportunity to reduce the physical footprint of 'front-end RF circuits' on a smart device and wearable computer, but this reduced physical footprint allows for more devices to be interfaced with the present invention simultaneously. Also, incorporating software-defined radios will enable these devices to filter and isolate specific frequencies, allowing and that may have an unnecessary amount of signal energy associated with it, highlight this face, and communicate specific measurements back to a audio control source. For adjustment by a user, or by logic contained in the system of the present invention.

In yet another preferred embodiment, system components and preferably the interfaced devices can send wireless signals to each other using ambient backscatter techniques. Incorporating backscatter techniques into the system allows for the appropriation of wireless signals that are reflected or scattered within the confines of a space; allowing system components

and compatible interfaced devices to communicate continuously, near-continuously, or on some predetermined interval while sustaining their charge for an optimal amount of time.

It is an object of the present invention to provide a system that can interface with various microphone-equipped devices to create sound fingerprints.

It is an object of the present invention to provide a system that can create these fingerprints in real-time.

It is an object of the present invention to provide a means to autonomously manage audio outputs.

It is an object of the present invention to provide a means to maintaining high power efficiency amongst interfaced devices and system components.

It is an object of the present invention to provide a means to use a cluster of sound recording devices to report perceived sound information.

It is an object of the present invention to provide a means to incorporate existing internet-enabled, microphone-equipped devices to create a sound-sensing network.

It is an object of the present invention to provide a means to obtain and visualize recorded sound information in real-time.

It is an object of the present invention to provide a means to provide a means to balance sound levels to reduce or cancel out unwanted noise in a performance venue.

It is an object of the present invention to provide a means to reduce the physical footprint of 'front-end RF circuits' on an electronic device equipped with a wireless transceiver or similar technology.

It is an object of the present invention to provide a means to filter and isolate specific frequencies.

It is an object of the present invention to provide for a way to maintain a high power efficiency among the devices that have interfaced with the present invention.

It is an objkect of the present invention that the audo mixing source includes a central mixing source.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 shows a schematic view of an embodiment of one cluster of the present invention with some interfaced devices.

Fig. 2 shows a schematic view of how interfaced devices create a sound fingerprint.

Fig. 3 shows an illustration of an embodiment of the system of the present invention engaging in inter-cluster, cluster-to-audio control source; and cluster-to-cluster data sharing.

Fig. 4 shows a flow chart outlining an embodiment of the method of the present invention.

Fig. 5A shows an illustration showing an embodiment of the present invention located in an automobile.

Fig. 5B shows an illustration showing an embodiment of the present invention located in an indoor theatre.

Fig. 5C shows an illustration showing an embodiment of the present invention located in an outdoor stadium.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The preferred embodiments of the present invention will now be described with reference to the drawings. Identical elements in the various figures are identified with the same reference numerals.

Reference will now be made in detail to each embodiment of the present invention. Such embodiments are provided by way of explanation of the present invention, which is not intended to be limited thereto. In fact, those of ordinary skill in the art may appreciate upon reading the present specification and viewing the present drawings that various modifications and variations can be made thereto.

As a threshold matter, it should be noted that whenever the phrases "microphone" or "microphone-equipped" are used, it is intended to refer to any device that is capable of detecting sound, not merely microphones. For example, a high-performance low frequency antenna connected to a software-defined radio may be used to input sound observations into the system, or a piezo-electric diagraph may be used to measure the vibrations the correspond to a given sound. These examples are provided to give greater clarity as to what the term "microphone" should be interpreted as, and not construed as a limiting example.

The system of the present invention operates by integrating clusters of various computing devices and wearable computers with sound management techniques and methods so that various sound "fingerprints" can be developed and used to visualize how sound is being perceived in micro-areas within a larger venue. In various embodiments, the system of the present invention can be integrated into an individual's home, vehicle audio system, concert venues, and other locations where sound is played. In addition, the system's components allow for the present invention to be scaled to accommodate sound management and monitoring control within the largest of venues such as stadiums and other sports arenas.

Due to the devices that are integrated into the system having the ability to sense the frequency and magnitude of audio signals, a sound fingerprint (summary) can be generated from deterministic methods. These fingerprints are then communicated to an audio control source and can subsequently be processed and used to communicate with external applications and things such as third party sound databases. However, the purpose of this system is not to be confused. In addition to the sound fingerprinting ability of the present invention, it is also capable of utilizing a series of methods to sense and control audio output in various venues.

In an alternative embodiment, the present invention is located in a train or airport station that has an intercom system that functions poorly when noisy crowds are present. If an audio control source within these facilities is able to autonomously collect audio data via a series of integrated devices, then with the present invention, the same audio control source can adjust system outputs accordingly in order to make important intercom announcements intelligible. In yet another embodiment, a user can enter in EQ parameters in their integrated computing device to ensure that both the audio perceived by them, and the audio perceived by their device is in accordance with some predetermined parameters/settings. While many short-range wireless technologies can be used with the present invention, preferably one or more of the following technologies will be used: ANT+, Bluetooth, cellular, IEEE 802.15.4, IEEE 802.22, ISA 100a, Infrared, ISM (band), NFC, RFID, WPAN, UWS, WI-FI, Wireless HART, Wireless HD/USB, ZigBee, or Z-wave.

Referring to FIG. 1, an embodiment of one cluster 101 of the present invention with some interfaced devices. Specifically, three embodiments of at least one computing device 102 are shown; wearable glasses, wearable watch, and a smartphone. It should be noted that while these three devices are listed as exemplary examples, any device with a sound sensing mechanism and

a way to transmit any recorded data is suitable for use as one of said at least one computing devices 102. Preferably, the sound sensing apparatus will be an omnidirectional transducer. The sound sensing mechanisms of at least one computing device 102 will be able convert perceived sounds into electronic signals so that the recorded information may be transmitted to neighboring clusters 101, or a audio control source (See FIG. 3), as desired. This data will be transmitted using either one or a combination of short-range wireless technologies, namely, ANT+, Bluetooth, cellular , IEEE 802.15.4, IEEE 802.22, ISA 100a, Infrared, ISM (band), NFC, RFID, WPAN, UWS, WI-FI, Wireless HART, Wireless HD/USB, ZigBee, or Z- wave. Preferably, transducers integrated into these computing devices have an output signal that is fed into the input of an analog-to-digital converter ("ADC") and can incorporate software and cognitive-defined radios to broaden the selection of compatible wireless communication interfaces and limit radio component footprints.

Fig. 2 shows a schematic view of how interfaced devices create a sound fingerprint. The sound transmission of the audio energy 109 sensed by the at least one computing device 102 propagates through air and is received by at least one computing device 102 using the transmission path outlined in Figure 2.

Assuming that Figure 2 depicts audio transmission in an indoor setting, at specified time intervals, each computing device measures the sound pressure level (SPL) and sound power level (SWL):

$$SPL = SWL + 10\log\left[\frac{Q}{4\pi r^2} + \frac{4}{R_C}\right]$$

Where:

SPL = Sound pressure level dB

SWL = Sound power level = $10\ \log_{10}(W/W_{ref})$

W is the total sound power radiated from a source with respect to a reference power (W_{ref}) dBW re 10^{-12} Watts.

r = distance from source m

Q_θ = directivity factor of the source in the direction of r

S = total surface area of a room m^2

$\alpha_{\alpha v}$ = average absorption coefficient in a room

R_c = room constant = $\frac{S\alpha_{av}}{1-\alpha_{av}}$ m^2

Over time, each computing device in Figure 2 detects differences in pressure (i.e. change in pressure vs. time) and converts the differences into an electrical signal. A Fast Fourier Transform is implemented (locally or in a cloud) to measure the relative amplitudes of the frequencies 'sensed' and to perform other frequency domain analyses.

It is important to note that in any given indoor environment, R_c, $\alpha_{\alpha v}$, and S can be predetermined and made available to each computing device, approximated or deemed negligible. Also note that each computing device in Figure 2 has a microphone. Computing devices may also obtain sound observations via a high-performance low frequency antenna.

Turning to Fig. 3 an illustration of an embodiment of the system of the present invention engaging in intra-cluster, cluster-to-audio control source; and cluster-to-cluster data sharing. Here, each cluster has a given location 110 (i.e. specified location) to accurately isolate and associate the sensed data. In one embodiment, the present invention is able to adjust a given output device based on its proximity to a given location 110 of a cluster. In alternative embodiments, output devices can be adjusted based on their proximity to more than one cluster. Devices in each cluster can either communicate directly to each other or an audio control source 111, devices within a cluster can communicate to a single device within that cluster which can

serve as a gateway to other clusters and/or audio control source 111. In some embodiments, the present invention further comprising an in-ear monitoring device 112.

The embodiment depicted here shows devices that sense audio signal energy within the confines of a single cluster and then sends data directly to an audio control unit and other clusters. Therefore, not only can these computing devices wirelessly share sensed data with each other, but data can be shared with audio control source 111 (for audio output management purposes) and other devices in other clusters. Depending on the audio signal energy sensed within a specific cluster(s), audio control source 111 adjusts any connected output devices in either a single cluster, or multiple clusters to ensure high quality/fidelity output.

Fig. 4 shows a flow chart outlining an embodiment of the method of the present invention. Here, method 200 is comprised of a number of steps. In step 201, initially, both desired and undesired audio output signals are sensed and subsequently analyzed. In step 202, the method proceeds to determine whether or not the input signals match a set of predefined thresholds. If there is only negligible output audio, that is, if the audio within an environment is outside of a specified frequency range, the method proceeds to step 203 where the devices in each cluster operate in sleep mode. If there is indeed sensible audio output, the method proceeds to step 204 where the present invention determines if the predefined threshold or EQ setting is breached. If this threshold had been breaches, the method moves to step 205 where the first device that sensed the breach will (preferably, wirelessly) communicate its signal measurements to other devices within its cluster and the receiving device will conduct the same audio measurements to confirm the threshold breach. Preferably, step 205 is repeated amongst all of the devices within a single cluster, to provide more robust data sets. Once the breach confirmation stage is completed, in step 206, the present invention moved to step 207 where at

least one computing device is chosen to communicate the breach to. Finally, in step 208, when the present invention, via the audio control source, adjusts audio levels at the at least one output device to transform undesired audio outputs to desired audio outputs.

Referring to Figs. 5A-5C, various embodiments of the present invention implemented in an automobile, an indoor theatre, and an outdoor stadium, respectively, are shown. While these venues are particularly suited for the present invention to be implemented in, any venue in which there are multiple listeners.

In a preferred embodiment, the sound sensing mechanisms (preferably, transducers) used within each "sensing" computer/device outputs an output signal that is fed into the input of an ADC. In the configurations described in Figure 5A, 5B and 5C, a single-ended ADC interface can be used effectively since ADCs and the transducer source are both located on the same integrated circuit board. However, since fully differential interfaces have performance gains over single-ended inputs due to its inherent noise rejection characteristics, using a fully-directional interface instead of a single-ended interface may be desirable.

When introducing elements of the present disclosure or the embodiment(s) thereof, the articles "a," "an," and "the" are intended to mean that there are one or more of the elements. Similarly, the adjective "another," when used to introduce an element, is intended to mean one or more elements. The terms "including" and "having" are intended to be inclusive such that there may be additional elements other than the listed elements.

While the disclosure refers to exemplary embodiments, it will be understood by those skilled in the art that various changes may be made and equivalents may be substituted for elements thereof without departing from the scope of the disclosure. In addition, many modifications will be appreciated by those skilled in the art to adapt a particular instrument,

situation or material to the teachings of the disclosure without departing from the spirit thereof. Therefore, it is intended that the disclosure not be limited to the particular embodiments disclosed.

CLAIMS

What is claimed is:

1. A system comprising:

at least one cluster of at least one computing device,

said at least one computing device comprising:

a sound sensing mechanism, capable of monitoring the amplitude and frequency of both a desired and an undesired frequency,

a wireless transceiver, capable of wirelessly transmitting and receiving data from an audio control source,

said data comprising at least one characteristic of at least one sound fingerprint;

at least one output device, comprising:

a power source for operating the device,

a speaker for outputting sound,

a communication mechanism, for receiving electronic information from said audio control source;

said audio control source, in electronic communication said at least one cluster and said at least one output device, said audio control source comprising:

a memory, containing computer-executable instructions for connecting to said at least one cluster, processing said at least one characteristic of at least sound fingerprint, visualizing said at least one sound fingerprint, varying the output of said at least one output device, providing an interface,

a processor, for executing said computer-executable instruction,

a interfacing mechanism, comprising:

a network adapter, capable of transmitting and receiving electronic information through both wired and wireless communication;

a display, for showing said interface and said at least one visualized sound fingerprint,

at least one input mechanism, for manipulating said interface, and varying said output of said at least one output device.

2. The system of claim 1, wherein said sound-sensing mechanism is an omnidirectional transducer.

3. The system of claim 1, wherein said display and said at least one input mechanism are one-in-the-same.

4. The system of claim 1, wherein said wireless transceiver utilizes short-range wireless technologies.

5. The system of claim 2, said at least one computing device further comprising:

an analog-to-digital converter, said analog-to-digital converter featuring an input structure selected from the group consisting of: fully-differential, pseudo-differential, wide input common mode, and single-ended.

6. The system of claim 5, said at least one computing device further comprising:

at least one audio codec,

at least one application processor, and

at least one baseband processor.

7. The system of claim 6, said at least one computing device further comprising:

software-defined radios,

superheterodyne architecture radios,

direct conversion architecture,

or some combination thereof.

8. The system of claim 1, said at least one computing device further comprising a software-based radio,

wherein said software-based radio isolates RF frequencies, said at least one computing device relays those frequencies to said audio control unit,

wherein said audio control unit ensures that predetermined frequency thresholds maintained.

9. The system of claim 1, wherein electronic communications between said at least one computing device, said at least one cluster, said at least one output device, and said audio control unit are sent and received using an ambient backscatter techniques.

10. The system of claim 1, wherein said input device is a touch-sensitized screen.

11. The system of claim 1, wherein said at least one output device is located within said at least one cluster, such that said audio control source may alter the power supplied to said speaker in real-time.

12. A method of maintaining consistent sound across, comprising the steps of:

a) providing at least one cluster of at least one computing device,

said at least one computing device comprising:

a sound sensing mechanism, capable of monitoring the amplitude and frequency of ambient noise,

a wireless transceiver, capable of wirelessly transmitting and receiving data from a audio control source,

said data comprising at least one characteristic of at least one sound fingerprint;

at least one output device, comprising:

a power source for operating the device,

a speaker for outputting sound,

a communication mechanism, for receiving electronic information from said audio control source;

said audio control source, in electronic communication said at least one cluster and said at least one output device, said audio control source comprising:

a memory, containing computer-executable instructions for connecting to said at least one cluster, processing said at least one characteristic of at least sound fingerprint, visualizing said at least one sound fingerprint, varying the output of said at least one output device, providing an interface,

a processor, for executing said computer-executable instruction,

a interfacing mechanism, comprising:

a network adapter, capable of transmitting and receiving electronic information through both wired and wireless communication;

a display, for showing said interface and said at least one visualized sound fingerprint,

at least one input mechanism, for manipulating said interface, and varying said output of said at least one output device;

b) sensing, measuring, and analyzing, by said at least one computing device, surrounding audio output signals;

c) determining, by said at least one computing device, whether a qualifying signal has been sensed;

d) identifying and categorizing said measurements, by said at least one computing device;

e) determining, by said at least one computing device, whether said measurements breach a predetermined threshold;

f) communicating, to other clusters, if present, and said audio control source, said breach;

g) determining, by said other clusters, if present, and said audio control source if a second breach has occurred;

h) adjusting said at least one output device, by said audio control source, based on said communicated measurements.

13. The method of claim 12, wherein step h) is done automatically based on predetermined values.

14. The method of claim 12, further comprising the step of:

i) entering, by said at least one computing device, sleep mode.

15. The method of claim 12, wherein said wireless transceiver utilizes short-range wireless technologies.

16. The method of claim 12, said at least one computing device further comprising:

an analog-to-digital converter, said analog-to-digital converter featuring an input structure selected from the group consisting of: fully-differential, pseudo-differential, wide input common mode, and single-ended.

17. The method of claim 16, said at least one computing device further comprising:

at least one audio codec,

at least one application processor, and

at least one baseband processor.

18. The method of claim 17, said at least one computing device further comprising:

software-defined radios,

superheterodyne architecture radios,

direct conversion architecture,

or some combination thereof.

19. The method of claim 12, wherein electronic communications between said at least one computing device, said at least one cluster, said at least one output device, and said audio control unit are sent and received using an ambient backscatter techniques.

20. The system of claim 1, said at least one computing device further comprising a software-based radio and a low-frequency antenna,

wherein said software-based radio and said low-frequency antenna isolate sound frequencies, said at least one computing device relays those frequencies to said audio control unit,

wherein said audio control unit ensures that predetermined frequency thresholds are not breached

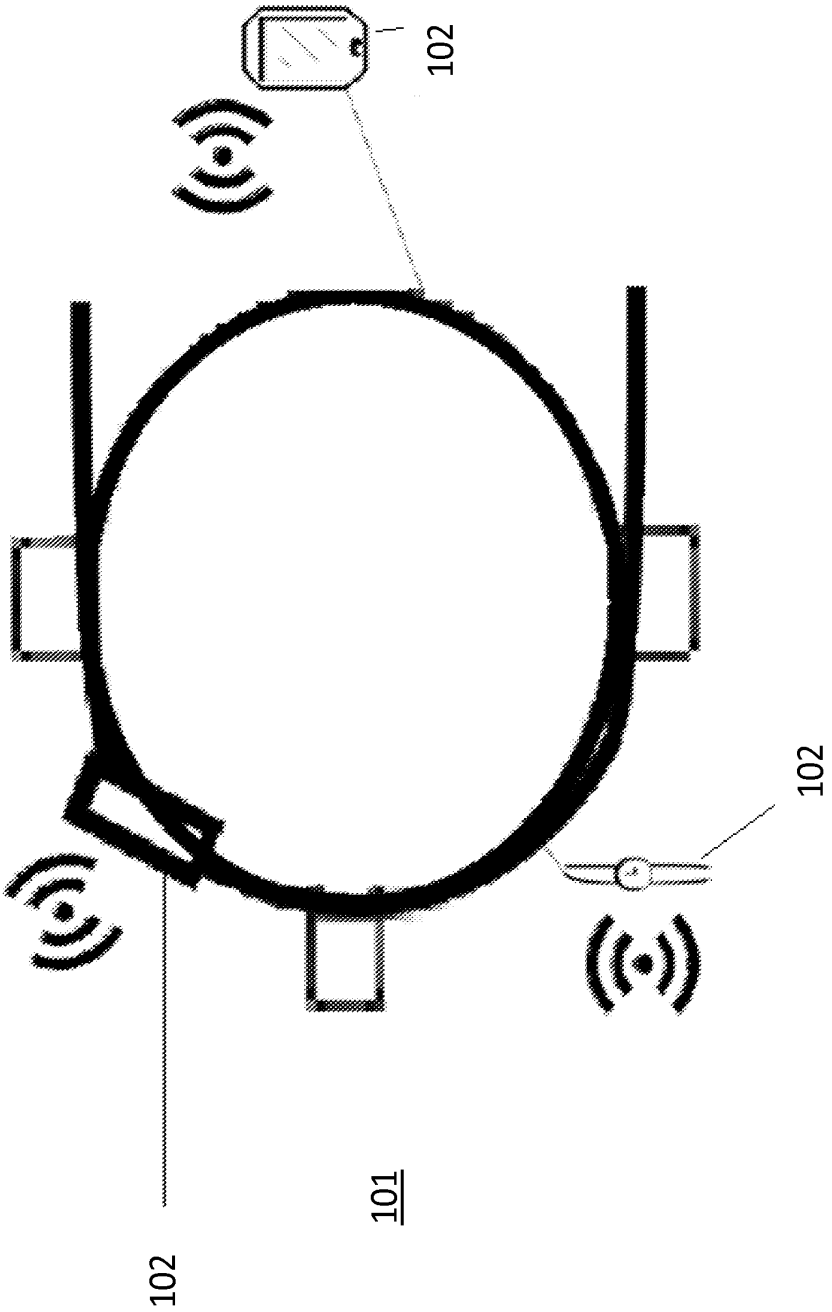


FIG. 1

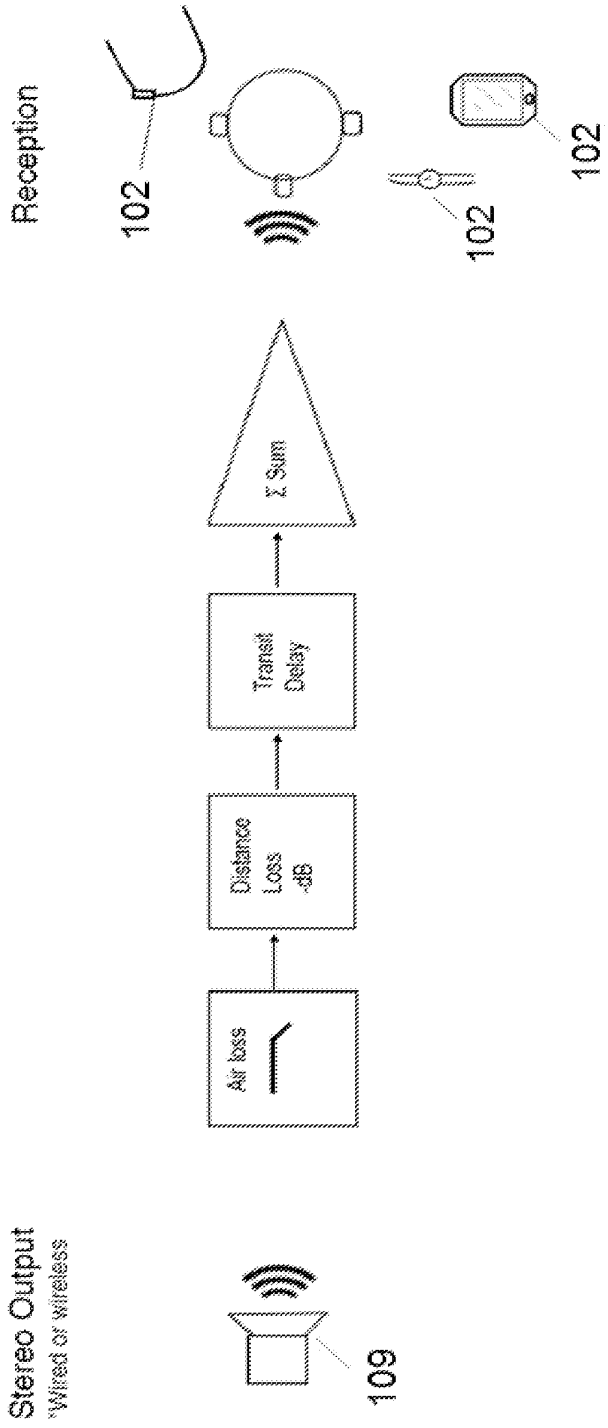

Reception
102
102
102
Σ Sum
Transit Delay
Distance Loss -dB
Air loss
Stereo Output
*Wired or wireless
109

FIG. 2

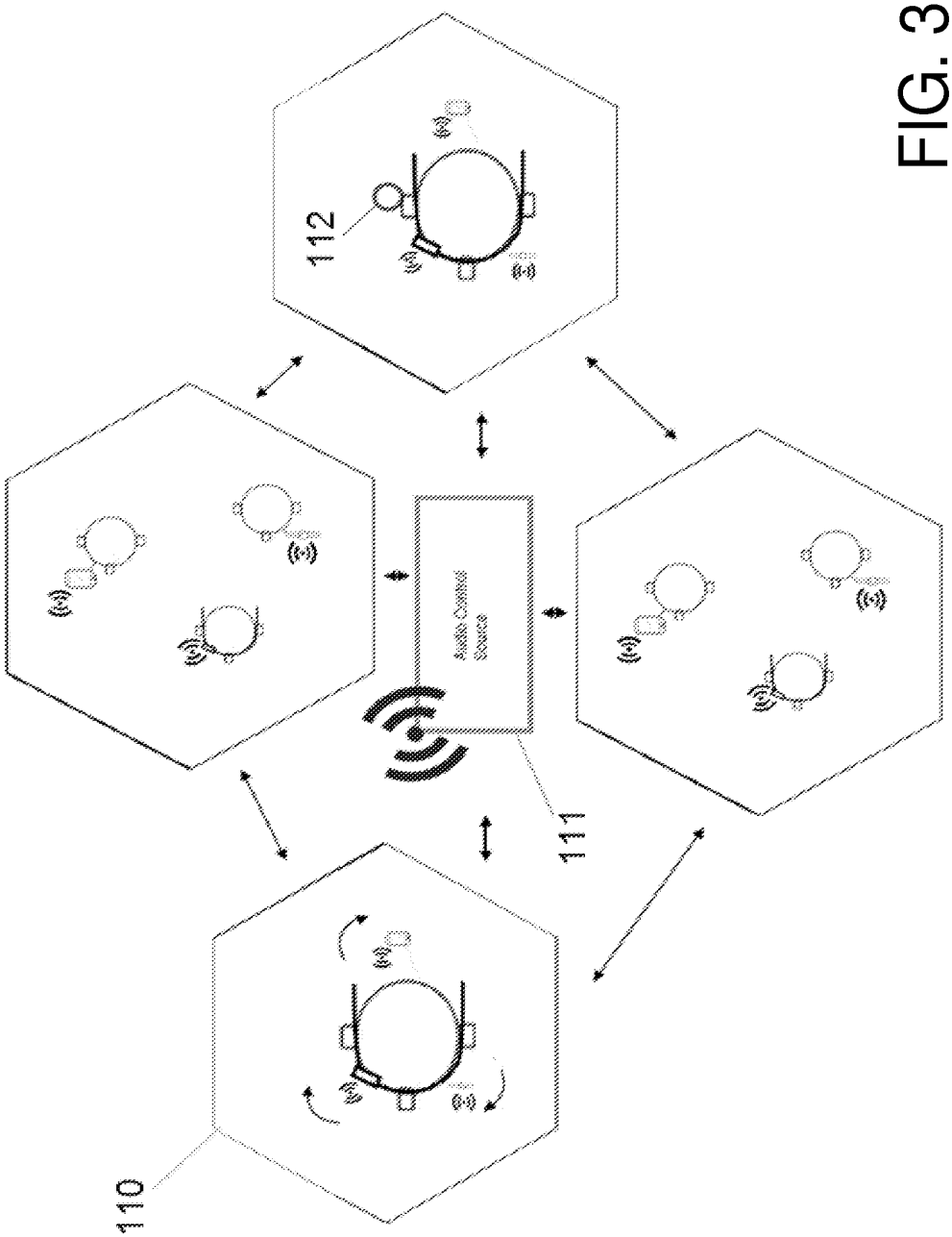


FIG. 3

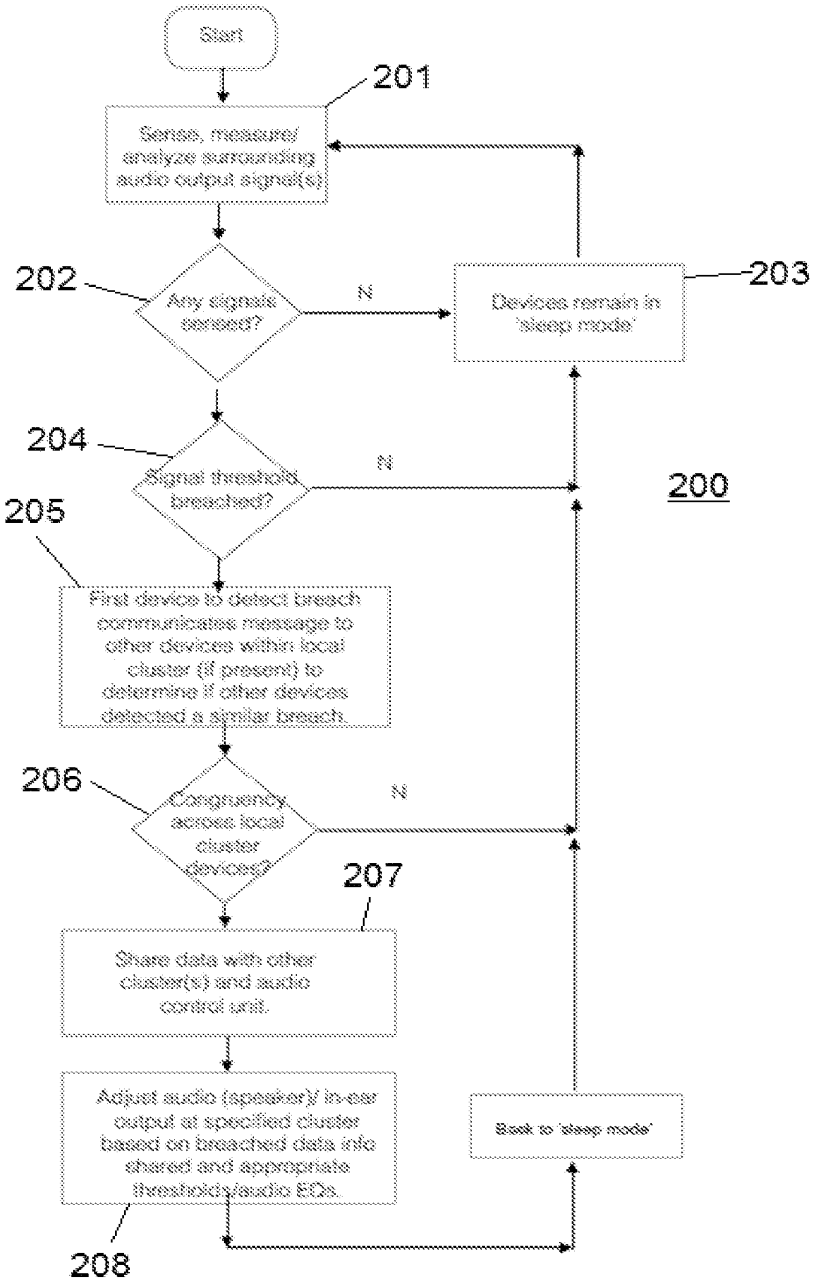

Start
201
Sense, measure/ analyze surrounding audio output signal(s)
202
Any signals sensed?
N
203
Devices remain in 'sleep mode'
204
Signal threshold breached?
N
200
205
First device to detect breach communicates message to other devices within local cluster (if present) to determine if other devices detected a similar breach.
206
Congruency across local cluster devices?
N
207
Share data with other cluster(s) and audio control unit.
Adjust audio (speaker)/ in-ear output at specified cluster based on breached data info shared and appropriate threshold/audio EQs.
Back to 'sleep mode'
208

FIG. 4

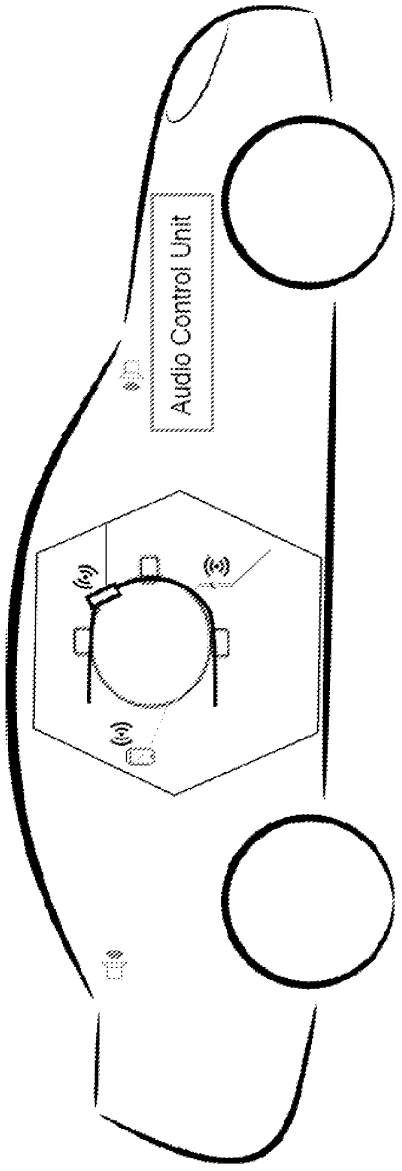
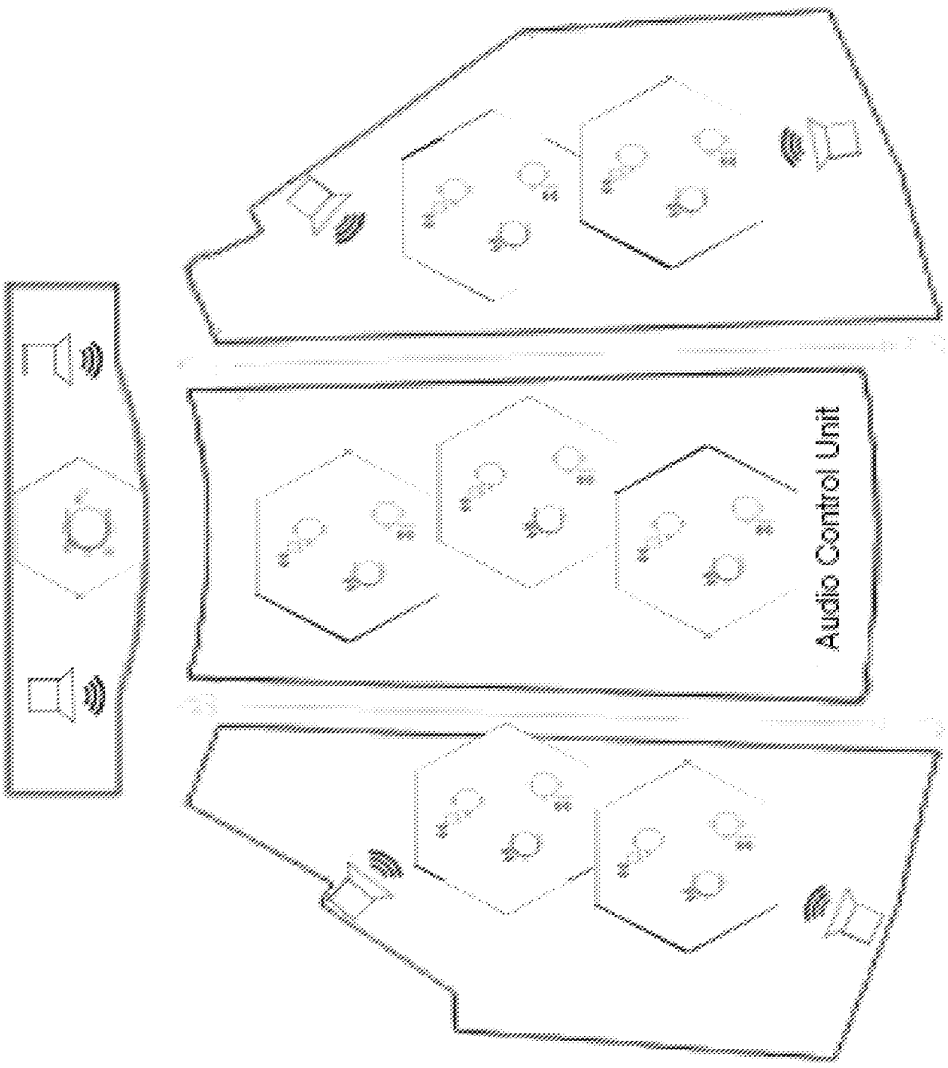


FIG. 5A

FIG. 5B



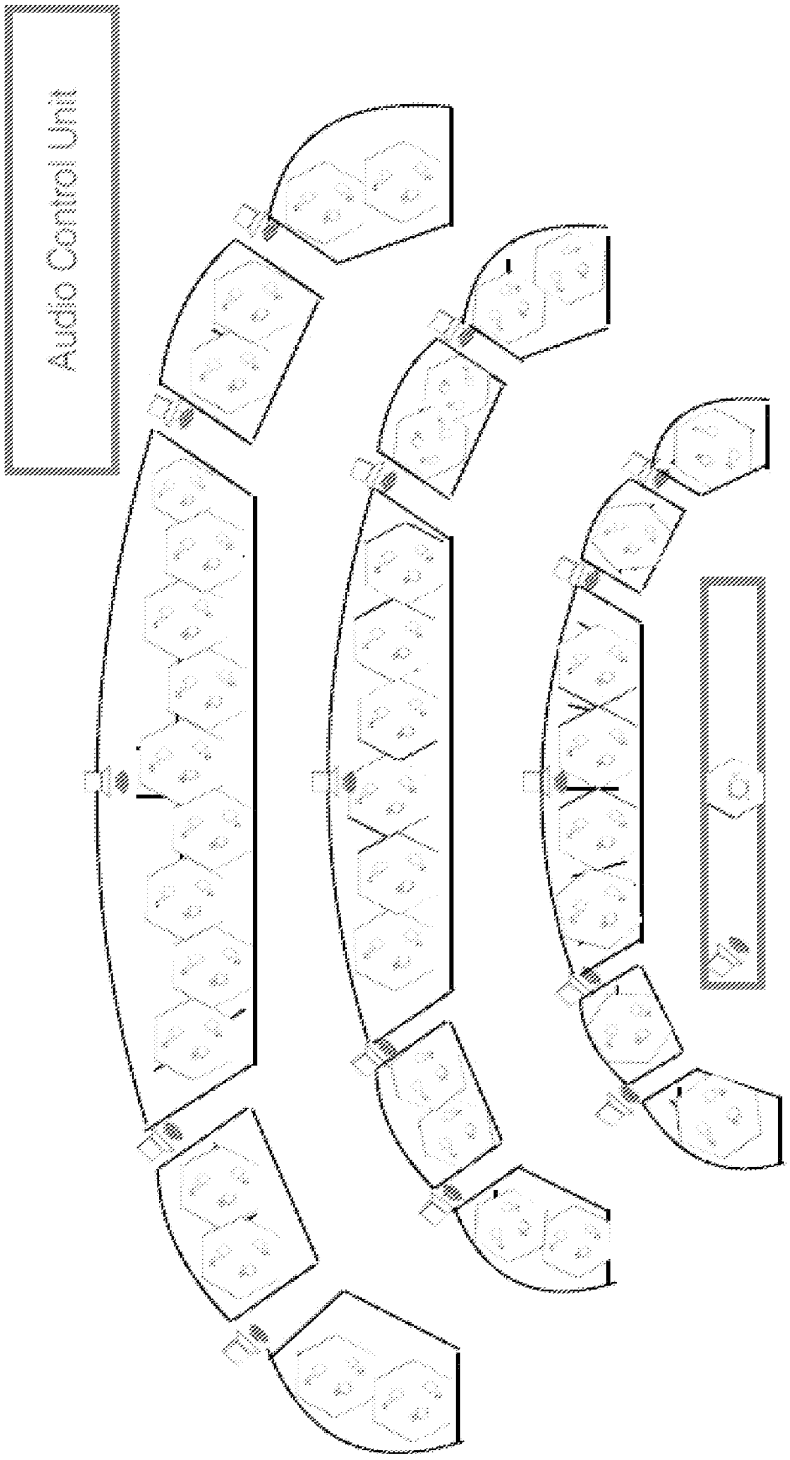


FIG. 5C

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 15/51638

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - H03G 3/20 (2016.01)
CPC - H03G 3/32
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC (8) -H03G 3/20 (2016.01)
CPC - H03G 3/32

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
CPC - H03G 3/24; H04R 27/00 (See keywords Below)
USPC - 381/57, 381/104, 381/107

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
Thomsoninnovation.com; Patbase; Google Scholar; Google Patents; Gogole.com; Freepatentsonline; ProQuest Dialog
Search Terms: Audio, sound, adapt, dynamic, adjust, modify, setting, parameter, frequency, amplitude, threshold, sensor, microphone, measure, sample, reading, compare, process, wireless, network, cluster, etc.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2010/0329471 A1 (DUNN et al.), 30 December 2010 (30.12.2010), entire document, especially Abstract; Para [0018], [0020], [0025], [0026]	1-20
Y	US 2013/0294618 A1 (LYUBACHEV), 07 November 2013 (07.11.2013), entire document, especially Abstract; Para [0018], [0021], [0028]-[0029], [0030], [0068]	1-20
Y	US 8,073,160 B1 (CLASSEN), 06 December 2011 (06.12.2011), col 3, ln 60 to col 4, ln 15; col 7, ln 3-45	1-20
Y	US 2004/0076305 A1 (SANTIAGO), 22 April 2004 (22.04.2004), entire document, especially Abstract; Para [0032]-[0037]	2 and 5-7
Y	US 2006/0082458 A1 (SHANKS et al.), 20 April 2006 (20.04.2006), entire document, especially Abstract; Para [0015]-[0016]	9 and 19
A	US 2013/0064380 A1 (MAHOWALD), 14 March 2013 (14.03.2013), entire document	1-20
A	US 2004/0240676 A1 (HASHIMOTO et al.), 02 December 2004 (02.12.2004), entire document	1-20

☐ Further documents are listed in the continuation of Box C. ☐

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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"&" document member of the same patent family

Date of the actual completion of the international search
16 January 2016 (16.01.2016)

Date of mailing of the international search report
29 JAN 2016

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PCT OSP: 571-272-7774

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(21) Application number: **08004782.2**

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(54) **Audio control system for a vehicle**

Audio-Steuerungssystem für ein Fahrzeug

Système de contrôle audio pour véhicule

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(56) References cited:
EP-A- 1 460 769
DE-A1- 10 065 772
DE-A1- 10 065 826
US-A1- 2003 133 582
US-B1- 6 920 086

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Printed by Jouve, 75001 PARIS (FR)

EP 1 971 035 B1

Description

[0001] This disclosure relates to an audio control system. In particular, this disclosure relates to an audio control system for a vehicle.

[0002] Users may wish to upgrade factory-installed audio systems. Users may replace or upgrade the amplifiers associated with the factory-installed radios and CD players rather than replacing an original radio or CD player. Users sometimes attach additional devices or "sources" to the vehicle's audio system. Such sources may include navigation systems, cellular or wireless telephones, AM-FM radios, satellite radios, MP3-based players, DVD players and other devices.

[0003] It may be expensive and difficult to remove and replace existing factory-installed equipment. Dashboard modification and/or cosmetic changes may be required to accommodate new devices. Replacement devices may not fit in an existing dashboard resulting in less than a perfect appearance. Decorative face plates configured to hide poor fitting devices may not provide a professional or factory-installed look. Therefore, a need exists for an audio control system that can manage and control multiple audio sources without impacting the appearance of the vehicle's dashboard.

[0004] DE 100 65 826 A1 discloses an apparatus for selecting sound sources in a vehicle, which comprises a selecting unit for selecting at least one sound source from a plurality of sound sources for output. The apparatus further comprises a control unit, to which a priority rule for the sound sources can be input, and which controls the selecting unit depending on the priority rule set for the sound sources.

[0005] An object of the present invention is to provide an audio control system and a method of managing a plurality of audio sources, which allow to prevent information coming from several sound channels from being lost in the switching operation.

[0006] The object of the invention is solved by the subject matter of the independent claims 1 and 7. Preferred embodiments are subject matter to the dependent claims.

[0007] An audio control system may receive a plurality of audio input signals. A switch or multiplexer may switch one of the plurality of audio input signals from respective audio sources to a power amplifier. A controller in communication with the multiplexer may control switching of the multiplexer. A display may provide the user with information regarding the switching of the audio signal inputs. A user interface may permit the user to manually switch the audio source. A signal detector in communication with an audio input signal may detect a signal from a priority source. When the signal from the priority source is detected, the controller may direct the multiplexer to route the signal from the priority source to the power amplifier.

[0008] Other systems, methods, features and advantages will be, or will become, apparent to one with skill in the art upon examination of the following figures and detailed description. It is intended that all such additional systems, methods, features and advantages be included within this description, be within the scope of the invention, and be protected by the following claims.

[0009] The system may be better understood with reference to the following drawings and description. The components in the figures are not necessarily to scale, emphasis instead being placed upon illustrating the principles of the invention. Moreover, in the figures, like-referenced numerals designate corresponding parts throughout the different views.

Figure 1 shows a block diagram of the audio control system.

Figure 2 shows an input/multiplexer portion of the audio control system.

Figure 3 shows a logic and control portion of the audio control system.

Figure 4 shows an output circuit of the audio control system.

Figure 5 shows a three-way amplifier configuration.

Figure 6 shows a five-way amplifier configuration.

Figure 7 shows a bi-amplified amplifier configuration.

Figure 8 shows a display module of the audio control system.

Figure 9 shows additional features of the audio control system.

Figure 10 is a flow diagram showing operation of the audio control system.

[0010] Figure 1 is a block diagram of an audio control system 110. The audio control system 110 may be installed in a vehicle environment 112. The audio control system 110 may include a display module 122 and an input module 124. The display module 122 may include an LCD display 128, a volume control 130 and an input control 132. The display module 122 may be mounted or integrated within a dashboard or cluster of the vehicle 112 and may provide a user interface 134. The display module 122 may be used in addition to original equipment manufacturer (OEM) devices, and may provide all of the user controls and visual output to the user. Accordingly, removal and/or modification of the existing OEM devices may not be necessary.

[0011] The LCD display 128 may include backlighting and dimming capability. However, any suitable display device may be used, such as a flat panel display or an electro-luminescent display. The display module 122

may have a body formed of molded plastic to present an aesthetically pleasing appearance. The volume control 130 may provide user-adjustable volume settings and power on/off functions. The input control 132 may provide system set-up functions, input labeling and input switching functions for each of a plurality of audio signal sources 136 through a command line interface, menu driven interface, and/or graphical user interface.

[0012] The display module 122 may communicate with the input module 122. The input module 124 may be mounted in an enclosed area of the vehicle 112, such as in the trunk, kick panel, behind the dashboard, below a seat, etc. The input module 124 may receive analog audio signals from the various source devices 136. Such source devices 136 may include a navigation system 140, a cellular or wireless telephone 142, an AM-FM radio 144, a satellite radio 146, an MP3-based player 148, DVD player 150 and CD player 152.

Other source devices may also be selected by the user.

[0013] The input module 124 may control switching of the various source devices 136 through commands from the display module 122. A wiring harness 154, which may be a unitary multi-wire cable, having connector hardware, may interface the display module 122 with the input module 124. Because a wiring harness 154 may be used, the display module 122 may be mounted near or on the dashboard of the vehicle 112 without diminishing its appearance. The display module 122 may control setting the input voltage levels and gain parameters for the audio control system 110 during installation, or through a user-selectable calibration process. The process may ensure compatibility between the various source devices 136 and the input module 124. The input module 124 may further include a volume processor 160 and a control processor 162. The input module 124 may provide audio output signals 166 to multiple power amplifiers 170 through an output connector block 172. The power amplifiers 170 may drive a plurality of vehicle loudspeakers 176.

[0014] Figure 2 shows an input/multiplexer circuit 210 of the input module 124. The input/multiplexer circuit 210 may include multiple analog input sources, six of which are shown. However, the audio control system 110 may be configured to handle more or fewer inputs. A first input 212 ("navigation input") may be dedicated to the navigation device 140, while a second input 214 ("telephone input") may be dedicated to a wireless or cellular telephone 142. A third input ("radio input") may include two separate inputs corresponding to a front radio input 216 and a rear radio input 218. A fourth input 220 ("DVD input") may receive audio signals from the DVD player 150, a fifth input 222 ("CD input") may receive audio signals from the CD player 152, and a sixth input 224 ("satellite radio input") may receive audio signals from the satellite radio 146.

[0015] A buffer amplifier 228 or pre-amplifier may receive the input from each of the inputs, respectively. Each buffer amplifier 228 may be an operational amplifier. A gain adjustment circuit 236 may receive output from some or all of the respective buffer amplifiers 228, and is thus shown in dashed lines. Note that each of the radio inputs 216 and 218 may be differential inputs. Accordingly, the corresponding buffer amplifier 230 for the radio inputs 216 and 218 may be arranged with a differential input. The differential inputs may reduce noise and increase signal quality. Some or all of the inputs and corresponding buffer amplifiers 228 and 230 may be arranged in a differential configuration.

[0016] The volume processor 160 may be programmed to control the respective gain adjustment circuits 236 to establish an appropriate input level for each corresponding audio source device 136. For example, the gain adjustment circuit 236 for the navigation input may be programmed to receive a signal in the range of about 100 millivolts to about 16 volts. The gain corresponding to each input may be individually programmed depending on the expected output levels of the various audio source devices 136.

[0017] A right channel multiplexer 240 and a left channel multiplexer 242 may receive the output from each gain adjustment circuit 236 respectively, or from the corresponding buffer amplifier 228 and 230 if no gain adjustment circuit is present. The right and left channel multiplexers 240 and 242 may be linear or analog multiplexers. The output of certain buffer amplifiers 228 or gain adjustment circuits 236 may be routed through additional pre-conditioning circuitry prior to routing to the multiplexers 240 and 242. The volume processor 160 may receive a right channel audio output signal 250 from the right channel multiplexer 240, and may receive a left channel audio output signal 252 from the left channel multiplexer 242. The volume processor 160 may control switching of the multiplexers 240 and 242 through a multiplexer control signal 244.

[0018] Some of the inputs corresponding to the respective audio source devices 136 may be prioritized. For example, the navigation input 212 and the telephone input 214 may have a higher priority than the other inputs. If the audio control system 110 detects an audio signal originating from the navigation input 212, the navigation input may receive priority over all of the other inputs. Accordingly, if the radio 144 or CD player 152 is operating, and a signal from the navigation system 140 becomes active, the audio control system 110 may control the right and left channel multiplexers 240 and 242 to immediately switch the navigation system input 212 through the multiplexers and to the volume processor. The navigation input 212 may be assigned a highest priority so that the user will not fail to hear an audio navigation prompt. Thus, the navigation input 212 may "interrupt" or deselect all other inputs, regardless of which input is in use at the time.

[0019] A navigation signal detection circuit 260 may receive an output 254 from the amplifier 228 or the gain adjustment circuit 236 corresponding to the navigation input 212 to determine if a navigation device signal is

present. The navigation signal detection circuit 260 may issue a navigation detection signal 262 to inform the control processor 162 if a navigation signal is present on the navigation input 212. The user may also select the navigation source 140 manually or through voice-command or other telemetric-based device linked to the display module 122.

[0020] If a signal on the navigation input 212 caused de-selection of another audio signal, the navigation detection circuit 260 may also detect when the navigation signal has terminated, and may restore the deselected audio signal. The navigation detection circuit 260 may delay restoration of the interrupted signal so as to make a smooth transition during switching. Such a delay may be, for example, about one to about two seconds.

[0021] The wireless telephone input 214 may be assigned to a second highest priority. Accordingly, receipt of a cellular or wireless telephone audio signal on the telephone input 214 may deselect all other sources in use, except for the navigation source 140. In this way, the radio 144, the CD player 152 or other audio source devices 136 may be deselected when the user receives a telephone call.

[0022] A telephone detection circuit 166 may receive a telephone output signal 264 from the respective buffer amplifier 228 (or gain adjustment circuit 236) corresponding to the telephone input 214, and determine if a wireless telephone signal is present. The telephone detection circuit 266 may issue a telephone detection signal 268 to inform the control processor 162 that the telephone signal is present on the telephone input 214. The user may also select the telephone source 142 manually or automatically through voice-command or through a telemetric-based device linked to the display module 122.

[0023] A short-range wireless decoder 270, such as a Bluetooth® decoder, may couple the telephone input 214 to the multiplexers 240 and 242 to link the telephone 142. The decoder 270 may include an antenna 272 and wireless transceiver circuit 274 configured to receive short-range radio signals. Various wireless telephone devices may be used, such as a Bluetooth® enabled cellular telephone. Other short-range cable-free decoders may be in communication with certain unallocated input sources to accommodate high-fidelity audio signals. Some of the decoders may be Bluetooth® decoders, such as an A2DP (advanced audio distribution protocol) decoder.

[0024] In some systems, the connections between the navigation input 212 and the telephone input 214 may be manually switched so that the telephone 142 may receive the highest priority, and the navigation system 140 may receive the second highest priority. The user may also select the wireless telephone source 214 manually using the input control 132 on the display module 122 to control the input source.

[0025] Alternatively, priority levels between some of the inputs may be reassigned under software control. The user may reprogram the priority levels by selecting the appropriate function using the volume control 130 or input control 132. Additional signal detection circuits similar to the navigation detection circuit 260 may be provided. Signals provided to and from the additional signal detection circuits may be re-routed using transmission gates or mechanical relays, such as a reed relay, when the priority levels are modified under software control so as to maintain a correspondence with the priority input to which it is associated. Accordingly, the user may have complete control over which input source device 136 is selected via the input control 132 located on the display module 122. Thus, the user may chose between the various input sources.

[0026] A signal summing circuit 280 may combine the telephone audio output signal 264 and the navigation audio output signal 254 to provide a summed signal. The signal summing circuit 280 may be an operational amplifier arranged in a summing configuration. This may permit the user to hear both audio signals so that the user does not miss the navigation information or a telephone call.

[0027] Figure 3 shows a logic and control portion 310 of the input module 124. The volume processor 160 may receive the right channel audio signal 250 and the left channel audio signal 252 from the respective multiplexers 240 and 242. The volume processor 160 may process the left and right channel audio signals 250 and 252 and route conditioned output signals 312 to a plurality of output buffer amplifiers 314. The conditioned output signals 312 may include a right channel output signal 316 and a left channel output signal 318. The output buffer amplifiers 314 may be operational amplifiers arranged in a unity gain configuration, or may provide a predetermined amount of gain. The output buffer amplifiers 314 may be configured to isolate and prevent damage to the circuitry should the output signals 166 to the power amplifiers 170 become short-circuited.

[0028] A connector arrangement or jack 319 may couple the control processor 162 to the display module 122 using a minimal number of wires. A standard DIN type connector may be used. A serial communication format may be used to minimize the number of wires.

[0029] The volume processor 160 may provide volume control 320 for all audio devices 136. The user may adjust the volume using the volume control 130 located on the display module 122. The volume processor 160 may also provide basic pre-amplification functions, such as tone control 322 (bass, treble, midrange), balance control 324, as well as fader control 326. The volume processor 160 may perform digital signal processing or may include a separate digital signal processor 330 to filter or provide graphic or band-specific equalization of the audio signals. The volume processor 160 may provide "phantom" imaging to shift the perceived audio "image" to the right or to the left. The inputs from the various audio source devices 136 may be controlled by the audio control system 110 to effect selection of a particular input and the corresponding audio volume level.

[0030] The control processor 162 may communicate

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with the volume processor 160 and may also receive the navigation detection signal 262 and the telephone detection signal 268. The control processor 162 may effect control of the navigation input 212 and the telephone input 214 to interrupt other source devices 136 in a priority-mode state. The control processor 162 may also provide a mute control signal 340 to the output buffer amplifiers 314.

[0031] Figure 4 shows additional details of an output circuit 410, which may include the output buffer amplifiers 314 and the output connector blocks 172. The output connector blocks 172 may include dual output jack configurations in the form of RCA-type connectors 420 and JR45-type connectors 422. Multiple output jacks 420 and 422 may provide universal connectivity. Any number of connectors may be used in alternative systems. The output jacks 420 and 422 may route the audio output signals 166 to the multiple power amplifiers 170. The multiple power amplifiers 170 may be located remote from the controller (e.g., in the trunk of the vehicle).

[0032] A sub-woofer summing circuit 426 may combine or sum the right channel audio output signal 316 and the left channel audio output signal 318 from the volume processor 360 to generate a monaural subwoofer audio signal 428. The sub-woofer summing circuit 426 may be an operational amplifier arranged in a summing configuration.

[0033] The multiple RCA-type connectors 420 may include front speaker connectors 430, rear speaker connectors 432 and a subwoofer connector 434. Corresponding signals are provided to the JR45-type connectors 422, which may include front speaker connectors 436, rear speaker connectors 438 and a subwoofer connector 440. The RCA-type connectors 420 and the JR45-type connectors 422 may be functionally equivalent.

[0034] The output circuit 410 and connectors 420 and 422 may be configured in several different ways and may interface multiple power amplifier 170 and speaker 176 configurations. Figure 5 shows a three-channel amplifier configuration. Only the RCA-type connectors 420 are shown to avoid duplication. A three-channel configuration may include a first power stereo amplifier 510 that may drive front speakers 512, a second power stereo amplifier 514 that may drive rear speakers 516, and a third power amplifier 518 that may drive a subwoofer speaker 520.

[0035] Figure 6 shows a five-channel amplifier configuration. Only the RCA-type connectors 420 are shown to avoid duplication. A five channel configuration may include a first power amplifier 610 that may drive a front left-side speaker 612, a second power amplifier 614 that may drive a front right-side speaker 616, and a third power amplifier 618, that may drive a subwoofer speaker 620. Additionally, a fourth power amplifier 630 may drive a rear left-side speaker 632, and a fifth power amplifier 634 may drive a rear right-side speaker 636.

[0036] Figure 7 shows an alternative bi-amplified five-channel configuration. The front speakers may be bi-amplified such that there may be separate amplifiers for tweeters 710, mid-range speakers 712 and a subwoofer speaker 714. The bi-amplified configuration may include a first stereo power amplifier 720 that may drive the tweeters 710. Because no crossover circuitry is provided in the loud speakers, a high-pass filter or crossover circuit 722 may connect the front input connectors 430 to the first stereo power amplifier 720 to provide the high-frequency audio signals. Similarly, a band-pass filter or crossover circuit 724 may connect the rear input connectors 432 to a second stereo power amplifier 728 to provide the midrange audio signals. Finally, a low-pass filter or crossover circuit 732 may connect the rear input connectors 434 to a third power amplifier 734 to provide the subwoofer audio signals. The amplifiers may be configured to provide LOGIC7 Surround Sound (trademark of Lexicon Corp., a division of Harman Specialty Group of Massachusetts). The power amplifiers may be Class-D power amplifiers.

[0037] Figure 8 shows the display module 122. The display module 122 may include an auxiliary or "convenience" input connector 820. An auxiliary circuit 822 may include a buffer amplifier or pre-amplifier 824 that receives the input from the auxiliary connector 820. The buffer amplifier 824 may be an operational amplifier. A gain adjustment circuit 826 may receive output from the buffer amplifier 824, and may be optionally included. The user or a passenger may connect an MP3 player or similar portable audio device to the auxiliary input 820. An output signal 828 corresponding to the auxiliary input 820 may connect to the input module 124 via the connector arrangement or jack 319. An auxiliary output signal 840 may be routed to the multiplexers 240 and 242 of the input module 124.

[0038] A single harness, such as the DIN-type cable or connector 319, may connect the display module 122 and the input module 124. The display module 122 and the input module 124 may communicate using various command and control signals 830 transmitted through the connector 319. The display module 122 may include a separate microprocessor 832 and a backlighting circuit 834. The display module 122, including the LCD display 128, may receive power from the power supply located in the input module. Alternatively, the display module 122 may connect to the input module 124 wirelessly so as to eliminate the DIN-type cable and connector 319. In such a configuration, the input module 122 may receive power from an internal battery, or vehicle power bus, or another source.

[0039] A first rotary encoder 842 may receive input from the volume control 130 of the display module 122. A second rotary encoder 844 may receive input from the input control 132 of the display module 122. The encoded information may be transmitted to the control processor 162 of the input module 124 via serial lines through the connector 319. The rotary encoders 842 and 844 may additionally provide push and pus8hold notification corresponding to depression and holding of the correspond-

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ing controls 130 and 132.

[0040] Figure 9 shows an alternate arrangement that may include an eighth input 910 ("digital input"), which may receive digital audio signals from a digital device, such as from a DVD player. Again, although a single line may be shown in Figure 9, the digital signal may be a stereo signal, including left and right channel signals. The configuration of Figure 9 may include the components shown in Figures 2 and 3, where and like-referenced numbers are used to denote the same or similar components. For clarity, other components of Figures 2 and 3 are not duplicated.

[0041] In this configuration, the DVD player, for example, may provide a direct digital output. A digital attenuator 920 may receive the digital signals and scale the signals in accordance with user-selected volume parameters. The digital signal processor 330 may provide tone modification (bass, treble, midrange) in accordance with user-selected tone parameters. A digital-to-analog converter 930 may convert the signal to analog form, and provide the analog signals to the power amplifiers, such as the power amplifiers shown in Figure 5. When the user selects the digital input 910, the volume processor may control a disconnect switch 940 via control signal 970, which may disconnect the output of the multiplexers 240 and 242 from the volume processor.

[0042] Figure 10 is a flow diagram showing acts 1000 that may be taken during operation of the audio control system 110. The user may depress or push in the volume control 130 to turn-on (Act 1010) the audio control system 110. The user may depress or push in the volume control 130 a second time (Act 1020) to access the tone, balance, and fader parameters. Turning the volume control in a clockwise or counter-clockwise direction (Act 1030) may change the selected parameter. If additional parameters require changing (Act 1040), the user may push the volume control and modify the selected parameter. After a predetermined period of time, for example about three seconds (Act 1050), if the volume control 130 is not depressed, the audio control system 110 may revert back to a volume control mode (Act 1060).

[0043] The logic, circuitry, and processing described above may be encoded in a computer-readable medium such as a CDROM, disk, flash memory, RAM or ROM, an electromagnetic signal, or other machine-readable medium as instructions for execution by a processor or controller. Alternatively or additionally, the logic may be implemented as analog or digital logic using hardware, such as one or more integrated circuits (including amplifiers, adders, delays, and filters), or one or more processors executing amplification, adding, delaying, and filtering instructions; or in software in an application programming interface (API) or in a Dynamic Link Library (DLL), functions available in a shared memory, or defined as local or remote procedure calls; or as a combination of hardware and software.

[0044] The logic may be represented in (e.g., stored on or in) a computer-readable medium, machine-readable medium, propagated-signal medium, and/or signal-bearing medium. The media may comprise any device that contains, stores, communicates, propagates, or transports executable instructions for use by or in connection with an instruction executable system, apparatus, or device. The machine-readable medium may selectively be, but is not limited to, an electronic, magnetic, optical, electromagnetic, or infrared signal or a semiconductor system, apparatus, device, or propagation medium. A non-exhaustive list of examples of a machine-readable medium includes: a magnetic or optical disk, a volatile memory such as a Random Access Memory "RAM," a Read-Only Memory "ROM," an Erasable Programmable Read-Only Memory (i.e., EPROM) or Flash memory, or an optical fiber. A machine-readable medium may also include a tangible medium upon which executable instructions are printed, as the logic may be electronically stored as an image or in another format (e.g., through an optical scan), then compiled, and/or interpreted or otherwise processed. The processed medium may then be stored in a computer and/or machine memory.

[0045] The systems may include additional or different logic and may be implemented in many different ways. A controller may be implemented as a microprocessor, microcontroller, application specific integrated circuit (ASIC), discrete logic, or a combination of other types of circuits or logic. Similarly, memories may be DRAM, SRAM, Flash, or other types of memory. Parameters (e.g., conditions and thresholds), and other data structures may be separately stored and managed, may be incorporated into a single memory or database, or may be logically and physically organized in many different ways. Programs and instruction sets may be parts of a single program, separate programs, or distributed across several memories and processors. The systems may be included in a wide variety of electronic devices, including a cellular or wireless phone, a headset, a hands-free set, a speakerphone, communication interface, or an infotainment system.

[0046] The audio control system 110 may manage and switch multiple audio sources. The control system may receive audio source input from existing OEM provided devices 136, such as the radio and CD player. The control system 110 may also receive audio source input from additional audio sources, such as navigation systems 140, cellular or wireless telephones 142, satellite radios 146, MP3-based players 148, DVD players 150 etc. The control system 110 may be an aftermarket or "add-on" system. Accordingly, removal or replacement of the OEM provided devices may be obviated, which may preserve the cosmetic appearance of the dashboard. Certain audio input sources may be prioritized such that audio signals from a high priority device, such as a navigation system or wireless telephone, may interrupt audio signals from lower priority devices.

[0047] While various embodiments of the invention have been described, it will be apparent to those of ordinary skill in the art that many more embodiments and

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implementations are possible within the scope of the invention. Accordingly, the invention is not to be restricted except in light of the attached claims.

Claims

1. An audio control system for managing a plurality of audio source devices (140, 142, 144, 146, 150, 152), the system comprising:

   an input module (124) configured to receive a plurality of audio input signals (212, 214, 216, 218, 220, 222, 224), at least one of the audio input signals corresponding to a priority audio source device;
   a switching circuit (240, 242) configured to select one of the plurality of audio input signals and switch the selected signal from the respective audio source devices through the switching circuit (240, 242);
   a controller (162) in communication with the switching circuit (240, 242) to control switching of the switching circuit (240, 242);
   a signal detector (260) in communication with at least one of the audio input signals and configured to detect a presence of a signal from the priority audio source device, wherein the controller (162) directs the switching circuit (240, 242) to deselect an existing input and select an audio input signal corresponding to the priority audio source device when the signal from the priority audio source device is detected; and
   a second signal detector configured to detect presence of a signal from a second priority audio source device, wherein the controller directs the switching circuit (240, 242) to deselect an existing audio input and select an audio input signal corresponding to the second priority audio source device, when a signal from the second priority audio source device is detected;
   wherein if a selected audio input signal corresponds to the priority audio source device, the controller (162) is adapted not to deselect the selected input when a signal from the second priority audio source device is detected,
   characterized by
   a summing circuit (280) configured to combine audio signals from the priority audio source device and the second priority audio source device for providing a summed signal in input to the switching circuit (240, 242).

2. The system according to claim 1, wherein the controller changes a relative priority level of the priority audio source device and the second priority audio source device.

3. The system according to claim 1 or claim 2, comprising a display in communication with the controller, configured to provide information regarding switching of the audio input signals.

4. The system according to any one of claims 1 to 3, comprising a user interface in communication with the controller and configured to permit manual selection and switching of the audio input source through the switching circuit.

5. The system according to any one of claims 1 to 4, comprising a wireless decoder circuit configured to transmit audio signals to the switching circuit.

6. The system according to any one of claims 1 to 5, wherein the switching circuit is a multiplexer.

7. A method of managing a plurality of audio sources (140, 142, 144, 146, 150, 152), comprising:

   receiving a plurality of audio input signals (212, 214, 216, 218, 220, 222, 224), at least one of the audio input signals corresponding to a priority audio source device;
   selecting one of the plurality of audio input signals from respective audio sources and switching the selected signal into communication with an amplifier;
   detecting a presence of a priority audio input signal;
   deselecting an existing audio input signal, reselecting the priority audio input signal, and switching the reselected signal into communication with the amplifier, when the priority audio signal is detected; and
   detecting the presence of a second priority audio input signal; wherein
   when the signal from the second priority audio source device is detected then

      deselecting an existing audio input signal;
      reselecting the second priority audio input signal; and
      switching the reselected signal into communication with the amplifier,

   wherein, if the priority audio input signal is selected, the priority audio input signal is not deselected when a second priority audio signal is detected,
   characterized by
   combining the priority audio input signal with the second priority audio input signal to provide a summed signal in input for switching.

8. The method according to claim 7, further comprising displaying information regarding switching of the au-

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dio signal inputs.

Patentansprüche

1. Audiosteuerungssystem zum Verwalten einer Mehrzahl von Audioquellvorrichtungen (140, 142, 144, 146, 150, 152), wobei das System Folgendes umfasst:

ein Eingangsmodul (124), das dazu konfiguriert ist, eine Mehrzahl von Audioeingangssignalen (212, 214, 216, 218, 220, 222, 224) zu empfangen, wobei wenigstens eins der Audioeingangssignale einer Prioritätsaudioquellvorrichtung entspricht;
ein Schaltstromkreis (240, 242), der dazu konfiguriert ist, eins der Mehrzahl von Audioeingangssignalen auszuwählen und das ausgewählte Signal von den jeweiligen Audioquellvorrichtungen durch den Schaltstromkreis (240, 242) zu schalten;
eine Steuereinrichtung (162) in Kommunikation mit dem Schaltstromkreis (240, 242), um das Schalten des Schaltstromkreises (240, 242) zu steuern;
einen Signaldetektor (260) in Kommunikation mit wenigstens einem der Audioeingangssignale, der dazu konfiguriert ist, ein Vorhandensein eines Signals von der Prioritätsaudioquellvorrichtung zu erkennen, wobei die Steuereinrichtung (162) den Schaltstromkreis (240, 242) anweist, die Auswahl eines existierenden Eingangs aufzuheben und ein Audioeingangssignal auszuwählen, das der Prioritätsaudioquellvorrichtung entspricht, wenn das Signal von der Prioritätsaudioquellvorrichtung erkannt wird; und
einen zweiten Signaldetektor, der dazu konfiguriert ist, das Vorhandensein eines Signals von einer zweiten Prioritätsaudioquellvorrichtung zu erkennen, wobei die Steuereinrichtung den Schaltstromkreis (240, 242) anweist, die Auswahl eines existierenden Audioeingangs aufzuheben und ein Audioeingangssignal auszuwählen, das der zweiten Prioritätsaudioquellvorrichtung entspricht, wenn ein Signal von der zweiten Prioritätsaudioquellvorrichtung erkannt wird;
wobei dann, wenn ein ausgewähltes Audioeingangssignal der Prioritätsaudioquellvorrichtung entspricht, die Steuereinrichtung (162) dazu angepasst ist, die Auswahl des ausgewählten Eingangs nicht aufzuheben, wenn ein Signal von der zweiten Prioritätsaudioquellvorrichtung erkannt wird,
gekennzeichnet durch
einen Summierungsschaltkreis (280), der dazu konfiguriert ist, Audiosignale von der Prioritätsaudioquellvorrichtung und der zweiten Prioritätsaudioquellvorrichtung zu kombinieren, um ein summiertes Signal im Eingang des Schaltstromkreises (240, 242) bereitzustellen.

2. System nach Anspruch 1, wobei die Steuereinrichtung eine relative Prioritätsstufe der Prioritätsaudioquellvorrichtung und der zweiten Prioritätsaudioquellvorrichtung ändert.

3. System nach Anspruch 1 oder Anspruch 2, umfassend eine Anzeige in Kommunikation mit der Steuereinrichtung, die dazu konfiguriert ist, Informationen bezüglich des Schaltens der Audioeingangssignale bereitzustellen.

4. System nach einem der Ansprüche 1 bis 3, umfassend eine Benutzerschnittstelle in Kommunikation mit der Steuereinrichtung, die Benutzerschnittstelle dazu konfiguriert ist, eine manuelle Auswahl und Schaltung der Audioeingangsquelle durch den Schaltstromkreis zuzulassen.

5. System nach einem der Ansprüche 1 bis 4, umfassend einen drahtlosen Dekodierschaltkreis, der dazu konfiguriert ist, Audiosignale an den Schaltstromkreis zu übertragen.

6. System nach einem der Ansprüche 1 bis 5, wobei der Schaltstromkreis ein Multiplexer ist.

7. Verfahren zum Verwalten einer Mehrzahl von Audioquellen (140, 142, 144, 146, 150, 152), umfassend:

Empfangen einer Mehrzahl von Audioeingangssignalen (212, 214, 216, 218, 220, 222, 224), wobei wenigstens eins der Audioeingangssignale einer Prioritätsaudioquellvorrichtung entspricht;
Auswählen von einem der Mehrzahl von Audioeingangssignalen von jeweiligen Audioquellen und Schalten des ausgewählten Signals in Kommunikation mit einem Verstärker;
Erkennen eines Vorhandenseins eines Prioritätsaudioeingangssignals;
Aufheben der Auswahl eines existierenden Audioeingangssignals, erneutes Auswählen des Prioritätsaudioeingangssignals und Schalten des erneut ausgewählten Signals in Kommunikation mit dem Verstärker, wenn das Prioritätsaudioeingangssignal erkannt wird; und
Erkennen des Vorhandenseins eines zweiten Prioritätsaudioeingangssignals; wobei
wenn das Signal von der zweiten Prioritätsaudioquellvorrichtung erkannt wird, dann

Aufheben der Auswahl eines existierenden Audioeingangssignals;

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erneutes Auswählen des zweiten Prioritätsaudioeingangssignals; und
Schalten des erneut ausgewählten Signals in Kommunikation mit dem Verstärker,

wobei, wenn das Prioritätsaudioeingangssignal ausgewählt wird, die Auswahl des Prioritätsaudioeingangssignals nicht aufgehoben wird, wenn ein zweites Prioritätsaudioeingangssignal erkannt wird,
gekennzeichnet durch
Kombinieren des Prioritätsaudioeingangssignals mit dem zweiten Prioritätsaudioeingangssignal, um ein summiertes Signal im Eingang zum Schalten bereitzustellen.

8. Verfahren nach Anspruch 7, ferner umfassend Anzeigen von Informationen bezüglich des Schaltens der Audiosignaleingänge.

Revendications

1. Système de commande audio pour gérer une pluralité de dispositifs de source audio (140, 142, 144, 146, 150, 152), le système comprenant :

un module d'entrée (124) configuré pour recevoir une pluralité de signaux d'entrée audio (212, 214, 216, 218, 220, 222, 224), au moins l'un des signaux d'entrée audio correspondant à un dispositif prioritaire de source audio ;
un circuit de commutation (240, 242) configuré pour sélectionner un des signaux d'entrée audio parmi la pluralité de signaux d'entrée audio et pour commuter le signal sélectionné à partir des dispositifs de source audio respectifs à travers le circuit de commutation (240, 242) ;
un contrôleur (162) en communication avec le circuit de commutation (240, 242), afin de réguler la commutation du circuit de commutation (240, 242) ;
un détecteur de signal (260) en communication avec au moins un des signaux d'entrée audio et configuré pour détecter la présence d'un signal provenant du dispositif prioritaire de source audio, le contrôleur (162) amenant le circuit de commutation (240, 242) à désélectionner une entrée existante et à sélectionner un signal d'entrée audio correspondant au dispositif prioritaire de source audio lorsque le signal provenant du dispositif prioritaire de source audio est détecté ; et
un deuxième détecteur de signal, configuré pour détecter la présence d'un signal provenant d'un deuxième dispositif prioritaire de source audio, le contrôleur amenant le circuit de commutation (240, 242) à désélectionner une entrée audio existante et à sélectionner un signal d'entrée audio correspondant au deuxième dispositif prioritaire de source audio, lorsqu'un signal provenant du deuxième dispositif de source audio est détecté ;
dans lequel, si un signal sélectionné d'entrée audio correspond au dispositif prioritaire de source audio, le contrôleur (162) est adapté pour ne pas désélectionner l'entrée sélectionnée lorsqu'un signal provenant du deuxième dispositif prioritaire de source audio est détecté,
caractérisé par
un circuit de sommation (280) configuré pour combiner des signaux audio à partir du dispositif prioritaire de source audio et le deuxième dispositif prioritaire de source audio en apportant un signal sommé en entrée au circuit de commutation (240, 242).

2. Système selon la revendication 1, dans lequel le contrôleur modifie un niveau relatif de priorité du dispositif prioritaire de source audio et du deuxième dispositif prioritaire de source audio.

3. Système selon la revendication 1 ou 2, comprenant un affichage en communication avec le contrôleur, configuré pour fournir des informations concernant la commutation des signaux d'entrée audio.

4. Système selon l'une quelconque des revendication 1 à 3, comprenant une interface d'utilisateur en communication avec le contrôleur et configurée pour permettre une sélection manuelle et une commutation de la source d'entrée audio à travers le circuit de commutation.

5. Système selon l'une quelconque des revendications 1 à 4, comprenant un circuit décodeur sans fil configuré pour transmettre des signaux audio au circuit de commutation.

6. Système selon l'une quelconque des revendications 1 à 5, dans lequel le circuit de commutation est un multiplexeur.

7. Procédé de gestion d'une pluralité de sources audio (140, 142, 144, 146 150, 152), comprenant :

la réception d'une pluralité de signaux d'entrée audio (212, 214, 216, 218, 220, 222, 224), au moins l'un des signaux d'entrée audio correspondant à un dispositif prioritaire de source audio ;
la sélection d'un des signaux d'entrée audio parmi la pluralité de signaux d'entrée audio à partir de sources audio respectives, et la commutation du signal choisi en communication avec un amplificateur ;

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la détection de la présence d'un signal prioritaire d'entrée audio ;
la désélection d'un signal d'entrée audio existant, la resélection du signal prioritaire d'entrée audio et la commutation du signal resélectionné en communication avec l'amplificateur, lorsque le signal audio prioritaire est détecté ; et
la détection de la présence d'un deuxième signal prioritaire d'entrée audio ; dans lequel
lorsque le signal provenant du deuxième dispositif prioritaire de source audio est détecté, alors

la désélection d'un signal d'entrée audio existant ;
la resélection du deuxième signal prioritaire d'entrée audio ; et
la commutation du signal resélectionné en communication avec l'amplificateur,

dans lequel, si le signal prioritaire d'entrée audio est sélectionné, le signal prioritaire d'entrée audio n'est pas désélectionné lorsqu'un deuxième signal prioritaire d'entrée audio est détecté, **caractérisé par**
la combinaison du signal prioritaire d'entrée audio avec le deuxième signal prioritaire d'entrée audio pour donner un signal sommé en entrée pour commutation.

8. Procédé selon la revendication 7, comprenant en outre l'affichage d'informations concernant la commutation des entrées de signaux audio.

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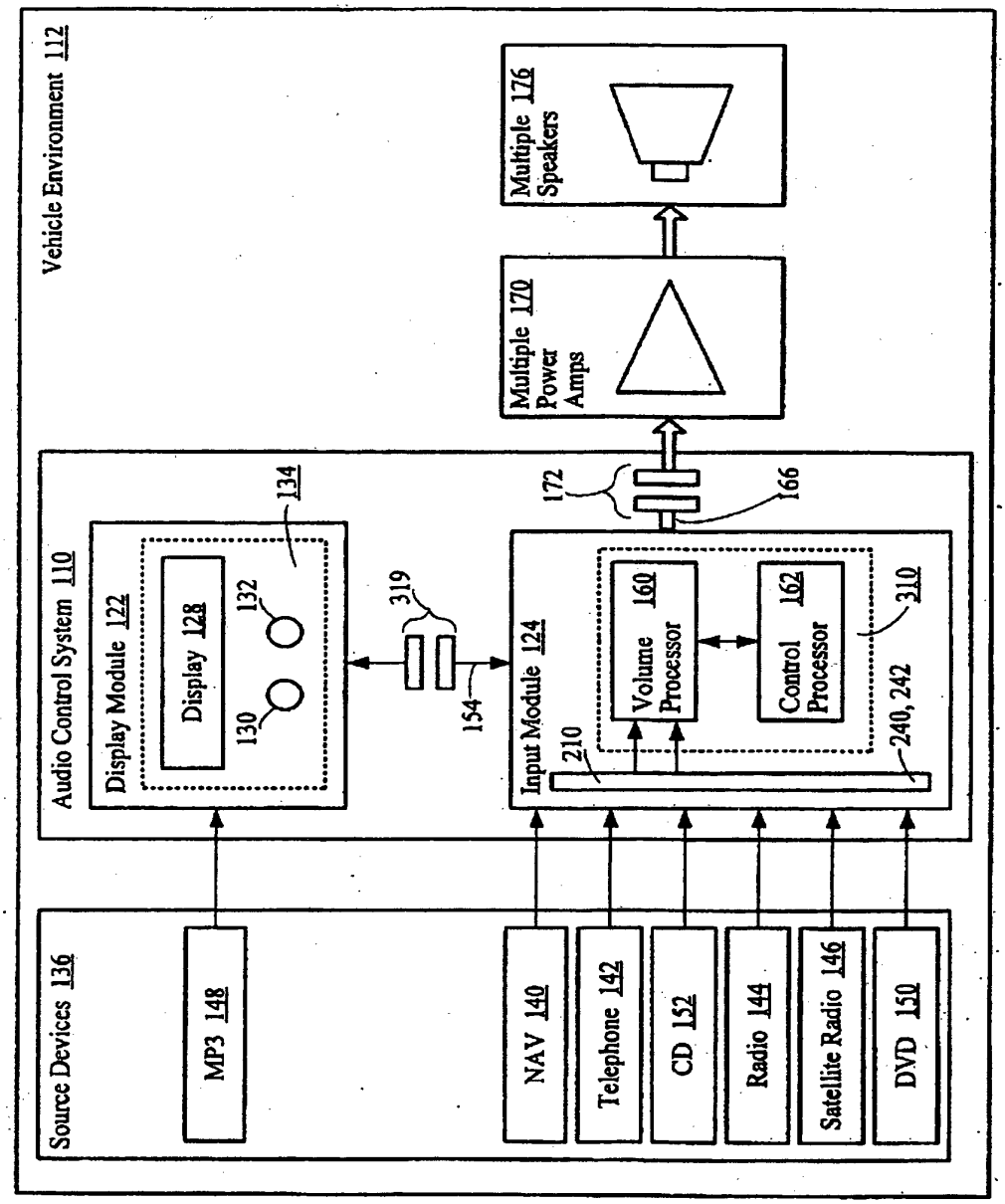
Vehicle Environment 112
Multiple 176 Speakers
Multiple 170 Power Amps
172
166
Audio Control System 110
Display Module 122
Display 128
134
132
130
319
154
Input Module 124
210
Volume Processor 160
Control Processor 162
310
240, 242
Source Devices 136
MP3 148
NAV 140
Telephone 142
CD 152
Radio 144
Satellite Radio 146
DVD 150

Figure 1

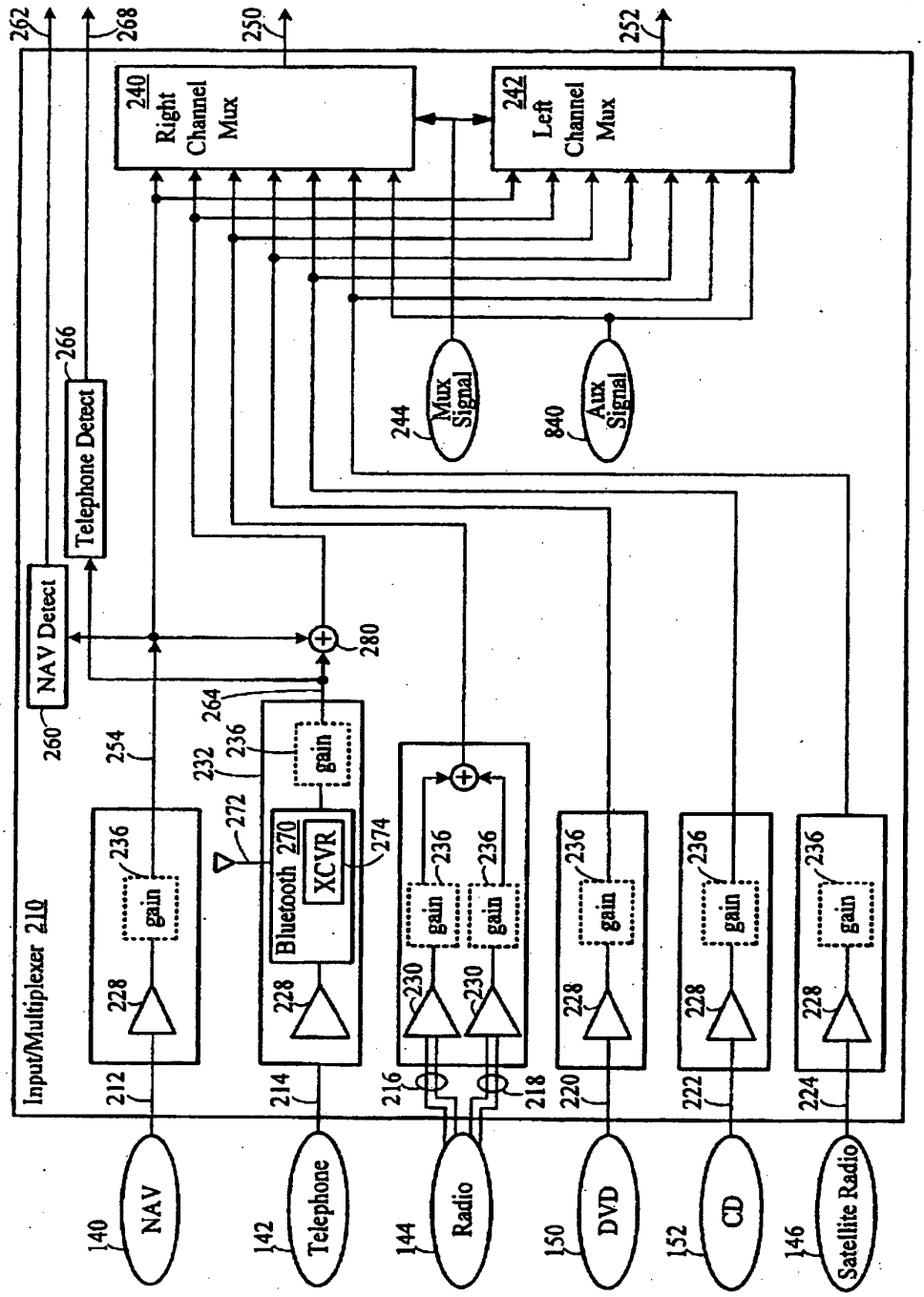
262
268
250
252
240 Right Channel Mux
242 Left Channel Mux
266
Telephone Detect
NAV Detect
260
244 Mux Signal
840 Aux Signal
280
264
254
232
236
gain
272
Bluetooth 270
XCVR
274
228
230
Input/Multiplexer 210
212
214
216
218
220
222
224
140 NAV
142 Telephone
144 Radio
150 DVD
152 CD
146 Satellite Radio

Figure 2

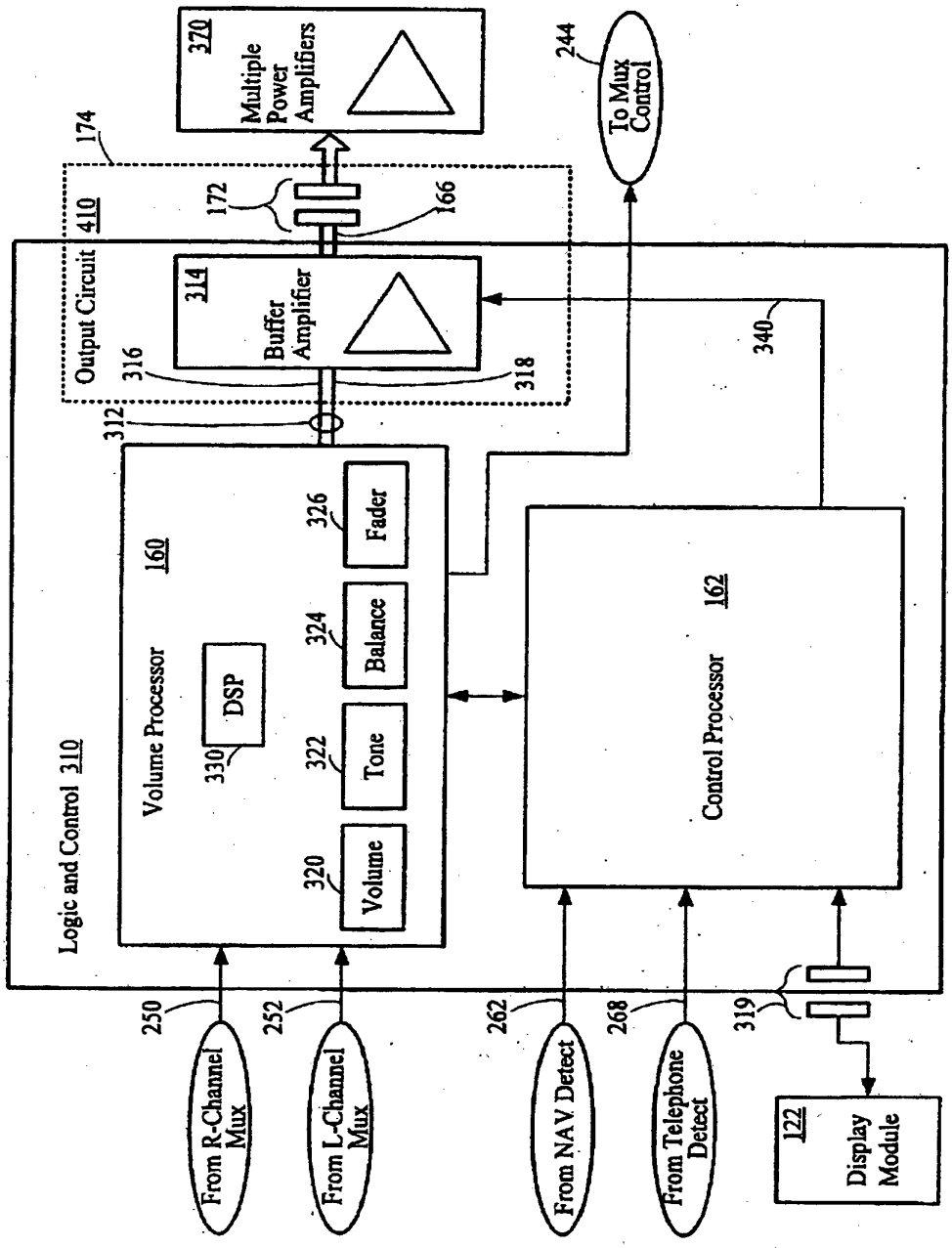
320
Multiple Power Amplifiers
174
172
166
244
To Mux Control
Output Circuit 410
314
Buffer Amplifier
316
318
340
312
326
Fader
160
Volume Processor
324
Balance
DSP
330
322
Tone
320
Volume
Logic and Control 310
162
Control Processor
250
252
262
268
319
From R-Channel Mux
From L-Channel Mux
From NAV Detect
From Telephone Detect
122
Display Module

Figure 3

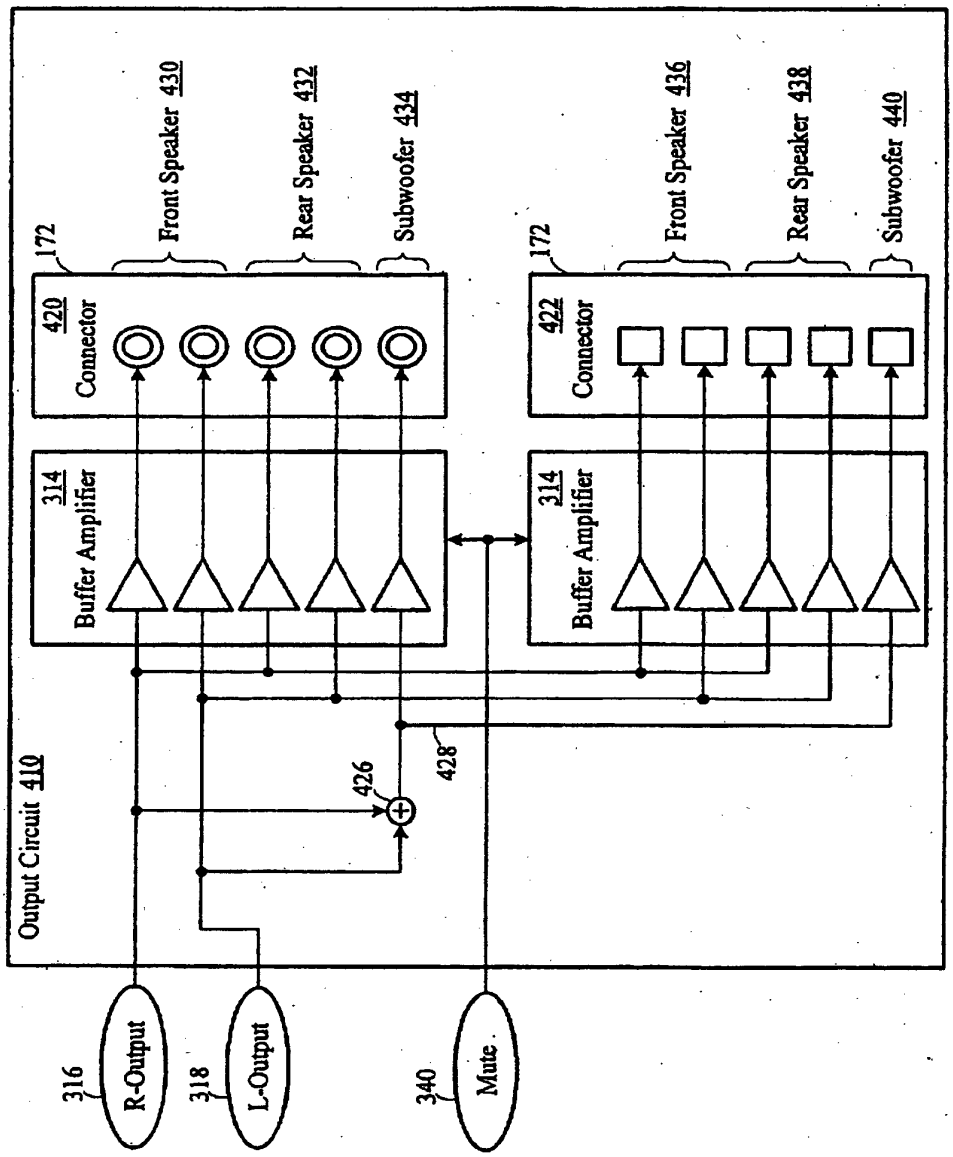
Output Circuit 410
172
420 Connector
314 Buffer Amplifier
Front Speaker 430
Rear Speaker 432
Subwoofer 434
172
422 Connector
314 Buffer Amplifier
Front Speaker 436
Rear Speaker 438
Subwoofer 440
426
428
316 R-Output
318 L-Output
340 Mute

Figure 4

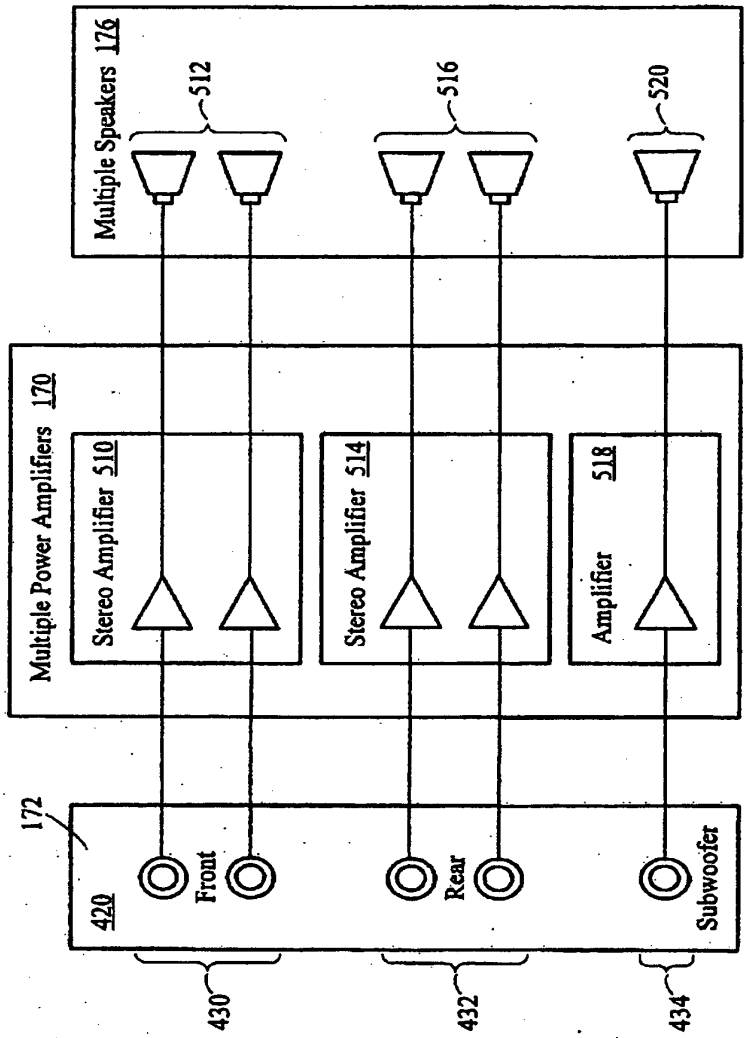
Multiple Speakers 176
512
516
520
Multiple Power Amplifiers 170
Stereo Amplifier 510
Stereo Amplifier 514
Amplifier 518
172
420
Front
Rear
Subwoofer
430
432
434

Figure 5

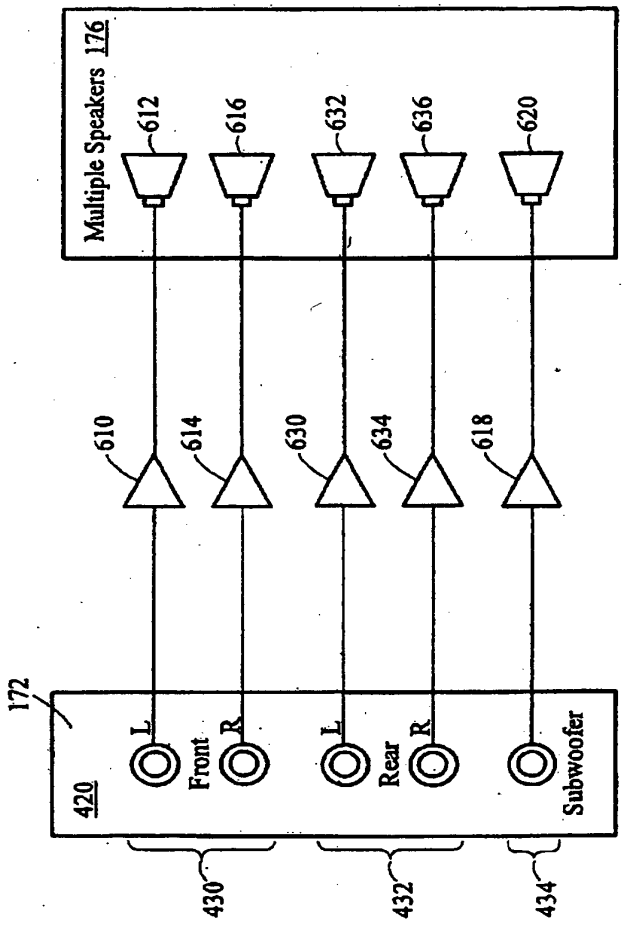
Multiple Speakers 176
612
616
632
636
620
610
614
630
634
618
172
420
L
Front
R
L
Rear
R
Subwoofer
430
432
434

Figure 6

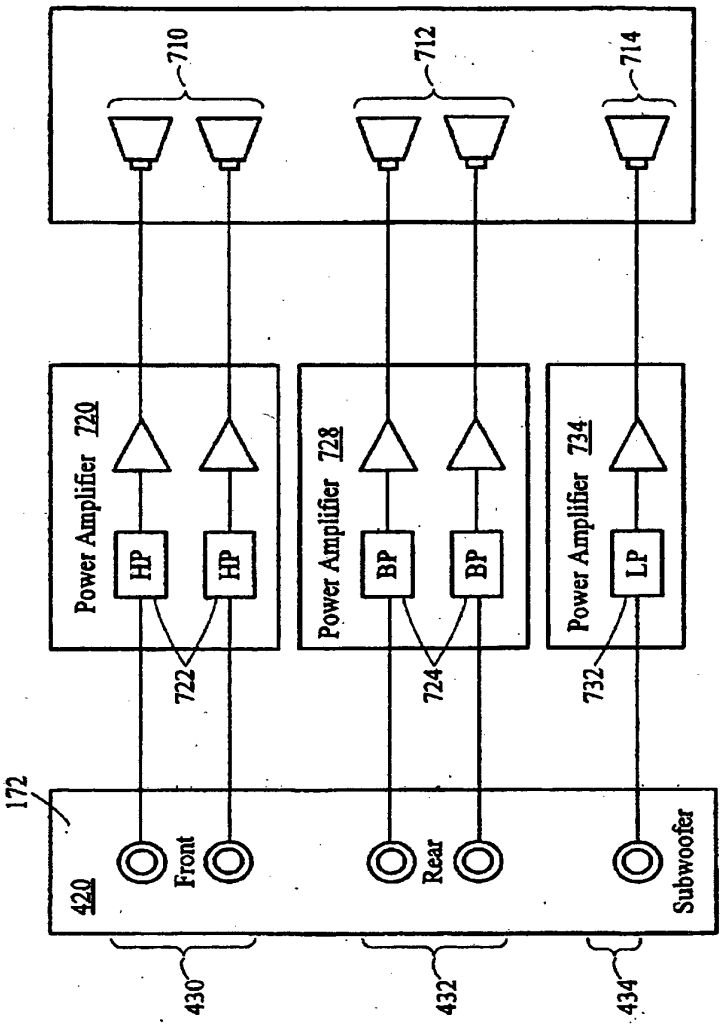
710
712
714
Power Amplifier 720
HP
HP
Power Amplifier 728
BP
BP
Power Amplifier 734
LP
722
724
732
172
420
Front
Rear
Subwoofer
430
432
434

Figure 7

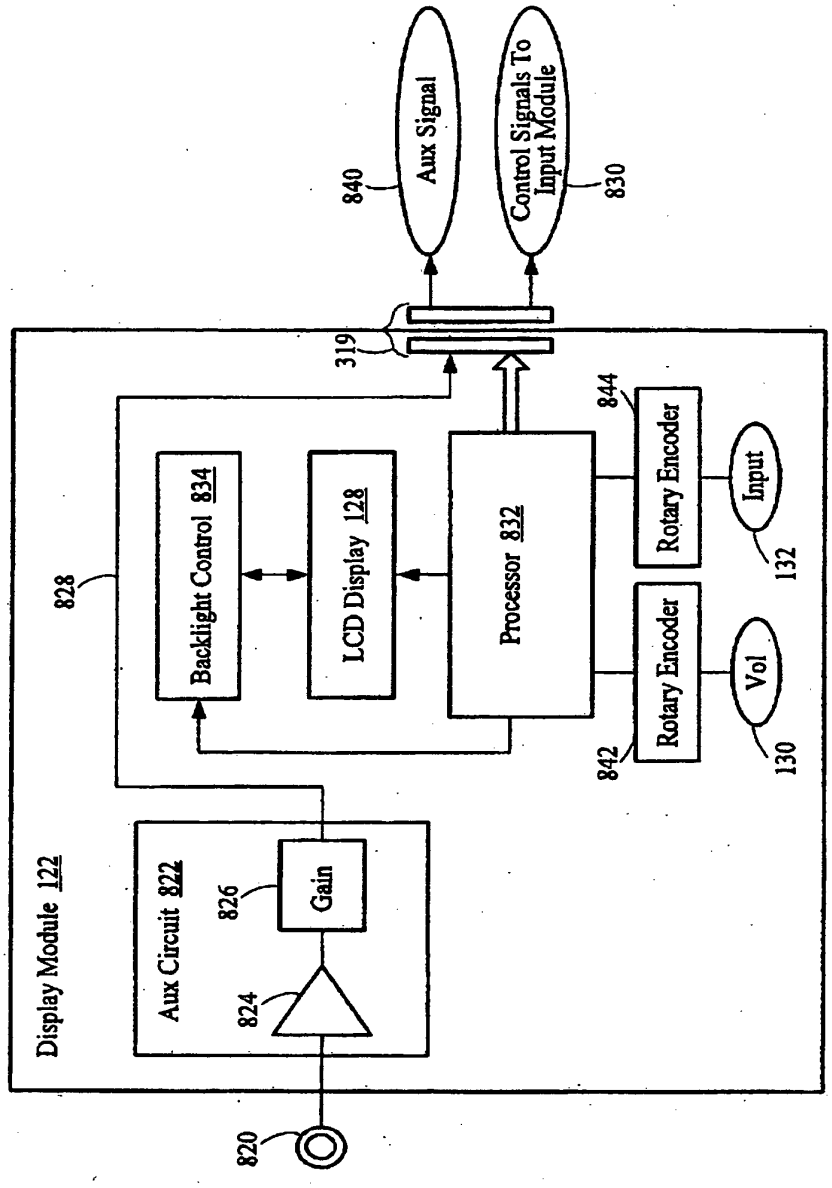
Aux Signal
840
Control Signals To Input Module
830
319
844
Rotary Encoder
Input
132
828
Backlight Control 834
LCD Display 128
Processor 832
Rotary Encoder
Vol
130
842
Display Module 122
Aux Circuit 822
826
Gain
824
820

Figure 8

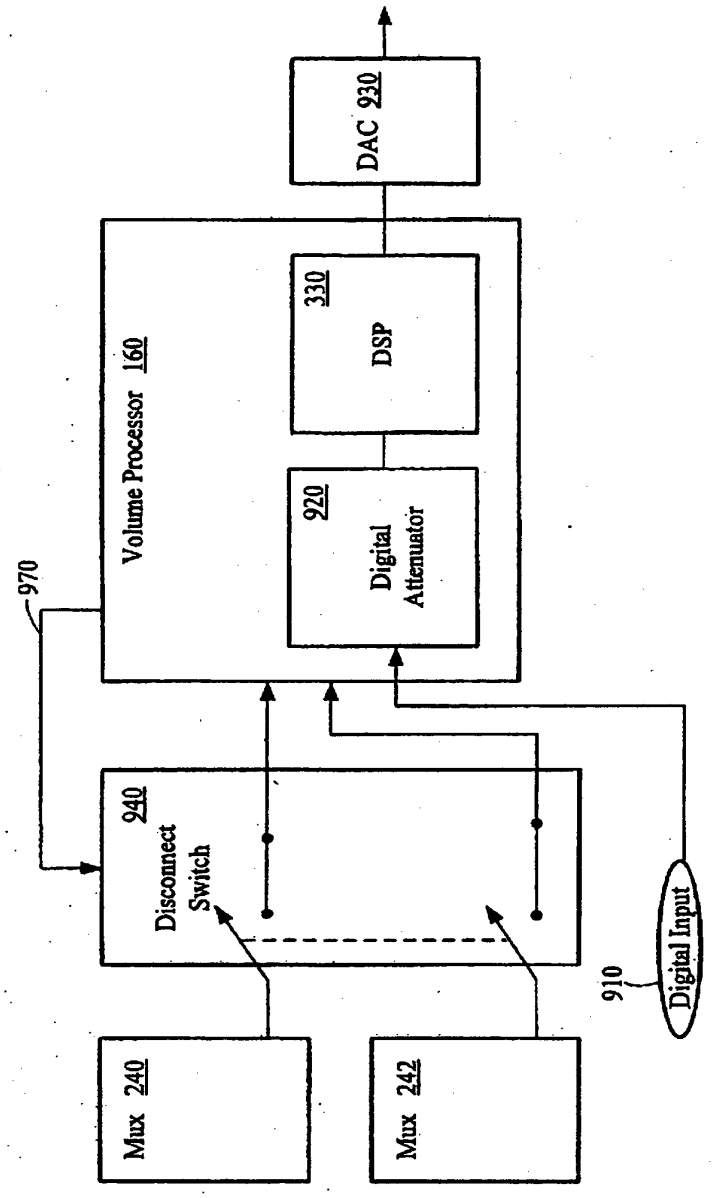
DAC 930
Volume Processor 160
330
DSP
920
Digital Attenuator
970
940
Disconnect Switch
910
Digital Input
Mux 240
Mux 242

Figure 9

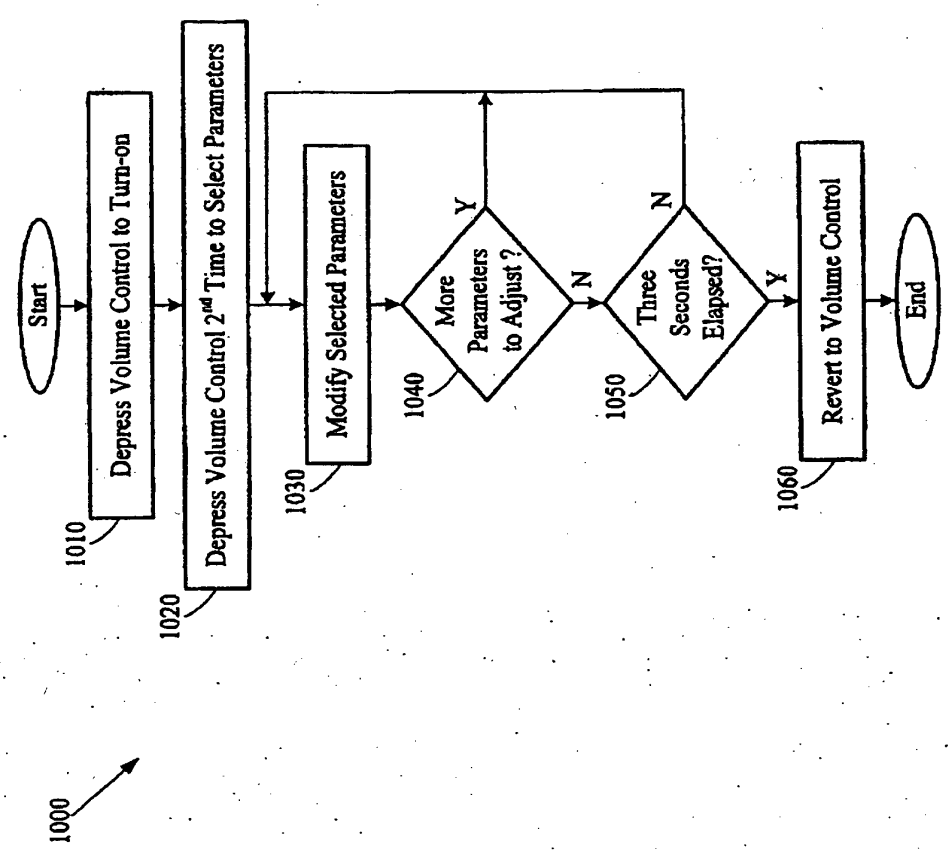
Start
Depress Volume Control to Turn-on
Depress Volume Control 2nd Time to Select Parameters
Modify Selected Parameters
More Parameters to Adjust ?
Y
N
Three Seconds Elapsed?
N
Y
Revert to Volume Control
End
1000
1010
1020
1030
1040
1050
1060

Figure 10

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- DE 10065826 A1 **[0004]**

Exhibit 1004
Page 274 of 538

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 2305LD01PCT	**FOR FURTHER ACTION**	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No. PCT/US 15/51638	International filing date *(day/month/year)* 23 September 2015 (23.09.2015)	(Earliest) Priority Date *(day/month/year)* 23 September 2014 (23.09.2014)
Applicant DENTON, LEVAUGHN		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 2 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

a. With regard to the **language**, the international search was carried out on the basis of:

☒ the international application in the language in which it was filed.

☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).

c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐ **Certain claims were found unsearchable** (see Box No. II).

3. ☐ **Unity of invention is lacking** (see Box No. III).

4. With regard to the **title**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the **drawings**,

a. the figure of the **drawings** to be published with the abstract is Figure No. 3

☐ as suggested by the applicant.

☒ as selected by this Authority, because the applicant failed to suggest a figure.

☐ as selected by this Authority, because this figure better characterizes the invention.

b. ☐ none of the figures is to be published with the abstract.

Form PCT/ISA/210 (first sheet) (January 2015)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 15/51638

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - H03G 3/20 (2016.01)
CPC - H03G 3/32
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC (8) -H03G 3/20 (2016.01)
CPC - H03G 3/32

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
CPC - H03G 3/24; H04R 27/00 (See keywords Below)
USPC - 381/57, 381/104, 381/107

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
Thomsoninnovation.com; Patbase; Google Scholar; Google Patents; Gogole.com; Freepatentsonline; ProQuest Dialog
Search Terms: Audio, sound, adapt, dynamic, adjust, modify, setting, parameter, frequency, amplitude, threshold, sensor, microphone, measure, sample, reading, compare, process, wireless, network, cluster, etc.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2010/0329471 A1 (DUNN et al.), 30 December 2010 (30.12.2010), entire document, especially Abstract; Para [0018], [0020], [0025], [0026]	1-20
Y	US 2013/0294618 A1 (LYUBACHEV), 07 November 2013 (07.11.2013), entire document, especially Abstract; Para [0018], [0021], [0028]-[0029], [0030], [0068]	1-20
Y	US 8,073,160 B1 (CLASSEN), 06 December 2011 (06.12.2011), col 3, ln 60 to col 4, ln 15; col 7, ln 3-45	1-20
Y	US 2004/0076305 A1 (SANTIAGO), 22 April 2004 (22.04.2004), entire document, especially Abstract; Para [0032]-[0037]	2 and 5-7
Y	US 2006/0082458 A1 (SHANKS et al.), 20 April 2006 (20.04.2006), entire document, especially Abstract; Para [0015]-[0016]	9 and 19
A	US 2013/0064380 A1 (MAHOWALD), 14 March 2013 (14.03.2013), entire document	1-20
A	US 2004/0240676 A1 (HASHIMOTO et al.), 02 December 2004 (02.12.2004), entire document	1-20

☐ Further documents are listed in the continuation of Box C. ☐

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
16 January 2016 (16.01.2016)	29 JAN 2016
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-8300	Authorized officer: Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/210 (second sheet) (January 2015)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To: RICHARD GEARHART
GEARHART LAW LLC
41 RIVER ROAD
SUMMIT, NJ 07901

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing *(day/month/year)*	29 JAN 2016
Applicant's or agent's file reference 2305LD01PCT	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US 15/51638	23 September 2015 (23.09.2015)	23 September 2014 (23.09.2014)

International Patent Classification (IPC) or both national classification and IPC
IPC(8) - H03G 3/20 (2016.01)
CPC - H03G 3/32

Applicant DENTON, LEVAUGHN

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule *43bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1 *bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/US	Date of completion of this opinion	Authorized officer:
Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-8300	16 January 2016 (16.01.2016)	Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/237 (cover sheet) (January 2015)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US 15/51638

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:
   - [x] the international application in the language in which it was filed.
   - [ ] a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. [ ] This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a)).

3. [ ] With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:
   - a. [ ] forming part of the international application as filed:
     - [ ] in the form of an Annex C/ST.25 text file.
     - [ ] on paper or in the form of an image file.
   - b. [ ] furnished together with the international application under PCT Rule 13*ter*.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.
   - c. [ ] furnished subsequent to the international filing date for the purposes of international search only:
     - [ ] in the form of an Annex C/ST.25 text file (Rule 13*ter*.1(a)).
     - [ ] on paper or in the form of an image file (Rule 13*ter*.1(b) and Administrative Instructions, Section 713).

4. [ ] In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US 15/51638

Box No. V **Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	1-20	YES
	Claims	None	NO
Inventive step (IS)	Claims	None	YES
	Claims	1-20	NO
Industrial applicability (IA)	Claims	1-20	YES
	Claims	None	NO

2. Citations and explanations:

Claims 1, 3-4, 8, 10-18 and 20 lack an inventive step under PCT Article 33(3) as being obvious over US 2010/0329471 A1 to Dunn et al. (hereinafter 'Dunn') in view of US 2013/0294618 A1 (LYUBACHEV) and further in view of US 8,073,160 B1 (CLASSEN).

Regarding claim 1, Dunn teaches a system comprising: at least one cluster of at least one computing device, said at least one computing device comprising (Para [0018], [0026]- sound system that may be used with exemplary embodiments may be a digital audio system); a sound sensing mechanism, capable of monitoring the amplitude and frequency of both a desired and an undesired frequency (Abstract; Para [0020]-A sound pick-up may be placed in the listening area to capture the sound level, including both the desired sound and ambient noise; the sound pick-up 24 is positioned in the listening area, so as to receive the sound produced by the speaker 22, ambient noise in the listening area is also received by the sound pick-up 24); transmitting and receiving data from an audio control source (Para [0021]- the sound pick-up 24 is positioned in the listening area, so as to receive the sound produced by the speaker 22, ambient noise in the listening area is also received by the sound pick-up 24); said data comprising at least one characteristic of at least one sound fingerprint (Para [0021]- it may then be run through a numerical process having a time window 28. The resultant value is the measured value 30); at least one output device, comprising (Para [0019]- After the signal has been converted to analog, the signal is transmitted to at least one speaker 22. The speaker 22 then converts the analog signal to audible sound); a speaker for outputting sound (Para [0019]- After the signal has been converted to analog, the signal is transmitted to at least one speaker 22. The speaker 22 then converts the analog signal to audible sound); varying the output of said at least one output device (Para [0025]- If the volume of the desired sound needs to be adjusted to be within the acceptable range a signal may be sent to the gain control 32. The gain control 32 may then automatically adjust the volume of the desired sound). Dunn does not teach a wireless transceiver capable of wirelessly transmitting and receiving data from an audio control source; at least one output device, comprising: a power source for operating the device, a communication mechanism, for receiving electronic information from said audio control source; said audio control source, in electronic communication said at least one cluster and said at least one output device, said audio control source comprising: a memory, containing computer-executable instructions for connecting to said at least one cluster, processing said at least one characteristic of at least sound fingerprint, visualizing said at least one sound fingerprint, providing an interface, a processor, for executing said computer-executable instruction, a interfacing mechanism, comprising: a network adapter, capable of transmitting and receiving electronic information through both wired and wireless communication; a display, for showing said interface and said at least one visualized sound fingerprint, at least one input mechanism, for manipulating said interface, and varying said output of said at least one output device. However, LYUBACHEV teaches wireless transceiver capable of wirelessly transmitting and receiving data from an audio control source (Para [0067]- Data transmission between devices within the system can be performed by means of wired or wireless communication); at least one output device, comprising a power source for operating the device (Para [0019], [0028]-[0029] - peripheral station, sound reproducing device (loudspeaker) for audio signal reception and playback; controlling tool for loudspeaker power control, power supply unit); a communication mechanism, for receiving electronic information from said audio control source (Para [0018], [0021], [0030], [0068] - network data exchange unit, All separately realized devices can be joined into local area network, central station, control device); said audio control source, in electronic communication said at least one cluster and said at least one output device, said audio control source comprising (Para [0018], [0021], [0030], [0068] - network data exchange unit, All separately realized devices can be joined into local area network, central station, control device); a memory, containing computer-executable instructions for connecting to said at least one cluster, processing said at least one characteristic of at least sound fingerprint (Para [0044], [0141] - All calculating devices can be realized on the base of processor with RAM and ROM, input and output devices, corresponding software, or on the base of hardwired logic; Computing device 9 for performing calculation and controlling data generation for system tuning for assigned sounding mode provision), a processor, for executing said computer-executable instruction (Para [0229]- controlling data generation is mainly realized on the base of computer device with embedded programmable processor), a network adapter, capable of transmitting and receiving electronic information through both wired and wireless communication (Abstract; Para [0122]- Mainly network data exchange unit 13 for data exchange with other devices within the network 14; system can be operated wirelessly and can compose a local network); at least one input mechanism (Para [0228]- input and output devices). It would have been obvious to one of ordinary skill in the art to combine the teachings of Dunn with those of LYUBACHEV since doing so would adaptively manage the audio settings thereby enhance the experience of the listeners.

--- (See Continuation in Supplemental Box) ---

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US 15/51638

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of:
Box V.2. Citations and Explanations.

Neither Dunn nor LYUBACHEV teaches visualizing said at least one sound fingerprint, providing an interface, a interfacing mechanism, comprising: a display, for showing said interface and said at least one visualized sound fingerprint, at least one input mechanism, for manipulating said interface, and varying said output of said at least one output device. However, Classen teaches visualizing said at least one sound fingerprint (col 3, ln 60 to col 4, ln 15; col 7, ln 3-45 - audio properties by viewing displayed visual properties of objects), providing an interface, a interfacing mechanism (col 4, ln 50-65; col 5, ln 20-45 - The user interface 100 provides for the visualization of audio properties of signals of audio sources.), comprising: a display, for showing said interface (col 15, ln 1-15 - one or more display devices 1404) and said at least one visualized sound fingerprint, at least one input mechanism, for manipulating said interface (Fig. 4; col 3, ln 2-55 - Editing the audio data further includes receiving a first user input selecting an audio object; receiving a second user input modifying a position of the selected audio object Within the region; and automatically modifying the audio properties associated With the audio object according to the neW location Within the region; Adjusting one or more audio properties associated With the audio object further includes adjusting a compressor associated With the audio data represented by the audio object), and varying said output of said at least one output device (col 3, ln 35-65 - updating the control parameters of the audio mixer according to the adjusted properties of the audio signals). It would have been obvious to one of ordinary skill in the art to combine the teachings of Dunn with those of LYUBACHEV and Classen since doing so would provide a user friendly interface for visualizing controlling audio properties.

Regarding claim 3, Classen teaches said display and said at least one input mechanism are one in-the-same (col 5, ln 20-67).

Regarding claim 4, LYUBACHEV teaches said wireless transceiver utilizes short-range wireless technologies (Para [0233] - radio channel).

Regarding claim 8, LYUBACHEV teaches at least one computing device further comprising a software-based radio, wherein said software-based radio isolates RF frequencies, said at least one computing device relays those frequencies to said audio control unit, wherein said audio control unit ensures that predetermined frequency thresholds maintained (Para [0225]-[0228], [0231]-[0234], [0244]-[0246]).

Regarding claim 10, Classen teaches said input device is a touch-sensitized screen (col 2, ln 5-35).

Regarding claim 11, LYUBACHEV teaches said at least one output device is located within said at least one cluster, such that said audio control source may alter the power supplied to said speaker in real-time (Para [02019]-[0222]).

Regarding claim 12, Dunn teaches a method of maintaining consistent sound across, comprising the steps of (Abstract): providing at least one cluster of at least one computing device, said at least one computing device comprising (Para [0018], [0026]- sound system that may be used with exemplary embodiments may be a digital audio system); a sound sensing mechanism, capable of monitoring the amplitude and frequency of ambient noise (Abstract; Para [0020]-A sound pick-up may be placed in the listening area to capture the sound level, including both the desired sound and ambient noise; the sound pick-up 24 is positioned in the listening area, so as to receive the sound produced by the speaker 22, ambient noise in the listening area is also received by the sound pick-up 24); transmitting and receiving data from an audio control source (Para [0021]- the sound pick-up 24 is positioned in the listening area, so as to receive the sound produced by the speaker 22, ambient noise in the listening area is also received by the sound pick-up 24); said data comprising at least one characteristic of at least one sound fingerprint (Para [0021]- it may then be run through a numerical process having a time window 28. The resultant value is the measured value 30); at least one output device, comprising (Para [0019]- After the signal has been converted to analog, the signal is transmitted to at least one speaker 22. The speaker 22 then converts the analog signal to audible sound); a speaker for outputting sound (Para [0019]- After the signal has been converted to analog, the signal is transmitted to at least one speaker 22. The speaker 22 then converts the analog signal to audible sound); varying the output of said at least one output device (Para [0025]- If the volume of the desired sound needs to be adjusted to be within the acceptable range a signal may be sent to the gain control 32. The gain control 32 may then automatically adjust the volume of the desired sound); sensing, measuring, and analyzing, by said at least one computing device, surrounding audio output signals (Para [0020]-[0022] - sound pick-up 24 may be any device capable of receiving sound waves; run through a numerical process having a time window 28. The resultant value is the measured value 30; It is this mutuality between the reference value 16 and the measured value 30 that is important ambient noise compensation. The complexity of this analysis may be affected mostly be the analog portion of the system, specifically, the characteristics of the sound pick-up and its physical environment for sensing); determining, by said at least one computing device, whether a qualifying signal has been sensed (Para [0020]- As the sound pick-up 24 is positioned in the listening area, so as to receive the sound produced by the speaker 22, ambient noise in the listening area is also received by the sound pick-up 24); identifying and categorizing said measurements, by said at least one computing device (Para [0021]-[0025]- C is positive and above D, the ambient noise may be presumed to be sufficient to interfere with the desired sound in the listening area); determining, by said at least one computing device, whether said measurements breach a predetermined threshold (Para [0009], [0024] - The measure value is the combination of the desired sound and ambient noise present in the listening area allowing the system to distinguish between the desired sound and the ambient noise by comparing the reference and measured values; Although C may have a definite value, in actual implementation, C may be given an acceptable range. By using a range of values for C, the ambient noise compensation may be able to compensate for variations between sound systems and audio sound data's randomness); adjusting said at least one output device, by said audio control source, based on said communicated measurements (Para [0010], [0025]- If a change in volume is required the ambient noise compensation system may adjust the gain of the sound system output automatically; If the volume of the desired sound needs to be adjusted to be within the acceptable range a signal may be sent to the gain control 32. The gain control 32 may then automatically adjust the volume of the desired sound.)

--- (See Continuation in Supplemental Box) ---

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US 15/51638

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of:
Box V.2. Citations and Explanations.

Dunn does not teach a wireless transceiver capable of wirelessly transmitting and receiving data from an audio control source; at least one output device, comprising a power source for operating the device, a communication mechanism, for receiving electronic information from said audio control source; said audio control source, in electronic communication said at least one cluster and said at least one output device, said audio control source comprising: a memory, containing computer-executable instructions for connecting to said at least one cluster, processing said at least one characteristic of at least sound fingerprint, visualizing said at least one sound fingerprint, providing an interface, a processor, for executing said computer-executable instruction, a interfacing mechanism, comprising: a network adapter, capable of transmitting and receiving electronic information through both wired and wireless communication; a display, for showing said interface and said at least one visualized sound fingerprint, at least one input mechanism, for manipulating said interface, and varying said output of said at least one output device; communicating, to other clusters, if present, and said audio control source, said breach; determining, by said other clusters, if present, and said audio control source if a second breach has occurred. However, LYUBACHEV teaches wireless transceiver capable of wirelessly transmitting and receiving data from an audio control source (Para [0067]- Data transmission between devices within the system can be performed by means of wired or wireless communication); at least one output device, comprising a power source for operating the device (Para [0019], [0028]-[0029] - peripheral station, sound reproducing device (loudspeaker) for audio signal reception and playback; controlling tool for loudspeaker power control, power supply unit); a communication mechanism, for receiving electronic information from said audio control source (Para [0018], [0021], [0030], [0068] - network data exchange unit, All separately realized devices can be joined into local area network, central station, control device); said audio control source, in electronic communication said at least one cluster and said at least one output device, said audio control source comprising (Para [0018], [0021], [0030], [0068] - network data exchange unit, All separately realized devices can be joined into local area network, central station, control device); a memory, containing computer-executable instructions for connecting to said at least one cluster, processing said at least one characteristic of at least sound fingerprint (Para [0044], [0141] - All calculating devices can be realized on the base of processor with RAM and ROM, input and output devices, corresponding software, or on the base of hardwired logic; Computing device 9 for performing calculation and controlling data generation for system tuning for assigned sounding mode provision), a processor, for executing said computer-executable instruction (Para [0229]- controlling data generation is mainly realized on the base of computer device with embedded programmable processor), a network adapter, capable of transmitting and receiving electronic information through both wired and wireless communication (Abstract; Para [0122]- Mainly network data exchange unit 13 for data exchange with other devices within the network 14; system can be operated wirelessly and can compose a local network); at least one input mechanism (Para [0228]- input and output devices); communicating, to other clusters, if present, and said audio control source, said breach (Para [0243]- A joint operation of the system comprising devices described as variant 1 and/or variant 2, and/or variant 3 on the neighboring or adjacent areas under control is also feasible); determining, by said other clusters, if present, and said audio control source if a second breach has occurred (Para [0243]- A joint operation of the system comprising devices described as variant 1 and/or variant 2, and/or variant 3 on the neighboring or adjacent areas under control is also feasible). It would have been obvious to one of ordinary skill in the art to combine the teachings of Dunn with those of LYUBACHEV since doing so would adaptively manage the audio settings thereby enhance the experience of the listeners. Neither Dunn nor LYUBACHEV teaches visualizing said at least one sound fingerprint, providing an interface, a interfacing mechanism, comprising: a display, for showing said interface and said at least one visualized sound fingerprint, at least one input mechanism, for manipulating said interface, and varying said output of said at least one output device. However, Classen teaches visualizing said at least one sound fingerprint (col 3, ln 60 to col 4, ln 15; col 7, ln 3-45 - audio properties by viewing displayed visual properties of objects), providing an interface, a interfacing mechanism (col 4, ln 50-65; col 5, ln 20-45 - The user interface 100 provides for the visualization of audio properties of signals of audio sources.), comprising: a display, for showing said interface (col 15, ln 1-15 - one or more display devices 1404) and said at least one visualized sound fingerprint, at least one input mechanism, for manipulating said interface (Fig. 4; col 3, ln 2-55 - Editing the audio data further includes receiving a first user input selecting an audio object; receiving a second user input modifying a position of the selected audio object Within the region; and automatically modifying the audio properties associated With the audio object according to the new location Within the region; Adjusting one or more audio properties associated With the audio object further includes adjusting a compressor associated With the audio data represented by the audio object), and varying said output of said at least one output device (col 3, ln 35-65 - updating the control parameters of the audio mixer according to the adjusted properties of the audio signals). It would have been obvious to one of ordinary skill in the art to combine the teachings of Dunn with those of LYUBACHEV and Classen since doing so would provide a user friendly interface for visualizing controlling audio properties.

Regarding claim 13, Dunn teaches the step of adjusting said at least one output device is done automatically based on predetermined values (Para [0010], [0023]-[0026]).

Regarding claim 14, LYUBACHEV teaches entering, by said at least one computing device, sleep mode (Para [0194]-[0198]).

Regarding claim 15, LYUBACHEV teaches said wireless transceiver utilizes short-range wireless technologies (Para [0233] - radio channel).

Regarding claim 16, Dunn teaches at least one computing device further comprising: an analog-to-digital converter, said analog-to-digital converter featuring an input structure selected from the group consisting of: fully-differential, pseudo-differential, wide input common mode, and single-ended (Para [0019]-[0023]).

Regarding claim 17, LYUBACHEV teaches at least one computing device further comprising: at least one audio codec, at least one application processor, and at least one baseband processor (Para [0171]-[0172], [0225]-[0228], [0236]).

Regarding claim 18, LYUBACHEV teaches at least one computing device further comprising: software-defined radios, Super heterodyne architecture radios, direct conversion architecture, or some combination thereof (Para [0225]-[0228], [0231]-[0234], [0244]-[0246]- software -defined radios).

--- (See Continuation in Supplemental Box) ---

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
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Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of:
Box V.2. Citations and Explanations.

Regarding claim 20, LYUBACHEV teaches at least one computing device further comprising a software-based radio, wherein said software-based radio isolates RF frequencies, said at least one computing device relays those frequencies to said audio control unit, wherein said audio control unit ensures that predetermined frequency thresholds maintained (Para [0225]-[0228], [0231]-[0234], [0244]-[0246]).

Claims 2 and 5-7 lack an inventive step under PCT Article 33(3) as being obvious over Dunn in view of LYUBACHEV and Classen and further in view of US 2004/0076305 A1 (SANTIAGO).

Regarding claim 2, neither Dunn nor LYUBACHEV or Classen teaches said sound-sensing mechanism is an omni-directional transducer. However, Santiago teaches a sound-sensing mechanism that is an omni-directional transducer (Para [0032]-[0037]). It would have been obvious to one of ordinary skill in the art to combine the teachings of Dunn and LYUBACHEV with those of Santiago and Classen since doing so would efficiently sense audio signals.

Regarding claim 5, Dunn teaches at least one computing device further comprising: an analog-to-digital converter, said analog-to-digital converter featuring an input structure selected from the group consisting of: fully-differential, pseudo-differential, wide input common mode, and single-ended (Para [0019]-[0023])

Regarding claim 6, LYUBACHEV teaches at least one computing device further comprising: at least one audio codec, at least one application processor, and at least one baseband processor (Para [0171]-[0172], [0225]-[0228], [0236]).

Regarding claim 7, LYUBACHEV teaches at least one computing device further comprising: software-defined radios, Super heterodyne architecture radios, direct conversion architecture, or some combination thereof (Para [0225]-[0228], [0231]-[0234], [0244]-[0246]- software -defined radios).

Claims 9 and 19 lack an inventive step under PCT Article 33(3) as being obvious over Dunn in view of LYUBACHEV and Classen and further in view of US 2006/0082458 A1 to Shanks et al. (hereinafter 'Shanks').

Regarding claim 9, neither Dunn nor LYUBACHEV or Classen teaches electronic communications between said at least one computing device, said at least one cluster, said at least one output device, and said audio control unit are sent and received using an ambient backscatter techniques. However, Shanks teaches electronic communications between said at least one computing device, said at least one cluster, said at least one output device, and said audio control unit are sent and received using an ambient backscatter techniques (Para [0015]-[0016]). It would have been obvious to one of ordinary skill in the art to combine the teachings of Dunn and LYUBACHEV with those of Shanks and Classen since doing so would enhance the power efficiency of the devices.

Regarding claim 19, neither Dunn nor LYUBACHEV or Classen teaches electronic communications between said at least one computing device, said at least one cluster, said at least one output device, and said audio control unit are sent and received using an ambient backscatter techniques. However, Shanks teaches electronic communications between said at least one computing device, said at least one cluster, said at least one output device, and said audio control unit are sent and received using an ambient backscatter techniques (Para [0015]-[0016]). It would have been obvious to one of ordinary skill in the art to combine the teachings of Dunn and LYUBACHEV with those of Shanks and Classen since doing so would enhance the power efficiency of the devices.

Claims 1-20 have industrial applicability as defined by PCT Article 33(4) because the subject matter can be made or used in industry.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference 2305LD01PCT	**FOR FURTHER ACTION**	See item 4 below
International application No. PCT/US2015/051638	International filing date *(day/month/year)* 23 September 2015 (23.09.2015)	Priority date *(day/month/year)* 23 September 2014 (23.09.2014)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant DENTON, Levaughn		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 7 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis* .2).

	Date of issuance of this report 28 March 2017 (28.03.2017)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Authorized officer Agnès Wittmann-Regis e-mail: pct.team6@wipo.int

Form PCT/IB/373 (January 2004)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To: RICHARD GEARHART
GEARHART LAW LLC
41 RIVER ROAD
SUMMIT, NJ 07901

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing *(day/month/year)*	29 JAN 2016
Applicant's or agent's file reference 2305LD01PCT	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US 15/51638	23 September 2015 (23.09.2015)	23 September 2014 (23.09.2014)

International Patent Classification (IPC) or both national classification and IPC
IPC(8) - H03G 3/20 (2016.01)
CPC - H03G 3/32

Applicant DENTON, LEVAUGHN

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule *43bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1 *bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/US	Date of completion of this opinion	Authorized officer:
Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-8300	16 January 2016 (16.01.2016)	Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/237 (cover sheet) (January 2015)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US 15/51638

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:
   - [X] the international application in the language in which it was filed.
   - [ ] a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. [ ] This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a)).

3. [ ] With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:
   - a. [ ] forming part of the international application as filed:
     - [ ] in the form of an Annex C/ST.25 text file.
     - [ ] on paper or in the form of an image file.
   - b. [ ] furnished together with the international application under PCT Rule 13*ter*.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.
   - c. [ ] furnished subsequent to the international filing date for the purposes of international search only:
     - [ ] in the form of an Annex C/ST.25 text file (Rule 13*ter*.1(a)).
     - [ ] on paper or in the form of an image file (Rule 13*ter*.1(b) and Administrative Instructions, Section 713).

4. [ ] In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

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Box No. V **Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	1-20	YES
	Claims	None	NO
Inventive step (IS)	Claims	None	YES
	Claims	1-20	NO
Industrial applicability (IA)	Claims	1-20	YES
	Claims	None	NO

2. Citations and explanations:

Claims 1, 3-4, 8, 10-18 and 20 lack an inventive step under PCT Article 33(3) as being obvious over US 2010/0329471 A1 to Dunn et al. (hereinafter 'Dunn') in view of US 2013/0294618 A1 (LYUBACHEV) and further in view of US 8,073,160 B1 (CLASSEN).

Regarding claim 1, Dunn teaches a system comprising: at least one cluster of at least one computing device, said at least one computing device comprising (Para [0018], [0026]- sound system that may be used with exemplary embodiments may be a digital audio system); a sound sensing mechanism, capable of monitoring the amplitude and frequency of both a desired and an undesired frequency (Abstract; Para [0020]-A sound pick-up may be placed in the listening area to capture the sound level, including both the desired sound and ambient noise; the sound pick-up 24 is positioned in the listening area, so as to receive the sound produced by the speaker 22, ambient noise in the listening area is also received by the sound pick-up 24); transmitting and receiving data from an audio control source (Para [0021]- the sound pick-up 24 is positioned in the listening area, so as to receive the sound produced by the speaker 22, ambient noise in the listening area is also received by the sound pick-up 24); said data comprising at least one characteristic of at least one sound fingerprint (Para [0021]- it may then be run through a numerical process having a time window 28. The resultant value is the measured value 30); at least one output device, comprising (Para [0019]- After the signal has been converted to analog, the signal is transmitted to at least one speaker 22. The speaker 22 then converts the analog signal to audible sound); a speaker for outputting sound (Para [0019]- After the signal has been converted to analog, the signal is transmitted to at least one speaker 22. The speaker 22 then converts the analog signal to audible sound); varying the output of said at least one output device (Para [0025]- If the volume of the desired sound needs to be adjusted to be within the acceptable range a signal may be sent to the gain control 32. The gain control 32 may then automatically adjust the volume of the desired sound). Dunn does not teach a wireless transceiver capable of wirelessly transmitting and receiving data from an audio control source; at least one output device, comprising: a power source for operating the device, a communication mechanism, for receiving electronic information from said audio control source; said audio control source, in electronic communication said at least one cluster and said at least one output device, said audio control source comprising: a memory, containing computer-executable instructions for connecting to said at least one cluster, processing said at least one characteristic of at least sound fingerprint, visualizing said at least one sound fingerprint, providing an interface, a processor, for executing said computer-executable instruction, a interfacing mechanism, comprising: a network adapter, capable of transmitting and receiving electronic information through both wired and wireless communication; a display, for showing said interface and said at least one visualized sound fingerprint, at least one input mechanism, for manipulating said interface, and varying said output of said at least one output device. However, LYUBACHEV teaches wireless transceiver capable of wirelessly transmitting and receiving data from an audio control source (Para [0067]- Data transmission between devices within the system can be performed by means of wired or wireless communication); at least one output device, comprising a power source for operating the device (Para [0019], [0028]-[0029] - peripheral station, sound reproducing device (loudspeaker) for audio signal reception and playback; controlling tool for loudspeaker power control, power supply unit); a communication mechanism, for receiving electronic information from said audio control source (Para [0018], [0021], [0030], [0068] - network data exchange unit, All separately realized devices can be joined into local area network, central station, control device); said audio control source, in electronic communication said at least one cluster and said at least one output device, said audio control source comprising (Para [0018], [0021], [0030], [0068] - network data exchange unit, All separately realized devices can be joined into local area network, central station, control device); a memory, containing computer-executable instructions for connecting to said at least one cluster, processing said at least one characteristic of at least sound fingerprint (Para [0044], [0141] - All calculating devices can be realized on the base of processor with RAM and ROM, input and output devices, corresponding software, or on the base of hardwired logic; Computing device 9 for performing calculation and controlling data generation for system tuning for assigned sounding mode provision), a processor, for executing said computer-executable instruction (Para [0229]- controlling data generation is mainly realized on the base of computer device with embedded programmable processor), a network adapter, capable of transmitting and receiving electronic information through both wired and wireless communication (Abstract; Para [0122]- Mainly network data exchange unit 13 for data exchange with other devices within the network 14; system can be operated wirelessly and can compose a local network); at least one input mechanism (Para [0228]- input and output devices). It would have been obvious to one of ordinary skill in the art to combine the teachings of Dunn with those of LYUBACHEV since doing so would adaptively manage the audio settings thereby enhance the experience of the listeners.

--- (See Continuation in Supplemental Box) ---

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
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Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of:
Box V.2. Citations and Explanations.

Neither Dunn nor LYUBACHEV teaches visualizing said at least one sound fingerprint, providing an interface, a interfacing mechanism, comprising: a display, for showing said interface and said at least one visualized sound fingerprint, at least one input mechanism, for manipulating said interface, and varying said output of said at least one output device. However, Classen teaches visualizing said at least one sound fingerprint (col 3, ln 60 to col 4, ln 15; col 7, ln 3-45 - audio properties by viewing displayed visual properties of objects), providing an interface, a interfacing mechanism (col 4, ln 50-65; col 5, ln 20-45 - The user interface 100 provides for the visualization of audio properties of signals of audio sources.), comprising: a display, for showing said interface (col 15, ln 1-15 - one or more display devices 1404) and said at least one visualized sound fingerprint, at least one input mechanism, for manipulating said interface (Fig. 4; col 3, ln 2-55 - Editing the audio data further includes receiving a first user input selecting an audio object; receiving a second user input modifying a position of the selected audio object Within the region; and automatically modifying the audio properties associated With the audio object according to the neW location Within the region; Adjusting one or more audio properties associated With the audio object further includes adjusting a compressor associated With the audio data represented by the audio object), and varying said output of said at least one output device (col 3, ln 35-65 - updating the control parameters of the audio mixer according to the adjusted properties of the audio signals). It would have been obvious to one of ordinary skill in the art to combine the teachings of Dunn with those of LYUBACHEV and Classen since doing so would provide a user friendly interface for visualizing controlling audio properties.

Regarding claim 3, Classen teaches said display and said at least one input mechanism are one in-the-same (col 5, ln 20-67).

Regarding claim 4, LYUBACHEV teaches said wireless transceiver utilizes short-range wireless technologies (Para [0233] - radio channel).

Regarding claim 8, LYUBACHEV teaches at least one computing device further comprising a software-based radio, wherein said software-based radio isolates RF frequencies, said at least one computing device relays those frequencies to said audio control unit, wherein said audio control unit ensures that predetermined frequency thresholds maintained (Para [0225]-[0228], [0231]-[0234], [0244]-[0246]).

Regarding claim 10, Classen teaches said input device is a touch-sensitized screen (col 2, ln 5-35).

Regarding claim 11, LYUBACHEV teaches said at least one output device is located within said at least one cluster, such that said audio control source may alter the power supplied to said speaker in real-time (Para [02019]-[0222]).

Regarding claim 12, Dunn teaches a method of maintaining consistent sound across, comprising the steps of (Abstract): providing at least one cluster of at least one computing device, said at least one computing device comprising (Para [0018], [0026]- sound system that may be used with exemplary embodiments may be a digital audio system); a sound sensing mechanism, capable of monitoring the amplitude and frequency of ambient noise (Abstract; Para [0020]-A sound pick-up may be placed in the listening area to capture the sound level, including both the desired sound and ambient noise; the sound pick-up 24 is positioned in the listening area, so as to receive the sound produced by the speaker 22, ambient noise in the listening area is also received by the sound pick-up 24); transmitting and receiving data from an audio control source (Para [0021]- the sound pick-up 24 is positioned in the listening area, so as to receive the sound produced by the speaker 22, ambient noise in the listening area is also received by the sound pick-up 24); said data comprising at least one characteristic of at least one sound fingerprint (Para [0021]- it may then be run through a numerical process having a time window 28. The resultant value is the measured value 30); at least one output device, comprising (Para [0019]- After the signal has been converted to analog, the signal is transmitted to at least one speaker 22. The speaker 22 then converts the analog signal to audible sound); a speaker for outputting sound (Para [0019]- After the signal has been converted to analog, the signal is transmitted to at least one speaker 22. The speaker 22 then converts the analog signal to audible sound); varying the output of said at least one output device (Para [0025]- If the volume of the desired sound needs to be adjusted to be within the acceptable range a signal may be sent to the gain control 32. The gain control 32 may then automatically adjust the volume of the desired sound); sensing, measuring, and analyzing, by said at least one computing device, surrounding audio output signals (Para [0020]-[0022] - sound pick-up 24 may be any device capable of receiving sound waves; run through a numerical process having a time window 28. The resultant value is the measured value 30; It is this mutuality between the reference value 16 and the measured value 30 that is important ambient noise compensation. The complexity of this analysis may be affected mostly be the analog portion of the system, specifically, the characteristics of the sound pick-up and its physical environment for sensing); determining, by said at least one computing device, whether a qualifying signal has been sensed (Para [0020]- As the sound pick-up 24 is positioned in the listening area, so as to receive the sound produced by the speaker 22, ambient noise in the listening area is also received by the sound pick-up 24); identifying and categorizing said measurements, by said at least one computing device (Para [0021]-[0025]- C is positive and above D, the ambient noise may be presumed to be sufficient to interfere with the desired sound in the listening area); determining, by said at least one computing device, whether said measurements breach a predetermined threshold (Para [0009], [0024] - The measure value is the combination of the desired sound and ambient noise present in the listening area allowing the system to distinguish between the desired sound and the ambient noise by comparing the reference and measured values; Although C may have a definite value, in actual implementation, C may be given an acceptable range. By using a range of values for C, the ambient noise compensation may be able to compensate for variations between sound systems and audio sound data's randomness); adjusting said at least one output device, by said audio control source, based on said communicated measurements (Para [0010], [0025]- If a change in volume is required the ambient noise compensation system may adjust the gain of the sound system output automatically; If the volume of the desired sound needs to be adjusted to be within the acceptable range a signal may be sent to the gain control 32. The gain control 32 may then automatically adjust the volume of the desired sound.)

--- (See Continuation in Supplemental Box) ---

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

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Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of:
Box V.2. Citations and Explanations.

Dunn does not teach a wireless transceiver capable of wirelessly transmitting and receiving data from an audio control source; at least one output device, comprising a power source for operating the device, a communication mechanism, for receiving electronic information from said audio control source; said audio control source, in electronic communication said at least one cluster and said at least one output device, said audio control source comprising: a memory, containing computer-executable instructions for connecting to said at least one cluster, processing said at least one characteristic of at least sound fingerprint, visualizing said at least one sound fingerprint, providing an interface, a processor, for executing said computer-executable instruction, a interfacing mechanism, comprising: a network adapter, capable of transmitting and receiving electronic information through both wired and wireless communication; a display, for showing said interface and said at least one visualized sound fingerprint, at least one input mechanism, for manipulating said interface, and varying said output of said at least one output device; communicating, to other clusters, if present, and said audio control source, said breach; determining, by said other clusters, if present, and said audio control source if a second breach has occurred. However, LYUBACHEV teaches wireless transceiver capable of wirelessly transmitting and receiving data from an audio control source (Para [0067]- Data transmission between devices within the system can be performed by means of wired or wireless communication); at least one output device, comprising a power source for operating the device (Para [0019], [0028]-[0029] - peripheral station, sound reproducing device (loudspeaker) for audio signal reception and playback; controlling tool for loudspeaker power control, power supply unit); a communication mechanism, for receiving electronic information from said audio control source (Para [0018], [0021], [0030], [0068] - network data exchange unit, All separately realized devices can be joined into local area network, central station, control device); said audio control source, in electronic communication said at least one cluster and said at least one output device, said audio control source comprising (Para [0018], [0021], [0030], [0068] - network data exchange unit, All separately realized devices can be joined into local area network, central station, control device); a memory, containing computer-executable instructions for connecting to said at least one cluster, processing said at least one characteristic of at least sound fingerprint (Para [0044], [0141] - All calculating devices can be realized on the base of processor with RAM and ROM, input and output devices, corresponding software, or on the base of hardwired logic; Computing device 9 for performing calculation and controlling data generation for system tuning for assigned sounding mode provision), a processor, for executing said computer-executable instruction (Para [0229]- controlling data generation is mainly realized on the base of computer device with embedded programmable processor), a network adapter, capable of transmitting and receiving electronic information through both wired and wireless communication (Abstract; Para [0122]- Mainly network data exchange unit 13 for data exchange with other devices within the network 14; system can be operated wirelessly and can compose a local network); at least one input mechanism (Para [0228]- input and output devices); communicating, to other clusters, if present, and said audio control source, said breach (Para [0243]- A joint operation of the system comprising devices described as variant 1 and/or variant 2, and/or variant 3 on the neighboring or adjacent areas under control is also feasible); determining, by said other clusters, if present, and said audio control source if a second breach has occurred (Para [0243]- A joint operation of the system comprising devices described as variant 1 and/or variant 2, and/or variant 3 on the neighboring or adjacent areas under control is also feasible). It would have been obvious to one of ordinary skill in the art to combine the teachings of Dunn with those of LYUBACHEV since doing so would adaptively manage the audio settings thereby enhance the experience of the listeners. Neither Dunn nor LYUBACHEV teaches visualizing said at least one sound fingerprint, providing an interface, a interfacing mechanism, comprising: a display, for showing said interface and said at least one visualized sound fingerprint, at least one input mechanism, for manipulating said interface, and varying said output of said at least one output device. However, Classen teaches visualizing said at least one sound fingerprint (col 3, ln 60 to col 4, ln 15; col 7, ln 3-45 - audio properties by viewing displayed visual properties of objects), providing an interface, a interfacing mechanism (col 4, ln 50-65; col 5, ln 20-45 - The user interface 100 provides for the visualization of audio properties of signals of audio sources.), comprising: a display, for showing said interface (col 15, ln 1-15 - one or more display devices 1404) and said at least one visualized sound fingerprint, at least one input mechanism, for manipulating said interface (Fig. 4; col 3, ln 2-55 - Editing the audio data further includes receiving a first user input selecting an audio object; receiving a second user input modifying a position of the selected audio object Within the region; and automatically modifying the audio properties associated With the audio object according to the new location Within the region; Adjusting one or more audio properties associated With the audio object further includes adjusting a compressor associated With the audio data represented by the audio object), and varying said output of said at least one output device (col 3, ln 35-65 - updating the control parameters of the audio mixer according to the adjusted properties of the audio signals). It would have been obvious to one of ordinary skill in the art to combine the teachings of Dunn with those of LYUBACHEV and Classen since doing so would provide a user friendly interface for visualizing controlling audio properties.

Regarding claim 13, Dunn teaches the step of adjusting said at least one output device is done automatically based on predetermined values (Para [0010], [0023]-[0026]).

Regarding claim 14, LYUBACHEV teaches entering, by said at least one computing device, sleep mode (Para [0194]-[0198]).

Regarding claim 15, LYUBACHEV teaches said wireless transceiver utilizes short-range wireless technologies (Para [0233] - radio channel).

Regarding claim 16, Dunn teaches at least one computing device further comprising: an analog-to-digital converter, said analog-to-digital converter featuring an input structure selected from the group consisting of: fully-differential, pseudo-differential, wide input common mode, and single-ended (Para [0019]-[0023]).

Regarding claim 17, LYUBACHEV teaches at least one computing device further comprising: at least one audio codec, at least one application processor, and at least one baseband processor (Para [0171]-[0172], [0225]-[0228], [0236]).

Regarding claim 18, LYUBACHEV teaches at least one computing device further comprising: software-defined radios, Super heterodyne architecture radios, direct conversion architecture, or some combination thereof (Para [0225]-[0228], [0231]-[0234], [0244]-[0246]- software -defined radios).

--- (See Continuation in Supplemental Box) ---

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US 15/51638

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:
Box V.2. Citations and Explanations.

Regarding claim 20, LYUBACHEV teaches at least one computing device further comprising a software-based radio, wherein said software-based radio isolates RF frequencies, said at least one computing device relays those frequencies to said audio control unit, wherein said audio control unit ensures that predetermined frequency thresholds maintained (Para [0225]-[0228], [0231]-[0234], [0244]-[0246]).

Claims 2 and 5-7 lack an inventive step under PCT Article 33(3) as being obvious over Dunn in view of LYUBACHEV and Classen and further in view of US 2004/0076305 A1 (SANTIAGO).

Regarding claim 2, neither Dunn nor LYUBACHEV or Classen teaches said sound-sensing mechanism is an omni-directional transducer. However, Santiago teaches a sound-sensing mechanism that is an omni-directional transducer (Para [0032]-[0037]). It would have been obvious to one of ordinary skill in the art to combine the teachings of Dunn and LYUBACHEV with those of Santiago and Classen since doing so would efficiently sense audio signals.

Regarding claim 5, Dunn teaches at least one computing device further comprising: an analog-to-digital converter, said analog-to-digital converter featuring an input structure selected from the group consisting of: fully-differential, pseudo-differential, wide input common mode, and single-ended (Para [0019]-[0023])

Regarding claim 6, LYUBACHEV teaches at least one computing device further comprising: at least one audio codec, at least one application processor, and at least one baseband processor (Para [0171]-[0172], [0225]-[0228], [0236]).

Regarding claim 7, LYUBACHEV teaches at least one computing device further comprising: software-defined radios, Super heterodyne architecture radios, direct conversion architecture, or some combination thereof (Para [0225]-[0228], [0231]-[0234], [0244]-[0246]- software -defined radios).

Claims 9 and 19 lack an inventive step under PCT Article 33(3) as being obvious over Dunn in view of LYUBACHEV and Classen and further in view of US 2006/0082458 A1 to Shanks et al. (hereinafter 'Shanks').

Regarding claim 9, neither Dunn nor LYUBACHEV or Classen teaches electronic communications between said at least one computing device, said at least one cluster, said at least one output device, and said audio control unit are sent and received using an ambient backscatter techniques. However, Shanks teaches electronic communications between said at least one computing device, said at least one cluster, said at least one output device, and said audio control unit are sent and received using an ambient backscatter techniques (Para [0015]-[0016]). It would have been obvious to one of ordinary skill in the art to combine the teachings of Dunn and LYUBACHEV with those of Shanks and Classen since doing so would enhance the power efficiency of the devices.

Regarding claim 19, neither Dunn nor LYUBACHEV or Classen teaches electronic communications between said at least one computing device, said at least one cluster, said at least one output device, and said audio control unit are sent and received using an ambient backscatter techniques. However, Shanks teaches electronic communications between said at least one computing device, said at least one cluster, said at least one output device, and said audio control unit are sent and received using an ambient backscatter techniques (Para [0015]-[0016]). It would have been obvious to one of ordinary skill in the art to combine the teachings of Dunn and LYUBACHEV with those of Shanks and Classen since doing so would enhance the power efficiency of the devices.

Claims 1-20 have industrial applicability as defined by PCT Article 33(4) because the subject matter can be made or used in industry.

Electronic Acknowledgement Receipt

EFS ID:	39661300
Application Number:	16656259
International Application Number:	
Confirmation Number:	7312
Title of Invention:	MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS
First Named Inventor/Applicant Name:	Levaughn Denton
Customer Number:	75207
Filer:	David D. Postolski/Ashley Sperbeck
Filer Authorized By:	David D. Postolski
Attorney Docket Number:	2305LD01UTL1USCON2
Receipt Date:	08-JUN-2020
Filing Date:	17-OCT-2019
Time Stamp:	21:08:56
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	2305LD01UTL1USCON2_IDS.pdf	613622 80226f241d3d7cdce64e79792874346bc070136b	no	6

Warnings:

Information:					
2	Foreign Reference	FR1.pdf	455323 f79bedd1d813e5116ddb457fa65ad7b18174c10d	no	38
Warnings:					
Information:					
3	Foreign Reference	FR2.pdf	344678 0a490b3d1726f98c61af7aedc6f10bbd09cb6d93	no	21
Warnings:					
Information:					
4	Non Patent Literature	NPL1.pdf	103302 03bf85a04f1575c526eb2e9260d6d90ea957925b	no	2
Warnings:					
Information:					
5	Non Patent Literature	NPL2.pdf	457078 2dc1b4555e91adefdea1b382cf985cfaf3d9a7c4	no	6
Warnings:					
Information:					
6	Non Patent Literature	NPL3.pdf	492691 4ac3d2fe7a591306139b483306db7ed487cac85e	no	7
Warnings:					
Information:					
			Total Files Size (in bytes):	2466694	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/656,259	10/17/2019	Levaughn Denton	2305LD01UTL1USCON2	7312

75207 7590 06/10/2020

Gearhart Law LLC
41 River Road
Suite 1A
Summit, NJ 07901

EXAMINER
TRAN, THANG V

ART UNIT	PAPER NUMBER
2688	

NOTIFICATION DATE	DELIVERY MODE
06/10/2020	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patent@gearhartlaw.com

Decision Granting Request for Prioritized Examination (Track I)	**Application No.** 16/656,259	**Applicant(s)** Denton, Levaughn	
	Examiner TERRI S JOHNSON	**Art Unit** OPET	**AIA (FITF) Status** Yes

1. THE REQUEST FILED 17 October 2019 IS **GRANTED** .

The above-identified application has met the requirements for prioritized examination

A. ☑ for an original nonprovisional application (Track I).
B. ☐ for an application undergoing continued examination (RCE).

2. **The above-identified application will undergo prioritized examination**. The application will be accorded special status throughout its entire course of prosecution until one of the following occurs:

A. filing a **petition for extension of time** to extend the time period for filing a reply;

B. filing an **amendment to amend the application to contain more than four independent claims, more than thirty total claims** , or a multiple dependent claim;

C. filing a **request for continued examination** ;

D. filing a notice of appeal;

E. filing a request for suspension of action;

F. mailing of a notice of allowance;

G. mailing of a final Office action;

H. completion of examination as defined in 37 CFR 41.102; or

I. abandonment of the application.

Telephone inquiries with regard to this decision should be directed to TERRI JOHNSON at (571)272 -2991. In his/her absence, calls may be directed to Petition Help Desk at (571) 272-3282.

/TERRI S JOHNSON/ Paralegal Specialist, OPET	

U.S. Patent and Trademark Office
PTO-2298 (Rev. 02-2012)

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UNITED STATES DEPARTMENT OF COMMERCE
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/656,259	10/17/2019	Levaughn Denton	2305LD01UTL1USCON2	7312

75207 7590 06/16/2020

Gearhart Law LLC
41 River Road
Suite 1A
Summit, NJ 07901

EXAMINER	
TRAN, THANG V	

ART UNIT	PAPER NUMBER
2688	

NOTIFICATION DATE	DELIVERY MODE
06/16/2020	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patent@gearhartlaw.com

Office Action Summary	Application No. 16/656,259	Applicant(s) Denton, Levaughn	
	Examiner THANG V TRAN	Art Unit 2688	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on 06/08/2020.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL.** 2b) ☑ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 1-20 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 1-20 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

Application Papers

10)☑ The specification is objected to by the Examiner.

11)☑ The drawing(s) filed on 01/06/2020 is/are: a)☐ accepted or b)☑ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☑ Notice of References Cited (PTO-892)

2) ☑ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

Notice of Pre-AIA or AIA Status

1. The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Specification

2. The substitute specification filed 05/27/2020 has not been entered because it does not conform to 37 CFR 1.125(b) and (c) because: a marked-up copy of the substitute specification does not mark or underline all the limitations or features newly added in the specification. For example, see limitations "In other embodiment … in the ground" newly added on page 18, line 9 to page 19, line 2.

3. The specification filed 10/17/2019 or later filed 05/27/2020 is objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows:

Statement "In other embodiment … in the ground" newly added on page 18, line 9 to page 19, line 2, is not supported by the original disclosure based on original information disclosed in the parent application 16/421,141.

Also, Figs. 9 and 10 and their respective descriptions newly added on page 14 of the specification filed 05/27/2020 are not supported by the original disclosure provided in the parent application 16/421,141.

Applicant is required to cancel the new matter in the reply to this Office Action.

Drawings

4. The drawings filed on 10/17/2019 or 01/06/2020 have been received. But, these drawings are unacceptable because they introduced new matter by adding thereto new Fig. 9 and Fig. 10 that are not supported by the original disclosure provided in the parent application 16/421,141.

Accordingly, the drawings are objected to as being introduced new matter thereto. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Double Patenting

5. A rejection based on double patenting of the "same invention" type finds its support in the language of 35 U.S.C. 101 which states that "whoever invents or discovers any new and useful

process... may obtain a patent therefor..." (Emphasis added). Thus, the term "same invention," in this context, means an invention drawn to identical subject matter. See *Miller v. Eagle Mfg. Co.*, 151 U.S. 186 (1894); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); *In re Ockert*, 245 F.2d 467, 114 USPQ 330 (CCPA 1957).

A statutory type (35 U.S.C. 101) double patenting rejection can be overcome by canceling or amending the claims that are directed to the same invention so they are no longer coextensive in scope. The filing of a terminal disclaimer cannot overcome a double patenting rejection based upon 35 U.S.C. 101.

6. Claims 1-20 is/are rejected under 35 U.S.C. 101 as claiming the same invention as that of claims 1-20 of prior U.S. Patent No. 10,656,906. See claims 1-20 of the present application and claims 1-20 of the U.S. Patent No. 10,656,906, respectively. This is a statutory double patenting rejection.

Contact Information

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to THANG V TRAN whose telephone number is (571)272-7595. The examiner can normally be reached on Mon-Fri: 7:00 AM -7:00 PM.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Lim can be reached on 571-272-1210. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see https://ppair-my.uspto.gov/pair/PrivatePair. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/THANG V TRAN/
Primary Examiner, Art Unit 2688

Notice of References Cited	Application/Control No. 16/656,259	Applicant(s)/Patent Under Reexamination Denton, Levaughn	
	Examiner THANG V TRAN	Art Unit 2688	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-10656906-B2	05-2020	Denton; Levaughn	G06F3/165	1/1
	B					
	C					
	D					
	E					
	F					
	G					
	H					
	I					
	J					
	K					
	L					
	M					

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/656,259	Denton, Levaughn
	Examiner	**Art Unit**
	THANG V TRAN	2688

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

CLAIMS										
☐ Claims renumbered in the same order as presented by applicant					☐ CPA		☐ T.D.		☐ R.1.47	
CLAIM		**DATE**								
Final	Original	06/09/2020								
	1	✓								
	2	✓								
	3	✓								
	4	✓								
	5	✓								
	6	✓								
	7	✓								
	8	✓								
	9	✓								
	10	✓								
	11	✓								
	12	✓								
	13	✓								
	14	✓								
	15	✓								
	16	✓								
	17	✓								
	18	✓								
	19	✓								
	20	✓								

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/656,259	Denton, Levaughn
	Examiner	Art Unit
	THANG V TRAN	2688

CPC - Searched*		
Symbol	Date	Examiner

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
CPC: Text Search in Class/Subclass Only (See WEST Search History Printout)	06/09/2020	Tran
USPC: Text Search Only (See WEST Search History Printout)	06/09/2020	Tran
IP.com Search (See IP.com Search History Printout)	06/09/2020	Tran

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

WEST Search History

Hide Items | Restore | Clear | Close

DATE: Tuesday, June 09, 2020

Hide?	Set Name	Query	Hit Count
Interference			
DB=PGPB,USPT; PLUR=YES; OP=OR			
☐	L37	(L1 same L6 same L23).clm.	13
☐	L36	L25.clm.	11
☐	L35	(L20 and L21 and L23).clm.	16
☐	L34	(L15 and (L8 or L9 or L10)).clm.	23
☐	L33	(L9 and L7).clm.	1
☐	L32	(L11 and L7).clm.	0
Prior Art			
DB=PGPB,USPT,USOC; PLUR=YES; OP=OR			
☐	L38	Denton near2 Levaughn	5
☐	L31	(L1 same L6 same L23) and ((H04R$ H04S$ H04W$ H04L$ H04N$ G06F$ G10L$ H04B$).CPC.)	25
☐	L30	L25 and ((H04R$ H04S$ H04W$ H04L$ H04N$ G06F$ G10L$ H04B$).CPC.)	22
☐	L29	L24 and ((H04R$ H04S$ H04W$ H04L$ H04N$ G06F$ G10L$ H04B$).CPC.)	42
☐	L28	L16 and ((H04R$ H04S$ H04W$ H04L$ H04N$ G06F$ G10L$ H04B$).CPC.)	74
☐	L27	L13 and ((H04R$ H04S$ H04W$ H04L$ H04N$ G06F$ G10L$ H04B$).CPC.)	24
☐	L26	L12 and ((H04R$ H04S$ H04W$ H04L$ H04N$ G06F$ G10L$ H04B$).CPC.)	4
DB=PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD,FPRS; PLUR=YES; OP=OR			
☐	L25	L7 same L23	45
☐	L24	L23 and L22	64
☐	L23	(L18 or L19) near15 (alert$4 or notification or notify$3 or notifies or indicat$4 or warn$4 or inform$4)	7153
☐	L22	L21 and L20	565
☐	L21	L6 same L19	1798
☐	L20	L6 same L18	1934
☐	L19	L4 near9 (smaller or lower or below or inside or lesser)	66704
☐	L18	L4 near9 (larger or greater or higher or outside)	69268
DB=USPT,PGPB; PLUR=YES; OP=OR			
☐	L17	('20070189544' | '20100119055' | '20100211199' | '20150215701')![pn]	4
DB=PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD,FPRS; PLUR=YES; OP=OR			
☐	L16	L15 and (L8 or L9 or L10)	133
☐	L15	L14 same L7	188
☐	L14	L6 near15 (alert$4 or notification or notify$3 or notifies or indicat$4 or warn$4 or inform$4)	1010
☐	L13	L9 and L7	42

☐	L12	L11 and L7	9
☐	L11	L10 same L9	733
☐	L10	(speaker or loudspeaker or transducer) same (power or battery)	440894
☐	L9	L8 same 47	9198
☐	L8	(receiv$4 or transmit$5 or transmission or transceiv$4 or antenna or wifi or Bluetooth) near5 (audio or sound or voice or acoustic)	1222559
☐	L7	L6 same L3	2545
☐	L6	L5 near9 L4	17841
☐	L5	frequency near3 (audio or sound or voice or acoustic)	366961
☐	L4	(predetermined or reference or preset or threshold) near5 frequency	698041
☐	L3	L2 same L1	364056
☐	L2	(identif$7 or determin$6 or detect$5 or discriminat$5 or extract$4) near5 (audio or sound or voice or acoustic)	748473
☐	L1	(audio or sound or voice or acoustic) near3 (sensor or sensing or detect$4 or collect$4 or captur$4 or microphone or transducer)	871773

END OF SEARCH HISTORY

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	16656259
Filing Date	2019-10-17
First Named Inventor	Levaughn Denton
Art Unit	2688
Examiner Name	THANG V. TRAN
Attorney Docket Number	2305LD01UTL1USCON2

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	10127005	B2	2018-11-13	Levaughn Denton	
	2	8073160	B1	2011-12-06	Adobe Systems Inc.	
	3	8452432	B2	2013-05-28	Brian Transeau	
	4	7991171	B1	2011-08-02	Gary C. Snow	
	5	8594319	B2	2013-11-26	Dolby International, AB	
	6	8315398	B2	2012-11-10	Themis Katsianos	
	7	5668884	A	1997-09-16	Clair Bros. Audio Enterprises, Inc.	

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	Application Number	16656259
	Filing Date	2019-10-17
	First Named Inventor	Levaughn Denton
	Art Unit	2688
	Examiner Name	THANG V. TRAN
	Attorney Docket Number	2305LD01UTL1USCON2

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20190050194	A1	2019-02-14	Zophonos, Inc.	
	2	20040076305	A1	2004-04-22	Shure, Inc.	
	3	20040240676	A1	2004-12-02	Panasonic Intellectual Property Corp.	
	4	20050160270	A1	2005-07-21	Black Hills Media, Inc.	
	5	20060067550	A1	2006-03-30	Sivantos GmbH	
	6	20060082458	A1	2006-04-20	Symbol Technologies, LLC	
	7	20070217623	A1	2007-09-20	Panasonic Corp.	
	8	20090003620	A1	2009-01-01	Apple, Inc.	
	9	20090076825	A1	2009-03-19	Bionica Corp.	
	10	20100329471	A1	2010-12-30	Dunn, et al.	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /T.V.T/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16656259
	Filing Date	2019-10-17
	First Named Inventor	Levaughn Denton
	Art Unit	2688
	Examiner Name	THANG V. TRAN
	Attorney Docket Number	2305LD01UTL1USCON2

	11	20090058611	A1	2009-03-05	Panasonic Corp.	
	12	20100329471	A1	2010-12-30	Manufacturing Resources International Inc.	
	13	20110134278	A1	2011-06-09	Alcor Micro Corp.	
	14	20120189140	A1	2012-07-26	Apple, Inc.	
	15	20130044131	A1	2013-02-21	Moheb Milad	
	16	20130064380	A1	2013-03-14	Apple, Inc.	
	17	20130294618	A1	2013-11-07	Mikhail Lyubachev	
	18	20110134278	A1	2011-07-09	Alcor Micro Corp.	
	19	20070217623	A1	2007-09-20	Noriyuki Harada	
	20	20130044131	A1	2013-02-21	Moheb Milad	

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Application Number	16656259
Filing Date	2019-10-17
First Named Inventor	Levaughn Denton
Art Unit	2688
Examiner Name	THANG V. TRAN
Attorney Docket Number	2305LD01UTL1USCON2

Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2]	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	2016049130	WO	A1	2016-03-31	Levaughn Denton		
	2	1971035	EP	B2	2014-08-20	Harman International Industries		

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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	International Search Report, dated January 29, 2016, for corresponding PCT Application Number PCT/US15/51638, International Filing Date September 23, 2015, consisting of 2 Pages.	
	2	International Preliminary Report on Patentability, dated March 28, 2017, for corresponding PCT Application Number PCT/US15/51638, International Filing Date September 23, 2015, consisting of 7 Pages.	
	3	Written Opinion of the International Searching Authority, dated January 29, 2016, for corresponding PCT Application Number PCT/US15/51638, International Filing Date September 23, 2015, consisting of 6 Pages.	

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EXAMINER SIGNATURE

Examiner Signature	/THANG V TRAN/	Date Considered	06/09/2020

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[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

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	Application Number	16656259
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	Art Unit	2688
	Examiner Name	THANG V. TRAN
	Attorney Docket Number	2305LD01UTL1USCON2

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/David Postolski/	Date (YYYY-MM-DD)	2020-06-08
Name/Print	David Postolski	Registration Number	67547

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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Main Concept Text
==========
determining is one or more of the one or more sounds includes a frequency outside of a predetermined threshold; if one or more of the one or more sounds includes the frequency outside of the predetermined threshold, altering the one or more of the one or more sounds so that the frequency does not fall outside of the predetermined threshold; and outputting the one or more sounds on the at least one output device.

(No Concept Modifiers)
==========

(No Filters)
==========

Options
==========
De-dup: Extended Family Numbers
Cut-off: None
Sort: Relevance

Content: Patent Publications (164)
==========
US Patents
US Designs
US Applications
EPO Patents
EPO Applications
China Patents
China Applications
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Japan Applications
Korea Patents
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Cuba Applications
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Guatemala Applications
Honduras Applications
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Nicaragua Patents
Panama Applications
Peru Applications
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Bulgaria Applications
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Norway Applications
Poland Patents
Poland Applications
Portugal Patents
Portugal Applications
Republic of Moldova Patents
Republic of Moldova Applications
Romania Patents
Romania Applications
San Marino Patents
San Marino Applications
Serbia Patents
Serbia Applications
Slovakia Patents
Slovakia Applications
Slovenia Patents
Spain Patents
Spain Applications
Sweden Patents
Sweden Applications
Switzerland Patents
Switzerland Applications
Ukraine Patents
Yugoslavia/Serbia and Montenegro Patents
Yugoslavia/Serbia and Montenegro Applications
Armenia Patents
Australia Patents
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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/656,259	10/17/2019	Levaughn Denton	2305LD01UTL1USCON2

CONFIRMATION NO. 7312

75207
Gearhart Law LLC
41 River Road
Suite 1A
Summit, NJ 07901

PUBLICATION NOTICE

OC000000119659938

Title:MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS

Publication No.US-2020-0278827-A1
Publication Date:09/03/2020

NOTICE OF PUBLICATION OF APPLICATION

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Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Office of Data Managment, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

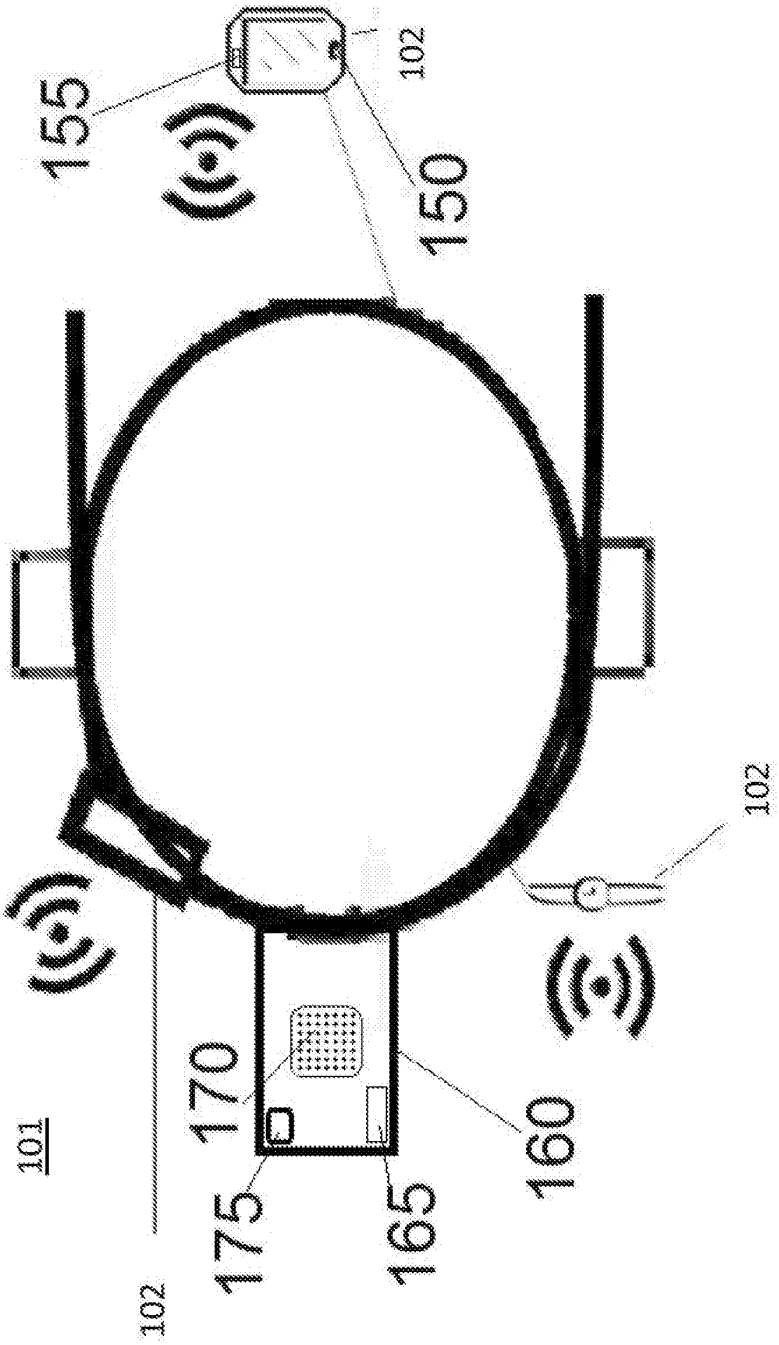


FIG. 1

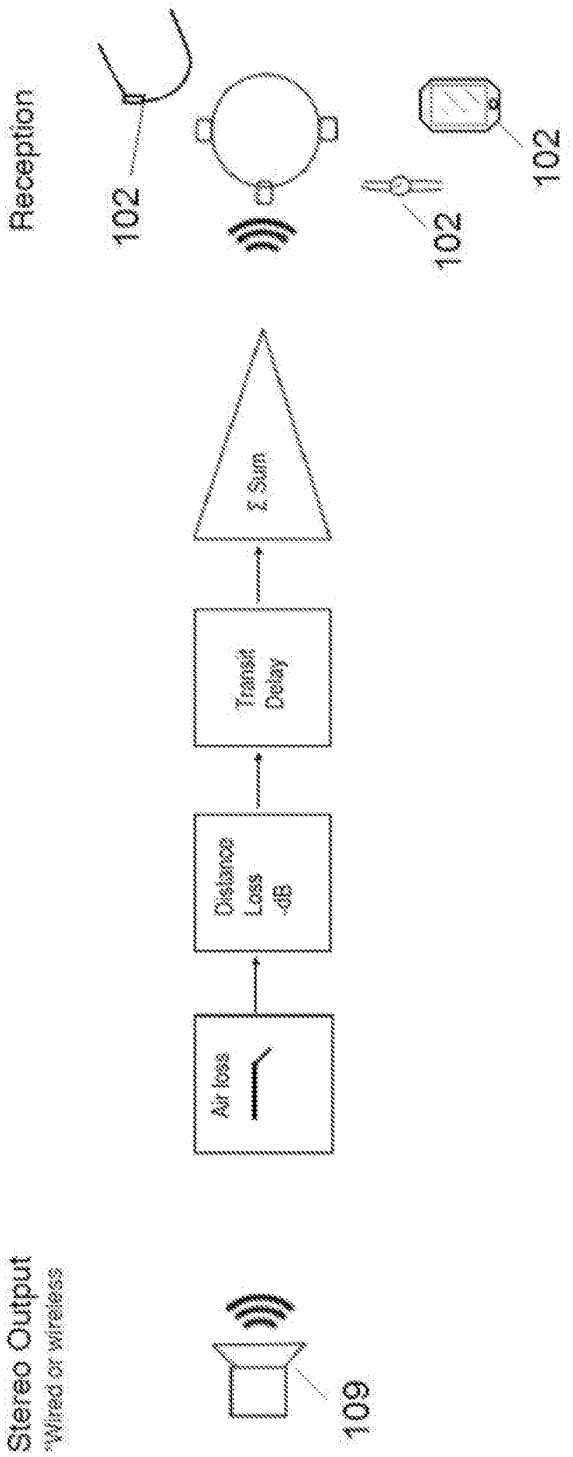

Reception
102
102
102
Σ Sum
Transit Delay
Distance Loss dB
Air loss
Stereo Output
*Wired or wireless
109

FIG. 2

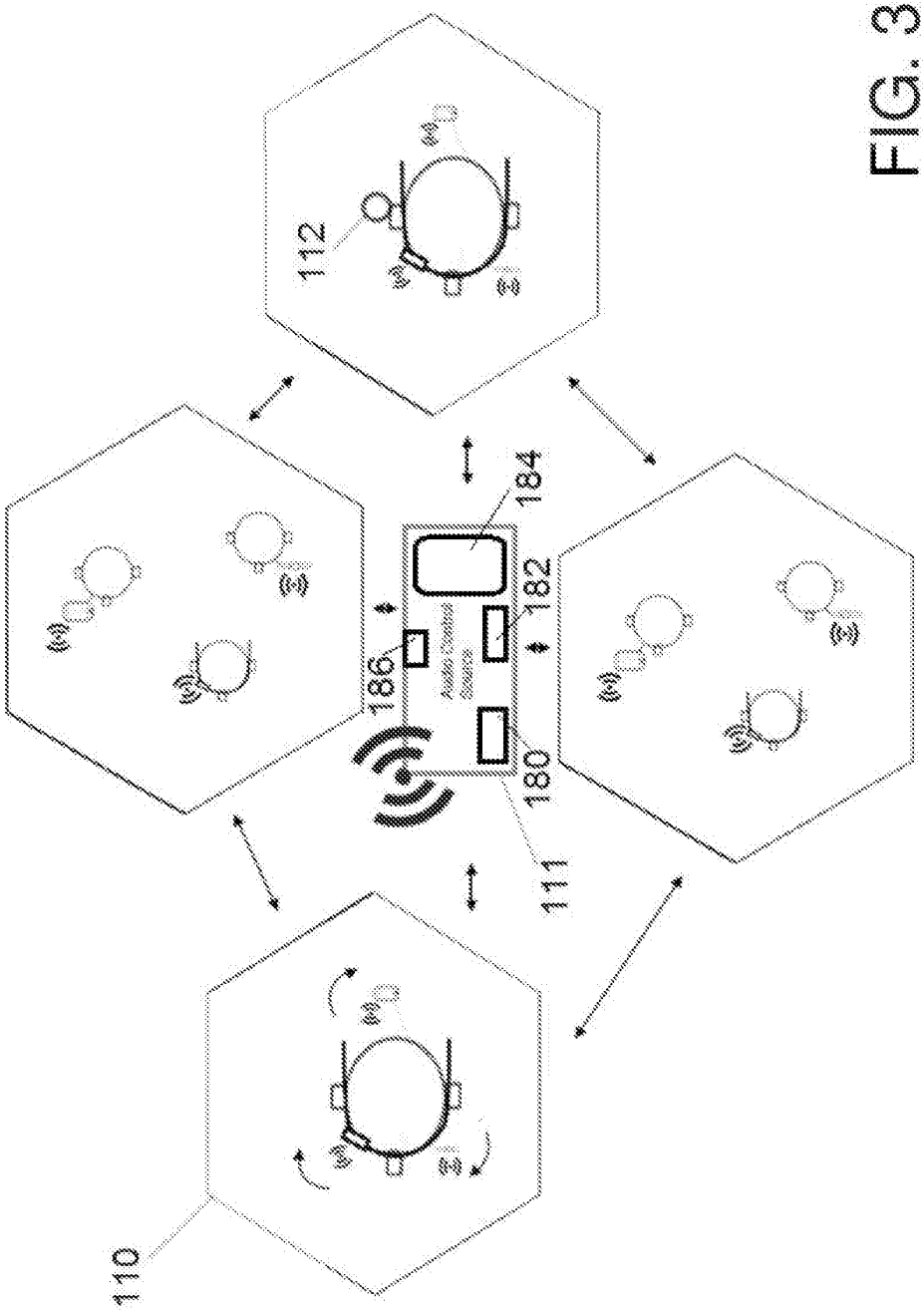


FIG. 3

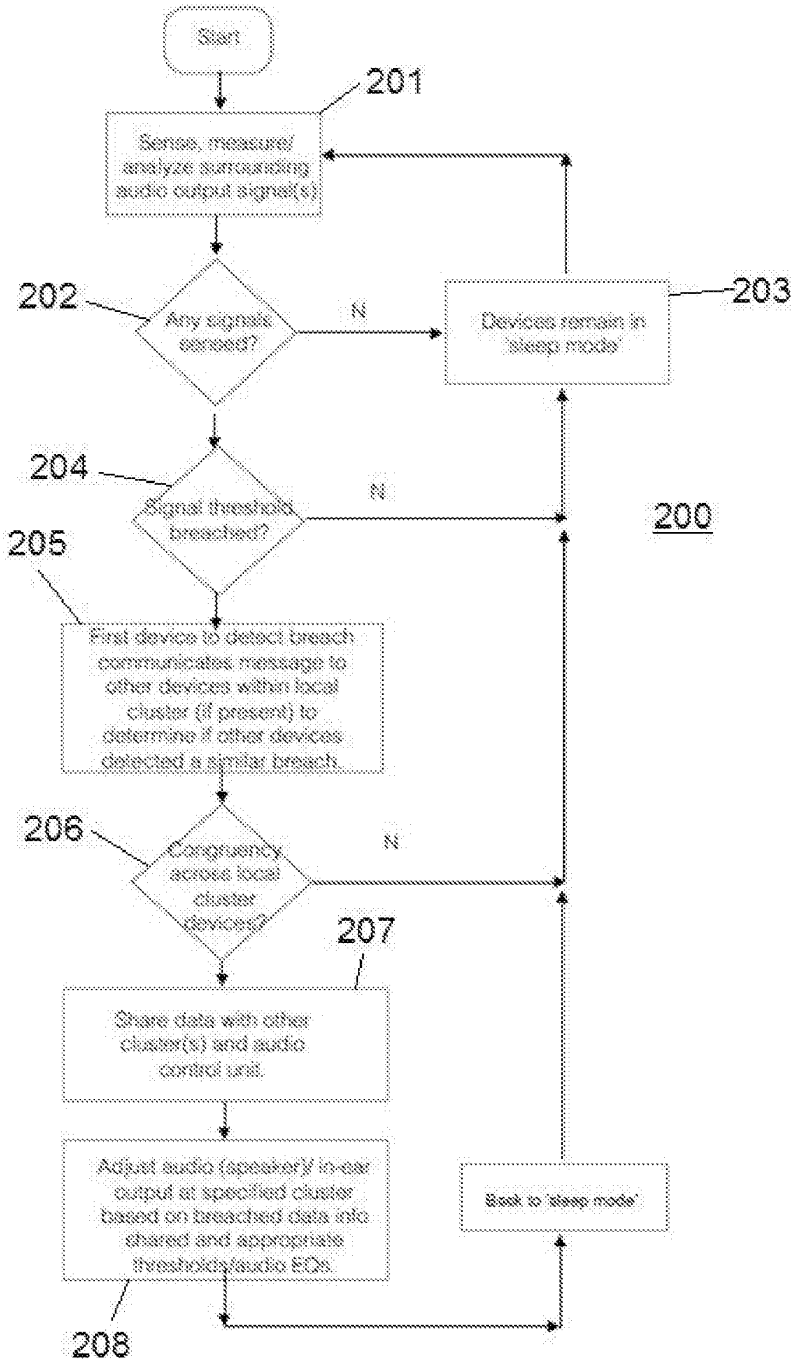

Start
201
Sense, measure/ analyze surrounding audio output signal(s)
202
Any signals sensed?
N
203
Devices remain in sleep mode
204
Signal threshold breached?
N
200
205
First device to detect breach communicates message to other devices within local cluster (if present) to determine if other devices detected a similar breach
206
Congruency across local cluster device(s)
N
207
Share data with other cluster(s) and audio control unit.
Adjust audio (speaker)/ in-ear output at specified cluster based on breached data info shared and appropriate threshold/audio EQs
Back to sleep mode
208

FIG. 4

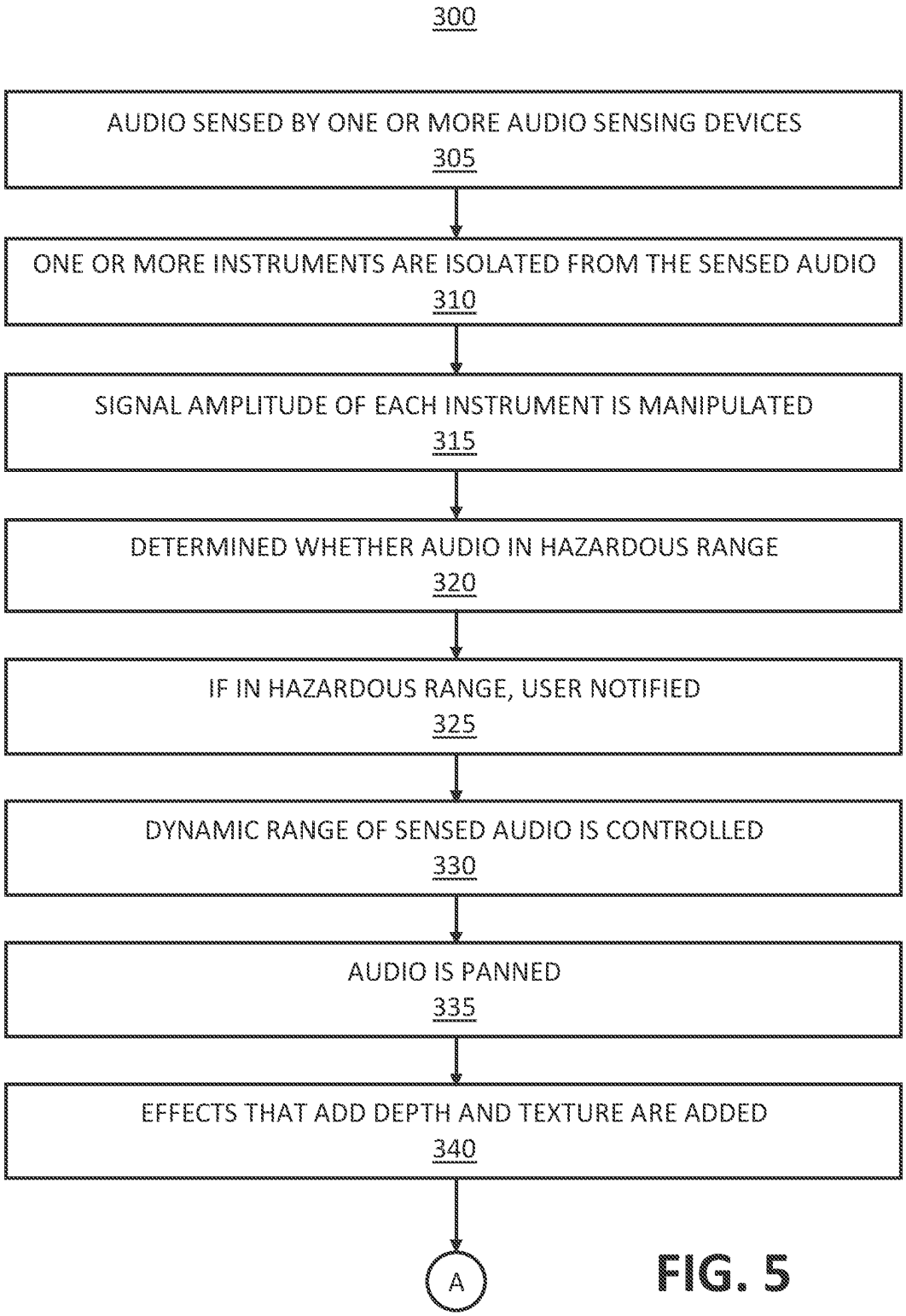

300
AUDIO SENSED BY ONE OR MORE AUDIO SENSING DEVICES
305
ONE OR MORE INSTRUMENTS ARE ISOLATED FROM THE SENSED AUDIO
310
SIGNAL AMPLITUDE OF EACH INSTRUMENT IS MANIPULATED
315
DETERMINED WHETHER AUDIO IN HAZARDOUS RANGE
320
IF IN HAZARDOUS RANGE, USER NOTIFIED
325
DYNAMIC RANGE OF SENSED AUDIO IS CONTROLLED
330
AUDIO IS PANNED
335
EFFECTS THAT ADD DEPTH AND TEXTURE ARE ADDED
340
A

FIG. 5

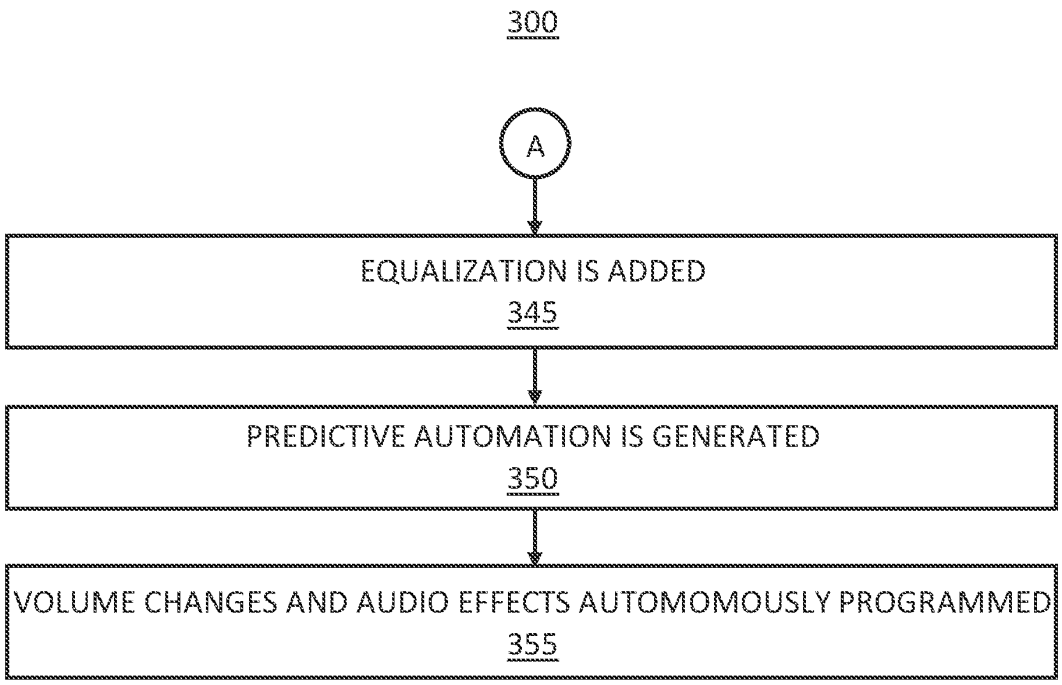

300
A
EQUALIZATION IS ADDED
345
PREDICTIVE AUTOMATION IS GENERATED
350
VOLUME CHANGES AND AUDIO EFFECTS AUTOMOMOUSLY PROGRAMMED
355

FIG. 6

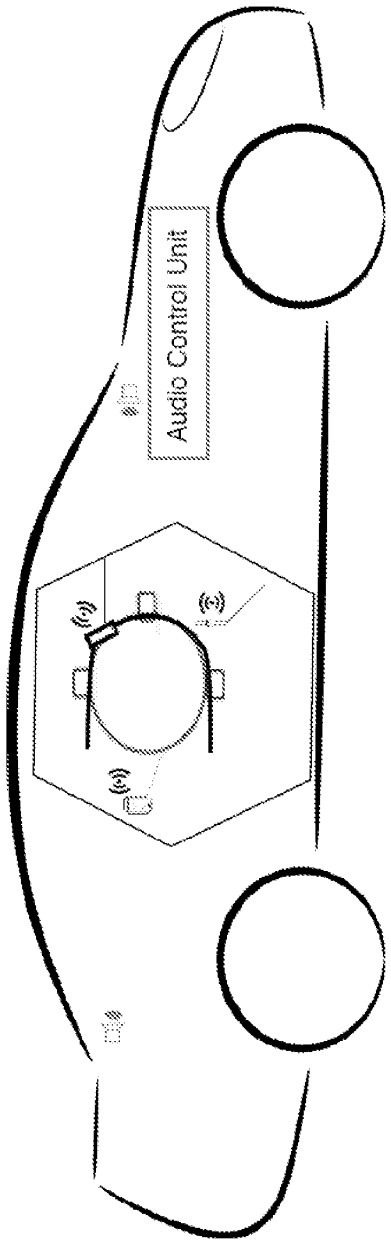
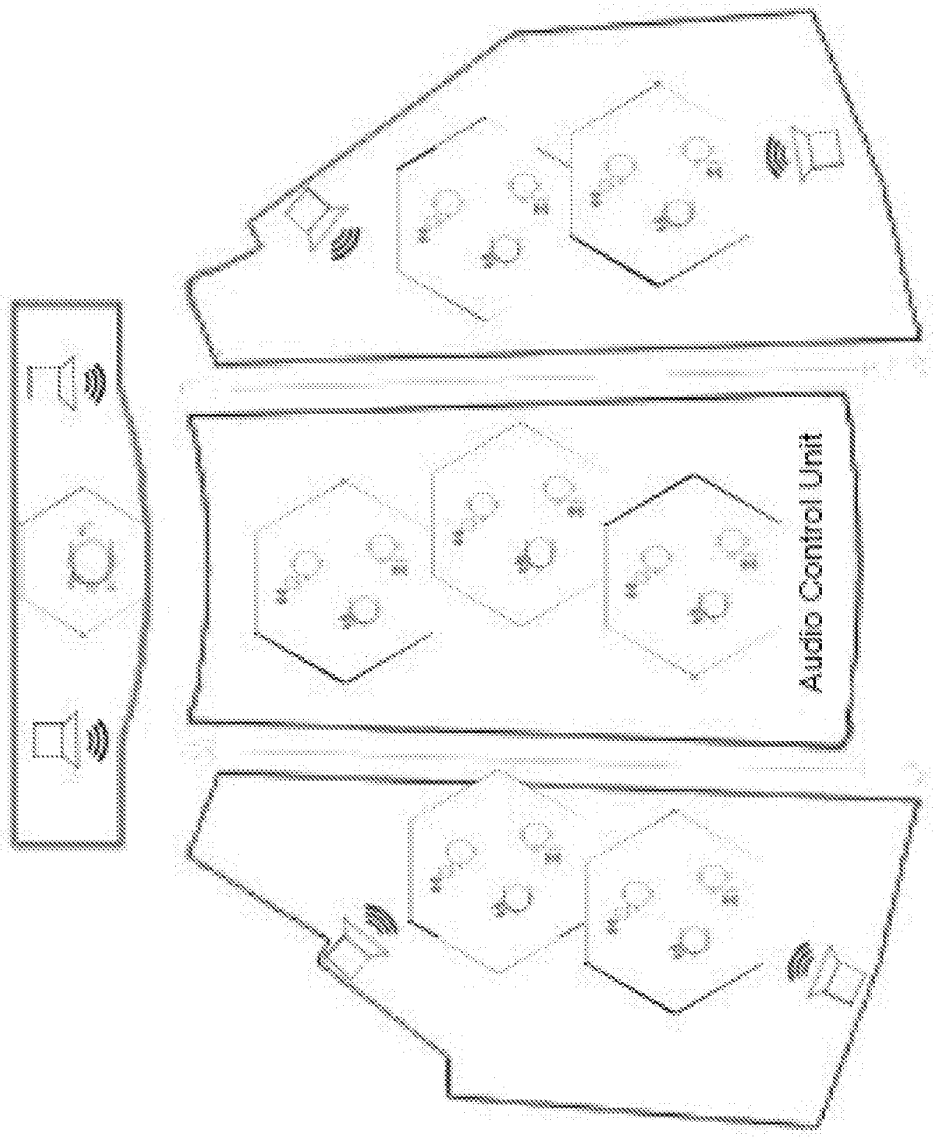


FIG. 7A

FIG. 7B



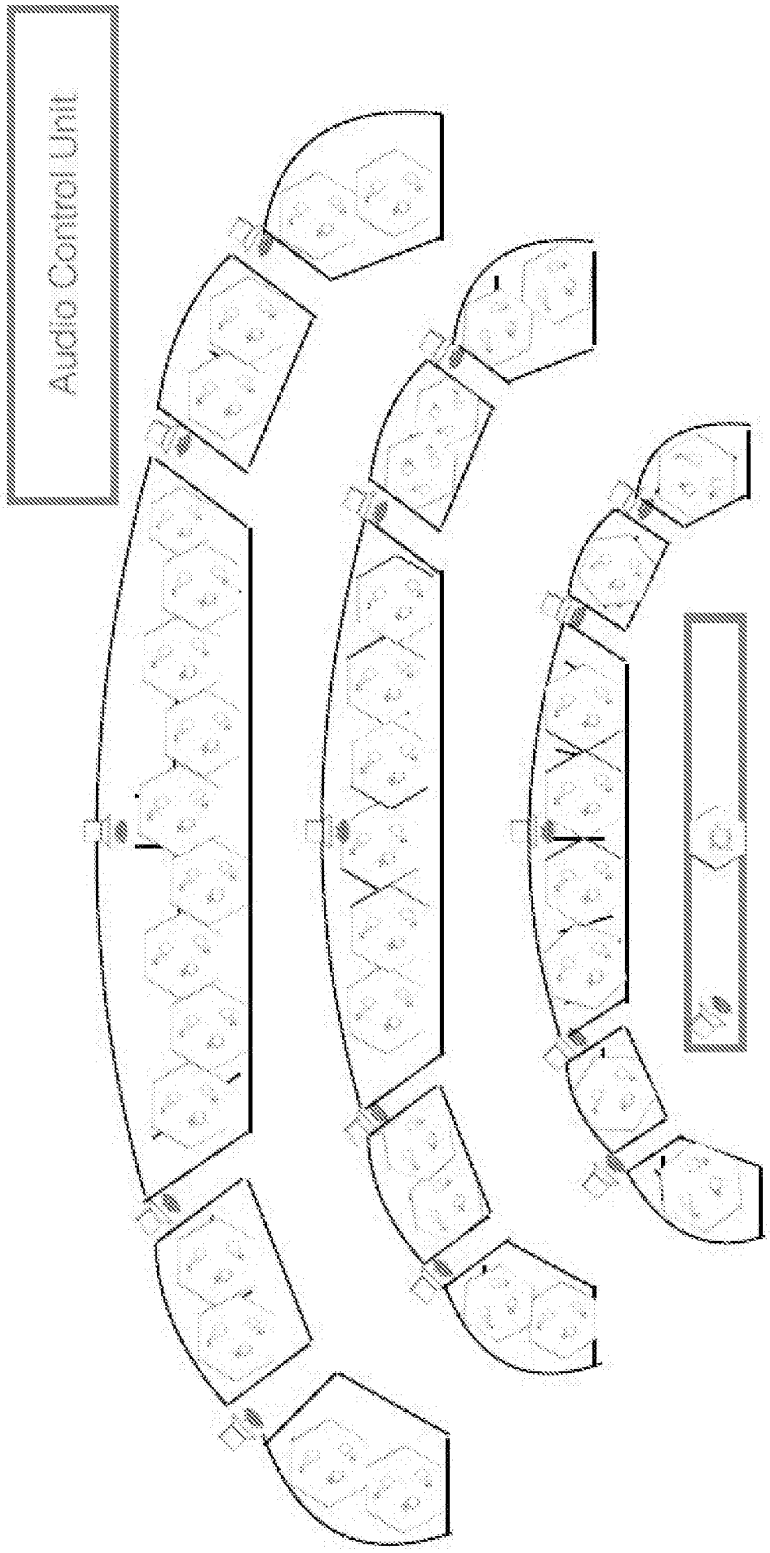
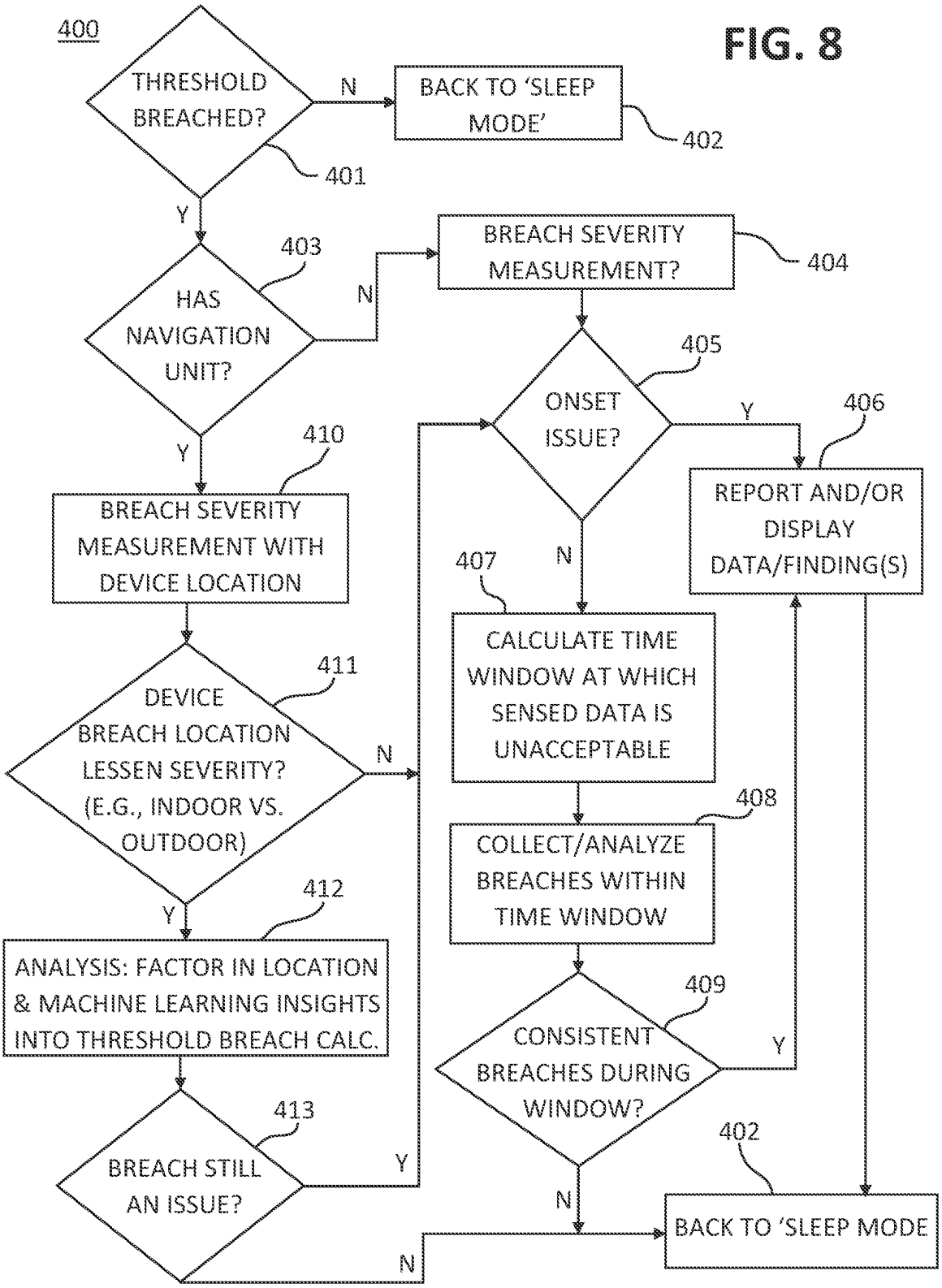


FIG. 7C

FIG. 8


400
THRESHOLD BREACHED?
401
N
BACK TO 'SLEEP MODE'
402
Y
403
HAS NAVIGATION UNIT?
N
BREACH SEVERITY MEASUREMENT?
404
Y
410
BREACH SEVERITY MEASUREMENT WITH DEVICE LOCATION
405
ONSET ISSUE?
Y
406
REPORT AND/OR DISPLAY DATA/FINDING(S)
N
407
CALCULATE TIME WINDOW AT WHICH SENSED DATA IS UNACCEPTABLE
411
DEVICE BREACH LOCATION LESSEN SEVERITY? (E.G., INDOOR VS. OUTDOOR)
N
408
COLLECT/ANALYZE BREACHES WITHIN TIME WINDOW
Y
412
ANALYSIS: FACTOR IN LOCATION & MACHINE LEARNING INSIGHTS INTO THRESHOLD BREACH CALC.
409
CONSISTENT BREACHES DURING WINDOW?
Y
413
BREACH STILL AN ISSUE?
Y
N
402
N
BACK TO 'SLEEP MODE

Electronic Patent Application Fee Transmittal

Application Number:	16656259
Filing Date:	17-Oct-2019
Title of Invention:	MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS
First Named Inventor/Applicant Name:	Levaughn Denton
Filer:	David D. Postolski
Attorney Docket Number:	2305LD01UTL1USCON2

Filed as Micro Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
CLAIMS IN EXCESS OF 20	3202	4	25	100
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**100**

Electronic Acknowledgement Receipt	
EFS ID:	40569327
Application Number:	16656259
International Application Number:	
Confirmation Number:	7312
Title of Invention:	MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS
First Named Inventor/Applicant Name:	Levaughn Denton
Customer Number:	75207
Filer:	David D. Postolski
Filer Authorized By:	
Attorney Docket Number:	2305LD01UTL1USCON2
Receipt Date:	16-SEP-2020
Filing Date:	17-OCT-2019
Time Stamp:	05:32:14
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$100
RAM confirmation Number	E20209F633192546
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Amendment/Req. Reconsideration-After Non-Final Reject	2305LD01UTL_200916_Response_to_OA.pdf	166894 e85df516c8390c014d20b732890a0d0e83440998	no	9
Warnings:					
Information:					
2	Drawings-only black and white line drawings	2305LD01UTL1USCON2_200916_drawings.pdf	479361 9db30acc7e78538a170972ee30a31453f6ba03ce	no	10
Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	30427 1e1f280d9d0830485ebd2f7de1308fe70e03446f	no	2
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		Total Files Size (in bytes):	676682		

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National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.
New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Patent Application of: Levaughn Denton			
Conf. No.:	7312	Group Art Unit:	2688
Appln. No.:	16/656,259	Examiner:	Tran, Thang V.
Filing Date:	10/17/2019	Attorney Docket No.:	2305LD01UTLCON2

Title: MOBILE FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS

RESPONSE TO FINAL OFFICE ACTION

This is in response to the Office Action dated June 16, 2020 giving a three-month shortened statutory period for reply. This reply is timely as submitted. No fees are deemed necessary in connection with the filing of this Response. However, if any additional fee is required or has been overpaid, authorization is hereby given to charge/credit the amount of such fee to Deposit Account No. 60-1818 including any additional claim fees that may not have been submitted with this Response. The Applicant respectfully requests that the Examiner enter the following amendments, without prejudice, to the above-identified application:

Amendments to the Claims begin on page 2.

Remarks begins on page 8.

CLAIM LISTING

This claim listing replaces any and all previous claim listings in the above captioned application.

1. (currently amended) A system comprising:

~~an audio control~~ a data source;

at least one cluster of at least one computing device, the at least one computing device including:

a sound sensing mechanism, configured to sense a noise; and

a wireless transceiver or an electronic bus which is [[,]] configured to wirelessly transmit and receive data from the ~~audio control~~ data source;

~~at least one output device, including:~~

~~a power source for operating the output device;~~

~~a speaker for outputting sound; and~~

~~a communication mechanism, for receiving electronic information from the audio control source;~~ and

the data ~~audio control~~ source, in electronic communication with at least one cluster and the at least one output device;[[,]] ~~the audio control including:~~

a memory, containing computer-executable instructions for connecting to the at least one cluster, and varying an output of the at least one output device, providing an interface; and

a processor, for executing the computer-executable instructions, wherein the computer-executable instructions include:

identifying one or more sounds within the noise;

isolating the one or more sounds;

determining if one or more of the one or more sounds includes a frequency outside of a predetermined threshold; and

wherein if one or more of the one or more sounds includes the frequency outside of the predetermined threshold, altering the one or more of the one or more sounds so that the frequency does not fall outside of the predetermined threshold; and

outputting the one or more sounds on the at least one output device.

2. (previously presented) The system as recited in claim 1, further comprising: an interfacing mechanism, the interfacing mechanism including:

a network adapter, configured to transmit and receive electronic information through both wired and wireless communication; and

at least one input mechanism, configured to:

manipulate the interfacing mechanism; and vary the output of the at least one output device.

3. (previously presented) The system as recited in claim 1, wherein the sound-sensing mechanism is an omnidirectional transducer.

4. (previously presented) The system as recited in claim 1, wherein the sound-sensing mechanism is selected from the group consisting of: an ultrasonic transducer; an infrasonic transducer: and a microwave transducer.

5. (previously presented) The system as recited in claim 4, wherein the sensed noise includes infrasonic or ultrasonic soundwaves.

6. (previously presented) The system as recited in claim 1, wherein the predetermined threshold equates to a frequency determined to pose a risk of harm to a user's hearing capabilities.

7. (previously presented)The system as recited in claim 1, wherein the computer-executable instructions further include: if one or more of the one or more sounds includes the frequency outside of the predetermined threshold, notifying a user, via a notification, that one or more of the one or more sounds includes the frequency outside of the predetermined threshold.

8. (previously presented) The system as recited in claim 1, wherein the computer-executable instructions further include steps selected from the group consisting of: panning the sensed noise; and equalizing the sensed noise.

9. (previously presented) The system as recited in claim 1, further comprising: an in-ear device, wherein an audio output of the in-ear device auto-adjusts based on signal energy sensed within a cluster or surrounding clusters.

10. (previously presented) The system as recited in claim 1, wherein the altering the one or more of the one or more sounds so that the frequency does not fall outside of the predetermined threshold is performed automatically.

11. (Currently Amended) A method of altering sensed noise prior to outputting the sensed noise, comprising:

providing at least one <u>data</u> ~~audio control~~ source.

providing at least one cluster of at least one computing device, the at least one computing device including: a sound sensing mechanism, configured to sense a noise; a wireless transceiver <u>or an electronic bus</u>, configured to wirelessly transmit and receive data from the <u>data</u> ~~audio control~~ source; ~~at least one output device, including:~~

~~a power source for operating the output device.~~

~~a speaker for outputting sound; and~~

~~a communication mechanism, for receiving electronic information from the audio control source~~; and

the data ~~audio control~~ source, in electronic communication the at least one cluster and the at least one output device;[[,]] ~~the audio control source including:~~

a memory, containing computer-executable instructions for connecting to the at least one cluster, and varying an output of the at least one output device, providing an interface; and

a processor, for executing the computer-executable instructions; identifying one or more sounds within the noise; isolating the one or more sounds;

determining if one or more of the one or more sounds includes a frequency outside of a predetermined threshold; and

wherein if one or more of the one or more sounds includes the frequency outside of the predetermined threshold, altering the one or more of the one or more sounds so that the frequency does not fall outside of the predetermined threshold; and

outputting the one or more sounds on the at least one output device.

12. (previously presented) The method as recited in claim 11, wherein the at least one computing device further includes: an interfacing mechanism, the interfacing mechanism including: a network adapter, configured to transmit and receive electronic information through both wired and wireless communication; and at least one input mechanism, configured to: manipulate the interfacing mechanism; and vary the output of the at least one output device.

13. (previously presented) The method as recited in claim 11, wherein the sound-sensing mechanism is selected from the group consisting of: an omnidirectional transducer; an ultrasonic transducer; an infrasonic transducer; an electro-optical transducer; and a microwave transducer.

14. (previously presented) The method as recited in claim 13, wherein the sensed noise includes infrasonic, ultrasonic, visible, or radio waves.

15. (previously presented) The method as recited in claim 11, wherein the predetermined threshold equates to a frequency determined to pose a risk of harm to a user's hearing capabilities.

16. (previously presented) The method as recited in claim 11, further comprising: if one or more of the one or more sounds includes the frequency outside of the predetermined threshold, notifying a user, via a notification, that one or more of the one or more sounds includes the frequency outside of the predetermined threshold.

17. (previously presented) The method as recited in claim 11, further comprising: panning the sensed noise.

18. (previously presented) The method as recited in claim 11, further comprising: adding one or more audio effects to the sensed noise.

19. (previously presented) The method as recited in claim 11, further comprising: equalizing the sensed noise.

20. (previously presented) The method as recited in claim 11, wherein the altering the one or more of the one or more sounds so that the frequency does not fall outside of the predetermined threshold is performed automatically.

21. (new) The system of claim 1, further comprising: the at least one output device, including:

a power source for operating the output device;

a speaker for outputting sound; and

a communication mechanism, for receiving electronic information from the data source; and

a display.

22. (new) The system of claim 21, wherein the power source and the display are varied outputs.

23. (new) The method of claim 1, further comprising: the at least one output device, including:

a power source for operating the output device;

a speaker for outputting sound; and

a communication mechanism, for receiving electronic information from the data source; and

a display.

24. (new) The method of claim 23, wherein the power source and the display are varied outputs.

APPLICANT ARGUMENTS / REMARKS MADE IN AN AMENDMENT

Objections to the Specification/Drawings

By the present Office Action, Applicant apologizes for any confusion when Applicant filed it Corrected Application Response. By this Response, Applicant cancels all references to any new matter designated by the Applicant including Figures 9 and 10 in the specification. Applicant submits a new set of drawings without Figures 9 and 10. Reconsideration and withdrawal of the objection is thus respectfully requested.

Double Patenting

Applicant submits new claims 21-24 with this response. All amended and new claims are fully supported and do not reflect new matter. Accordingly, Applicant requests that the statutory double patenting rejection been withdrawn and consideration for the current set of amended and new claims be given.

Conclusion

It is submitted that all of the Examiners rejections and objections have been responded to and addressed, and therefore, a Notice of Allowance is respectfully requested. If the Examiner has any questions or concerns, they are encouraged to contact the undersigned by phone at 908-273-0700 for further discussions.

Respectfully Submitted,

/David D. Postolski/

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DocCode – SCORE

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Application Number: 16656259 Document Date: 09/16/2020

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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/656,259	Filing Date 10/17/2019	☐ To be Mailed

ENTITY: ☑ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $100 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $460 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	09/16/2020	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 24	Minus	** 20	= 4		x $100 =	400
	Independent (37 CFR 1.16(h))	* 3	Minus	*** 3	= 0		x $460 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	400

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/ANGELA S WHITE/
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	16656259
	Filing Date	2019-10-17
	First Named Inventor	Levaughn Denton
	Art Unit	2688
	Examiner Name	TRAN, THANG V
	Attorney Docket Number	2305LD01UTL1USCON2

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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20160150338	A1	2016-05-26	Kim et al.	
	2	20150358730	A1	2015-12-10	Kirsch et al.	
	3	20110313555	A1	2011-12-22	Shoham et al.	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16656259
	Filing Date	2019-10-17
	First Named Inventor	Levaughn Denton
	Art Unit	2688
	Examiner Name	TRAN, THANG V
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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	International Search Report dated September 16, 2020 issued in PCT/US2020/042927.	

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EXAMINER SIGNATURE

Examiner Signature		Date Considered	

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[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16656259
	Filing Date	2019-10-17
	First Named Inventor	Levaughn Denton
	Art Unit	2688
	Examiner Name	TRAN, THANG V
	Attorney Docket Number	2305LD01UTL1USCON2

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/David Postolski/	Date (YYYY-MM-DD)	2020-10-05
Name/Print	David Postolski	Registration Number	67547

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7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

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DAVID POSTOLSKI
GEARHART LAW LLC
41 RIVER ROAD
SUMMIT, NEW JERSEY 07901
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(PCT Rule 44.1)

Date of mailing *(day/month/year)*	16 SEP 2020
Applicant's or agent's file reference **2305LD01PCT1USCIP**	**FOR FURTHER ACTION** See paragraphs 1 and 4 below
International application No. **PCT/US2020/042927**	International filing date *(day/month/year)* **21 July 2020 (21.07.2020)**
Applicant **DENTON, LEVAUGHN**	

1. ☑ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

   Filing of amendments and statement under Article 19:
   The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

   When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

   How? Directly to the International Bureau preferably through ePCT, or on paper to: The International Bureau of WIPO, 34 chemin des Colombettes, 1211 Geneva 20, Switzerland (Facsimile No.: +41 22 338 82 70)

   For more detailed instructions, see the *PCT Applicant's Guide*, International Phase, paragraphs 9.004 – 9.011.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. ☐ **With regard to any protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

   ☐ the protest together with the decision thereon has been transmitted to the International Bureau together with any request to forward the texts of both the protest and the decision thereon to the designated Offices.

   ☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. Reminders

   The applicant may **submit comments on an informal basis on the written opinion of the International Searching Authority** to the International Bureau. These comments will be made available to the public after international publication. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established.

   Shortly after the expiration of **18 months from the priority date, the international application will be published** by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before the completion of the technical preparations for international publication (Rules 90bis.1 and 90bis.3).

   Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for **entry into the national phase** before those designated Offices. In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months. For details about the applicable time limits, Office by Office, see www.wipo.int/pct/en/texts/time_limits.html and the PCT Applicant's Guide, National Chapters.

   Within **22 months from the priority date, the applicant may request that a supplementary international search be carried out** by a different International Searching Authority that offers this service (Rule 45bis.1). The procedure for requesting supplementary international search is described in the *PCT Applicant's Guide*, International Phase, paragraphs 8.006-8.032.

Name and mailing address of the ISA/US **COMMISSIONER FOR PATENTS MAIL STOP PCT, ATTN: ISA/US P.O. BOX 1450 ALEXANDRIA, VA 22313-1450, UNITED STATES OF AMERICA** Facsimile No. **(571)273-8300**	Authorized officer **HARRY C. KIM** Telephone No. **571-272-4300**

Form PCT/ISA/220 (revised January 2019)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference **2305LD01PCT1USCIP**	**FOR FURTHER ACTION**	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No. **PCT/US2020/042927**	International filing date *(day/month/year)* **21 July 2020 (21.07.2020)**	(Earliest) Priority Date *(day/month/year)* **23 May 2019 (23.05.2019)**
Applicant **DENTON, LEVAUGHN**		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 2 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

a. With regard to the **language**, the international search was carried out on the basis of:

☑ the international application in the language in which it was filed.

☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).

c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐ **Certain claims were found unsearchable** (see Box No. II).

3. ☐ **Unity of invention is lacking** (see Box No. III).

4. With regard to the **title**,

☑ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☑ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the **drawings**,

a. the figure of the **drawings** to be published with the abstract is Figure No. 1

☑ as suggested by the applicant.

☐ as selected by this Authority, because the applicant failed to suggest a figure.

☐ as selected by this Authority, because this figure better characterizes the invention.

b. ☐ none of the figures is to be published with the abstract.

Form PCT/ISA/210 (first sheet) (July 2019)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2020/042927

A. CLASSIFICATION OF SUBJECT MATTER

IPC: G06F 3/16; H04B 1/00; H04S 7/00; H04L 29/08; H04R 27/00
CPC: G06F 3/165

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

CPC: G06F 3/165; H04R 3/00, 3/04, 3/12, 25/35, 25/48, 25/356, 27/00, 27/003, 29/00, 29/001, 29/002, 29/003, 29/004, 29/007, 2227/003, 2430/01; H04S 7/40, 2400/15; H04L 67/12; H04B 1/0003

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WEST: PGPD; USPT; USOC; EPAB; JPAB; DWPI. TDBD; FPRS; Search Terms: alert$4, notification, notify$3, notifies, indicat $4, warn$4, inform$4, smaller, lower, below, inside, lessor, larger, greater, higher, outside, loudspeaker, transducer, power, battery, receiv$4, transmit$5, transmission, transceiv$4, antenna, wifi, Bluetooth, audio, sound, voice, acoustic, frequency, predetermined, reference, preset, threshold, identif$7, determin$6, detect$5, discriminat$5, extract$4, sensor, sensing, detect$4, collect$4, captur$4, microphone, transducer

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2016/0150338 A1 (KIM ET AL.) 26 May 2016 (26.05.2016), entire document.	1-20
A	US 2015/0358730 A1 (KIRSCH ET AL.) 10 December 2015 (10.12.2015), entire document.	1-20
A	US 2011/0313555 A1 (SHOHAM ET AL.) 22 December 2011 (22.12.2011), entire document.	1-20
A	US 2011/0087079 A1 (AARTS) 14 April 2011 (14.04.2011), entire document.	1-20
A	US 2012/0189140 A1 (HUGHES) 26 July 2012 (26.07.2012), entire document.	1-20
A	US 2010/0329471 A1 (DUNN ET AL.) 30 December 2010 (30.12.2010), entire document.	1-20

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"D" document cited by the applicant in the international application
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
08 September 2020 (08.09.2020)	16 SEP 2020
Name and mailing address of the ISA/US **COMMISSIONER FOR PATENTS MAIL STOP PCT, ATTN: ISA/US P.O. BOX 1450 ALEXANDRIA, VA 22313-1450, UNITED STATES OF AMERICA** Facsimile No. **(571)273-8300**	Authorized officer **HARRY C. KIM** Telephone No. **571-272-4300**

Form PCT/ISA/210 (second sheet) (July 2019)

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To:
DAVID POSTOLSKI
GEARHART LAW LLC
41 RIVER ROAD
SUMMIT, NEW JERSEY 07901
UNITED STATES OF AMERICA

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing *(day/month/year)*	16 SEP 2020
Applicant's or agent's file reference: **2305LD01PCT1USCIP**	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2020/042927	**21 July 2020 (21.07.2020)**	**23 May 2019 (23.05.2019)**

International Patent Classification (IPC) or both national classification and IPC
IPC: G06F 3/16; H04B 1/00; H04S 7/00; H04L 29/08; H04R 27/00
CPC: G06F 3/165

Applicant: **DENTON, LEVAUGHN**

1. This opinion contains indications relating to the following items:
   - [x] Box No. I Basis of the opinion
   - [ ] Box No. II Priority
   - [ ] Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - [ ] Box No. IV Lack of unity of invention
   - [x] Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
   - [ ] Box No. VI Certain documents cited
   - [ ] Box No. VII Certain defects in the international application
   - [ ] Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/US	Date of completion of this opinion	Authorized officer
COMMISSIONER FOR PATENTS MAIL STOP PCT, ATTN: ISA/US P.O. BOX 1450 ALEXANDRIA, VA 22313-1450, UNITED STATES OF AMERICA	**08 September 2020 (08.09.2020)**	**HARRY C. KIM**
Facsimile No. **(571)273-8300**		Telephone No. **571-272-4300**

Form PCT/ISA/237 (Cover sheet) (revised January 2019)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2020/042927

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:
   - [✓] the international application in the language in which it was filed.
   - [ ] a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. [ ] This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(b)).

3. [ ] With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:
   - a. [ ] forming part of the international application as filed:
     - [ ] in the form of an Annex C/ST.25 text file.
     - [ ] on paper or in the form of an image file.
   - b. [ ] furnished together with the international application under PCT Rule 13*ter*.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.
   - c. [ ] furnished subsequent to the international filing date for the purposes of international search only:
     - [ ] in the form of an Annex C/ST.25 text file (Rule 13*ter*.1(a)).
     - [ ] on paper or in the form of an image file (Rule 13*ter*.1(b) and Administrative Instructions, Section 713).

4. [ ] In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2020/042927

Box No. V **Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	1-20	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	1-20	YES
	Claims	NONE	NO
Industrial applicability (IA)	Claims	1-20	YES
	Claims	NONE	NO

2. Citations and explanations :

-------- EXPLANATION ---------

Claim(s) 1-20 meet the criteria set out in PCT Article 33(2)-(3) because the prior art does not teach or fairly suggest the claimed invention.

Claimed limitations including a combination of: least one computing device including: a sound sensing mechanism, configured to sense a noise; and a wireless transceiver, configured to wirelessly transmit and receive data from the audio control source; at least one output device, including: a power source for operating the output device; a speaker for outputting sound; and a communication mechanism, for receiving electronic information from the audio control source; and the audio control source, in electronic communication the at least one cluster and the at least one output device, the audio control source including: a memory, containing computer-executable instructions for connecting to the at least one cluster, and varying an output of the at least one output device, providing an interface; and a processor, for executing the computer-executable instructions, wherein the computer-executable instructions include: identifying one or more sounds within the noise; isolating the one or more sounds; determining is one or more of the one or more sounds includes a frequency outside of a predetermined threshold; if one or more of the one or more sounds includes the frequency outside of the predetermined threshold, altering the one or more of the one or more sounds so that the frequency does not fall outside of the predetermined threshold; and outputting the one or more sounds on the at least one output device, as recited in claim 1, and similarly recited in a corresponding method claim 11.

Claim(s) 1-20 meet the criteria set out in PCT Article 33(4), and thus have industrial applicability because the subject matter claimed can be made or used in industry.

Electronic Acknowledgement Receipt

EFS ID:	40759183
Application Number:	16656259
International Application Number:	
Confirmation Number:	7312
Title of Invention:	MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS
First Named Inventor/Applicant Name:	Levaughn Denton
Customer Number:	75207
Filer:	Richard I. Gearhart./Kristin Bennett
Filer Authorized By:	Richard I. Gearhart.
Attorney Docket Number:	2305LD01UTL1USCON2
Receipt Date:	05-OCT-2020
Filing Date:	17-OCT-2019
Time Stamp:	14:38:45
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	2305LD01UTL1USCON2_IDS_Transmittal.pdf	114692 2aef74b6d7dd28a5b3fec793d48668466d2859c9	no	1

Warnings:

Information:					
2	Information Disclosure Statement (IDS) Form (SB08)	2305LD01UTL1USCON2_IDS_SB_08.pdf	1034311 8aadd65cbec8027eb0149b2078761edb1e0117b5	no	4
Warnings:					
Information:					
3	Non Patent Literature	2305LD01PCT1USCIP_ISR_WO.pdf	7171536 18e4aa9adb3f6b51bddc9bc71c3a6d7d74d821ac	no	6
Warnings:					
Information:					
		Total Files Size (in bytes):	8320539		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Patent Application of: Levaughn Denton			
Conf. No.:	7312	Group Art Unit:	2688
Appln. No.:	16/656,259	Examiner:	TRAN, THANG V
Filing Date:	10-17-2019	Attorney Docket No.:	2305LD01UTL1USCON2

Title: MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS

INFORMATION DISCLOSURE STATEMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Pursuant to 37 CFR §1.56, the attention of the Patent and Trademark Office is hereby directed to the reference(s) listed on the attached PTO-1449. Unless otherwise indicated herein, one copy of each reference is attached. It is respectfully requested that the information be expressly considered during the prosecution of this application, and that the reference(s) be made of record therein and appear among the "References Cited" on any patent to issue therefrom.

☑ 1. This Information Disclosure Statement is being filed (a) within three months of the U.S. filing date of this non-CPA application, OR (b) before the mailing date of a first Office Action on the merits in the present application. No certification or fee is required.

Respectfully submitted;

/David Postolski/
David Postolski, Esq.
Partner
Gearhart Law LLC
41 River Road
Innovation Plaza
Summit, NJ 07901
Reg 67547

Date: October 5, 2020

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/656,259	10/17/2019	Levaughn Denton	2305LD01UTL1USCON2	7312

75207 7590 10/29/2020

Gearhart Law LLC
41 River Road
Suite 1A
Summit, NJ 07901

EXAMINER	
TRAN, THANG V	

ART UNIT	PAPER NUMBER
2688	

NOTIFICATION DATE	DELIVERY MODE
10/29/2020	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patent@gearhartlaw.com

Office Action Summary	Application No. 16/656,259	Applicant(s) Denton, Levaughn	
	Examiner THANG V TRAN	Art Unit 2688	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on 09/16/2020.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☑ This action is **FINAL.** 2b) ☐ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 1-24 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 1-24 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☑ The drawing(s) filed on 09/16/2020 is/are: a)☑ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☑ Notice of References Cited (PTO-892)

2) ☑ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

Notice of Pre-AIA or AIA Status

1. The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Claim Rejections - 35 USC § 112

2. The following is a quotation of 35 U.S.C. 112(b):

> (b) CONCLUSION.—The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention.

The following is a quotation of 35 U.S.C. 112 (pre-AIA), second paragraph:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1-24 are rejected under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the inventor or a joint inventor (or for applications subject to pre-AIA 35 U.S.C. 112, the applicant), regards as the invention.

In claim 1:

The term "the at least one output device", lines 14, 16, 19 and 28, lacks antecedent basis.

In claim 11:

The term "the at least one output device", lines 14, 16, 19 and 26, lacks antecedent basis.

In claim 23:

The term "claim 1", line 1, is apparently mistyped. It should be --claim 11--.

Claims 2-10 and 12-24 fall with their respective base claim.

Double Patenting

4. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory double patenting rejection is appropriate where

the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on nonstatutory double patenting provided the reference application or patent either is shown to be commonly owned with the examined application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement. See MPEP § 717.02 for applications subject to examination under the first inventor to file provisions of the AIA as explained in MPEP § 2159. See MPEP § 2146 *et seq.* for applications not subject to examination under the first inventor to file provisions of the AIA. A terminal disclaimer must be signed in compliance with 37 CFR 1.321(b).

The USPTO Internet website contains terminal disclaimer forms which may be used. Please visit www.uspto.gov/patent/patents-forms. The filing date of the application in which the form is filed determines what form (e.g., PTO/SB/25, PTO/SB/26, PTO/AIA/25, or PTO/AIA/26) should be used. A web-based eTerminal Disclaimer may be filled out completely online using web-screens. An eTerminal Disclaimer that meets all requirements is auto-processed and approved immediately upon submission. For more information about eTerminal Disclaimers, refer to www.uspto.gov/patents/process/file/efs/guidance/eTD-info-I.jsp.

5. Claims 1-20 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-20 of U.S. Patent No. 10,656,906. Although the claims at issue are not identical, they are not patentably distinct from each other because claims 1-20 of the U.S. Patent No. 10,656,906 anticipate all of limitations recited in claims 1-20 of the present application. See claims of the U.S. Patent No. 10,656,906 for claims 1-20 of the present application respectively.

6. Claims 21-24 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1 and 11 of U.S. Patent No. 10,656,906. Although the claims at issue are not identical, they are not patentably distinct from each other because claims 1 and 11 include all of limitation of claims 21-24 (see claim 1 for claims 21 and 22 and see claim 11 for claims 23 and 24) except that the output device in claims 11 and 11, each does not include a display. However, using the output device comprising a display is well known in the art for display information (Official notice). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was effectively filed to modify claims 1 and 11 by providing a display in the output device, as well known in the art (Official notice is taken), in order to obtain an alternative embodiment capable of displaying information and thus make the device more comparable. Limitations in claims 22 and 24 are included in the power source and the display as these limitations are part of the output of the power source and the display.

Allowable Subject Matter

7. Claims 1-24 would be allowable if a proper terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) is timely filed and used to overcome an actual or provisional rejection based on nonstatutory double patenting, set forth in this Office action.

8. Claims 1-24 are allowable over the prior art of record because the prior art of record including US 20160150338 as the closest prior art, which is related to the concept the claimed

subject matter, mainly include a processing device to determine if a frequency of a received sound is outside of range, then acquire the sound and transmit it to the output device based on the result of the frequency determination (see Figs. 3019 of the closest prior art); however, there is at least a difference between the closest prior art and the claimed invention is that the closest prior art fails to include features comprising: the audio control source including: a memory, containing computer-executable instructions for connecting to the at least one cluster, and varying an output of the at least one output device, providing an interface; and a processor, for executing the computer-executable instructions, wherein the computer-executable instructions include: identifying one or more sounds within the noise; isolating the one or more sounds; determining is one or more of the one or more sounds includes a frequency outside of a predetermined threshold; if one or more of the one or more sounds includes the frequency outside of the predetermined threshold, altering the one or more of the one or more sounds so that the frequency does not fall outside of the predetermined threshold; and outputting the one or more sounds on the at least one output device, as recited in claim 1, and similarly recited in a corresponding method claim 11.

Other references of the record are directed to a similar concept, but none of them teaches any feature nor fairly suggest any obvious improvement that is directed to the features identified above as the difference between the closest prior art and the claimed invention so that it can be relied upon to modify the closest prior art to derive the claimed invention as recited in claims 1 and 11. Therefore, claims 1 and 11 are allowable over the prior art of record, and claims 2-10 and claims 12-24 are also allowable with their respective base claim.

Cited References

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The reference cites herewith is directed to a system to determine frequency of a sound

signal and transmit sound signal or notification to output device bas the result of the frequency determination.

Response to Arguments

10. Applicant's arguments with respect to claim(s) 1-24 have been considered but are moot because the new ground of rejections are different from the prior rejection specifically challenged in the argument.

Conclusion

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to THANG V TRAN whose telephone number is (571)272-7595. The examiner can normally be reached on Mon-Fri: 7:00 AM -7:00 PM.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is

encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Lim can be reached on 571-272-1210. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see https://ppair-my.uspto.gov/pair/PrivatePair. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/THANG V TRAN/
Primary Examiner, Art Unit 2688

Notice of References Cited	Application/Control No. 16/656,259	Applicant(s)/Patent Under Reexamination Denton, Levaughn	
	Examiner THANG V TRAN	Art Unit 2688	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-20140350927-A1	11-2014	YAMABE; Takaaki	G10L25/48	704/233
	B					
	C					
	D					
	E					
	F					
	G					
	H					
	I					
	J					
	K					
	L					
	M					

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/656,259	Denton, Levaughn
	Examiner	Art Unit
	THANG V TRAN	2688

CPC - Searched*		
Symbol	Date	Examiner

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
CPC: Text Search in Class/Subclass Only (See WEST Search History Printout)	10/25/2020	Tran
USPC: Text Search Only (See WEST Search History Printout)	10/25/2020	Tran
IP.com Search (See IP.com Search History Printout)	10/25/2020	Tran

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/656,259	Denton, Levaughn
	Examiner	**Art Unit**
	THANG V TRAN	2688

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

CLAIMS

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	06/09/2020	10/25/2020							
	1	✓	✓							
	2	✓	✓							
	3	✓	✓							
	4	✓	✓							
	5	✓	✓							
	6	✓	✓							
	7	✓	✓							
	8	✓	✓							
	9	✓	✓							
	10	✓	✓							
	11	✓	✓							
	12	✓	✓							
	13	✓	✓							
	14	✓	✓							
	15	✓	✓							
	16	✓	✓							
	17	✓	✓							
	18	✓	✓							
	19	✓	✓							
	20	✓	✓							
	21		✓							
	22		✓							
	23		✓							
	24		✓							

WEST Search History

Hide Items | Restore | Clear | Close

DATE: Sunday, October 25, 2020

Hide?	Set Name	Query	Hit Count
Prior Art			
DB=PGPB,USPT,USOC; PLUR=YES; OP=OR			
☐	L38	Denton near2 Levaughn	8
☐	L31	(L1 same L6 same L23) and ((H04R$ H04S$ H04W$ H04L$ H04N$ G06F$ G10L$ H04B$).CPC.)	28
☐	L30	L25 and ((H04R$ H04S$ H04W$ H04L$ H04N$ G06F$ G10L$ H04B$).CPC.)	25
☐	L29	L24 and ((H04R$ H04S$ H04W$ H04L$ H04N$ G06F$ G10L$ H04B$).CPC.)	45
☐	L28	L16 and ((H04R$ H04S$ H04W$ H04L$ H04N$ G06F$ G10L$ H04B$).CPC.)	79
☐	L27	L13 and ((H04R$ H04S$ H04W$ H04L$ H04N$ G06F$ G10L$ H04B$).CPC.)	24
☐	L26	L12 and ((H04R$ H04S$ H04W$ H04L$ H04N$ G06F$ G10L$ H04B$).CPC.)	4
DB=PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD,FPRS; PLUR=YES; OP=OR			
☐	L25	L7 same L23	48
☐	L24	L23 and L22	68
☐	L23	(L18 or L19) near15 (alert$4 or notification or notify$3 or notifies or indicat$4 or warn$4 or inform$4)	7404
☐	L22	L21 and L20	586
☐	L21	L6 same L19	1877
☐	L20	L6 same L18	2005
☐	L19	L4 near9 (smaller or lower or below or inside or lesser)	68403
☐	L18	L4 near9 (larger or greater or higher or outside)	71258
DB=USPT,PGPB; PLUR=YES; OP=OR			
☐	L17	('20070189544' | '20100119055' | '20100211199' | '20150215701')![pn]	4
DB=PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD,FPRS; PLUR=YES; OP=OR			
☐	L16	L15 and (L8 or L9 or L10)	140
☐	L15	L14 same L7	198
☐	L14	L6 near15 (alert$4 or notification or notify$3 or notifies or indicat$4 or warn$4 or inform$4)	1059
☐	L13	L9 and L7	43
☐	L12	L11 and L7	9
☐	L11	L10 same L9	735
☐	L10	(speaker or loudspeaker or transducer) same (power or battery)	454158
☐	L9	L8 same 47	9288
☐	L8	(receiv$4 or transmit$5 or transmission or transceiv$4 or antenna or wifi or Bluetooth) near5 (audio or sound or voice or acoustic)	1257998
☐	L7	L6 same L3	2643
☐	L6	L5 near9 L4	18343

☐	L5	frequency near3 (audio or sound or voice or acoustic)	375634
☐	L4	(predetermined or reference or preset or threshold) near5 frequency	714134
☐	L3	L2 same L1	376907
☐	L2	(identif$7 or determin$6 or detect$5 or discriminat$5 or extract$4) near5 (audio or sound or voice or acoustic)	772378
☐	L1	(audio or sound or voice or acoustic) near3 (sensor or sensing or detect$4 or collect$4 or captur$4 or microphone or transducer)	903530

Interference

DB=PGPB,USPT; PLUR=YES; OP=OR

☐	L37	(L1 same L6 same L23).clm.	15
☐	L36	L25.clm.	13
☐	L35	(L20 and L21 and L23).clm.	18
☐	L34	(L15 and (L8 or L9 or L10)).clm.	25
☐	L33	(L9 and L7).clm.	1
☐	L32	(L11 and L7).clm.	0

END OF SEARCH HISTORY

Main Concept Text
==========
determining is one or more of the one or more sounds includes a frequency outside of a predetermined threshold; if one or more of the one or more sounds includes the frequency outside of the predetermined threshold, altering the one or more of the one or more sounds so that the frequency does not fall outside of the predetermined threshold; and outputting the one or more sounds on the at least one output device.

(No Concept Modifiers)
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(No Filters)
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Options
=======
De-dup: Extended Family Numbers
Cut-off: None
Sort: Relevance

Content: Patent Publications (164)
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US Patents
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Cuba Applications
Dominican Republic Applications
Ecuador Patents
Ecuador Applications
El Salvador Applications

Guatemala Applications
Honduras Applications
Mexico Patents
Mexico Applications
Nicaragua Patents
Panama Applications
Peru Applications
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Bosnia & Herzegovina Applications
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Bulgaria Applications
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Croatia Applications
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Czech Republic Applications
Czechoslovakia Patents
Czechoslovakia Applications
Denmark Patents
Denmark Applications
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Estonia Applications
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Finland Patents
Finland Applications
France Patents
France Applications
Germany Patents
Germany Applications
Great Britain Patents
Great Britain Applications
Greece Patents
Greece Applications
Hungary Patents
Hungary Applications
Iceland Patents
Iceland Applications
Ireland Patents
Ireland Applications
Italy Patents
Italy Applications
Latvia Patents
Latvia Applications
Lithuania Patents
Lithuania Applications
Luxembourg Patents
Malta Patents
Monaco Patents

Montenegro Patents
Montenegro Applications
Netherlands Patents
Netherlands Applications
Norway Patents
Norway Applications
Poland Patents
Poland Applications
Portugal Patents
Portugal Applications
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Yugoslavia/Serbia and Montenegro Applications
Armenia Patents
Australia Patents
Australia Applications
Cyprus Patents
Gulf Cooperation Council Patents
Hong Kong Patents
India Patents
India Applications
Indonesia Patents
Indonesia Applications
Israel Applications
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Malaysia Patents
Mongolia Patents
New Zealand Patents
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Saudi Arabia Patents
Singapore Patents
Singapore Applications
Taiwan Patents
Taiwan Applications

Tajikistan Patents
Tajikistan Applications
Thailand Applications
Uzbekistan Patents
Vietnam Patents
Algeria Patents
ARIPO Patents
ARIPO Applications
Egypt Patents
Kenya Patents
Malawi Patents
Morocco Patents
Morocco Applications
OAPI Patents
South Africa Patents
Tunisia Applications
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EAPO Patents
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Georgia Patents
Georgia Applications
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Russia Patents
Russia Applications
Turkey Patents
Turkey Applications

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (02-18)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	16656259
Filing Date	2019-10-17
First Named Inventor	Levaughn Denton
Art Unit	2688
Examiner Name	TRAN, THANG V
Attorney Docket Number	2305LD01UTL1USCON2

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	1	20160150338	A1	2016-05-26	Kim et al.	
	2	20150358730	A1	2015-12-10	Kirsch et al.	
	3	20110313555	A1	2011-12-22	Shoham et al.	

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	1							

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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /T.V.T/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16656259
	Filing Date	2019-10-17
	First Named Inventor	Levaughn Denton
	Art Unit	2688
	Examiner Name	TRAN, THANG V
	Attorney Docket Number	2305LD01UTL1USCON2

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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	International Search Report dated September 16, 2020 issued in PCT/US2020/042927.	

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EXAMINER SIGNATURE

Examiner Signature	/THANG V TRAN/	Date Considered	10/25/2020

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16656259
	Filing Date	2019-10-17
	First Named Inventor	Levaughn Denton
	Art Unit	2688
	Examiner Name	TRAN, THANG V
	Attorney Docket Number	2305LD01UTL1USCON2

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/David Postolski/	Date (YYYY-MM-DD)	2020-10-05
Name/Print	David Postolski	Registration Number	67547

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /T.V.T/

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /T.V.T/

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Patent Application of: Levaughn Denton			
Conf. No.:	7312	Group Art Unit:	2688
Appln. No.:	16/656,259	Examiner:	Thang V. Tran
Filing Date:	October 17, 2019	Attorney Docket No.:	2305LD01UTL1USCON2

Title: MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS

RESPONSE TO FINAL OFFICE ACTION

Responsive to the Final Office Action dated October 29, 2020 (hereinafter as "Office Action"), Applicant hereby submits the following Amendment, accompanying remarks, and terminal disclaimer under the After Final Consideration Pilot Program 2.0. If any additional fee is required or has been overpaid, authorization is hereby given to charge/credit the amount of such fee to Deposit Account No. 60-1818. Reconsideration of the application in view of the following response is respectfully requested.

Listing and Amendments to the Claims begins on Page 2 of this paper; and

Remarks/Arguments begin on Page 9 of this paper.

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CLAIM LISTING

This listing of claims will replace all prior versions, and listings, of claims in the Application.

1. (Currently Amended) A system comprising:

a data source;

at least one cluster of at least one computing device, the at least one computing device including:

a sound sensing mechanism, configured to sense a noise; and

~~a wireless transceiver or~~ an electronic bus which is configured to ~~wirelessly~~ transmit and receive data from the data source; and

the data source, in electronic communication with at least one cluster and [[the]] at least one output device,

a memory, containing computer-executable instructions for connecting to the at least one cluster, and varying an output of the at least one output device, providing an interface; and

a processor, for executing the computer-executable instructions, wherein the computer-executable instructions include:

identifying one or more sounds within the noise;

isolating the one or more sounds;

determining if one or more of the one or more sounds includes a frequency outside of a predetermined threshold; and

wherein if one or more of the one or more sounds includes the frequency outside of the predetermined threshold, altering the one or more of the one or more sounds so that the frequency does not fall outside of the predetermined threshold; and

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outputting the one or more sounds on the at least one output device.

2. (Previously Presented) The system as recited in claim 1, further comprising:

an interfacing mechanism, the interfacing mechanism including:

a network adapter, configured to transmit and receive electronic information through both wired and wireless communication; and

at least one input mechanism, configured to:

manipulate the interfacing mechanism; and

vary the output of the at least one output device.

3. (Previously Presented) The system as recited in claim 1, wherein the sound-sensing mechanism is an omnidirectional transducer.

4. (Previously Presented) The system as recited in claim 1, wherein the sound-sensing mechanism is selected from the group consisting of: an ultrasonic transducer; an infrasonic transducer: and a microwave transducer.

5. (Previously Presented) The system as recited in claim 4, wherein the sensed noise includes infrasonic or ultrasonic soundwaves.

6. (Previously Presented) The system as recited in claim 1, wherein the predetermined threshold equates to a frequency determined to pose a risk of harm to a user's hearing capabilities.

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7. (Previously Presented)The system as recited in claim 1, wherein the computer-executable instructions further include: if one or more of the one or more sounds includes the frequency outside of the predetermined threshold, notifying a user, via a notification, that one or more of the one or more sounds includes the frequency outside of the predetermined threshold.

8. (Previously Presented) The system as recited in claim 1, wherein the computer-executable instructions further include steps selected from the group consisting of: panning the sensed noise; and equalizing the sensed noise.

9. (Previously Presented) The system as recited in claim 1, further comprising:

an in-ear device, wherein an audio output of the in-ear device auto-adjusts based on signal energy sensed within a cluster or surrounding clusters.

10. (Previously Presented) The system as recited in claim 1, wherein the altering the one or more of the one or more sounds so that the frequency does not fall outside of the predetermined threshold is performed automatically.

11. (Currently Amended) A method of altering sensed noise prior to outputting the sensed noise, comprising:

providing at least one data source.

providing at least one cluster of at least one computing device, the at least one computing device including:

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a sound sensing mechanism, configured to sense a noise;

~~a wireless transceiver or~~ an electronic bus[[,]] configured to ~~wirelessly~~ transmit and receive data from the data source; and

the data source, in electronic communication the at least one cluster and [[the]] at least one output device,

a memory, containing computer-executable instructions for connecting to the at least one cluster, and varying an output of the at least one output device, providing an interface; and

a processor, for executing the computer-executable instructions;

identifying one or more sounds within the noise;

isolating the one or more sounds;

determining if one or more of the one or more sounds includes a frequency outside of a predetermined threshold; and

wherein if one or more of the one or more sounds includes the frequency outside of the predetermined threshold, altering the one or more of the one or more sounds so that the frequency does not fall outside of the predetermined threshold; and

outputting the one or more sounds on the at least one output device.

12. (Previously Presented) The method as recited in claim 11, wherein the at least one computing device further includes:

an interfacing mechanism, the interfacing mechanism including:

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a network adapter, configured to transmit and receive electronic information through both wired and wireless communication; and

at least one input mechanism, configured to:

manipulate the interfacing mechanism; and

vary the output of the at least one output device.

13. (Previously Presented) The method as recited in claim 11, wherein the sound-sensing mechanism is selected from the group consisting of: an omnidirectional transducer; an ultrasonic transducer; an infrasonic transducer; an electro-optical transducer; and a microwave transducer.

14. (Previously Presented) The method as recited in claim 13, wherein the sensed noise includes infrasonic, ultrasonic, visible, or radio waves.

15. (Previously Presented) The method as recited in claim 11, wherein the predetermined threshold equates to a frequency determined to pose a risk of harm to a user's hearing capabilities.

16. (Previously Presented) The method as recited in claim 11, further comprising:

if one or more of the one or more sounds includes the frequency outside of the predetermined threshold, notifying a user, via a notification, that one or more of the one or more sounds includes the frequency outside of the predetermined threshold.

17. (Previously Presented) The method as recited in claim 11, further comprising:

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panning the sensed noise.

18. (Previously Presented) The method as recited in claim 11, further comprising:

adding one or more audio effects to the sensed noise.

19. (Previously Presented) The method as recited in claim 11, further comprising:

equalizing the sensed noise.

20. (Previously Presented) The method as recited in claim 11, wherein the altering the one or more of the one or more sounds so that the frequency does not fall outside of the predetermined threshold is performed automatically.

21. (Previously Presented) The system of claim 1, further comprising:

the at least one output device, including:

a power source for operating the output device;

a speaker for outputting sound; and

a communication mechanism, for receiving electronic information from the data source; and

a display.

22. (Previously Presented) The system of claim 21, wherein the power source and the display are varied outputs.

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23. (Currently Amended) The method of claim 11, further comprising: the at least one output device, including:

a power source for operating the output device;

a speaker for outputting sound; and

a communication mechanism, for receiving electronic information from the data source; and

a display.

24. (Previously Presented) The method of claim 23, wherein the power source and the display are varied outputs.

25. (New) The system of claim 1, wherein a configured transmission medium comprises a wireless transceiver.

26. (New) The method of claim 11, wherein a configured transmission medium comprises a wireless transceiver.

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APPLICANT ARGUMENTS/REMARKS MADE IN AMENDMENT

This Application has been reviewed in light of the Final Office Action dated October 29, 2020. Claims 1-24 are currently pending in the application, and of those claims, claims 1, 11, and 23 are being amended herein. Moreover, claims 25-26 are being added as new herein. The Examiner's reconsideration of the rejections in view of the following remarks and amendments is respectfully requested.

New Claims

Claims 25-26 are being added as new herein. Applicant asserts that new claims 25-26 contain no new matter, and as such, Applicant respectfully requests entry of new claims 25-26. Moreover, Applicant is instantly submitting the fee for two new dependent claims. If any additional fee is required or has been overpaid, authorization is hereby given to charge/credit the amount of such fee to Deposit Account No. 60-1818.

Rejection under 35 U.S.C. § 112(b)

The examiner rejected claims 1-24 under 35 U.S.C. § 112(b) as allegedly being indefinite for failing to particularly point out and distinctly claim the subject matter regarded as the invention. Specifically, the examiner asserts that the phrase "the at least one output device" in claims 1 and 11 lacks antecedent and that the phrase "claim 1" in claim 23 should be "claim 11." See, Office Action, Page 2.

Without conceding to the merits of this rejection, but in the interest of expediting prosecution, Applicant is instantly amending claims 1, 11, and 23 herein. Applicant asserts that such amendments to claims 1, 11, and 23 add no new matter. As such, Applicant respectfully

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requests entry of the amendments to claims 1, 11, and 23. Since these amendments to claims 1, 11, and 23 address and overcome the rejection of claims 1, 11, and 23 under 35 U.S.C. § 112(b), withdrawal of the rejection of claims 1, 11, and 23 under 35 U.S.C. § 112(b) is respectfully requested. As such, Applicant asserts that claims 1, 11, and 23 are in condition for allowance.

Since claims 2-10 depend from independent claim 1 and claims 12-22 and 24 depend from independent claim 21, respectively, which Applicant has argued *supra* to be definite under 35 U.S.C. § 112(b), Applicant maintains that dependent claims 2-10, 12-22, and 24 are likewise definite under 35 U.S.C. § 112(b). Thus, dependent claims 2-10, 12-22, and 24 are also in condition for allowance. Favorable action on these claims is respectfully requested.

Non-Statutory Double-Patenting Rejection

The examiner rejected claims 1-20 on the ground of non-statutory double patenting as allegedly being unpatentable over claims 1-20 of U.S. Patent No. 10,656906 B2. Moreover, the examiner rejected claims 21-24 on the ground of non-statutory double patenting as allegedly being unpatentable over claims 1 and 11 of U.S. Patent No. 10,656906 B2. See, Office Action, Page 4.

Without conceding to the merits of this rejection, but in the interest of expediting prosecution, Applicant is filing a terminal disclaimer accompanied by a terminal disclaimer fee (in accordance with 37 CFR 1.20(d)) with this response. Applicant asserts that the terminal disclaimer is in compliance with 37 CFR 1.321(b)-(d), MPEP 717.02, and MPEP 2159. As such, Applicant requests withdraw of the non-statutory double patenting rejection of claims 1-24. Favorable action on these claims is respectfully requested.

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Allowable Subject Matter

The examiner acknowledged claims 1-24 as allowable if a proper terminal disclaimer in compliance with 37 CFR 1.321(c) or (d) is timely filed and used to overcome an actual or provisional rejection based on non-statutory double patenting set forth in this Office Action. See, Office Action, Pages 4-5.

Applicant appreciates this acknowledgement of allowable subject matter. Moreover, in view of the amendments made to the claims instantly herein and the terminal disclaimer filed with this response, Applicant asserts that claims 1-24 are in condition for allowance. Notice to that effect is respectfully requested.

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Conclusion

It is submitted that all of the Examiner's rejections have been responded to and addressed. Applicant respectfully submits that the amendments and arguments presented above place the application in condition for allowance and therefore, respectfully requests that they be entered into the prosecution and that a Notice of Allowance is issued. However, if any additional fee is required or has been overpaid, authorization is hereby given to charge/credit the amount of such fee to Deposit Account No. 60-1818. If the Examiner has any questions or concerns, they are encouraged to contact the undersigned by phone at 908-273-0700 for further discussions.

Respectfully Submitted,

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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/656,259	Filing Date 10/17/2019	☐ To be Mailed

ENTITY: ☑ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $100 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $460 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	12/16/2020	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 26	Minus	** 20	= 6		x $100 =	600
	Independent (37 CFR 1.16(h))	* 2	Minus	*** 3	= 0		x $480 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	600

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/MONICA D FRANCIS/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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Doc Code: A.NE.AFCP
Document Description: After Final Consideration Pilot Program Request

PTO/SB/434 (05-13)

CERTIFICATION AND REQUEST FOR CONSIDERATION UNDER THE AFTER FINAL CONSIDERATION PILOT PROGRAM 2.0

Practitioner Docket No.:	Application No.:	Filing Date:
2305LD01UTL1USCON2	16/656,259	October 17, 2019
First Named Inventor:	**Title:**	
Levaughn Denton	MULTI-FREQUENCYSENSINGMETHOD AND APPARATUSUSING MOBILE-CLUSTERS	

APPLICANT HEREBY CERTIFIES THE FOLLOWING AND REQUESTS CONSIDERATION UNDER THE AFTER FINAL CONSIDERATION PILOT PROGRAM 2.0 (AFCP 2.0) OF THE ACCOMPANYING RESPONSE UNDER 37 CFR 1.116.

1. The above-identified application is (i) an original utility, plant, or design nonprovisional application filed under 35 U.S.C. 111(a) [a continuing application (*e.g.*, a continuation or divisional application) is filed under 35 U.S.C. 111(a) and is eligible under (i)], or (ii) an international application that has entered the national stage in compliance with 35 U.S.C. 371(c).
2. The above-identified application contains an outstanding final rejection.
3. Submitted herewith is a response under 37 CFR 1.116 to the outstanding final rejection. The response includes an amendment to at least one independent claim, and the amendment does not broaden the scope of the independent claim in any aspect.
4. This certification and request for consideration under AFCP 2.0 is the only AFCP 2.0 certification and request filed in response to the outstanding final rejection.
5. Applicant is willing and available to participate in any interview requested by the examiner concerning the present response.
6. This certification and request is being filed electronically using the Office's electronic filing system (EFS-Web).
7. Any fees that would be necessary consistent with current practice concerning responses after final rejection under 37 CFR 1.116, *e.g.*, extension of time fees, are being concurrently filed herewith. [There is no additional fee required to request consideration under AFCP 2.0.]
8. By filing this certification and request, applicant acknowledges the following:
   - Reissue applications and reexamination proceedings are not eligible to participate in AFCP 2.0.
   - The examiner will verify that the AFCP 2.0 submission is compliant, *i.e.*, that the requirements of the program have been met (see items 1 to 7 above). For compliant submissions:
     - The examiner will review the response under 37 CFR 1.116 to determine if additional search and/or consideration (i) is necessitated by the amendment and (ii) could be completed within the time allotted under AFCP 2.0. If additional search and/or consideration is required but cannot be completed within the allotted time, the examiner will process the submission consistent with current practice concerning responses after final rejection under 37 CFR 1.116, *e.g.*, by mailing an advisory action.
     - If the examiner determines that the amendment does not necessitate additional search and/or consideration, or if the examiner determines that additional search and/or consideration is required and could be completed within the allotted time, then the examiner will consider whether the amendment places the application in condition for allowance (after completing the additional search and/or consideration, if required). If the examiner determines that the amendment does not place the application in condition for allowance, then the examiner will contact the applicant and request an interview.
       - The interview will be conducted by the examiner, and if the examiner does not have negotiation authority, a primary examiner and/or supervisory patent examiner will also participate.
       - If the applicant declines the interview, or if the interview cannot be scheduled within ten (10) calendar days from the date that the examiner first contacts the applicant, then the examiner will proceed consistent with current practice concerning responses after final rejection under 37 CFR 1.116.

Signature	Date
/David Postolski/	December 16, 2020
Name (Print/Typed) David Postolski	**Practitioner Registration No.** 67547

***Note**: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. Submit multiple forms if more than one signature is required, see below*.*

☑ * Total of 1 forms are submitted.

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The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

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TERMINAL DISCLAIMER TO OBVIATE A DOUBLE PATENTING REJECTION OVER A "PRIOR" PATENT	Docket Number (Optional) 2305LD01UTL1USCON2

In re Application of: Levaughn Denton

Application No.: 16/656,259

Filed: October 17, 2019

For: MULTI-FREQUENCYSENSINGMETHOD AND APPARATUSUSING MOBILE-CLUSTERS

The applicant, Levaughn Denton, owner of 100 percent interest in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of **prior patent** No. 10656906 as the term of said **prior patent** is presently shortened by any terminal disclaimer. The applicant hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and the **prior patent** are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

In making the above disclaimer, the applicant does not disclaim the terminal part of the term of any patent granted on the instant application that would extend to the expiration date of the full statutory term of the **prior patent**, "as the term of said **prior patent** is presently shortened by any terminal disclaimer," in the event that said **prior patent** later:

expires for failure to pay a maintenance fee;
is held unenforceable;
is found invalid by a court of competent jurisdiction;
is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321;
has all claims canceled by a reexamination certificate;
is reissued; or
is in any manner terminated prior to the expiration of its full statutory term as presently shortened by any terminal disclaimer.

Check either box 1 or 2 below, if appropriate.

1. ☐ The undersigned is the applicant. If the applicant is an assignee, the undersigned is authorized to act on behalf of the assignee.

I hereby acknowledge that any willful false statements made are punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

2. ☑ The undersigned is an attorney or agent of record. Reg. No. 67547

/David Postolski/ — Signature
December 16, 2020 — Date

David Postolski — Typed or printed name

Attorney of Record — Title
908-273-0700 — Telephone Number

☑ Terminal disclaimer fee under 37 CFR 1.20(d) included.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

This collection of information is required by 37 CFR 1.321. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Patent Application of: Levaughn Denton			
Conf. No.:	7312	Group Art Unit:	2688
Appln. No.:	16/656,259	Examiner:	Thang V. Tran
Filing Date:	October 17, 2019	Attorney Docket No.:	2305LD01UTL1USCON2

Title: MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS

RESPONSE TO FINAL OFFICE ACTION

Responsive to the Final Office Action dated October 29, 2020 (hereinafter as "Office Action"), Applicant hereby submits the following Amendment, accompanying remarks, and terminal disclaimer under the After Final Consideration Pilot Program 2.0. If any additional fee is required or has been overpaid, authorization is hereby given to charge/credit the amount of such fee to Deposit Account No. 60-1818. Reconsideration of the application in view of the following response is respectfully requested.

Listing and Amendments to the Claims begins on Page 2 of this paper; and

Remarks/Arguments begin on Page 9 of this paper.

CLAIM LISTING

This listing of claims will replace all prior versions, and listings, of claims in the Application.

1. (Currently Amended) A system comprising:

a data source;

at least one cluster of at least one computing device, the at least one computing device including:

a sound sensing mechanism, configured to sense a noise; and

~~a wireless transceiver or~~ an electronic bus which is configured to ~~wirelessly~~ transmit and receive data from the data source; and

the data source, in electronic communication with at least one cluster and [[the]] at least one output device,

a memory, containing computer-executable instructions for connecting to the at least one cluster, and varying an output of the at least one output device, providing an interface; and

a processor, for executing the computer-executable instructions, wherein the computer-executable instructions include:

identifying one or more sounds within the noise;

isolating the one or more sounds;

determining if one or more of the one or more sounds includes a frequency outside of a predetermined threshold; and

wherein if one or more of the one or more sounds includes the frequency outside of the predetermined threshold, altering the one or more of the one or more sounds so that the frequency does not fall outside of the predetermined threshold; and

outputting the one or more sounds on the at least one output device.

2. (Previously Presented) The system as recited in claim 1, further comprising:

an interfacing mechanism, the interfacing mechanism including:

a network adapter, configured to transmit and receive electronic information through both wired and wireless communication; and

at least one input mechanism, configured to:

manipulate the interfacing mechanism; and

vary the output of the at least one output device.

3. (Previously Presented) The system as recited in claim 1, wherein the sound-sensing mechanism is an omnidirectional transducer.

4. (Previously Presented) The system as recited in claim 1, wherein the sound-sensing mechanism is selected from the group consisting of: an ultrasonic transducer; an infrasonic transducer: and a microwave transducer.

5. (Previously Presented) The system as recited in claim 4, wherein the sensed noise includes infrasonic or ultrasonic soundwaves.

6. (Previously Presented) The system as recited in claim 1, wherein the predetermined threshold equates to a frequency determined to pose a risk of harm to a user's hearing capabilities.

7. (Previously Presented)The system as recited in claim 1, wherein the computer-executable instructions further include: if one or more of the one or more sounds includes the frequency outside of the predetermined threshold, notifying a user, via a notification, that one or more of the one or more sounds includes the frequency outside of the predetermined threshold.

8. (Previously Presented) The system as recited in claim 1, wherein the computer-executable instructions further include steps selected from the group consisting of: panning the sensed noise; and equalizing the sensed noise.

9. (Previously Presented) The system as recited in claim 1, further comprising:

an in-ear device, wherein an audio output of the in-ear device auto-adjusts based on signal energy sensed within a cluster or surrounding clusters.

10. (Previously Presented) The system as recited in claim 1, wherein the altering the one or more of the one or more sounds so that the frequency does not fall outside of the predetermined threshold is performed automatically.

11. (Currently Amended) A method of altering sensed noise prior to outputting the sensed noise, comprising:

providing at least one data source.

providing at least one cluster of at least one computing device, the at least one computing device including:

a sound sensing mechanism, configured to sense a noise;

~~a wireless transceiver or~~ an electronic bus[[,]] configured to ~~wirelessly~~ transmit and receive data from the data source; and

the data source, in electronic communication the at least one cluster and [[the]] at least one output device,

a memory, containing computer-executable instructions for connecting to the at least one cluster, and varying an output of the at least one output device, providing an interface; and

a processor, for executing the computer-executable instructions;

identifying one or more sounds within the noise;

isolating the one or more sounds;

determining if one or more of the one or more sounds includes a frequency outside of a predetermined threshold; and

wherein if one or more of the one or more sounds includes the frequency outside of the predetermined threshold, altering the one or more of the one or more sounds so that the frequency does not fall outside of the predetermined threshold; and

outputting the one or more sounds on the at least one output device.

12. (Previously Presented) The method as recited in claim 11, wherein the at least one computing device further includes:

an interfacing mechanism, the interfacing mechanism including:

a network adapter, configured to transmit and receive electronic information through both wired and wireless communication; and

at least one input mechanism, configured to:

manipulate the interfacing mechanism; and

vary the output of the at least one output device.

13. (Previously Presented) The method as recited in claim 11, wherein the sound-sensing mechanism is selected from the group consisting of: an omnidirectional transducer; an ultrasonic transducer; an infrasonic transducer; an electro-optical transducer; and a microwave transducer.

14. (Previously Presented) The method as recited in claim 13, wherein the sensed noise includes infrasonic, ultrasonic, visible, or radio waves.

15. (Previously Presented) The method as recited in claim 11, wherein the predetermined threshold equates to a frequency determined to pose a risk of harm to a user's hearing capabilities.

16. (Previously Presented) The method as recited in claim 11, further comprising:

if one or more of the one or more sounds includes the frequency outside of the predetermined threshold, notifying a user, via a notification, that one or more of the one or more sounds includes the frequency outside of the predetermined threshold.

17. (Previously Presented) The method as recited in claim 11, further comprising:

panning the sensed noise.

18. (Previously Presented) The method as recited in claim 11, further comprising:

adding one or more audio effects to the sensed noise.

19. (Previously Presented) The method as recited in claim 11, further comprising:

equalizing the sensed noise.

20. (Previously Presented) The method as recited in claim 11, wherein the altering the one or more of the one or more sounds so that the frequency does not fall outside of the predetermined threshold is performed automatically.

21. (Previously Presented) The system of claim 1, further comprising:

the at least one output device, including:

a power source for operating the output device;

a speaker for outputting sound; and

a communication mechanism, for receiving electronic information from the data source; and

a display.

22. (Previously Presented) The system of claim 21, wherein the power source and the display are varied outputs.

23. (Currently Amended) The method of claim 11, further comprising: the at least one output device, including:

a power source for operating the output device;

a speaker for outputting sound; and

a communication mechanism, for receiving electronic information from the data source; and

a display.

24. (Previously Presented) The method of claim 23, wherein the power source and the display are varied outputs.

25. (New) The system of claim 1, wherein a configured transmission medium comprises a wireless transceiver.

26. (New) The method of claim 11, wherein a configured transmission medium comprises a wireless transceiver.

APPLICANT ARGUMENTS/REMARKS MADE IN AMENDMENT

This Application has been reviewed in light of the Final Office Action dated October 29, 2020. Claims 1-24 are currently pending in the application, and of those claims, claims 1, 11, and 23 are being amended herein. Moreover, claims 25-26 are being added as new herein. The Examiner's reconsideration of the rejections in view of the following remarks and amendments is respectfully requested.

New Claims

Claims 25-26 are being added as new herein. Applicant asserts that new claims 25-26 contain no new matter, and as such, Applicant respectfully requests entry of new claims 25-26. Moreover, Applicant is instantly submitting the fee for two new dependent claims. If any additional fee is required or has been overpaid, authorization is hereby given to charge/credit the amount of such fee to Deposit Account No. 60-1818.

Rejection under 35 U.S.C. § 112(b)

The examiner rejected claims 1-24 under 35 U.S.C. § 112(b) as allegedly being indefinite for failing to particularly point out and distinctly claim the subject matter regarded as the invention. Specifically, the examiner asserts that the phrase "the at least one output device" in claims 1 and 11 lacks antecedent and that the phrase "claim 1" in claim 23 should be "claim 11." See, Office Action, Page 2.

Without conceding to the merits of this rejection, but in the interest of expediting prosecution, Applicant is instantly amending claims 1, 11, and 23 herein. Applicant asserts that such amendments to claims 1, 11, and 23 add no new matter. As such, Applicant respectfully

requests entry of the amendments to claims 1, 11, and 23. Since these amendments to claims 1, 11, and 23 address and overcome the rejection of claims 1, 11, and 23 under 35 U.S.C. § 112(b), withdrawal of the rejection of claims 1, 11, and 23 under 35 U.S.C. § 112(b) is respectfully requested. As such, Applicant asserts that claims 1, 11, and 23 are in condition for allowance.

Since claims 2-10 depend from independent claim 1 and claims 12-22 and 24 depend from independent claim 21, respectively, which Applicant has argued *supra* to be definite under 35 U.S.C. § 112(b), Applicant maintains that dependent claims 2-10, 12-22, and 24 are likewise definite under 35 U.S.C. § 112(b). Thus, dependent claims 2-10, 12-22, and 24 are also in condition for allowance. Favorable action on these claims is respectfully requested.

Non-Statutory Double-Patenting Rejection

The examiner rejected claims 1-20 on the ground of non-statutory double patenting as allegedly being unpatentable over claims 1-20 of U.S. Patent No. 10,656906 B2. Moreover, the examiner rejected claims 21-24 on the ground of non-statutory double patenting as allegedly being unpatentable over claims 1 and 11 of U.S. Patent No. 10,656906 B2. See, Office Action, Page 4.

Without conceding to the merits of this rejection, but in the interest of expediting prosecution, Applicant is filing a terminal disclaimer accompanied by a terminal disclaimer fee (in accordance with 37 CFR 1.20(d)) with this response. Applicant asserts that the terminal disclaimer is in compliance with 37 CFR 1.321(b)-(d), MPEP 717.02, and MPEP 2159. As such, Applicant requests withdraw of the non-statutory double patenting rejection of claims 1-24. Favorable action on these claims is respectfully requested.

Allowable Subject Matter

The examiner acknowledged claims 1-24 as allowable if a proper terminal disclaimer in compliance with 37 CFR 1.321(c) or (d) is timely filed and used to overcome an actual or provisional rejection based on non-statutory double patenting set forth in this Office Action. See, Office Action, Pages 4-5.

Applicant appreciates this acknowledgement of allowable subject matter. Moreover, in view of the amendments made to the claims instantly herein and the terminal disclaimer filed with this response, Applicant asserts that claims 1-24 are in condition for allowance. Notice to that effect is respectfully requested.

Conclusion

It is submitted that all of the Examiner's rejections have been responded to and addressed. Applicant respectfully submits that the amendments and arguments presented above place the application in condition for allowance and therefore, respectfully requests that they be entered into the prosecution and that a Notice of Allowance is issued. However, if any additional fee is required or has been overpaid, authorization is hereby given to charge/credit the amount of such fee to Deposit Account No. 60-1818. If the Examiner has any questions or concerns, they are encouraged to contact the undersigned by phone at 908-273-0700 for further discussions.

Respectfully Submitted,

/David Postolski/
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Electronic Patent Application Fee Transmittal

Application Number:	16656259
Filing Date:	17-Oct-2019
Title of Invention:	MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS
First Named Inventor/Applicant Name:	Levaughn Denton
Filer:	David D. Postolski/Ashley Sperbeck
Attorney Docket Number:	2305LD01UTL1USCON2

Filed as Micro Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
CLAIMS IN EXCESS OF 20	3202	2	25	50
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
STATUTORY OR TERMINAL DISCLAIMER	3814	1	170	170
		Total in USD ($)		**220**

Electronic Acknowledgement Receipt	
EFS ID:	41401449
Application Number:	16656259
International Application Number:	
Confirmation Number:	7312
Title of Invention:	MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS
First Named Inventor/Applicant Name:	Levaughn Denton
Customer Number:	75207
Filer:	David D. Postolski/Ashley Sperbeck
Filer Authorized By:	David D. Postolski
Attorney Docket Number:	2305LD01UTL1USCON2
Receipt Date:	16-DEC-2020
Filing Date:	17-OCT-2019
Time Stamp:	12:14:28
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$220
RAM confirmation Number	E2020BFC15103341
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	After Final Consideration Program Request	2305LD01UTL1USCON2_AFCP_Form.pdf	226786 20c89763601352acd33bbc2d847827befa7b593c	no	2
Warnings:					
Information:					
2	Terminal Disclaimer Filed	2305LD01UTL1USCON2_TD.pdf	166222 ce931db7a94b22d9287c1a4f5db982f52f188e96	no	2
Warnings:					
Information:					
3		2305LD01UTL1USCON2_Response.pdf	121032 789af75c49f5410d6a4e9c39da9ceeb121b8ca18	yes	12

Multipart Description/PDF files in .zip description

Document Description	Start	End
Response After Final Action	1	1
Claims	2	8
Applicant Arguments/Remarks Made in an Amendment	9	12

Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	32483 a4fc5dba731ceef3332beb51bd289a698346f78e	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	546523		

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If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (02-18)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**		
	Application Number	16656259
	Filing Date	2019-10-17
	First Named Inventor	Levaughn Denton
	Art Unit	2688
	Examiner Name	TRAN, THANG V
	Attorney Docket Number	2305LD01UTL1USCON2

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	10127005	B2	2018-11-13	Denton	
	2	10656906	B2	2020-05-19	Denton	
	3	8645993	B2	2014-02-04	Perry	

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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20150281853	A1	2015-10-01	Eisner et al.	
	2					
	3					

EFS Web 2.1.18

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16656259
	Filing Date	2019-10-17
	First Named Inventor	Levaughn Denton
	Art Unit	2688
	Examiner Name	TRAN, THANG V
	Attorney Docket Number	2305LD01UTL1USCON2

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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1							

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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
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EXAMINER SIGNATURE

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16656259
	Filing Date	2019-10-17
	First Named Inventor	Levaughn Denton
	Art Unit	2688
	Examiner Name	TRAN, THANG V
	Attorney Docket Number	2305LD01UTL1USCON2

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☒ See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/David Postolski/	Date (YYYY-MM-DD)	2020-12-17
Name/Print	David Postolski	Registration Number	67547

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Patent Application Fee Transmittal

Application Number:	16656259
Filing Date:	17-Oct-2019
Title of Invention:	MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS
First Named Inventor/Applicant Name:	Levaughn Denton
Filer:	David D. Postolski/Kristin Bennett
Attorney Docket Number:	2305LD01UTL1USCON2

Filed as Micro Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
SUBMISSION- INFORMATION DISCLOSURE STMT	3806	1	65	65
		Total in USD ($)		**65**

Electronic Acknowledgement Receipt	
EFS ID:	41419022
Application Number:	16656259
International Application Number:	
Confirmation Number:	7312
Title of Invention:	MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS
First Named Inventor/Applicant Name:	Levaughn Denton
Customer Number:	75207
Filer:	David D. Postolski/Kristin Bennett
Filer Authorized By:	David D. Postolski
Attorney Docket Number:	2305LD01UTL1USCON2
Receipt Date:	17-DEC-2020
Filing Date:	17-OCT-2019
Time Stamp:	15:04:53
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$65
RAM confirmation Number	E2020BGF06002062
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	2305LD01UTL1USCON2_IDS_Transmittal.pdf	119857 23a079c178432b6721cab1278f59c278354e8d6f	no	2
Warnings:					
Information:					
2	Information Disclosure Statement (IDS) Form (SB08)	2305LD01UTL1USCON2_IDS_SB_08.pdf	1034379 d5a0c1da6bc567516e3385a880c421ae3dc8c4f1	no	4
Warnings:					
Information:					
A U.S. Publication Number Citation is required in the Information Disclosure Statement (IDS) form. You may remove the form to add the required data in order to correct the Informational Message or if you chose not to, the image of the form will be processed and be made available within the Image File Wrapper (IFW) system. However, no data will be extracted from this form. Any additional data such as Foreign Patent Documents or Non Patent Literature will be manually reviewed and keyed into USPTO systems.					
3	Fee Worksheet (SB06)	fee-info.pdf	30544 39a925200a74992e0d689150e2e49eaa193521cf	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	1184780		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Patent Application of: Levaughn Denton			
Conf. No.:	7312	Group Art Unit:	2688
Appln. No.:	16/656,259	Examiner:	TRAN, THANG V
Filing Date:	10-17-2019	Attorney Docket No.:	2305LD01UTL1USCON2

Title: MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS

INFORMATION DISCLOSURE STATEMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Pursuant to 37 CFR §1.56, the attention of the Patent and Trademark Office is hereby directed to the reference(s) listed on the attached PTO-1449. Unless otherwise indicated herein, one copy of each reference is attached. It is respectfully requested that the information be expressly considered during the prosecution of this application, and that the reference(s) be made of record therein and appear among the "References Cited" on any patent to issue therefrom.

☑ 1. This Information Disclosure Statement is being filed more than three months after the U.S. filing date and after the mailing date of a Final Rejection, Notice of Allowance, or other action that closes prosecution (e.g., Quayle Action), but on or before payment of the Issue Fee. The fees associated with this filing under 37 C.F.R. §1.17(p) are being paid electronically with this filing. The Commissioner is hereby authorized to charge any additional fee (or credit any overpayment) associated for this filing to Deposit Account No. 601818.

☐ a. I hereby certify that each item of information contained in this Information Disclosure Statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this Information Disclosure Statement. 37 CFR §1.97(e)(1).

☑ b. I hereby certify that no item of information in this Information Disclosure Statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to my knowledge after making reasonable inquiry, no item of information in this Information Disclosure Statement was

known to any individual designated in 37 CFR §1.56(c) more than three months prior to the filing of this Information Disclosure Statement. 37 CFR §1.97(e)(2).

Respectfully submitted;

/David Postolski/

David Postolski, Esq.
Partner
Gearhart Law LLC
41 River Road
Innovation Plaza
Summit, NJ 07901
Reg # 67,547

Date: December 17, 2020

Application Number	Application/Control No.	Applicant(s)/Patent under Reexamination	
* 16/656,259 *	16/656,259	Denton, Levaughn	
	Examiner	**Art Unit**	
	TRAN, THANG V	2688	

Document Code - DISQ	**Internal Document - DO NOT MAIL**

TERMINAL DISCLAIMER	☑ APPROVED	☐ DISAPPROVED
Date Filed: **16 December 2020**	**This patent is subject to a Terminal Disclaimer**	

Approved/Disapproved by:

/LAWANA R HIXON/

Technology Center: OPLC

Telephone: (571)272-6074

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/656,259	10/17/2019	Levaughn Denton	2305LD01UTL1USCON2	7312

75207 7590 12/24/2020

Gearhart Law LLC
41 River Road
Suite 1A
Summit, NJ 07901

EXAMINER
TRAN, THANG V

ART UNIT	PAPER NUMBER
2688	

NOTIFICATION DATE	DELIVERY MODE
12/24/2020	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

eofficeaction@appcoll.com
patent@gearhartlaw.com

Advisory Action Before the Filing of an Appeal Brief	**Application No.** 16/656,259	**Applicant(s)** Denton, Levaughn	
	Examiner THANG V TRAN	**Art Unit** 2688	**AIA (FITF) Status** Yes

--The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

THE REPLY FILED 16 December 2020 FAILS TO PLACE THIS APPLICATION IN CONDITION FOR ALLOWANCE.

NO NOTICE OF APPEAL FILED

1. ☑ The reply was filed after a final rejection. No Notice of Appeal has been filed. To avoid abandonment of this application, applicant must timely file one of the following replies: (1) an amendment, affidavit, or other evidence, which places the application in condition for allowance; (2) a Notice of Appeal (with appeal fee) in compliance with 37 CFR 41.31; or (3) a Request for Continued Examination (RCE) in compliance with 37 CFR 1.114 if this is a utility or plant application. Note that RCEs are not permitted in design applications. The reply must be filed within one of the following time periods:
   a) ☐ The period for reply expires ____ months from the mailing date of the final rejection.
   b) ☑ The period for reply expires on: (1) the mailing date of this Advisory Action; or (2) the date set forth in the final rejection, whichever is later. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of the final rejection.
   c) ☐ A prior Advisory Action was mailed more than 3 months after the mailing date of the final rejection in response to a first after-final reply filed within 2 months of the mailing date of the final rejection.The current period for reply expires ____ months from the mailing date of *the prior Advisory Action* or SIX MONTHS from the mailing date of the final rejection, whichever is earlier.
   Examiner Note: If box 1 is checked, check either box (a), (b) or (c). ONLY CHECK BOX (b) WHEN THIS ADVISORY ACTION IS THE FIRST RESPONSE TO APPLICANTS FIRST AFTER-FINAL REPLY WHICH WAS FILED WITHIN TWO MONTHS OF THE FINAL REJECTION. ONLY CHECK BOX (c) IN THE LIMITED SITUATION SET FORTH UNDER BOX (c). See MPEP 706.07(f).

Extensions of time may be obtained under 37 CFR 1.136(a). The date on which the petition under 37 CFR 1.136(a) and the appropriate extension fee have been filed is the date for purposes of determining the period of extension and the corresponding amount of the fee. The appropriate extension fee under 37 CFR 1.17(a) is calculated from: (1) the expiration date of the shortened statutory period for reply originally set in the final Office action; or (2) as set forth in (b) or (c) above, if checked. Any reply received by the Office later than three months after the mailing date of the final rejection, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

NOTICE OF APPEAL

2. ☐ The Notice of Appeal was filed on _____. A brief in compliance with 37 CFR 41.37 must be filed within two months of the date of filing the Notice of Appeal (37 CFR 41.37(a)), or any extension thereof (37 CFR 41.37(e)), to avoid dismissal of the appeal. Since a Notice of Appeal has been filed, any reply must be filed within the time period set forth in 37CFR 41.37(a).

AMENDMENTS

3. ☑ The proposed amendments filed after a final rejection, but prior to the date of filing a brief, will not be entered because
   a) ☑ They raise new issues that would require further consideration and/or search (see NOTE below);
   b) ☐ They raise the issue of new matter (see NOTE below);
   c) ☑ They are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal; and/or
   d) ☑ They present additional claims without canceling a corresponding number of finally rejected claims.
   NOTE: See Continuation Sheet (See 37CFR 1.116 and 41.33(a)).
4. ☐ The amendments are not in compliance with 37CFR 1.121. See attached Notice of Non-Compliant Amendment (PTOL-324).
5. ☑ Applicants reply has overcome the following rejection(s): The double patenting rejection has overcome by the terminal disclaimer
6. ☐ Newly proposed or amended claim(s) _____ would be allowable if submitted in a separate, timely filed amendment canceling the non-allowable claim(s).
7. ☑ For purposes of appeal, the proposed amendment(s):(a) ☑ will not be entered, or (b) ☐ will be entered, and an explanation of how the new or amended claims would be rejected is provided below or appended.

AFFIDAVIT OR OTHER EVIDENCE

8. ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____
9. ☐ The affidavit or other evidence filed after final action, but before or on the date of filing a Notice of Appeal will not be entered because applicant failed to provide a showing of good and sufficient reasons why the affidavit or other evidence is necessary and was not earlier presented. See 37 CFR 1.116(e).
10. ☐ The affidavit or other evidence filed after the date of filing the Notice of Appeal, but prior to the date of filing a brief, will not be entered because the affidavit or other evidence failed to overcome all rejections under appeal and/or appellant fails to provide a showing of good and sufficient reasons why it is necessary and was not earlier presented. See 37 CFR 41.33(d)(1).
11. ☐ The affidavit or other evidence is entered. An explanation of the status of the claims after entry is below or attached.

REQUEST FOR RECONSIDERATION/OTHER

12. ☑ The request for reconsideration has been considered but does NOT place the application in condition for allowance because: See Continuation Sheet.
13. ☐ Note the attached Information *Disclosure Statement*(s). (PTO/SB/08) Paper No(s). _____
14. ☑ Other: PTO-2323.

STATUS OF CLAIMS

15. The status of the claim(s) is (or will be) as follows:
    Claim(s) allowed:_____.
    Claim(s) objected to:_____.
    Claim(s) rejected:1-12.
    Claim(s) withdrawn from consideration:_____.

/THANG V TRAN/ Primary Examiner, Art Unit 2688	

Continuation of 3. NOTE: Newly amended claims 1 and 11 raise new issues that would change the scope of the invention previously prosecuted and newly added claims 25 and 26 raise new 112(b) problem due to their structural interconnection with features recited in their respective base claim, and thus newly amended claims 1 and 11 and newly added claims 25 and 26 would require further consideration and search.

Continuation of REQUEST FOR RECONSIDERATION/OTHER 12. The request for reconsideration has been considered but does NOT place the application in condition for allowance because: the new issues and the 112(b) problem raised in the claims, and time require for further consideration and search cannot be performed within the time permitted under guidelines of the pilot program. Therefore, this application cannot be placed in condition for allowance at this time.

AFCP 2.0 Decision

Application No.	Applicant(s)	
16/656,259	Denton, Levaughn	
Examiner	**Art Unit**	**AIA (FITF) Status**
THANG V TRAN	2688	Yes

This is in response to the After Final Consideration Pilot request filed 16 December 2020.

1. **Improper Request** – The AFCP 2.0 request is improper for the following reason(s) and the after final amendment submitted with the request will be treated under pre-pilot procedure.

   ☐ An AFCP 2.0 request form PTO/SB/434 (or equivalent document) was not submitted.

   ☑ A non-broadening amendment to at least one independent claim was not submitted.

   ☐ The request is not the first proper AFCP 2.0 request submitted in response to the most recent final rejection.

   ☐ Other: _____

2. **Proper Request**

   A. After final amendment submitted with the request will not be treated under AFCP 2.0.
   The after final amendment cannot be reviewed and a search conducted within the guidelines of the pilot program.

   ☐ The after final amendment will be treated under pre-pilot procedure.

   B. Updated search and/or completed additional consideration.
   The examiner performed an updated search and/or completed additional consideration of the after final amendment within the time authorized for the pilot program. The result(s) of the updated search and/or completed additional consideration are:

   ☐ 1. All of the rejections in the most recent final Office action are overcome and a Notice of Allowance is issued herewith.

   ☐ 2. The after final amendment would not overcome all of the rejections in the most recent final Office action . See attached interview summary for further details.

   ☐ 3. The after final amendment was reviewed, and it raises a new issue(s). See attached interview summary for further details.

   ☐ 4. The after final amendment raises new issues, but would overcome all of the rejections in the most recent final Office action. A decision on determining allowability could not be made within the guidelines of the pilot. See attached interview summary for further details, including any newly discovered prior art.

   ☐ 5. Other: _____

   Examiner Note: Please attach an interview summary when necessary as described above.

DO NOT ENTER: /T.V.T/

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Patent Application of: Levaughn Denton			
Conf. No.:	7312	Group Art Unit:	2688
Appln. No.:	16/656,259	Examiner:	Thang V. Tran
Filing Date:	October 17, 2019	Attorney Docket No.:	2305LD01UTL1USCON2

Title: MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS

DO NOT ENTER: /T.V.T/

RESPONSE TO FINAL OFFICE ACTION

Responsive to the Final Office Action dated October 29, 2020 (hereinafter as "Office Action"), Applicant hereby submits the following Amendment, accompanying remarks, and terminal disclaimer under the After Final Consideration Pilot Program 2.0. If any additional fee is required or has been overpaid, authorization is hereby given to charge/credit the amount of such fee to Deposit Account No. 60-1818. Reconsideration of the application in view of the following response is respectfully requested.

Listing and Amendments to the Claims begins on Page 2 of this paper; and

Remarks/Arguments begin on Page 9 of this paper.

Doc code: RCEX
Doc description: Request for Continued Examination (RCE)

PTO/SB/30EFS (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL
(Submitted Only via EFS-Web)

Application Number	16/656,259	Filing Date	2019-10-17	Docket Number (if applicable)	2305LD01UTL1USCON2	Art Unit	2688
First Named Inventor	Levaughn Denton			Examiner Name	Thang V. Tran		

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV

SUBMISSION REQUIRED UNDER 37 CFR 1.114

Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

☒ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____

☒ Other Response after final action submitted on December 16, 2020

☐ Enclosed

☐ Amendment/Reply

☐ Information Disclosure Statement (IDS)

☐ Affidavit(s)/ Declaration(s)

☐ Other _____

MISCELLANEOUS

☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months _____
(Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

☐ Other _____

FEES

☒ **The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.**
The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No 601818

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

X Patent Practitioner Signature

Applicant Signature

PTO/SB/30EFS (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Signature of Registered U.S. Patent Practitioner			
Signature	/David Postolski/	Date (YYYY-MM-DD)	2021-01-08
Name	David Postolski	Registration Number	67547

This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Patent Application Fee Transmittal

Application Number:	16656259
Filing Date:	17-Oct-2019
Title of Invention:	MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS
First Named Inventor/Applicant Name:	Levaughn Denton
Filer:	David D. Postolski/Ashley Sperbeck
Attorney Docket Number:	2305LD01UTL1USCON2

Filed as Micro Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
RCE- 1ST REQUEST	3801	1	340	340
		Total in USD ($)		**340**

Electronic Acknowledgement Receipt	
EFS ID:	41591146
Application Number:	16656259
International Application Number:	
Confirmation Number:	7312
Title of Invention:	MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS
First Named Inventor/Applicant Name:	Levaughn Denton
Customer Number:	75207
Filer:	David D. Postolski/Ashley Sperbeck
Filer Authorized By:	David D. Postolski
Attorney Docket Number:	2305LD01UTL1USCON2
Receipt Date:	08-JAN-2021
Filing Date:	17-OCT-2019
Time Stamp:	11:06:26
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$340
RAM confirmation Number	E202118B07144288
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Request for Continued Examination (RCE)	2305LD01UTL1USCON2_RCE.pdf	697646 d7de781ca323f1192faafd3470d65235ba5e6334	no	3
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30771 8b3500e7d7f7dc287346d09a81c2b89a7a156170	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	728417		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/656,259	Filing Date 10/17/2019	☐ To be Mailed

ENTITY: ☑ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $100 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $460 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	01/08/2021	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 26	Minus	** 26	= 0		x $100 =	0
	Independent (37 CFR 1.16(h))	* 2	Minus	*** 3	= 0		x $480 =	0
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	0

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/VINCENT S BUTLER/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/656,259	10/17/2019	Levaughn Denton	2305LD01UTL1USCON2	7312

75207 7590 01/19/2021

Gearhart Law LLC
41 River Road
Suite 1A
Summit, NJ 07901

EXAMINER
TRAN, THANG V

ART UNIT	PAPER NUMBER
2688	

NOTIFICATION DATE	DELIVERY MODE
01/19/2021	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

eofficeaction@appcoll.com
patent@gearhartlaw.com

Office Action Summary	Application No. 16/656,259	Applicant(s) Denton, Levaughn	
	Examiner THANG V TRAN	Art Unit 2688	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on 01/08/2021.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL.** 2b) ☑ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 1-26 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 1-26 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☑ The drawing(s) filed on 09/16/2020 is/are: a)☑ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☑ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

Notice of Pre-AIA or AIA Status

1. The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Continued Examination Under 37 CFR 1.114

2. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 12/16/2020 has been entered.

Claim Rejections - 35 USC § 112

3. The following is a quotation of 35 U.S.C. 112(b):
(b) CONCLUSION.—The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention.

The following is a quotation of 35 U.S.C. 112 (pre-AIA), second paragraph:
The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 1-26 are rejected under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the inventor or a joint inventor (or for applications subject to pre-AIA 35 U.S.C. 112, the applicant), regards as the invention.

In claim 1:

The statement "determining if one or more of the one or more sounds", line 16, is unclear as to whether "the one or more sounds" is the one or more sounds identified by identifying step, line 14, or the one or more sounds isolated by isolating step, line 15.

The above statement should be replaced with --determining if one or more of the isolated one or more sounds--.

The term “the one or more sounds”, lines 18, 19 and 21 recited in this claim should also be changed to --the isolated one or more sounds--.

The statement “a memory, containing computer-executable instructions for connecting to the at least one cluster, and varying an output of the at least one output device, providing an interface”, lines 10-11, is confusing because it is unclear how the instructions for connecting to the at least one cluster, and varying an output of the at least one output device, providing an interface.

Did applicant intend to recite claim 1 as follows or similar thereto?

1. (Suggestion) A system comprising:

a data source;

~~at least one cluster of~~ at least one computing device, the at least one computing device including:

at least one cluster of a sound;

sensing mechanism[[,]] configured to sense a noise; and

an electronic bus which is configured to transmit and receive data from the data source; ~~and~~

wherein the data source, in electronic communication with at least one cluster and at least one output device,

a memory[[,]] containing computer-executable instructions ~~for connecting to the at least one cluster, and varying an output of the at least one output device, providing an interface~~; and

a processor~~, for executing~~ configured to execute the computer-executable instructions to cause the processor to perform functions including ~~, wherein the computer-executable instructions include~~:

identifying one or more sounds within the noise;

isolating the one or more sounds;

determining if one or more of the isolated one or more sounds includes a frequency outside of a predetermined threshold; and

wherein if one or more of the isolated one or more sounds includes the frequency outside of the predetermined threshold, altering the isolated one or more of the one or more sounds so that the frequency does not fall outside of the predetermined threshold; and

outputting the isolated one or more sounds on the at least one output device.

In claim 2:

The claim further comprises an interfacing mechanism, lines 2-7, but it is unclear how this interfacing mechanism is structurally connected and/or relatively operated with limitations/features early recited in its parent claim 1.

Did applicant intend to recite claim 2 as follows or similar thereto?

2. (Suggestion) The system as recited in claim 1, further comprising:

an interfacing mechanism, the interfacing mechanism including:

a network adapter, configured to transmit and receive ~~electronic information~~ the data through both wired and wireless communication; and

at least one input mechanism, configured to:

manipulate the interfacing mechanism; and

vary the output of the at least one output device.

In claim 7:

The term "the one or more sounds", lines 2 and 4, should be changed to --the isolated one or more sounds--. Otherwise, the term is unclear for similar reason early stated in claim 1.

In claim 9:

The claim further comprises an in-ear device, lines 2-3, but it is unclear how this in-ear device is structurally connected and/or relatively operated with limitations/features early recited in its parent claim 1.

Also, it is unclear as to what "signal energy sensed within a cluster or surrounding clusters" is since there is no sensor or source provided in the claim to sense this signal energy.

Further, it is unclear what cluster or surrounding clusters recited here this claim is/are. Is it the same cluster early recited in claim 1, line 3?

In claim 10:

The term "the one or more sounds", line 2, should be changed to --the isolated one or more sounds--. Otherwise, the term is unclear for similar reason early stated in claim 1.

In claim 11:

The statement "determining if one or more of the one or more sounds", line 17, is unclear as to whether "the one or more sounds" is the one or more sounds identified by identifying step, line 15, or the one or more sounds isolated by isolating step, line 16.

The above statement should be replaced with --determining if one or more of the isolated one or more sounds--.

The term "the one or more sounds", lines 19, 20-21 and 23 recited in this claim should also be changed to --the isolated one or more sounds--.

Also, claim 11 is directed to a method of altering sensed noise, but limitations recited in the body of the claim are mainly directed the structure and functional operation of the computing device. Accordingly, it is unclear how the structure and functional operation of the computing device are performed to carry out the method as the claimed directed.

Did applicant overall intend to recite claim 11 as follows or similar thereto?

11. (Suggestion) A method of altering sensed noise prior to outputting the sensed noise, comprising:

providing at least one data source;

providing ~~at least one cluster of~~ at least one computing device, the at least one computing device including:

at least one cluster;

a sound sensing mechanism, configured to sense a noise; and

an electronic bus configured to transmit and receive data from the data source; ~~and~~

wherein, the data source, in electronic communication the at least one cluster and at least one output device,

providing a memory[[,]] containing computer-executable instructions ~~for connecting to the at least one cluster, and varying an output of the at least one output device, providing an interface~~; and

providing a processor~~, for executing~~ to execute the computer-executable instructions [[;]] to cause the processor to perform steps comprising:

identifying one or more sounds within the noise;

isolating the one or more sounds;

determining if one or more of the isolated one or more sounds includes a frequency outside of a predetermined threshold; ~~and~~

wherein if one or more of the isolated one or more sounds includes the frequency outside of the predetermined threshold, altering the one or more of the isolated one or more sounds so that the frequency does not fall outside of the predetermined threshold; and

outputting the isolated one or more sounds on the at least one output device.

In claim 12:

Claim 12 is directed to the method recited in claim 11, but limitations recited in the body of the claim are directed to the computing device that includes an interfacing mechanism and its structure, lines 3-8. Accordingly, it is unclear how the interfacing mechanism and its structure are performed in order to carry out the method as the claim directed, and it is also unclear how the interfacing mechanism and its structure are relatively operated with method steps early recited in claim 11.

Did applicant intend to recite in claim 12 as follows or similar thereto?

12. (Suggestion) The method as recited in claim 11, ~~wherein the at least one computing device~~ further includes:

providing an interfacing mechanism, the interfacing mechanism including:

a network adapter, configured to transmit and receive ~~electronic information~~ the data through both wired and wireless communication; and

at least one input mechanism, configured to:

manipulate the interfacing mechanism; and

vary the output of the at least one output device.

In claim 16:

The term "the one or more sounds", line 2, should be changed to --the isolated one or more sounds-- for the same reason early stated in claim 11.

In claim 20:

The term "the one or more sounds", line 2, should be changed to --the isolated one or more sounds-- for the same reason early stated in claim 11.

In claim 23:

Claim 23 is directed to the method of claim 11, but limitations recited in the body of the claims are directed to output device and its structure. Accordingly, it is unclear how the output device and its structure are operated in order to carry out the method as the claimed is directed.

Did applicant intend to recite in claim 23 as follows or similar thereto?

23. (Suggestion) The method of claim 11 further comprising:

providing the at least one output device, including:

a power source for operating the output device;

a speaker for outputting sound; and

a communication mechanism, for receiving electronic information from the data source; and

a display.

In claim 25:

It is unclear what a configured transmission medium comprises a wireless transceiver recited in this claim is. Also, it is unclear as to how this configured transmission medium is structurally connected and relatively operated with limitations early recited in its parent claim 1.

Did applicant intend to recite in claim 25 as follows or similar thereto?

25. (Suggestion) The system of claim 1, ~~wherein~~ further comprising: a ~~configured~~ transmission medium comprises a wireless transceiver configured to wirelessly transmit and receive data from the data source.

In claim 26:

It is unclear what a configured transmission medium comprises a wireless transceiver recited in this claim is. Also, it is unclear as to how this configured transmission medium is

structurally connected and relatively operated with limitations early recited in its parent claim 11.

Did applicant intend to recite in claim 26 as follows or similar thereto?

26. (Suggestion) The method of claim 11, ~~wherein~~ further comprising:

providing a ~~configured~~ transmission medium comprises a wireless transceiver configured to wirelessly transmit and receive data from the data source.

Claims 3-6, 8, 13-15, 17-19, 21, 22 and 24 fall with their respective base claim.

Allowable Subject Matter

5. Claims 1-26 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), 2nd paragraph, set forth in this Office action.

6. Claims 1-26 are allowable over the prior art of record because the prior art of record including US 20160150338 as the closest prior art, which is directed to similar concept of the claimed invention, mainly includes a processing device to: receiver sound input, extract the frequency of the sound input, determine if the frequency is outside of range, then acquire the sound and transmit it to the output device based on the result of the frequency determination (see Figs. 3-9 of the closest prior art); however, there is at least a difference between the closest prior art and the claimed invention is that the closest prior art fails to include features comprising: a processor, for executing the computer-executable instructions contained in a memory, to perform functions include: identifying one or more sounds within the sensed noise; isolating the one or more sounds; determining is one or more of the [isolated] one or more sounds includes a frequency outside of a predetermined threshold; if one or more of the [isolated] one or more sounds includes the frequency outside of the predetermined threshold, altering the one or more of the [isolated] one or more sounds so that the frequency does not fall outside of the predetermined threshold; and

outputting the [isolated]one or more sounds on the at least one output device, as recited in claim 1, and similarly recited in a corresponding method claim 11.

Other references of the record are also directed to a similar concept, but none of them teaches any feature nor fairly suggest any obvious improvement that is directed to the features identified above as the difference between the closest prior art and the claimed invention so that it can be relied upon to modify the closest prior art to derive the claimed invention as recited in claims 1 and 11. Therefore, claims 1 and 11 are allowable over the prior art of record, and claims 2-10 and claims 12-26 are also allowable with their respective base claim.

Response to Arguments

7. The terminal disclaimer dated 12/16/2020 has been received and approved. Therefore, double patenting rejections applied to claims 1-22 are hereby withdrawn as requested by applicant.

Applicant's arguments with respect to the 112(b) rejection(s) applied to claims 1-24 have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of 112(b) rejection is made. Therefore, claims 1-26 cannot be placed in condition for allowance at this time.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to THANG V TRAN whose telephone number is (571)272-7595. The examiner can normally be reached on Mon-Fri: 7:00 AM -7:00 PM.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Lim can be reached on 571-272-1210. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see https://ppair-my.uspto.gov/pair/PrivatePair. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/THANG V TRAN/
Primary Examiner, Art Unit 2688

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/656,259	Denton, Levaughn
	Examiner	**Art Unit**
	THANG V TRAN	2688

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

CLAIMS

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	06/09/2020	10/25/2020	01/13/2021						
	1	✓	✓	✓						
	2	✓	✓	✓						
	3	✓	✓	✓						
	4	✓	✓	✓						
	5	✓	✓	✓						
	6	✓	✓	✓						
	7	✓	✓	✓						
	8	✓	✓	✓						
	9	✓	✓	✓						
	10	✓	✓	✓						
	11	✓	✓	✓						
	12	✓	✓	✓						
	13	✓	✓	✓						
	14	✓	✓	✓						
	15	✓	✓	✓						
	16	✓	✓	✓						
	17	✓	✓	✓						
	18	✓	✓	✓						
	19	✓	✓	✓						
	20	✓	✓	✓						
	21		✓	✓						
	22		✓	✓						
	23		✓	✓						
	24		✓	✓						
	25			✓						
	26			✓						

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/656,259	Denton, Levaughn
	Examiner	Art Unit
	THANG V TRAN	2688

CPC - Searched*		
Symbol	Date	Examiner

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
CPC: Text Search in Class/Subclass Only (See WEST Search History Printout)	01/13/2021	Tran
USPC: Text Search Only (See WEST Search History Printout)	01/13/2021	Tran
IP.com Search (See IP.com Search History Printout)	01/13/2021	Tran

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

Main Concept Text
==========
determining is one or more of the one or more sounds includes a frequency outside of a predetermined threshold; if one or more of the one or more sounds includes the frequency outside of the predetermined threshold, altering the one or more of the one or more sounds so that the frequency does not fall outside of the predetermined threshold; and outputting the one or more sounds on the at least one output device.

(No Concept Modifiers)
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(No Filters)
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Options
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De-dup: Extended Family Numbers
Cut-off: None
Sort: Relevance

Content: Patent Publications (164)
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US Patents
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Kazakhstan Patents
Kazakhstan Applications
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Russia Applications
Turkey Patents
Turkey Applications

WEST Search History

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DATE: Wednesday, January 13, 2021

Hide?	Set Name	Query	Hit Count
Interference			
DB=PGPB,USPT; PLUR=YES; OP=OR			
☐	L52	L46.clm.	19
☐	L51	L43.clm.	15
☐	L50	L41.clm.	10
☐	L37	(L1 same L6 same L23).clm.	15
☐	L36	L25.clm.	13
☐	L35	(L20 and L21 and L23).clm.	20
☐	L34	(L15 and (L8 or L9 or L10)).clm.	26
☐	L33	(L9 and L7).clm.	1
☐	L32	(L11 and L7).clm.	0
Prior Art			
DB=PGPB,USPT,USOC; PLUR=YES; OP=OR			
☐	L49	L46 and ((H04R$ H04S$ H04W$ H04L$ H04N$ G06F$ G10L$ H04B$).CPC.)	41
☐	L48	L43 and ((H04R$ H04S$ H04W$ H04L$ H04N$ G06F$ G10L$ H04B$).CPC.)	22
☐	L47	L41 and ((H04R$ H04S$ H04W$ H04L$ H04N$ G06F$ G10L$ H04B$).CPC.)	17
DB=PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD,FPRS; PLUR=YES; OP=OR			
☐	L46	L45 same (speaker or loudspeaker or transducer or display$3 or monitor or (output$3 near3 (device or unit)))	83
☐	L45	L44 same L23	331
☐	L44	(audio or sound or voice or acoustic or speech) near5 frequency	491125
☐	L43	L42 same l39	27
☐	L42	L23 same L6	195
☐	L41	L40 same l23	23
☐	L40	L39 near5 (identif$7 or determin$6 or detect$5 or discriminat$5 or extract$4)	59436
☐	L39	(audio or sound or voice or acoustic or speech or phrase or word) near5 (noise or background or ambient)	357997
DB=PGPB,USPT,USOC; PLUR=YES; OP=OR			
☐	L38	Denton near2 Levaughn	9
☐	L31	(L1 same L6 same L23) and ((H04R$ H04S$ H04W$ H04L$ H04N$ G06F$ G10L$ H04B$).CPC.)	28
☐	L30	L25 and ((H04R$ H04S$ H04W$ H04L$ H04N$ G06F$ G10L$ H04B$).CPC.)	25
☐	L29	L24 and ((H04R$ H04S$ H04W$ H04L$ H04N$ G06F$ G10L$ H04B$).CPC.)	47
☐	L28	L16 and ((H04R$ H04S$ H04W$ H04L$ H04N$ G06F$ G10L$ H04B$).CPC.)	80
☐	L27	L13 and ((H04R$ H04S$ H04W$ H04L$ H04N$ G06F$ G10L$ H04B$).CPC.)	24

☐	L26	L12 and ((H04R$ H04S$ H04W$ H04L$ H04N$ G06F$ G10L$ H04B$).CPC.)	4
DB=PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD,FPRS; PLUR=YES; OP=OR			
☐	L25	L7 same L23	49
☐	L24	L23 and L22	72
☐	L23	(L18 or L19) near15 (alert$4 or notification or notify$3 or notifies or indicat$4 or warn$4 or inform$4)	7561
☐	L22	L21 and L20	600
☐	L21	L6 same L19	1924
☐	L20	L6 same L18	2040
☐	L19	L4 near9 (smaller or lower or below or inside or lesser)	69556
☐	L18	L4 near9 (larger or greater or higher or outside)	72667
DB=USPT,PGPB; PLUR=YES; OP=OR			
☐	L17	('20070189544' | '20100119055' | '20100211199' | '20150215701')![pn]	4
DB=PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD,FPRS; PLUR=YES; OP=OR			
☐	L16	L15 and (L8 or L9 or L10)	143
☐	L15	L14 same L7	202
☐	L14	L6 near15 (alert$4 or notification or notify$3 or notifies or indicat$4 or warn$4 or inform$4)	1082
☐	L13	L9 and L7	43
☐	L12	L11 and L7	9
☐	L11	L10 same L9	736
☐	L10	(speaker or loudspeaker or transducer) same (power or battery)	463191
☐	L9	L8 same 47	9344
☐	L8	(receiv$4 or transmit$5 or transmission or transceiv$4 or antenna or wifi or Bluetooth) near5 (audio or sound or voice or acoustic)	1282995
☐	L7	L6 same L3	2704
☐	L6	L5 near9 L4	18674
☐	L5	frequency near3 (audio or sound or voice or acoustic)	381915
☐	L4	(predetermined or reference or preset or threshold) near5 frequency	726800
☐	L3	L2 same L1	385882
☐	L2	(identif$7 or determin$6 or detect$5 or discriminat$5 or extract$4) near5 (audio or sound or voice or acoustic)	789256
☐	L1	(audio or sound or voice or acoustic) near3 (sensor or sensing or detect$4 or collect$4 or captur$4 or microphone or transducer)	925586

END OF SEARCH HISTORY

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (02-18)
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(Not for submission under 37 CFR 1.99)

Application Number	16656259
Filing Date	2019-10-17
First Named Inventor	Levaughn Denton
Art Unit	2688
Examiner Name	TRAN, THANG V
Attorney Docket Number	2305LD01UTL1USCON2

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Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	10127005	B2	2018-11-13	Denton	
	2	10656906	B2	2020-05-19	Denton	
	3	8645993	B2	2014-02-04	Perry	

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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20150281853	A1	2015-10-01	Eisner et al.	
	2					
	3					

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16656259
	Filing Date	2019-10-17
	First Named Inventor	Levaughn Denton
	Art Unit	2688
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Examiner Signature	/THANG V TRAN/	Date Considered	01/13/2021

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[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16656259
	Filing Date	2019-10-17
	First Named Inventor	Levaughn Denton
	Art Unit	2688
	Examiner Name	TRAN, THANG V
	Attorney Docket Number	2305LD01UTL1USCON2

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☒ See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/David Postolski/	Date (YYYY-MM-DD)	2020-12-17
Name/Print	David Postolski	Registration Number	67547

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PTO/SB/06 (09-11)
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/656,259	Filing Date 10/17/2019	☐ To be Mailed

ENTITY: ☐ LARGE ☐ SMALL ☑ MICRO

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $25 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $115 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	04/16/2021	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 32	Minus	** 26	= 6		x $25 =	150
	Independent (37 CFR 1.16(h))	* 5	Minus	*** 3	= 2		x $120 =	240
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	390

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	SLIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/APRIL L. WALKER/
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Patent Application of: Levaughn Denton			
Conf. No.:	7312	Group Art Unit:	2688
Appln. No.:	16/656,259	Examiner:	Thang V. Tran
Filing Date:	October 17, 2019	Attorney Docket No.:	2305LD01UTL1USCON2

Title: MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS

RESPONSE TO NON-FINAL OFFICE ACTION

Responsive to the Non-Final Office Action dated January 19, 2021 (hereinafter as "Office Action"), Applicant hereby submits the following Amendment and accompanying remarks. Various claims are being added as new herein. The fees associated with these new claims are being submitted herewith. If any additional fee is required or has been overpaid, authorization is hereby given to charge/credit the amount of such fee to Deposit Account No. 60-1818. Reconsideration of the application in view of the following response is respectfully requested.

Listing and Amendments to the Claims begins on Page 2 of this paper; and

Remarks/Arguments begin on Page 12 of this paper.

CLAIM LISTING

This listing of claims will replace all prior versions, and listings, of claims in the Application.

1. (Currently Amended) A system comprising:

a data source;

~~at least one cluster of~~ at least one computing device, the at least one computing device including:

at least one cluster of a sound sensing mechanism, configured to sense a noise; and

an electronic bus which is configured to transmit and receive data from the data source, wherein ~~; and~~ the data source[[,]] is in electronic communication with at least one cluster and at least one output device,

a memory, containing computer-executable instructions; and ~~for connecting to the at least one cluster, and varying an output of the at least one output device, providing an interface; and~~

a processor[[,]] configured to execute ~~for executing~~ the computer-executable instructions[[,]] to cause the processor to perform functions including: ~~wherein the computer-executable instructions include:~~

identifying one or more sounds within the noise;

isolating the one or more sounds; and

determining if one or more of the isolated one or more sounds includes a frequency outside of a predetermined threshold.~~; and~~

~~wherein if one or more of the one or more sounds includes the frequency outside of the predetermined threshold, altering the one or more of the one or more sounds so that the frequency does not fall outside of the predetermined threshold; and~~

~~outputting the one or more sounds on the at least one output device.~~

2. (Currently Amended) The system as recited in claim 1, further comprising:

an interfacing mechanism, the interfacing mechanism including:

a network adapter, configured to transmit and receive the data ~~electronic information~~ through both wired and wireless communication; and

at least one input mechanism, configured to:

manipulate the interfacing mechanism; and

vary the output of the at least one output device.

3. (Previously Presented) The system as recited in claim 1, wherein the sound-sensing mechanism is an omnidirectional transducer.

4. (Previously Presented) The system as recited in claim 1, wherein the sound-sensing mechanism is selected from the group consisting of: an ultrasonic transducer; an infrasonic transducer: and a microwave transducer.

5. (Previously Presented) The system as recited in claim 4, wherein the sensed noise includes infrasonic or ultrasonic soundwaves.

6. (Previously Presented) The system as recited in claim 1, wherein the predetermined threshold equates to a frequency determined to pose a risk of harm to a user's hearing capabilities.

7. (Currently Amended) The system as recited in claim 1, wherein the computer-executable instructions further include: if one or more of the isolated one or more sounds includes the frequency outside of the predetermined threshold, notifying a user, via a notification, that one or more of the isolated one or more sounds includes the frequency outside of the predetermined threshold.

8. (Previously Presented) The system as recited in claim 1, wherein the computer-executable instructions further include steps selected from the group consisting of: panning the sensed noise; and equalizing the sensed noise.

9. (Previously Presented) The system as recited in claim 1, further comprising:

an in-ear device, wherein an audio output of the in-ear device auto-adjusts based on signal energy sensed within a cluster or surrounding clusters.

10. (Currently Amended) The system as recited in claim 1, wherein the altering the one or more of the isolated one or more sounds so that the frequency does not fall outside of the predetermined threshold is performed automatically.

11. (Currently Amended) A method of ~~altering~~ managing sensed noise ~~prior to outputting the sensed noise~~, comprising:

providing at least one data source; [[.]]

providing ~~at least one cluster of~~ at least one computing device, the at least one computing device including:

at least one cluster;

a sound sensing mechanism, configured to sense a noise; and

an electronic bus configured to transmit and receive data from the data source, wherein~~; and~~ the data source[[,]] is in electronic communication with the at least one cluster and at least one output device,

providing a memory, containing computer-executable instructions; and ~~for connecting to the at least one cluster, and varying an output of the at least one output device, providing an interface; and~~

providing a processor to execute~~, for executing~~ the computer-executable instructions to cause the processor to perform steps comprising:[[;]]

identifying one or more sounds within the noise;

isolating the one or more sounds; and

determining if one or more of the isolated one or more sounds includes a frequency outside of a predetermined threshold. ~~; and~~

~~wherein if one or more of the one or more sounds includes the frequency outside of the predetermined threshold, altering the one or more of the one or more sounds so that the frequency does not fall outside of the predetermined threshold; and~~

~~outputting the one or more sounds on the at least one output device.~~

12. (Currently Amended) The method as recited in claim 11, further comprising: ~~wherein the at least one computing device further includes:~~

providing an interfacing mechanism, the interfacing mechanism including:

a network adapter, configured to transmit and receive the data ~~electronic information~~ through both wired and wireless communication; and

at least one input mechanism, configured to:

manipulate the interfacing mechanism; and

vary the output of the at least one output device.

13. (Previously Presented) The method as recited in claim 11, wherein the sound-sensing mechanism is selected from the group consisting of: an omnidirectional transducer; an ultrasonic transducer; an infrasonic transducer; an electro-optical transducer; and a microwave transducer.

14. (Previously Presented) The method as recited in claim 13, wherein the sensed noise includes infrasonic, ultrasonic, visible, or radio waves.

15. (Previously Presented) The method as recited in claim 11, wherein the predetermined threshold equates to a frequency determined to pose a risk of harm to a user's hearing capabilities.

16. (Currently Amended) The method as recited in claim 11, further comprising:

if one or more of the one or more sounds includes the frequency outside of the predetermined threshold, notifying a user, via a notification, that one or more of the isolated one or more sounds includes the frequency outside of the predetermined threshold.

17. (Previously Presented) The method as recited in claim 11, further comprising:

panning the sensed noise.

18. (Previously Presented) The method as recited in claim 11, further comprising:

adding one or more audio effects to the sensed noise.

19. (Previously Presented) The method as recited in claim 11, further comprising:

equalizing the sensed noise.

20. (Currently Amended) The method as recited in claim 11, wherein the altering the one or more of the isolated one or more sounds so that the frequency does not fall outside of the predetermined threshold is performed automatically.

21. (Previously Presented) The system of claim 1, further comprising:

the at least one output device, including:

a power source for operating the output device;

a speaker for outputting sound; and

a communication mechanism, for receiving electronic information from the data source; and

a display.

22. (Previously Presented) The system of claim 21, wherein the power source and the display are varied outputs.

23. (Currently Amended) The method of claim 11, further comprising:

providing the at least one output device, including:

a power source for operating the output device;

a speaker for outputting sound; and

a communication mechanism, for receiving electronic information from the data source; and

a display.

24. (Previously Presented) The method of claim 23, wherein the power source and the display are varied outputs.

25. (Currently Amended) The system of claim 1, further comprising:

~~wherein a configured~~ a transmission medium comprising ~~comprises~~ a wireless transceiver configured to wirelessly transmit and receive data from the data source.

26. (Currently Amended) The method of claim 11, further comprising:

providing a ~~wherein a configured~~ transmission medium comprising ~~comprises~~ a wireless transceiver configured to wirelessly transmit and receive data from the data source.

27. (New) The system of claim 1, wherein if one or more of the isolated one or more sounds includes the frequency outside of the predetermined threshold,

altering the one or more of the isolated one or more sounds so that the frequency does not fall outside of the predetermined threshold; and

outputting the isolated one or more sounds on the at least one output device.

28. (New) The method of claim 11, wherein if one or more of the isolated one or more sounds includes the frequency outside of the predetermined threshold,

altering the one or more of the isolated one or more sounds so that the frequency does not fall outside of the predetermined threshold; and

outputting the isolated one or more sounds on the at least one output device.

29. (New) A system containing a pet wearable device, the system comprising:

at least one sensing device affixed or integrated into the pet wearable device, wherein the at least one sensing device comprises:

at least one cluster of a noise sensing mechanism configured to sense a noise; wherein the sensed noise includes infrasonic, ultrasonic, visible, audio or radio waves;

an electronic bus that is configured to transmit and receive data from a data source, wherein the data source is in electronic communication with at least one cluster and at least one output device;

a memory, containing computer-executable instructions; and

a processor configured to execute the computer-executable instructions to cause the processor to perform functions including:

identifying one or more frequencies within the noise;

isolating the one or more frequencies;

determining if one or more of the isolated one or more frequencies includes a frequency outside of a predetermined threshold, wherein if one or more of the isolated one or more frequencies includes the frequency outside of the predetermined threshold; and

transmitting an alert to a computing device associated with a pet owner regarding the frequency of the one or more of the isolated one or more frequencies being outside of the predetermined threshold.

30. (New) The system of claim 29, wherein the at least one sensing device is in wireless communication with the computing device.

31. (New) The system of claim 29, wherein the transmission of the alert to the computing device associated with the pet owner occurs via a cloud.

32. (New) A system comprising:

a data source;

at least one computing device, the at least one computing device including:

at least one cluster of a noise sensing mechanism configured to sense a noise; wherein the sensed noise includes infrasonic, ultrasonic, visible, audio or radio waves;

an electronic bus which is configured to transmit and receive data from the data source, wherein the data source is in electronic communication with at least one cluster and at least one output device,

a memory, containing computer-executable instructions; and

a processor configured to execute the computer-executable instructions to cause the processor to perform functions including:

identifying one or more frequencies within the noise;

isolating the one or more frequencies; and

determining if one or more of the isolated one or more frequencies includes a frequency outside of a predetermined threshold, wherein if one or more of the isolated one or more frequencies includes the frequency outside of the predetermined threshold, transmitting an alert to another computing device regarding the frequency of the one or more of the isolated one or more frequencies being outside of the predetermined threshold.

APPLICANT ARGUMENTS/REMARKS MADE IN AMENDMENT

This Application has been reviewed in light of the Non-Final Office Action dated January 19, 2021. Claims 1-26 are currently pending in the application. In this instant response, claims 1, 2, 7, 10, 11, 12, 16, 20, 23, 25, and 26 are being amended. Claims 27-32 are being added as new. The examiner's reconsideration of the rejections in view of the following remarks and amendments is respectfully requested.

Allowable Subject Matter

In the pending office action, the examiner indicated claims 1-26 as being allowable if rewritten or amended to overcome the pending rejection under 35 U.S.C. § 112(b). See, Office Action, Pages 9-10. The examiner is thanked for this indication of allowable subject matter.

New Claims

Claims 27-32 are being added as new herein. Applicant asserts that no new matter is being added with these claims. As such, entry of claims 27-32 is respectfully requested.

Rejection under 35 U.S.C. § 112(b)

The examiner rejected claims 1-26 under 35 U.S.C. § 112(b) for allegedly being indefinite for failing to particularly point out and distinctly claim the subject matter regarded as the invention.

Claims 1, 2, 7, 10, 11, 12, 16, 20, 23, 25, and 26

Without conceding to the merits of this rejection, but in the interest of expediting prosecution, Applicant is amending claims 1, 2, 7, 10, 11, 12, 16, 20, 23, 25, and 26 herein. Applicant asserts that the amendments to claims 1, 2, 7, 10, 11, 12, 16, 20, 23, 25, and 26 add no new matter. Furthermore, Applicant asserts that amended claims 1, 2, 7, 10, 11, 12, 16, 20, 23, 25, and 26 overcome the rejection of claims 1, 2, 7, 10, 11, 12, 16, 20, 23, 25, and 26 under 35 U.S.C. § 112(b). As such, claims 1, 2, 7, 10, 11, 12, 16, 20, 23, 25, and 26 are in condition for allowance.

Claim 9

Without conceding to the merits of this rejection, but in the interest of expediting prosecution, Applicant asserts that claim 1 recites a cluster internal to the computing device and claim 9 recites an external cluster with sound/noise signal energy that can be from speakers, white noise, from people, etc.. Thus, Applicant asserts that claim 9, as written, complies with 35 U.S.C. § 112(b). As such, claim 9 is in condition for allowance.

Claims 3-6, 8, 13-15, 17-19, 21, 22, and 24

Claims 3-6 and 8 depend from claim 1 and claims 13-15, 17-19, 21, 22, and 24 depend from claim 11, respectively, which Applicant has argued *supra* to comply with 35 U.S.C. § 112(b). As such, Applicant maintains that dependent claims 3-6, 8, 13-15, 17-19, 21, 22, and 24 likewise comply with 35 U.S.C. § 112(b). Thus, dependent claims 3-6, 8, 13-15, 17-19, 21, 22, and 24 are also in condition for allowance. Favorable action on these claims is respectfully requested.

Conclusion

It is submitted that all of the Examiner's rejections have been responded to and addressed. Applicant respectfully submits that the amendments and arguments presented above place the application in condition for allowance and therefore, respectfully requests that they be entered into the prosecution and that a Notice of Allowance is issued. However, if any additional fee is required or has been overpaid, authorization is hereby given to charge/credit the amount of such fee to Deposit Account No. 60-1818. If the Examiner has any questions or concerns, they are encouraged to contact the undersigned by phone at 908-273-0700 for further discussions.

Respectfully Submitted,

/David Postolski/
David Postolski, Esq.
Attorney for Applicant
Reg. No. 67,547

Gearhart Law, LLC
Innovation Plaza, Suite 1A
41 River Road, Summit, NJ 07901
T: (908) 273 0700 F: (908) 273 0711

Electronic Patent Application Fee Transmittal

Application Number:	16656259
Filing Date:	17-Oct-2019
Title of Invention:	MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS
First Named Inventor/Applicant Name:	Levaughn Denton
Filer:	David D. Postolski/Ashley Sperbeck
Attorney Docket Number:	2305LD01UTL1USCON2

Filed as Micro Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
CLAIMS IN EXCESS OF 20	3202	4	25	100
INDEPENDENT CLAIMS IN EXCESS OF 3	3201	2	120	240
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**340**

Electronic Acknowledgement Receipt	
EFS ID:	42476537
Application Number:	16656259
International Application Number:	
Confirmation Number:	7312
Title of Invention:	MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS
First Named Inventor/Applicant Name:	Levaughn Denton
Customer Number:	75207
Filer:	David D. Postolski/Ashley Sperbeck
Filer Authorized By:	David D. Postolski
Attorney Docket Number:	2305LD01UTL1USCON2
Receipt Date:	16-APR-2021
Filing Date:	17-OCT-2019
Time Stamp:	15:17:20
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$340
RAM confirmation Number	E20214FF18313235
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		2305LD01UTL1USCON2_Response.pdf	131233 58d064e60d4dcb67ba078e6f6affbf5b9ee906de	yes	14

Multipart Description/PDF files in .zip description

Document Description	Start	End
Amendment/Req. Reconsideration-After Non-Final Reject	1	1
Claims	2	11
Applicant Arguments/Remarks Made in an Amendment	12	14

Warnings:

Information:

2	Fee Worksheet (SB06)	fee-info.pdf	32216 9dcea4a8129196b6d6eb51c72a5b0acd7184542d	no	2

Warnings:

Information:

Total Files Size (in bytes):	163449

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

75207 7590 07/13/2021

Gearhart Law LLC
41 River Road
Suite 1A
Summit, NJ 07901

EXAMINER
TRAN, THANG V

ART UNIT	PAPER NUMBER
2688	

DATE MAILED: 07/13/2021

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/656,259	10/17/2019	Levaughn Denton	2305LD01UTL1USCON2	7312

TITLE OF INVENTION: MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	MICRO	$300	$0.00	$0.00	$300	10/13/2021

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

PTOL-85 (Rev. 02/11)

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

75207 7590 07/13/2021

Gearhart Law LLC
41 River Road
Suite 1A
Summit, NJ 07901

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/656,259	10/17/2019	Levaughn Denton	2305LD01UTL1USCON2	7312

TITLE OF INVENTION: MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	MICRO	$300	$0.00	$0.00	$300	10/13/2021

EXAMINER	ART UNIT	CLASS-SUBCLASS
TRAN, THANG V	2688	381-056000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-09 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1_____
2_____
3_____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. Fees submitted: ❑Issue Fee ❑Publication Fee (if required) ❑Advance Order - # of Copies _____

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

❑ Electronic Payment via EFS-Web ❑ Enclosed check ❑ Non-electronic payment by credit card (Attach form PTO-2038)

❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

5. **Change in Entity Status** (from status indicated above)

❑ Applicant certifying micro entity status. See 37 CFR 1.29

❑ Applicant asserting small entity status. See 37 CFR 1.27

❑ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/656,259	10/17/2019	Levaughn Denton	2305LD01UTL1USCON2	7312

75207 7590 07/13/2021

Gearhart Law LLC
41 River Road
Suite 1A
Summit, NJ 07901

EXAMINER	
TRAN, THANG V	
ART UNIT	PAPER NUMBER
2688	

DATE MAILED: 07/13/2021

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 16/656,259	Applicant(s) Denton, Levaughn	
	Examiner THANG V TRAN	Art Unit 2688	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☑ This communication is responsive to an amendment dated 04/16/2021.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

3. ☑ The allowed claim(s) is/are 1-32 . As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see **http://www.uspto.gov/patents/init_events/pph/index.jsp** or send an inquiry to **PPHfeedback@uspto.gov.**

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some *c) ☐ None of the:

   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____ .

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____.
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.
4. ☑ Interview Summary (PTO-413), Paper No./Mail Date. _____.
5. ☑ Examiner's Amendment/Comment
6. ☑ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/THANG V TRAN/
Primary Examiner, Art Unit 2688

Notice of Pre-AIA or AIA Status

1. The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Examiner's Amendment

2. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in an interview with Sperbeck Ashley on 07/01/2021.

3. Claims 1, 11, 16 and 32 in this application have been amended as follows:

IN THE CLAIMS:

1. (Currently Amended) A system comprising:

a data source;

at least one cluster of at least one computing device, the at least one computing device including:

~~at least one cluster of~~ a sound sensing mechanism, configured to sense a noise; and

an electronic bus which is configured to transmit and receive data from the data source, wherein the data source is in electronic communication with the at least one cluster and at least one output ~~device,~~ device;

a memory, containing computer-executable instructions; and

a processor configured to execute the computer-executable instructions to cause the processor to perform functions including:

identifying one or more sounds within the noise;

isolating the one or more sounds; and

determining if one or more of the isolated one or more sounds includes a frequency outside of a predetermined threshold.

11. (Currently Amended) A method of managing sensed noise, comprising:

providing at least one data source;

providing at least one cluster of at least one computing device, the at least one computing device including:

~~at least one cluster;~~

a sound sensing mechanism, configured to sense a noise; and

an electronic bus configured to transmit and receive data from the data source, wherein the data source is in electronic communication with the at least one cluster and at least one output ~~device,~~ device;

providing a memory, containing computer-executable instructions; and

providing a processor to execute the computer-executable instructions to cause the processor to perform steps comprising:

identifying one or more sounds within the noise;

isolating the one or more sounds; and

determining if one or more of the isolated one or more sounds includes a frequency outside of a predetermined threshold.

16. (Currently Amended) The method as recited in claim 11, further comprising:

if one or more of the isolated one or more sounds includes the frequency outside of the predetermined threshold, notifying a user, via a notification, that one or more of the isolated one

or more sounds includes the frequency outside of the predetermined threshold.

32. (Currently Amended) A system comprising:

a data source;

at least one cluster of at least one computing device, the at least one computing device including:

~~at least one cluster of~~ a noise sensing mechanism configured to sense a noise; wherein the sensed noise includes infrasonic, ultrasonic, visible, audio or radio waves;

an electronic bus which is configured to transmit and receive data from the data source, wherein the data source is in electronic communication with at least one cluster and at least one output ~~device,~~ device;

a memory, containing computer-executable instructions; and

a processor configured to execute the computer-executable instructions to cause the processor to perform functions including:

identifying one or more frequencies within the noise;

isolating the one or more frequencies; and

determining if one or more of the isolated one or more frequencies includes a frequency outside of a predetermined threshold,

wherein if one or more of the isolated one or more frequencies includes the frequency outside of the predetermined threshold, transmitting an alert to another computing device regarding the frequency of the one or more of the isolated one or more frequencies being outside of the predetermined threshold.

Reasons for Allowance

4. The following is an examiner's statement of reasons for allowance: 1-32 are allowed over the prior art of record because the prior art of record including US 20160150338 as the closet prior art, which is directed to a similar subject matter of the claimed invention, mainly include a sound detecting apparatus comprising: a data source (13); at least one computing device (100), including: at least one cluster of a sound sensing mechanism (110) to sense a noise; an electronic bus (wire connection) which is configured to transmit and receive data from the data source (13) detected by the sensing mechanism (110), a memory (139) containing computer-executable instructions; and a processor (135)configured to execute the computer-executable instructions to cause the processor to perform functions (paragraph 0030) including: identifying one or more sounds within the noise; isolating the one or more sounds; and analyzing the isolated sound to obtain an alter (see Fig. 9, 13 or 17).

However, there is at least a difference between the closest prior art and the claimed invention is that the closest prior art fails to include the following claimed features.

Claimed feature including a combination of: at least one cluster of at least one computing device, the at least one computing device includes: a sound sensing mechanism, configured to sense a noise, and an electronic bus which is configured to transmit and receive data from the data source, wherein the data source is in electronic communication with the at least one cluster and at least one output device; and a processor configured to execute the computer-executable instructions to cause the processor to perform functions including: identifying one or more sounds within the noise; isolating the one or more sounds; and determining if one or more of the isolated one or more sounds includes a frequency outside of a predetermined threshold, as recited in claim 1, and functionally recited in method claim 11.

Claimed features including: at least one sensing device affixed or integrated into the pet wearable device, wherein the at least one sensing device comprises: at least one cluster of a noise sensing mechanism configured to sense a noise; and a processor configured to execute the computer-executable instructions to cause the processor to perform functions including: identifying one or more frequencies within the noise; isolating the one or more frequencies; determining if one or more of the isolated one or more frequencies includes a frequency outside of a predetermined threshold, wherein if one or more of the isolated one or more frequencies includes the frequency outside of the predetermined threshold; and transmitting an alert to a computing device associated with a pet owner regarding the frequency of the one or more of the isolated one or more frequencies being outside of the predetermined threshold, as recited in claim 29.

Claimed feature including a combination of: at least one cluster of at least one computing device, the at least one computing device includes: a sound sensing mechanism, configured to sense a noise, and an electronic bus which is configured to transmit and receive data from the data source, wherein the data source is in electronic communication with the at least one cluster and at least one output device; and a processor configured to execute the computer-executable instructions to cause the processor to perform functions including: identifying one or more sounds within the noise; isolating the one or more sounds; and determining if one or more of the isolated one or more sounds includes a frequency outside of a predetermined threshold, and wherein if one or more of the isolated one or more frequencies includes the frequency outside of the predetermined threshold, transmitting an alert to another computing device regarding the frequency of the one or more of the isolated one or more frequencies being outside of the predetermined threshold, as recited in claim 32.

Other references of the record are also directed to a similar concept of the claimed invention, but none of them specifically teaches or fairly suggests any feature or obvious improvement that is directed to the claimed features identified above as the difference between the closest prior art and the claimed invention so that it can be relied upon to modify the closest prior art to derive the claimed invention as recited in claims 1, 11, 29 and 32. Therefore, claims 1, 11, 29 and 32 are allowed over the prior art of record, and claims 2-10, 12-28, 30 and 1 are also allowed over the prior art of record with their respective base claim.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to THANG V TRAN whose telephone number is (571)272-7595. The examiner can normally be reached on Mon-Fri: 7:00 AM -7:00 PM.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Lim can be reached on 571-272-1210. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications

may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see https://ppair-my.uspto.gov/pair/PrivatePair. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/THANG V TRAN/
Primary Examiner, Art Unit 2688

Examiner-Initiated Interview Summary	**Application No.** 16/656,259	**Applicant(s)** Denton, Levaughn		
	Examiner THANG V TRAN	**Art Unit** 2688	**AIA (First Inventor to File) Status** Yes	**Page** 1 of 1

All Participants (applicant, applicants representative, PTO personnel)	**Title**	**Type**
THANG V TRAN	Primary Examiner	Telephonic
SPERBECK ASHLEY	Attorney of Record	

Date of Interview: 01 July 2021

Issues Discussed:

35 U.S.C. 112

Discussing claimed languages in claims 1, 11, 16 and 32, and also discussing claimed languages to be amended for the claims in order to better define the claimed invention. Agreement was reached in the claimed languages as discussed. See examiner's amendment for details.

/THANG V TRAN/ Primary Examiner, Art Unit 2688	

Applicant is reminded that a complete written statement as to the substance of the interview must be made of record in the application file. It is the applicants responsibility to provide the written statement, unless the interview was initiated by the Examiner and the Examiner has indicated that a written summary will be provided. See MPEP 713.04
Please further see:
MPEP 713.04
Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews, paragraph (b)
37 CFR § 1.2 Business to be transacted in writing

Applicant recordation instructions: It is not necessary for applicant to provide a separate record of the substance of interview.

Examiner recordation instructions: Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/656,259	Denton, Levaughn
	Examiner	**Art Unit**
	THANG V TRAN	2688

CPC							
Symbol						**Type**	**Version**
G06F	/	3	/	165		F	2013-01-01
H04B	/	1	/	0003		I	2013-01-01
H04S	/	7	/	40		I	2013-01-01
H04R	/	27	/	00		I	2013-01-01
H04L	/	67	/	12		I	2013-01-01
H04R	/	3	/	005		I	2013-01-01
H04R	/	29	/	00		I	2013-01-01
H04S	/	2400	/	15		A	2013-01-01
H04R	/	2227	/	003		A	2013-01-01

CPC Combination Sets								
Symbol					**Type**	**Set**	**Ranking**	**Version**
	/		/					

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	32	
/THANG V TRAN/ Primary Examiner, Art Unit 2688	02 July 2021	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	3

U.S. Patent and Trademark Office — Part of Paper No.: 20210507

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/656,259	Denton, Levaughn
	Examiner	**Art Unit**
	THANG V TRAN	2688

INTERNATIONAL CLASSIFICATION				
CLAIMED				
H04R	/	29	/	00
H04R	/	3	/	00
G06F	/	3	/	16
	/		/	

NON-CLAIMED				
	/		/	

US ORIGINAL CLASSIFICATION	
CLASS	**SUBCLASS**

CROSS REFERENCES(S)						
CLASS	**SUBCLASS (ONE SUBCLASS PER BLOCK)**					

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	32	
/THANG V TRAN/ Primary Examiner, Art Unit 2688	02 July 2021	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	3

U.S. Patent and Trademark Office — Part of Paper No.: 20210507

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/656,259	Denton, Levaughn
	Examiner	**Art Unit**
	THANG V TRAN	2688

☑ Claims renumbered in the same order as presented by applicant ☐ CPA ☑ T.D. ☐ R.1.47

CLAIMS

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
	1		10		19		28								
	2		11		20		29								
	3		12		21		30								
	4		13		22		31								
	5		14		23		32								
	6		15		24										
	7		16		25										
	8		17		26										
	9		18		27										

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	32	
/THANG V TRAN/ Primary Examiner, Art Unit 2688	02 July 2021	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	3

U.S. Patent and Trademark Office — Part of Paper No.: 20210507

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/656,259	Denton, Levaughn
	Examiner	Art Unit
	THANG V TRAN	2688

CPC - Searched*		
Symbol	Date	Examiner
H04R3/00, 005, 12; H04R29/00, 001, 002, 004, 005, 007, 008; H04R27/00; H04R2227/003; H04F3/16, 165, 167; H04B1/0003; H04S7/40; H04S2400/15; H04L67/12	07/02/2021	Tran

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
CPC: Text Search in Class/Subclass Only (See WEST Search History Printout)	07/02/2021	Tran
USPC: Text Search Only (See WEST Search History Printout)	07/02/2021	Tran
IP.com Search (See IP.com Search History Printout)	07/01/2021	Tran

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
	See Interference Search in WEST Search History Printout	07/02/2021	Tran

Bibliographic Data

Application No: 16/656,259

Foreign Priority claimed: ○ Yes ◉ No

35 USC 119 (a-d) conditions met: ☐ Yes ☑ No ☐ Met After Allowance

Verified and Acknowledged: /THANG V TRAN/ Examiner's Signature | Initials

Title: MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
10/17/2019	381	2688	2305LD01UTL1USCON2
RULE			

APPLICANTS

INVENTORS

Levaughn Denton, Baisley Park, NY, UNITED STATES

CONTINUING DATA

This application is a CON of 16421141 05/23/2019 PAT 10656906

16421141 is a CIP of 16155919 10/10/2018ABN

16155919 is a CON of 14862304 09/23/2015 PAT 10127005

14862304 has PRO of 62054286 09/23/2014

FOREIGN APPLICATIONS

IF REQUIRED, FOREIGN LICENSE GRANTED**

11/04/2019

**** MICRO ENTITY ****

STATE OR COUNTRY

UNITED STATES

ADDRESS

Gearhart Law LLC
41 River Road
Suite 1A
Summit, NJ 07901
UNITED STATES

FILING FEE RECEIVED

$1,465

Main Concept Document
==========
US20200278827
Title: Multi-frequency sensing method and apparatus using mobile-clusters

Concept Modifiers (1)
==========
1. More Like Text: calculating an inverted sound wave based on the one or more characteristics using a processor coupled to the microphone, configured to calculate the inverted sound wave based on the one or more characteristics; and emitting the inverted sound wave by flowing a current, selected by the processor according to the inverted sound wave, through a wire, thereby causing the wire to vibrate

(No Filters)
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Options
=======
De-dup: Extended Family Numbers
Cut-off: None
Sort: Relevance

Content: Patent Publications (164)
==========
US Patents
US Designs
US Applications
EPO Patents
EPO Applications
China Patents
China Applications
Japan Patents
Japan Applications
Korea Patents
Korea Applications
WIPO Applications
Argentina Patents
Argentina Applications
Brazil Patents
Brazil Applications
Canada Patents
Canada Applications
Chile Patents
Chile Applications
Colombia Applications
Costa Rica Applications
Cuba Patents
Cuba Applications
Dominican Republic Applications

Ecuador Patents
Ecuador Applications
El Salvador Applications
Guatemala Applications
Honduras Applications
Mexico Patents
Mexico Applications
Nicaragua Patents
Panama Applications
Peru Applications
Trinidad & Tobago Patents
Uruguay Applications
Austria Patents
Austria Applications
Belarus Patents
Belgium Patents
Belgium Applications
Bosnia & Herzegovina Patents
Bosnia & Herzegovina Applications
Bulgaria Patents
Bulgaria Applications
Croatia Patents
Croatia Applications
Czech Republic Patents
Czech Republic Applications
Czechoslovakia Patents
Czechoslovakia Applications
Denmark Patents
Denmark Applications
Estonia Patents
Estonia Applications
EUIPO Patents
Finland Patents
Finland Applications
France Patents
France Applications
Germany Patents
Germany Applications
Great Britain Patents
Great Britain Applications
Greece Patents
Greece Applications
Hungary Patents
Hungary Applications
Iceland Patents
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Ireland Patents
Ireland Applications
Italy Patents
Italy Applications
Latvia Patents
Latvia Applications
Lithuania Patents
Lithuania Applications

Luxembourg Patents
Malta Patents
Monaco Patents
Montenegro Patents
Montenegro Applications
Netherlands Patents
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Norway Patents
Norway Applications
Poland Patents
Poland Applications
Portugal Patents
Portugal Applications
Republic of Moldova Patents
Republic of Moldova Applications
Romania Patents
Romania Applications
San Marino Patents
San Marino Applications
Serbia Patents
Serbia Applications
Slovakia Patents
Slovakia Applications
Slovenia Patents
Spain Patents
Spain Applications
Sweden Patents
Sweden Applications
Switzerland Patents
Switzerland Applications
Ukraine Patents
Yugoslavia/Serbia and Montenegro Patents
Yugoslavia/Serbia and Montenegro Applications
Armenia Patents
Australia Patents
Australia Applications
Cyprus Patents
Gulf Cooperation Council Patents
Hong Kong Patents
India Patents
India Applications
Indonesia Patents
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Israel Applications
Jordan Patents
Kyrgyzstan Patents
Macao Applications
Malaysia Patents
Mongolia Patents
New Zealand Patents
Philippines Patents
Philippines Applications
Saudi Arabia Patents
Singapore Patents

Singapore Applications
Taiwan Patents
Taiwan Applications
Tajikistan Patents
Tajikistan Applications
Thailand Applications
Uzbekistan Patents
Vietnam Patents
Algeria Patents
ARIPO Patents
ARIPO Applications
Egypt Patents
Kenya Patents
Malawi Patents
Morocco Patents
Morocco Applications
OAPI Patents
South Africa Patents
Tunisia Applications
Zambia Patents
Zimbabwe Patents
EAPO Patents
EAPO Applications
Georgia Patents
Georgia Applications
Kazakhstan Patents
Kazakhstan Applications
Russia Patents
Russia Applications
Turkey Patents
Turkey Applications

WEST Search History

Hide Items | Restore | Clear | Close

DATE: Friday, July 02, 2021

Hide?	Set Name	Query	Hit Count
Interference			
DB=PGPB,USPT; PLUR=YES; OP=OR			
☐	L63	L59.clm.	5
☐	L62	L56.clm.	28
☐	L52	L46.clm.	21
☐	L51	L43.clm.	15
☐	L50	L41.clm.	10
☐	L37	(L1 same L6 same L23).clm.	17
☐	L36	L25.clm.	14
☐	L35	(L20 and L21 and L23).clm.	21
☐	L34	(L15 and (L8 or L9 or L10)).clm.	26
☐	L33	(L9 and L7).clm.	1
☐	L32	(L11 and L7).clm.	0
Prior Art			
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☐	L58	L54 near15 (alert$4 or notification or notify$3 or notifies or indicat$4 or warn$4 or inform$4)	4118
☐	L57	L55 same L44	320
☐	L56	L55 same L1	97
☐	L55	L54 same L53	425
☐	L54	frequency adj3 (larger or greater or higher or outside or exceed$4) adj3 (predetermined or reference or preset or threshold or designated or desired)	46512
☐	L53	(audio or sound or voice or acoustic) near5 (extract$4 or isolate$4 or seprat$4 or filter$4)	274081
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☐	L49	L46 and ((H04R$ H04S$ H04W$ H04L$ H04N$ G06F$ G10L$ H04B$).CPC.)	45
☐	L48	L43 and ((H04R$ H04S$ H04W$ H04L$ H04N$ G06F$ G10L$ H04B$).CPC.)	24
☐	L47	L41 and ((H04R$ H04S$ H04W$ H04L$ H04N$ G06F$ G10L$ H04B$).CPC.)	18
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☐	L45	L44 same L23	359
☐	L44	(audio or sound or voice or acoustic or speech) near5 frequency	507173

☐	L43	L42 same L39	29
☐	L42	L23 same L6	206
☐	L41	L40 same L23	24
☐	L40	L39 near5 (identif$7 or determin$6 or detect$5 or discriminat$5 or extract$4)	62287
☐	L39	(audio or sound or voice or acoustic or speech or phrase or word) near5 (noise or background or ambient)	376771
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☐	L30	L25 and ((H04R$ H04S$ H04W$ H04L$ H04N$ G06F$ G10L$ H04B$).CPC.)	26
☐	L29	L24 and ((H04R$ H04S$ H04W$ H04L$ H04N$ G06F$ G10L$ H04B$).CPC.)	50
☐	L28	L16 and ((H04R$ H04S$ H04W$ H04L$ H04N$ G06F$ G10L$ H04B$).CPC.)	82
☐	L27	L13 and ((H04R$ H04S$ H04W$ H04L$ H04N$ G06F$ G10L$ H04B$).CPC.)	27
☐	L26	L12 and ((H04R$ H04S$ H04W$ H04L$ H04N$ G06F$ G10L$ H04B$).CPC.)	4
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☐	L23	(L18 or L19) near15 (alert$4 or notification or notify$3 or notifies or indicat$4 or warn$4 or inform$4)	7857
☐	L22	L21 and L20	627
☐	L21	L6 same L19	2016
☐	L20	L6 same L18	2146
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☐	L18	L4 near9 (larger or greater or higher or outside)	75507
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DB=PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD,FPRS; PLUR=YES; OP=OR			
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☐	L14	L6 near15 (alert$4 or notification or notify$3 or notifies or indicat$4 or warn$4 or inform$4)	1145
☐	L13	L9 and L7	45
☐	L12	L11 and L7	9
☐	L11	L10 same L9	746
☐	L10	(speaker or loudspeaker or transducer) same (power or battery)	481495
☐	L9	L8 same 47	9465
☐	L8	(receiv$4 or transmit$5 or transmission or transceiv$4 or antenna or wifi or Bluetooth) near5 (audio or sound or voice or acoustic)	1336163
☐	L7	L6 same L3	2840
☐	L6	L5 near9 L4	19379
☐	L5	frequency near3 (audio or sound or voice or acoustic)	394199
☐	L4	(predetermined or reference or preset or threshold) near5 frequency	749919
☐	L3	L2 same L1	405137

☐	L2	(identif$7 or determin$6 or detect$5 or discriminat$5 or extract$4) near5 (audio or sound or voice or acoustic)	826464
☐	L1	(audio or sound or voice or acoustic) near3 (sensor or sensing or detect$4 or collect$4 or captur$4 or microphone or transducer)	972587

END OF SEARCH HISTORY

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

75207 7590 07/13/2021
Gearhart Law LLC
41 River Road
Suite 1A
Summit, NJ 07901

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/656,259	10/17/2019	Levaughn Denton	2305LD01UTL1USCON2	7312

TITLE OF INVENTION: MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	MICRO	$300	$0.00	$0.00	$300	10/13/2021

EXAMINER	ART UNIT	CLASS-SUBCLASS
TRAN, THANG V	2688	381-056000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-09 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 David Postolski, Esq.
2 Gearhart Law LLC
3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE	(B) RESIDENCE: (CITY and STATE OR COUNTRY)
ZOPHONOS INC.	DOVER, DELAWARE

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ☒ Corporation or other private group entity ❑ Government

4a. Fees submitted: ☒ Issue Fee ❑ Publication Fee (if required) ❑ Advance Order - # of Copies _____

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

☒ Electronic Payment via EFS-Web ❑ Enclosed check ❑ Non-electronic payment by credit card (Attach form PTO-2038)

☒ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. 601818

5. **Change in Entity Status** (from status indicated above)

❑ Applicant certifying micro entity status. See 37 CFR 1.29

❑ Applicant asserting small entity status. See 37 CFR 1.27

❑ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature /David Postolski/ Date October 13, 2021

Typed or printed name David Postolski Registration No. 67547

Electronic Patent Application Fee Transmittal

Application Number:	16656259
Filing Date:	17-Oct-2019
Title of Invention:	MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS
First Named Inventor/Applicant Name:	Levaughn Denton
Filer:	David D. Postolski/Kristin Bennett
Attorney Docket Number:	2305LD01UTL1USCON2

Filed as Micro Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
UTILITY ISSUE FEE	3501	1	300	300

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**300**

Electronic Acknowledgement Receipt	
EFS ID:	44014850
Application Number:	16656259
International Application Number:	
Confirmation Number:	7312
Title of Invention:	MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS
First Named Inventor/Applicant Name:	Levaughn Denton
Customer Number:	75207
Filer:	David D. Postolski/Kristin Bennett
Filer Authorized By:	David D. Postolski
Attorney Docket Number:	2305LD01UTL1USCON2
Receipt Date:	13-OCT-2021
Filing Date:	17-OCT-2019
Time Stamp:	08:34:44
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$300
RAM confirmation Number	E20210C935404521
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	2305LD01UTL1USCON2_FeeTrans.pdf	182467 7b7d95dad20d4365ae7b2eb8b4d58e3ee370c6fc	no	1
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	37896 6d3c0e3554b552b23ebb609fa343fe8927216ad0	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	220363		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16656259
	Filing Date	2019-10-17
	First Named Inventor	Levaughn Denton
	Art Unit	2688
	Examiner Name	THANG V. TRAN
	Attorney Docket Number	2305LD01UTL1USCON2

	11	20090058611	A1	2009-03-05	Kawamura et al. ~~Panasonic Corp.~~	
Change(s) applied to document, /P.H./ 7/16/2021	12	20100329471	A1	2010-12-30	Dunn et al. Manufacturing Resources International Inc.	
	13	20110134278	A1	2011-06-09	Chang et al. ~~Aleor Micro Corp.~~	
	14	20120189140	A1	2012-07-26	Hughes ~~Apple, Inc.~~	
	15	20130044131	A1	2013-02-21	Moheb Milad	
	16	20130064380	A1	2013-03-14	Mahowald ~~Apple, Inc.~~	
	17	20130294618	A1	2013-11-07	Mikhail Lyubachev	
	18	20110134278	A1	2011-07-09	Chang et al. ~~Aleor Micro Corp.~~	
	19	20070217623	A1	2007-09-20	Noriyuki Harada	
	20	20130044131	A1	2013-02-21	Moheb Milad	

If you wish to add additional U.S. Published Application citation information please click the Add button. Add

FOREIGN PATENT DOCUMENTS Remove

EFS Web 2.1.17

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /T.V.T/

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	16656259
Filing Date	2019-10-17
First Named Inventor	Levaughn Denton
Art Unit	2688
Examiner Name	THANG V. TRAN
Attorney Docket Number	2305LD01UTL1USCON2

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	10127005	B2	2018-11-13	Levaughn Denton	
Change(s) applied to document, /P.H./ 7/16/2021	2	8073160	B1	2011-12-06	Classen ~~Adobe Systems Inc~~.	
	3	8452432	B2	2013-05-28	Brian Transeau	
	4	7991171	B1	2011-08-02	Gary C. Snow	
	5	8594319	B2	2013-11-26	Ho et al. ~~Dolby International, AB~~	
	6	8315398	B2	2012-11-10	Themis Katsianos	
	7	5668884	A	1997-09-16	Clair, Jr. et al. ~~Clair Bros. Audio Enterprises, Inc.~~	

If you wish to add additional U.S. Patent citation information please click the Add button. Add

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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /T.V.T/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	16656259
	Filing Date	2019-10-17
	First Named Inventor	Levaughn Denton
	Art Unit	2688
	Examiner Name	THANG V. TRAN
	Attorney Docket Number	2305LD01UTL1USCON2

Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20190050194	A1	2019-02-14	Denton ~~Zophonos, Inc.~~	
	2	20040076305	A1	2004-04-22	Santiago ~~Shure, Inc.~~	
	3	20040240676	A1	2004-12-02	Hashimoto et al. ~~Panasonic Intellectual Property Corp.~~	
	4	20050160270	A1	2005-07-21	Goldberg et al. ~~Black Hills Media, Inc.~~	
	5	20060067550	A1	2006-03-30	Puder et al. ~~Sivantos GmbH~~	
	6	20060082458	A1	2006-04-20	Shanks et al. ~~Symbol Technologies, LLC~~	
	7	20070217623	A1	2007-09-20	Harada ~~Panasonic Corp.~~	
	8	20090003620	A1	2009-01-01	McKillop et al. ~~Apple, Inc.~~	
Change(s) applied to document, /P.H./ 7/19/2021	9	20090076825	A1	2009-03-19	Bradford et al. ~~Bionica Corp.~~	
	10	20100329471	A1	2010-12-30	Dunn, et al.	

EFS Web 2.1.17

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /T.V.T/

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/656,259	11/16/2021	11175881	2305LD01UTL1USCON2	7312

75207 7590 10/27/2021

Gearhart Law LLC
41 River Road
Suite 1A
Summit, NJ 07901

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 0 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Patents Stakeholder Experience (OPSE), Stakeholder Support Division (SSD) at (571)-272-4200.

INVENTOR(s) (Please see PAIR WEB site http://pair.uspto.gov for additional inventors):

Levaughn Denton, Baisley Park, NY;

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

Electronic Patent Application Fee Transmittal

Application Number:	16656259
Filing Date:	17-Oct-2019
Title of Invention:	MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS
First Named Inventor/Applicant Name:	Levaughn Denton
Filer:	David D. Postolski/Kristin Bennett
Attorney Docket Number:	2305LD01UTL1USCON2

Filed as Micro Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
PETITION FEE-37CFR 1.17(H) (GRP III)	3464	1	35	35
RCE- 2ND AND SUBSEQUENT REQUEST	3820	1	500	500
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**535**

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

Decision Date : November 8, 2021

In re Application of :

Levaughn Denton

DECISION ON PETITION
UNDER CFR 1.313(c)(2)

Application No : 16656259

Filed : 17-Oct-2019

Attorney Docket No : 2305LD01UTL1USCON2

This is an electronic decision on the petition under 37 CFR 1.313(c)(2), filed November 8, 2021, to withdraw the above-identified application from issue after payment of the issue fee.

The petition is **GRANTED.**

The above-identified application is withdrawn from issue for consideration of a submission under 37 CFR 1.114 (request for continued examination). See 37 CFR 1.313(c)(2).

Petitioner is advised that the issue fee paid in this application cannot be refunded. If, however, this application is again allowed, petitioner may request that it be applied towards the issue fee required by the new Notice of Allowance.

Telephone inquiries concerning this decision should be directed to the Patent Electronic Business Center (EBC) at 866-217-9197.

This application file is being referred to Technology Center AU 2688 for processing of the request for continuing examination under 37 CFR 1.114 .

Office of Petitions

Electronic Acknowledgement Receipt	
EFS ID:	44227366
Application Number:	16656259
International Application Number:	
Confirmation Number:	7312
Title of Invention:	MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS
First Named Inventor/Applicant Name:	Levaughn Denton
Customer Number:	75207
Filer:	David D. Postolski/Kristin Bennett
Filer Authorized By:	David D. Postolski
Attorney Docket Number:	2305LD01UTL1USCON2
Receipt Date:	08-NOV-2021
Filing Date:	17-OCT-2019
Time Stamp:	14:41:15
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$535
RAM confirmation Number	E2021A8E41080554
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	ePetition Request Form	petition-request.pdf	39922 1637c85b53ba34555f814a39b262743ab737409b	no	2
Warnings:					
Information:					
2	Transmittal Letter	2305LD01UTL1USCON2_QPIDS_Trans.pdf	209500 5885833719bcce338f3e505dcc14c66768cba8d3	no	2
Warnings:					
Information:					
3	Quick Path Information Disclosure Statement	2305LD01UTL1USCON2_SB-08.pdf	1053631 ee5a636ef5cdcc2c474f04ac5070264941fd9caf	no	4
Warnings:					
Information:					
4	Transmittal Letter	2305LD01UTL1USCON2-IDSTransmittal.pdf	107774 c9fff23f37faecf4e6551eb2ccc6a3577ff64ee3	no	2
Warnings:					
Information:					
5	Request for Continued Examination (RCE)	2305LD01UTL1USCON2_RCE-11-8-2021.pdf	932511 4d248adc07085e89964d4c6ac7e6dcc3115c7db6	no	3
Warnings:					
This is not a USPTO supplied RCE SB30 form.					
Information:					
6	Other Reference-Patent/App/Search documents	WO2015175566A1.pdf	1148646 b115f6b67bcb8a0d207d1cbd6a421b7c22195cb3	no	43
Warnings:					

Information:					
7	Other Reference-Patent/App/Search documents	16928779_NOA.pdf	1127277 a0441f92eaa65048d540afa1df8785dba0592b58	no	9
Warnings:					
Information:					
8	Fee Worksheet (SB06)	fee-info.pdf	40311 01d7e139fb2f36173957e931f946da4fa9138a5a	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	4659572		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Doc Code: PET.AUTO Document Description: Petition automatically granted by EFS-Web	PTO/SB/140 U.S. Patent and Trademark Office Department of Commerce

Electronic Petition Request	**PETITION TO WITHDRAW AN APPLICATION FROM ISSUE AFTER PAYMENT OF THE ISSUE FEE UNDER 37 CFR 1.313(c)**
Application Number	16656259
Filing Date	17-Oct-2019
First Named Inventor	Levaughn Denton
Art Unit	2688
Examiner Name	
Attorney Docket Number	2305LD01UTL1USCON2
Title	MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS

An application may be withdrawn from issue for further action upon petition by the applicant. To request that the Office withdraw an application from issue, applicant must file a petition under this section including the fee set forth in § 1.17(h) and a showing of good and sufficient reasons why withdrawal of the application from issue is necessary.

APPLICANT HEREBY PETITIONS TO WITHDRAW THIS APPLICATION FROM ISSUE UNDER 37 CFR 1.313(c).

A grantable petition requires the following items:
(1) Petition fee; and
(2) One of the following reasons:
(a) Unpatentability of one or more claims, which must be accompanied by an unequivocal statement that one or more claims are unpatentable, an amendment to such claim or claims, and an explanation as to how the amendment causes such claim or claims to be patentable;
(b) Consideration of a request for continued examination in compliance with § 1.114 (for a utility or plant application only); or
(c) Express abandonment of the application. Such express abandonment may be in favor of a continuing application, but not a CPA under 37 CFR 1.53(d).

Petition Fee

- ○ Small Entity
- ◉ Micro Entity
- ○ Regular Undiscounted

Reason for withdrawal from issue

◯ One or more claims are unpatentable ◉ Consideration of a request for continued examination (RCE) (List of Required Documents and Fees) ◯ Applicant hereby expressly abandons the instant application (any attorney/agent signing for this reason must have power of attorney pursuant to 37 CFR 1.32(b)).
RCE request,submission, and fee. ☐ I certify, in accordance with 37 CFR 1.4(d)(4) that : The RCE request ,submission, and fee have already been filed in the above-identified application on ☒ Are attached.
THIS PORTION MUST BE COMPLETED BY THE SIGNATORY OR SIGNATORIES I certify, in accordance with 37 CFR 1.4(d)(4) that I am: ◉ An attorney or agent registered to practice before the Patent and Trademark Office who has been given power of attorney in this application. ◯ An attorney or agent registered to practice before the Patent and Trademark Office, acting in a representative capacity. ◯ A sole inventor ◯ A joint inventor; I certify that I am authorized to sign this submission on behalf of all of the inventors as evidenced by the power of attorney in the application ◯ A joint inventor; all of whom are signing this e-petition

Signature	/David Postolski/
Name	David Postolski
Registration Number	67547

Doc Code: QPIDS.REQ
Document Description: QuickPath Information Disclosure Statement

PTO/SB/09 (09-18)

CERTIFICATION AND REQUEST FOR CONSIDERATION OF AN INFORMATION DISCLOSURE STATEMENT FILED AFTER PAYMENT OF THE ISSUE FEE UNDER THE QPIDS PROGRAM

Non-Provisional Application Number: 16/656,259	Filing Date: 10-17-2019
First Named Inventor: Levaughn Denton	Title of Invention: MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS

THE UNDERSIGNED HEREBY CERTIFIES AND REQUESTS THE FOLLOWING FOR THE ABOVE-IDENTIFIED APPLICATION.

1. Consideration is requested of the information disclosure statement (IDS) submitted herewith, which is being filed after payment of the issue fee.
2. Check the box next to the appropriate selection:

   ☐ Each item of information contained in the IDS was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the IDS. See 37 CFR 1.97(e)(1).

   OR

   ☑ No item of information contained in the IDS was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the IDS was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the IDS. See 37 CFR 1.97(e)(2).

   OR

   ☐ See attached certification statement in compliance with 37 CFR 1.97(e).
3. Please charge the IDS fee set forth in 37 CFR 1.17(p) to Deposit Account No. _____.
4. A Petition to Withdraw from Issue After Payment of the Issue Fee (37 CFR 1.313(c)(2)), including the petition fee set forth in 37 CFR 1.17(h), is submitted herewith as a **Web-based ePetition**. **WARNING:** Do not submit the petition as a follow-on paper via EFS-Web. Submit the petition as a Web-based ePetition by signing on to EFS-Web as a registered user, selecting the radio button next to "Existing application/patent," and then selecting the radio button next to "ePetition (for automatic processing and immediate grant, if all petitions requirements are met)." Failure to use the Web-based ePetition interface will result in automatic entry of the RCE.
5. A request for continued examination (RCE) under 37 CFR 1.114 and the RCE fee under 37 CFR 1.17(e) are submitted herewith.
6. The RCE will be treated as a "conditional" RCE. In the event the examiner determines that any item of information contained in the IDS necessitates the reopening of prosecution in the application, the undersigned understands that (i) the RCE will be processed and treated as an RCE under 37 CFR 1.114 and therefore (ii) the IDS fee under 37 CFR 1.17(p) will be returned in accordance with 37 CFR 1.97(b)(4). In the event that no item of information in the IDS necessitates reopening prosecution, the undersigned understands that the RCE will not be processed and the RCE fee under 37 CFR 1.17(e) will be returned.
7. This certification and request is being filed as a **Web-based ePetition** and is not accompanied by an amendment to the application. Inclusion of an amendment will result in automatic entry of the RCE.

Signature /David Postolski/	Date 2021-11-08
Name (Print/Typed) David Postolski	Practitioner Registration Number (If applicable) 67547

Note: *Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required in accordance with 37 CFR 1.33 and 11.18. Please see 37 CFR 1.4(d) for the form of the signature. If necessary, submit multiple forms for more than one signature, see below.**

☐ *Total of _____ forms are submitted.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PTO/SB/08a (02-18)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT
(Not for submission under 37 CFR 1.99)

Application Number	16656259
Filing Date	2019-10-17
First Named Inventor	Levaughn Denton
Art Unit	2688
Examiner Name	Thang V TRAN
Attorney Docket Number	2305LD01UTL1USCON2

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	10157434	B2	2018-12-18	Shanley et al.	Entire Document

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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20060031551	A1	2006-02-09	Agresta et al.	Entire Document
	2	20110106673	A1	2011-05-05	Shanley et al.	Entire Document
	3	20110213720	A1	2011-09-01	Waid et al.	Entire Document
	4	20150287153	A1	2015-10-08	Kankanala et al.	Entire Document
	5	20170116694	A1	2017-04-27	GABIE et al.	Entire Document

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
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	6	20190318060	A1	2019-10-17	Brenner et al.	Entire Document
	7	20200167385	A1	2020-05-28	JUNG	Entire Document

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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2]	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	2015175566	WO	A1	2015-11-19	BOOTH et al.	Entire Document	

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NON-PATENT LITERATURE DOCUMENTS Remove

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	Notice of Allowance dated October 20, 2021 issued in U.S. Application No. 16/928,779.	

If you wish to add additional non-patent literature document citation information please click the Add button Add

EXAMINER SIGNATURE

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

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	Art Unit	2688
	Examiner Name	Thang V TRAN
	Attorney Docket Number	2305LD01UTL1USCON2

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☒ See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/David Postolski/	Date (YYYY-MM-DD)	2021-11-08
Name/Print	David Postolski	Registration Number	67547

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these record s.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of

Levaughn Denton	Group Art Unit: 2688
Application No.: 16/656,259	Examiner: TRAN, THANG V
Filed: 10-17-2019	Docket No.: 2305LD01UTL1USCON2

For: MULTI-FREQUENCY SENSING METHOD AND APPARATUS USING MOBILE-CLUSTERS

INFORMATION DISCLOSURE STATEMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Pursuant to 37 CFR §1.56, the attention of the Patent and Trademark Office is hereby directed to the reference(s) listed on the attached PTO-1449. Unless otherwise indicated herein, one copy of each reference is attached. It is respectfully requested that the information be expressly considered during the prosecution of this application, and that the reference(s) be made of record therein and appear among the "References Cited" on any patent to issue therefrom.

☑ 1. This Information Disclosure Statement is being filed in accordance with the QPIDS Pilot Program. Accordingly, a "conditional" Request for Continued Examination is attached. The fees associated with this filing under 37 C.F.R. §1.17(p) are being paid electronically with this filing. The Commissioner is hereby authorized to charge any additional fee (or credit any overpayment) associated for this filing to Deposit Account No. 601818.

☐ a. I hereby certify that each item of information contained in this Information Disclosure Statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this Information Disclosure Statement. 37 CFR §1.97(e)(1).

☑ b. I hereby certify that no item of information in this Information Disclosure Statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to my knowledge after making reasonable inquiry, no item of information in this Information Disclosure Statement was known to any individual designated in 37 CFR §1.56(c) more than three months prior to the filing of this Information Disclosure Statement. 37 CFR §1.97(e)(2).

Respectfully submitted;

/David Postolski/
David Postolski, Esq.
Partner
Gearhart Law LLC
41 River Road
Innovation Plaza
Summit, NJ 07901
Reg # 67547
Date: November 8, 2021

United States Patent and Trademark Office

Office of the Chief Financial Officer

Document Code:WFEE

User :70972

Sale Accounting Date:11/09/2021

Sale Item Reference Number	Effective Date
16656259	11/08/2021

Document Number	Fee Code	Fee Code Description	Amount Paid	Payment Method
I2021A9714313913	3806	SUBMISSION- INFORMATION DISCLOSURE STMT	$65.00	Deposit Account

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UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/656,259	10/17/2019	Levaughn Denton	2305LD01UTL1USCON2	7312

75207 7590 11/19/2021

Gearhart Law LLC
41 River Road
Suite 1A
Summit, NJ 07901

EXAMINER	
TRAN, THANG V	

ART UNIT	PAPER NUMBER
2688	

NOTIFICATION DATE	DELIVERY MODE
11/19/2021	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

eofficeaction@appcoll.com
patent@gearhartlaw.com

Corrected ***Notice of Allowability***	**Application No.** 16/656,259	**Applicant(s)** Denton, Levaughn	
	Examiner THANG V TRAN	**Art Unit** 2688	**AIA (FITF) Status** Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☑ This communication is responsive to a communication dated 11/08/2021.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

3. ☑ The allowed claim(s) is/are 1-32 . As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see **http://www.uspto.gov/patents/init_events/pph/index.jsp** or send an inquiry to **PPHfeedback@uspto.gov.**

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some* c) ☐ None of the:

   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____ .

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☑ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____.
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date. _____.
5. ☐ Examiner's Amendment/Comment
6. ☐ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/THANG V TRAN/
Primary Examiner, Art Unit 2688

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (02-18)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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First Named Inventor	Levaughn Denton
Art Unit	2688
Examiner Name	Thang V TRAN
Attorney Docket Number	2305LD01UTL1USCON2

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Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	10157434	B2	2018-12-18	Shanley et al.	Entire Document

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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20060031551	A1	2006-02-09	Agresta et al.	Entire Document
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	3	20110213720	A1	2011-09-01	Waid et al.	Entire Document
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	5	20170116694	A1	2017-04-27	GABIE et al.	Entire Document

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /T.V.T/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
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	7	20200167385	A1	2020-05-28	JUNG	Entire Document

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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2]	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
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NON-PATENT LITERATURE DOCUMENTS Remove

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	Notice of Allowance dated October 20, 2021 issued in U.S. Application No. 16/928,779.	

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EXAMINER SIGNATURE

Examiner Signature	/THANG V TRAN/	Date Considered	11/15/2021

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

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☒ See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/David Postolski/	Date (YYYY-MM-DD)	2021-11-08
Name/Print	David Postolski	Registration Number	67547

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Document Code:WFEE

User :C46472

Sale Adjustment Accounting Date:11/23/2021

Effective Date	Sale Accounting Date	Sale Item Reference Number
11/08/2021	11/23/2021	16656259

Document Number	Fee Code	Fee Code Description	Amount Paid	Payment Method
I2021AMB57452583	3820	RCE- 2ND AND SUBSEQUENT REQUEST	$500.00	Visa

United States Patent and Trademark Office

Office of the Chief Financial Officer

Document Code:WFEE

User :C46472

Refund Accounting Date:11/23/2021

Effective Date	Sale Item Reference Number	Refund Total
11/08/2021	16656259	$500.00

Document Number	Fee Code	Fee Code Description	Amount Paid	Payment Method	Account Number
I2021AMB57452583	3820	RCE- 2ND AND SUBSEQUENT REQUEST	$500.00	Visa	**********1929

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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/656,259	12/21/2021	11204736	2305LD01UTL1USCON2	7312

75207 7590 12/01/2021

Gearhart Law LLC
41 River Road
Suite 1A
Summit, NJ 07901

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 0 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

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