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DESCRIPTION

BACKGROUND OF THE INVENTION

[0001] The claimed invention relates to personalized sound systems, and more particularly to an effective method for generating a personalized hearing profile.

[0002] It is widely understood that hearing levels vary widely among individuals, and it is also known that signal processing techniques can condition audio content to fit an individual's hearing response. Individual hearing ability varies across a number of variables, including thresholds of hearing, or hearing sensitivity (differences in hearing based on the pitch, or frequency, of the sound), dynamic response (differences in hearing based on the loudness of the sound, or relative loudness of closely paired sounds), and psychoacoustical factors such as the nature or and context of the sound. Actual injury or impairment, physical or mental, can also affect hearing in a number of ways. The most widely used gauge of hearing ability is a profile showing relative hearing sensitivity as a function of frequency, generally called a hearing profile, discussed in more detail below. Yet, it remains true that the art has not succeeded in providing a system for effectively and rapidly generating individual hearing profiles.

[0003] The most widespread employment of individual hearing profiles remains in the hearing aid field, where some degree of hearing impairment makes intervention a necessity. This application entails detailed testing in an audiologist or otologist office, employing sophisticated equipment and highly trained technicians. The result is an individually-tailored hearing aid, utilizing multiband compression to deliver audio content exactly matched to the user's hearing response. It will be understood that this process is expensive, time-consuming and cumbersome, and it plainly is not suitable for mass personalization efforts.

[0004] The rise of the Internet has offered the possibility for the development of personalization techniques that flow from on-line testing. Efforts in that direction have sought to generate user hearing profiles by presenting the user with a questionnaire, often running to 20 questions or more, and using the user input to build a hearing profile. Such tests have encountered problems in two areas, however. First, user input to such questionnaires has proved unreliable. Asked about their age alone, without asking for personal information, for example, users tend to be less than completely truthful. To the extent such tests can be psychologically constructed to filter out such bias, the test becomes complex and cumbersome, to that users simply do not finish the test.

[0005] Another testing regime is set out in U.S. Patent No. 6,840,908, entitled "SYSTEM AND METHOD FOR REMOTELY ADMINISTERED, INTERACTIVE HEARING TESTS," issued to Edwards and others on 11 January 2005, and owned by the assignee of the present application. That patent presents a number of techniques for such testing, most particularly a technique called "N-Alternative Forced Choice," in which a user is offered a number of audio choices among which to select one that sounds best to her. Also known as "sound flavors," based on the notion of presenting sound and asking the user which one is preferred, this method can lack sufficient detail to enable the analyst to build a profile.

[0006] In sum, at least three different forms of test procedure have been employed by the art, without arriving at a method that produces accurate results in a way that makes mass deployment possible.

[0007] The ultimate goal of personalization efforts is the delivery of personalized audio content. That goal actually encompasses a number of distinct products and processes. For example, one facet of this effort aims at offering devices that deliver personalized audio signals to a user. U.S. Patent No. 6,944,474, issued to Rader and others, describes a mobile phone with audio processing functionality that can be adapted to the hearing profile of the user. In another example, International Publication No. WO 01/24576 A1, entitled PRODUCING AND STORING HEARING PROFILES AND CUSTOMIZED AUDIO DATA BASED (sic), by Pluinage, describes a variety of applications of hearing profile data. Among the specific applications mentioned there is downloading audio content, such as MP3 music files, which have been conditioned to match a user profile already on file with the provider.

[0008] The prior art has focused on coupling hearing aids using wireless networks to other devices, for the purpose of programming the hearing aid and for coupling the hearing aid with sources of sound other than the ambient environment. See, for example, International Publication No. WO 2004/110099 A2, entitled HEARING AID WIRELESS NETWORK, by Larsen et al.; International Publication No. WO 01/54458 A2, entitled HEARING AID SYSTEMS, by Eaton et al.; German Laid-open Specification DE 102 22 408 A1, entitled INTEGRATION OF HEARING SYSTEMS INTO HOUSEHOLD TECHNOLOGY PLATFORMS by Dageforde. In Larsen et al. and Dageforde, for example, the idea is described of coupling a hearing aid by wireless network to a number of sources of sound, such as door bells, mobile phones, televisions, various other household appliances and audio broadcast systems. Co-pending and co-owned U.S. Application PERSONAL SOUND SYSTEM INCLUDING MULTIMODE EAR

LEVEL MODULE WITH PRIORITY LOGIC; application Ser. No. 11/569,499, filed 21 Nov. 2006, by Cohen et al. (Publication No. US-2007-0255435-A1) describes implementation of user customizable ear modules for use in a variety of settings, including the ability to process audio using hearing profiles of the users.

[0009] US 4548082 describes a hearing aid including a microphone for generating an electrical output from sounds external to a user of the hearing aid, an electrically driven receiver for emitting sound into the ear of the user of the hearing aid, and circuitry for driving the receiver. The circuitry drives the receiver in a self-generating mode activated by a first set of signals supplied externally of the hearing aid to cause the receiver to emit sound having at least one parameter controlled by the first set of externally supplied signals and then drives the receiver in a filtering mode, activated by a second set of signals supplied externally of the hearing aid, with the output of the external microphone filtered according to filter parameters established by the second set of the externally supplied signals.

[0010] WO 2004/004414 relates to a method of calibrating an intelligent earphone, e.g. hearing aid, the method comprising the steps of establishing a series of comparative audio presentations of audio signals to a user by means of a sound transducer, facilitating the user to select a series of preferred audio signals, and establishing signal processing parameters of the intelligent earphone on the basis of the user selected preferred audio signals.

[0011] WO 03/030586 concerns a method for prescribing the initial setting of signal processing parameters in a hearing aid to the needs of a hearing aid user. A first set of data concerning the user's audiological function are gathered and stored in electronic form and a second set of data indicating the level of cognitive function possessed by the user are gathered and stored in electronic form. The two sets of data are used in combination for computing at least one suggested initial setting of the signal processing parameters of the hearing aid.

[0012] US 2005/094822 describes a system for use with an audio reproduction system that corrects for distortion caused by the system as well as any hearing impairment suffered a listener. Test signals are introduced into the input of the system to produce test sounds that are perceptible by the listener. Using a pushbutton, the listener indicates when a test signal of progressively increasing volume reaches an audible level. The resulting measured values of the listener's threshold of hearing at different frequencies is compared with comparable data for a normal listener to generate correction values that are used to program an equalizer which compensates for not only the listener's hearing impairments but also any distortion produced by system components or room acoustics.

[0013] US 6,181,800 describes a system and method for interactive approximation of a head related transfer function (HRTF) that is used to simulate positional three-dimensional sound. The HRTF is unique to each individual and is affected by the shape and size of the head, the shape and size of the pinnae, the characteristics of the ear canal and the relationship of the shoulder to the ear. An HRTF for an individual is interactively approximated by first choosing a generalised HRTF. Audio signals are output from fixed locations using the generalised HRTF and the user inputs the actual perceived position of the sound which is then used to calculate positional errors. The positional errors are used to either adjust the parameters of the current HRTF or to select a new HRTF.

[0014] EP 1,667,487 describes a sound image control device that localises, using a sound transducer such as a speaker and a headphone, a sound image at a position other than where such sound transducer exists.

[0015] US 2006/0222182 describes a speaker system and sound signal reproduction apparatus for handling audio signals within an automotive multichannel surround system environment.

[0016] A drawback of many products offered to date has been the significant data processing workload required at each audio source to support participation in the network. There remains a need for techniques to reduce these data processing requirements.

SUMMARY

[0017] Particular and preferred aspects and embodiments are set out in the attached claims. In the following text, an initial hearing profile may also be referred to as an initial profile, and an alternate hearing profile may also be referred to as an alternate profile.

[0018] A hearing profile can be characterized by a set of coefficients for a multiband compression algorithm, and the relationship

between alternate profiles and the initial profile can be based on amplitudes of the coefficients. For example, one alternate profile includes a set of coefficients having greater magnitude, on average or across the board, than the corresponding coefficients for the initial profile and the other alternate profile includes a set of coefficients having lesser magnitude, on average or across the board, than the corresponding coefficients for the initial profile. An embodiment offers multiple sound samples in different modes, resulting in the selection of multiple final profiles for the different modes.

[0019] The relationship between alternate profiles and the initial profile can be based on gain as a function of frequency, one alternate profile having a higher sensitivity at given frequencies and the other a lower sensitivity. An embodiment offers multiple sound samples in different modes, resulting in the selection of multiple final profiles for the different modes.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020]

FIGS. 1a and 1b contain hearing impairment curves (also referred to herein as hearing profiles) based, respectively, on age and gender.

FIG. 2a depicts an example of a process useful for understanding the claimed invention.

FIGS. 2b and 2c depict examples useful for understanding the claimed invention.

FIG. 3 illustrates a computer graphic user interface screen displayed during execution of the process shown in FIG. 2.

FIG. 4 illustrates the architecture of a database employed in an embodiment of the system of FIG. 2b.

FIG. 5 contains hearing profiles employed during execution of the process shown in FIG. 2.

FIG. 6 illustrates a further computer graphic user interface screen displayed during execution of the process shown in FIG. 2.

FIG. 7 illustrates another computer graphic user interface screen displayed during execution of the process shown in Fig. 2.

DETAILED DESCRIPTION

[0021] A detailed description of examples useful for understanding and embodiments of the present invention is provided with reference to the Figures 1-7.

[0022] As is generally known, hearing varies among individuals. Generally, the most important measure of hearing is threshold of hearing, or hearing sensitivity, which measures hearing acuity as a function of frequency, or pitch, as shown in the charts of Figs. 1a and 1b. Hearing profiles vary considerably among individuals, both as a generally characteristic and as the result of injury, or exposure to high level sounds of particular pitch, such as the loud high-frequency noise associated with jet aircraft engines. Profiles vary over time for individuals as well, as seen in the curves of Fig. 1a, as can be seen there, high frequency hearing drops of markedly as a person ages. Additionally, a general divergence in hearing ability between the genders has been noted, as shown in Fig. 1b.

[0023] Despite the known diversity in hearing abilities, providers of audio content have continued to supply products tailored to a single, mythical "standard" hearing sensitivity curve (also referred to herein as a hearing profile). Those of skill in the art, however, understand that the ability to modify audio signals to compensate for individual differences has existed for some time in the hearing aid industry. That art once was limited simply to boosting the volume of audio input to an individual's ear, but modern devices apply multiband compression algorithms to modify signals in discrete frequency bands. That technology offers the ability to achieve a desired profile, tailored to an individual's hearing needs. The problem remains one of devising a test method suitable for use by a mass audience, which also produces sufficiently detailed and accurate profile information.

[0024] An example of a process 200 for solving that problem is shown in Fig. 2a. As depicted there, the process lends itself to implementation in a wide variety of contexts and formats. Therefore, the generally functionality and overview of the system will be discussed first, followed by a more detailed exploration that includes possible implementation details.

[0025] In broad terms, the process selects a suitable individual profile by first selecting an optimum start point for evaluation, then further selecting suitable alternate choices, presenting the choices to the user, accepting the user's choice, and then implementing that choice in a variety of ways. That description covers a considerable array of alternatives, with some representative choices set out below.

[0026] This profile can be implemented in a number of ways, and those in the art will appreciate that a variety of choices, in both hardware and software, are suitable to particular situations. One set of examples that call for the process to be set out in software, operable either in a pure client mode (that is, the software is contained on a storage medium, such as a disk, and is loaded and run on a single computer, such as the widely used PC). Alternatively, the system could be run in client-server mode, in which a portion of the system resides on a client (user) computer and the remainder runs on a server, such as a web server, accessible via the world-wide web on the Internet. Another alternative is a completely web-based system, in which all functionality resides on a web server. As a further alternative, the software operating the claimed system could be wholly embedded in an operating audio device, such as a mobile phone, headset or earpiece, which could interact with a client computer as required for interface purposes (GUI, keyboard, etc.). Such interaction could be via cable or wireless communication link.

[0027] Fig. 2b illustrates a client-server architecture of a system useful for performing the process 200. The system includes a hearing test server 10 coupled to a communication network 11, such as the Internet. The hearing test server 10 executes an interactive, hearing test protocol, as set out by steps 202, 204, 206 and 208. That protocol is embodied in machine-readable code carried on a readable storage medium, such as CD-ROM or DVD, or on a hard disk resident at the server 10. A user end station 12, such as a personal computer, is also coupled to the communication network 11. The end station 12 includes a sound card 13 which provides data processing resources for producing audio output and receiving audio input under control of the logic in computer programs executed by the processor in the end station 12. In the figure, the sound card 13 is connected to stereo speakers 14 and 15, or to a headphone, and to a microphone 16. However, a wide variety of configurations exist in the end stations, which are not in the control of the hearing test server. The end station 12 also typically includes a display 19, a keyboard 17, and a mouse 18. During the test, audio stimuli in the form of sound signals produced in the sound card 13 are generated using the stereo speakers 14 and 15 in this example. The sound signals may be sampled or computed sound. Environmental factors such as background noise, and the level of the output of the speakers 14 and 15 could be sensed using a microphone 16. The display 19 is used to display a graphical user interface which prompts a user to input data using the keyboard 17 or the mouse 18 in response to the audio stimuli of the test.

[0028] Alternatively, the test can be carried out using the final device in which the profile is to be implemented. The examples of Fig. 2c, for example, shows a cell phone 55, in communication with a communications card 53 in the user PC. The communication link can be an appropriate cable, a wireless link via the telephone system or a separate link built into the phone, or other system hereafter developed. Here, rather than testing the user's response to profiles reproduced on speakers, a response which could differ from that achieved on the actual device, such as a cell phone, the device itself is brought into the test procedure. Further implementation details for this example will be clear to those of skill in the art.

[0029] The first portion of the process 200 is executed using a computer program that includes a first component stored on the server test program memory 20, which is connected to the server 10. A second program component is stored in the PC test program memory 21 which is connected to the end station 12. As discussed in more detail below, a hearing profile is produced for the user at the completion of a test cycle. In one example, this hearing profile is stored in a hearing profile database 22, which is accessible using Internet 11. In another example, the hearing profile database 22 is coupled directly to the server 10. Alternatively, the hearing profile might be stored only on users end station and not made available to the communication network.

[0030] In this example, the end station 12 consists of a personal computer with standard sound card components. In other examples, the end station consists of a mobile phone, a personal digital assistant, or other consumer electronic device, such as home stereo or television equipment having the capability to communicate with a remote test server.

[0031] In one implementation, the hearing test server 10 maintains a web site. To initiate a hearing test, a user at the end station 12 accesses the web site and downloads a component (e.g. a web page with or without active code, a way file that encodes an audio stimulus, or other software component) of the hearing test computer program from the server 10 for execution at the end station 12. The user initiates the test without intervention by a third party, and uses the resources available via the Internet and the resources at the end station to conduct a hearing test.

[0032] In similar fashion, as known to those in the art, the claimed invention can be implemented in pure server model or pure client models. While operational details would differ in each instance, the functionality of the process would remain the same. Primarily, each model would suffice to turn out operable hearing profiles.

[0033] Ultimately, the system claimed below provides hearing profiles that condition audio content delivered to a user. One manner of such operation is operation within audio delivery devices, such as headsets, earpieces, speakers and the like. Here, each device contains audio processing means, which accept a "standard" audio signal as input and output a signal modified according to a user profile. Audio playback devices such as music players, radio receivers, and the like function similarly, taking signals from a storage device, such as a music disk, or from broadcast radio or TV sources. A separate delivery means is accomplished by content providers, who obtain a profile from a user and then deliver personalized content to a user, so that, for example, a piece of music downloaded from a participating site has already been conditioned, based upon the user's individual needs. These and many other applications are possible, all within the ambit of the claims set out below. Those in the art can adapt the description below to any of these environments or contexts with no further technical discussion required.

[0034] Turning back to Fig. 2, the first step, selecting the initial profile, step 202, turns out to be critical for achieving any efficiency or computational speed. As those in the art will appreciate, a vast number of profiles present themselves as possible starting points, from which the user will home in on a profile that provides the best match to her hearing response. As taught in the prior art references cited above, approaches to that problem have generally sought to identify factors that might affect a user's hearing, such as environmental factors. Alternatively, the N-Alternative Forced Choice method seeks its result by offering a series of sound choices.

[0035] All of the examples set out above suffer from the amount of user participation required. A surprising finding by the inventors herein is that by selecting a few key demographic data, one can come very close to an optimum result. According to the invention, the selected data are the gender and age of the user. In studying hearing issues with representative populations, it has been found that using these two data produces results sufficiently accurate for highly usable profiles.

[0036] A screen shot of a method for capturing age and gender information is shown in Fig. 3, in the form of a graphical user interface screen dialog box. It should be noted that the only information needed by the system is age and gender. It has been found, however, that users do not respond accurately to short, simple questions. Offered several questions, however, the accuracy of responses goes up. The need is to pick a list short enough to avoid confusing or boring the user, yet long enough to elicit truthful responses. As noted in the figure, the user is prompted for input by presenting a set of questions via the computer GUI. As known in the art, a number of techniques can be used for user input, such as the textboxes seen in the drawing here, or radio buttons, pick lists and the like. The key points are that the user is prompted for input and that input is received when the user enters it.

[0037] However the data are collected and processed, the result is the selection of a set of data sufficient to allow the generation of selection of a hearing modification profile. In one embodiment, an algorithm is derived from basic principles that allow calculation of a profile. That result requires considerable computation overhead, however. Another embodiment employs a database containing a set of profiles, indexed by age and gender. An example of such a database is the database 400 seen in Fig. 4. The database consists of a number of records 402, shown as Rec 1, Rec 2 ... Rec n. Each record contains a record ID, an age, a gender, a profile records, and Offset Up and Offset Down records, explained below. The database can be implemented using any of the standard commercially available relational database products, such as those available from Oracle Corp. or Microsoft Corp.

[0038] Data for the profiles contained in the database records can best be gathered empirically, either from existing test data or from newly collected test data, as desired by the user. Here, empirical data is highly preferable, as those in the art understand how to describe the hearing profile with good accuracy.

[0039] Although one could achieve minimally acceptable results with a database having relatively few entries, the cost in all respects of maintaining a larger database is highly reasonable, offering highly granular results. Relational database techniques allow very fast access, and the relatively small size of the data records allows fast retrieval. Thus, while a database having tens of entries might produce minimally acceptable results, it will be relatively straightforward to build a database of hundreds or thousands of records, providing more accurate and detailed results.

[0040] Having a starting profile, a set of alternate profiles is generated in step 204. The object of the exercise is to present the user with a set of choices that differ sufficiently to present a choice, yet are sufficiently close to stay within the same hearing area. A method for accomplishing that result is to start with the selected profile and then select a profile higher than the selected profile and another below it. Experience in the field suffices to provide a basis for selecting the separation between profiles. A resulting set of profiles is shown in Fig. 5, where profile A is the profile selected as the starting point, and profiles B and C are the surrounding profiles.

[0041] The alternate profiles are indicated in the database record 402 for the primary profile, in the data items Offset Up and Offset Down, which contain the Record IDs of the upper and lower alternate profiles associated with a given primary profile. Those profiles can be retrieved very rapidly.

[0042] Then, the set of profiles is linked with a sound sample to be played for the user, employing each of the profiles. The sample can be any audio content, but better results will be achieved if the content is chosen to simulate the sort of content that the user is most likely to hear. For example, if the primary application will be on cellular phones, then the sample should be chosen to reflect speech. Music player applications would feature music, and so on. Also, the samples should be amenable to hearing tonal differences, so the user can clearly distinguish such differences. In each instance, application of basic principles to the facts of the situation will allow a practitioner to arrive at a workable solution rapidly.

[0043] In the illustrated embodiment, samples are offered for a number of different audio content modes. A minimal embodiment offers only two modes, speech and music. A music mode requires different psychoacoustic processing than does the speech mode, allowing for different hearing profiles to be created for each mode. Alternative modes to the basic speech and music modes described are based on the type of device being programmed and the type of audio source being processed, including cell phone mode, companion module mode, office phone mode, home phone mode, music from cell phone mode, music from dedicated music player mode, music from television mode, etc. During testing for each mode, the user selects among three hearing profiles. In the illustrated embodiment the user listens to audio samples played on her own computer, via the Internet. In alternative embodiments, audio samples could be transmitted via a communication channel to an ear module and played by the audio processors on the ear module. In any of the embodiments, the user selects the sample that sounds best.

[0044] Figure 5 illustrates a screen in a graphical user interface such that the user can compare simulated audio for the speech and music modes of operation in different environments with and without the selected hearing profiles, so that the user can understand how applying the hearing profile to the ear module will affect its operation

[0045] Turning again to process 200, the samples are presented to the user, step 208, and the user plays them to determine which is preferable. A method for accomplishing that result is shown in Fig. 5, in which the samples are linked to pushbuttons, allowing the user to play selections as often as needed, using the mouse or other input device. When ready, the user can indicate her choice with the appropriate radio button, step 210.

[0046] At that point the system is prepared to apply the selected profile to the application, step 212 of process 200. Given the nature of the application, a person of skill in the art can implement an appropriate means for transmitting the selected profile to the device being used, as discussed above, and for integrating the profile into the device itself. The Rader and Pluvilage documents, referred to above, provide examples of such processes. For example, a data channel can be opened between the device and a computer, either via a cable or wireless connection, and the device's operating software can oversee the data transfer and integration.

[0047] In an alternative embodiment, the system selects and applies not only the user's preferred profile but several others to the user device. The profile selected by the user is selected, and others can be chosen in a cluster around that profile. One embodiment provides two additional profiles, but more are used in other embodiments. Here, the user can be offered a choice, allowing her to toggle between a number of profiles. Such a choice will provide the user the ability to compensate somewhat for environmental changes, such as increased noise or the like, that affects the user's perception or hearing sensitivity.

[0048] Fig. 7 illustrates a screen in a graphical user interface that allows the user to enter information necessary to link to a mobile phone by a configuration link across a public switched telephone network, to program one or more hearing profiles. In the illustrated embodiment the selected hearing profiles are transferred to a mobile phone.

[0049] In alternative embodiments the hearing profiles are transferred in data formats used by an ear module to an ear module using a process like that described above, or other processes using wired or wireless links as known in the art. For example, a data format like "presets" adapted for use by a processor on the ear module as described in co-owned and co-pending U.S. Patent Application No. 11/569,499, referred to above can be used for delivery of the selected hearing profile.

[0050] While the present invention is disclosed by reference to the preferred embodiments and examples detailed above, it is to be understood that these examples are intended in an illustrative rather than in a limiting sense. It is contemplated that modifications and combinations will readily occur to those skilled in the art, which modifications and combinations will be within the scope of the present invention as defined by the claims.

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.

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Patentkrav

1. Fremgangsmåde (200) til at danne en persontilpasset høreprofil i et lydsystem for en bruger, der omfatter trinnene af:

5 at udvælge (202) en indledende høreprofil, baseret på udvalgte faktorer af brugerinput;

at identificere (204) én eller flere alternative høreprofiler, der har et udvalgt forhold til den indledende høreprofil, idet
10 den indledende og de alternative høreprofiler svarer til hørefølsomhed som en funktion af frekvens;

at sammenkæde (206) i det mindste én lydprøve med den indledende og de alternative høreprofiler;

at afspille (208) den i det mindste ene lydprøve for brugeren under anvendelse af den indledende og de alternative høreprofiler for at forsyne brugeren med en flerhed af profilerede lydprøver;

15 at modtage (210) identifikation af en foretrukken, profileret lydprøve fra brugeren;

20 at udvælge (210) en endelig høreprofil fra den indledende og de alternative høreprofiler baseret på brugerens identificerede, foretrukne, profilerede lydprøve; og

at anvende (212) den endelige høreprofil på lydsystemet, hvorved de valgte faktorer er demografiske faktorer, som er
25 relaterede til brugeren, og som omfatter alder og køn for brugeren.

2. Fremgangsmåde ifølge krav 1, hvorved der bliver identificeret to eller flere alternative høreprofiler.

3. Fremgangsmåde ifølge krav 1, hvorved trinnet af at udvælge indbefatter trinnene af:

at spørge om brugerinput med et computerskærmdisplay (19) på et computergrafisk brugerinputsystem (12); og

35 at modtage brugerinput.

4. Fremgangsmåde ifølge krav 1, hvorved den indledende høreprofil bliver dannet baseret på en profilalgoritme.

5. Fremgangsmåde ifølge krav 1, hvorved den indledende høreprofil bliver valgt fra blandt en flerhed af lagrede profiler.

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6. Fremgangsmåde ifølge krav 1, hvorved der bliver identificeret to alternative høreprofiler, én ved en i almindelighed højere følsomhed ved givne frekvenser og den anden ved lavere følsomhed end den indledende høreprofil.

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7. Fremgangsmåde ifølge krav 1, hvorved trinnet af at sammenkæde sammenkæder den indledende og de alternative høreprofiler med mangfoldige lydprøver, idet hver lydprøve præsenterer en forskellig lyd måde, og hvori lyd måderne indbefatter i det mindste musik og tale.

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8. System til at danne en persontilpasset høreprofil i et lydssystem for en bruger, der omfatter:

organer (10) til at udvælge en indledende høreprofil, baseret på udvalgte faktorer af brugerinput;

20

organer (10) til at identificere én eller flere alternative høreprofiler, der har et udvalgt forhold til den indledende høreprofil, idet den indledende og de alternative høreprofiler svarer til hørefølsomhed som en funktion af frekvens;

25

organer (10) til at sammenkæde i det mindste én lydprøve med den indledende og de alternative høreprofiler;

organer (12, 13, 14, 15) til at afspille den i det mindste ene lydprøve for brugeren under anvendelse af den indledende og de alternative høreprofiler for at forsyne brugeren med en flerhed af profilerede lydprøver;

30

organer (17, 18) til at modtage identifikation af en foretrukken, profileret lydprøve fra brugeren;

organer (10) til at udvælge en endelig høreprofil fra den indledende og de alternative høreprofiler baseret på brugerens identificerede, foretrukne, profilerede lydprøve; og

35

organer til at anvende den endelige høreprofil på lydsystemet, hvori de valgte faktorer er demografiske faktorer, som er relaterede til brugeren, og som omfatter alder og køn for

brugeren.

9. System ifølge krav 8, hvori systemet virker som en internetbaseret applikation.

5

10. System ifølge krav 8, hvori systemet er konfigureret i en client-server arkitektur.

11. System ifølge krav 8, hvori udvælgelsen indbefatter:

10 at spørge om brugerinput med et computerskærmdisplay (19) på et computergrafisk brugerinputsystem (12); og
at modtage brugerinput.

12. System ifølge krav 8, hvori den indledende høreprofil
15 bliver valgt fra blandt en flerhed af lagrede profiler.

13. System ifølge krav 8, hvori trinnet af at sammenkæde sammenkæder den indledende og de alternative høreprofiler med mangfoldige lydprøver, idet hver lydprøve præsenterer en
20 forskellig lyd måde, og hvori lyd måderne indbefatter i det mindste musik og tale.

DRAWINGS

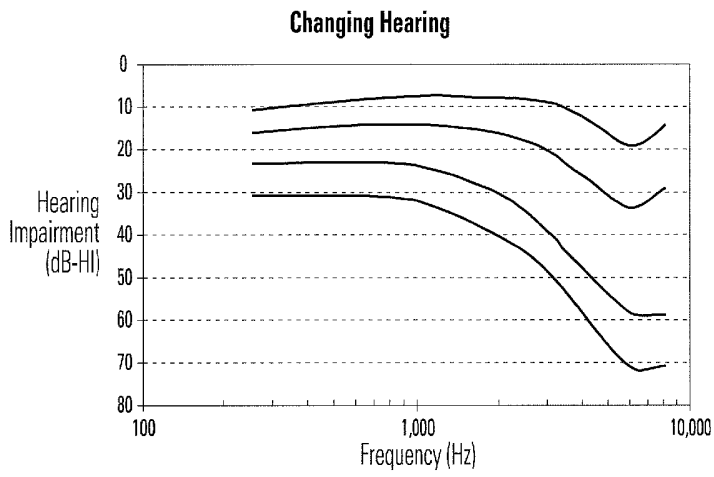


FIG. 1A

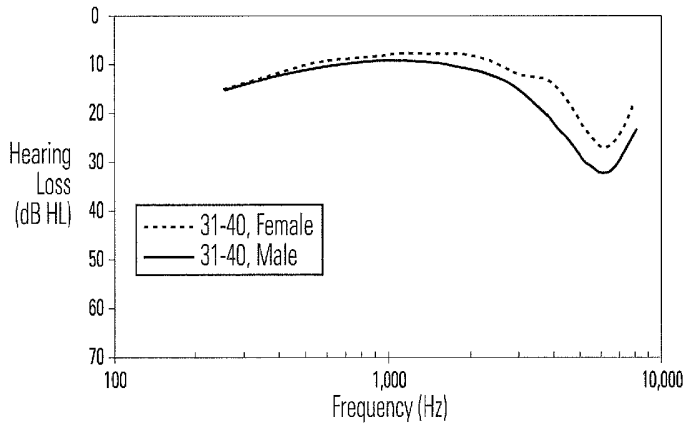


FIG. 1B

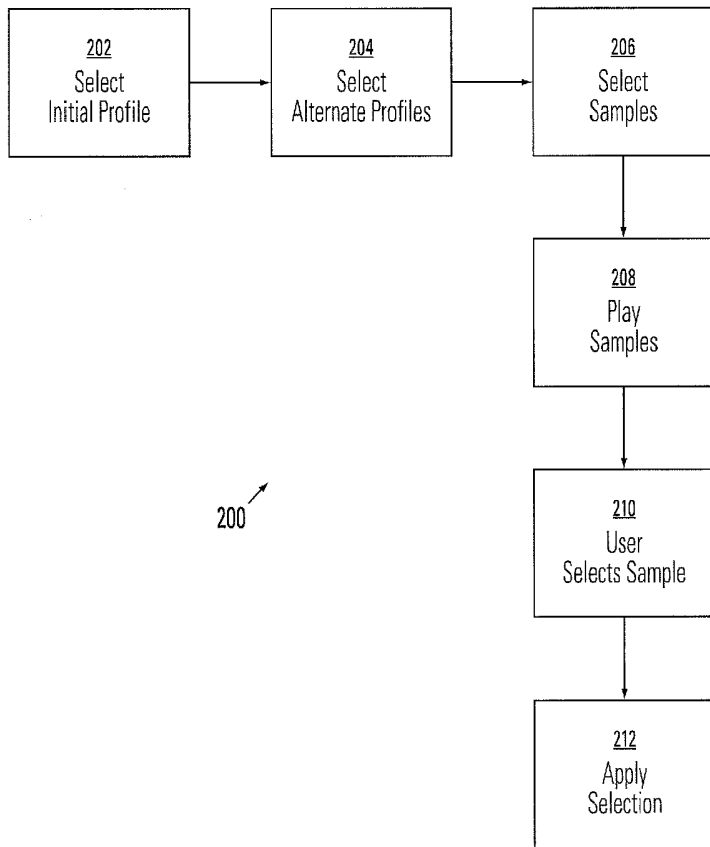


FIG. 2A

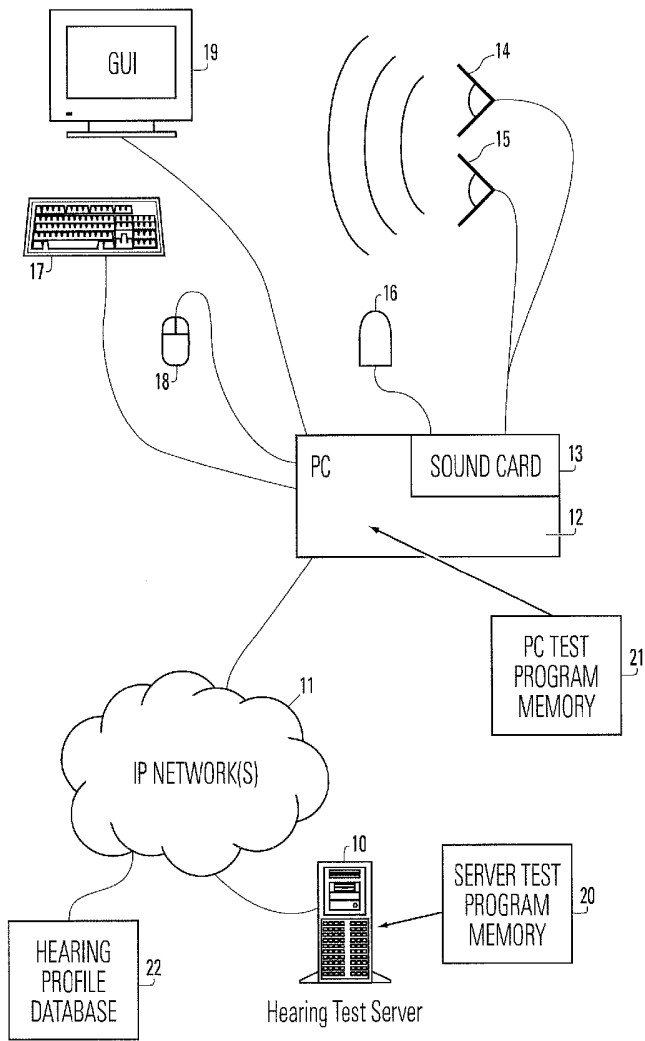


FIG. 2B

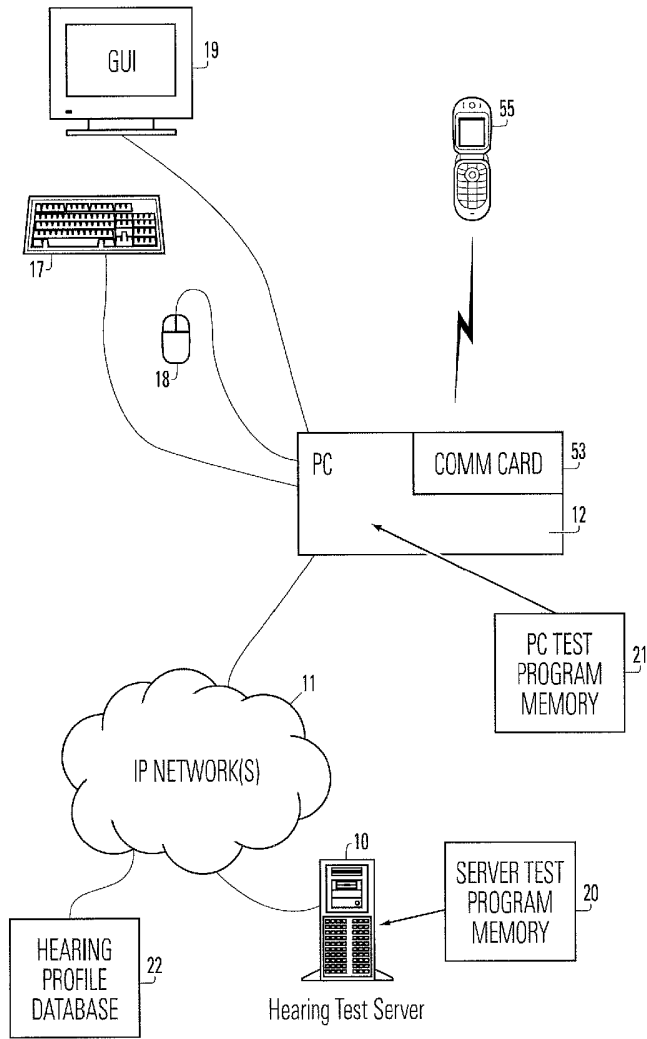


FIG. 2C

[NOAH - Sound ID]

File Edit SoundID View Window Help

Personal Data

Date of Birth

Month

Year

Gender

M F

Birthplace

Occupation

Residence

Education

Client Name: Lfert, Mike Session Date: Today's Date: 1/26/2006 User ID: ABC

FIG. 3

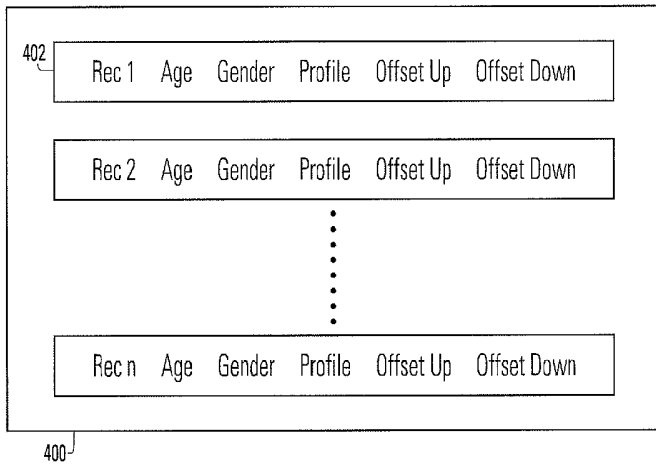


FIG. 4

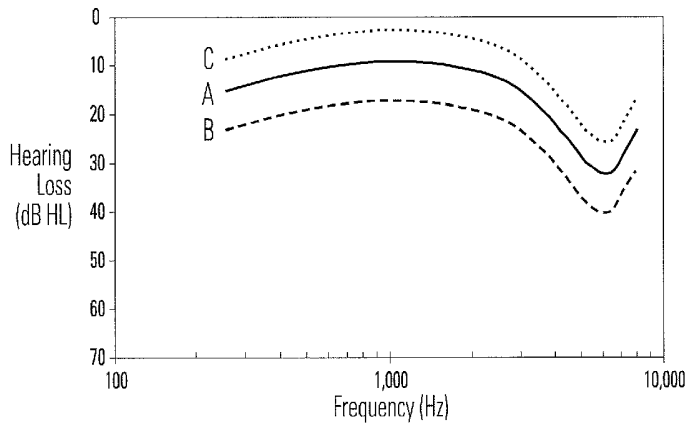


FIG. 5

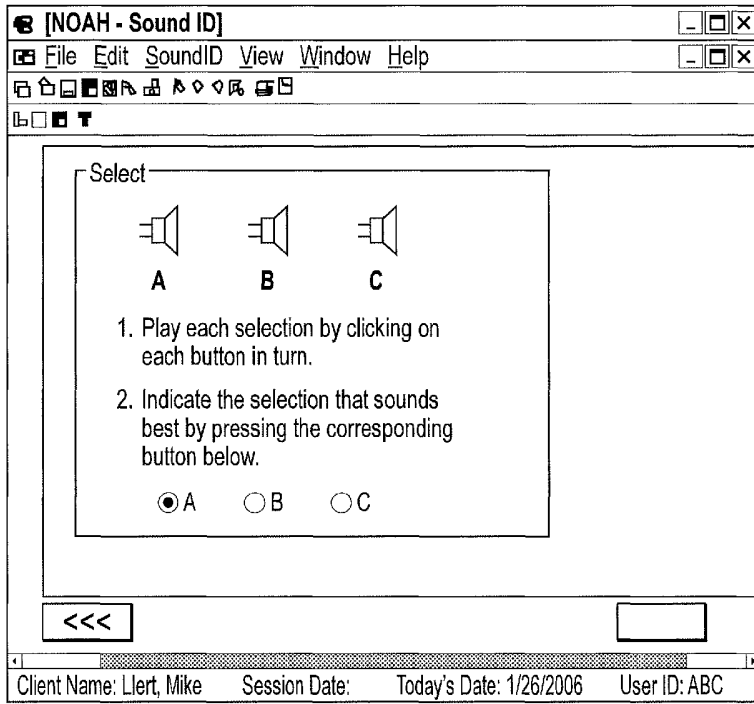


FIG. 6

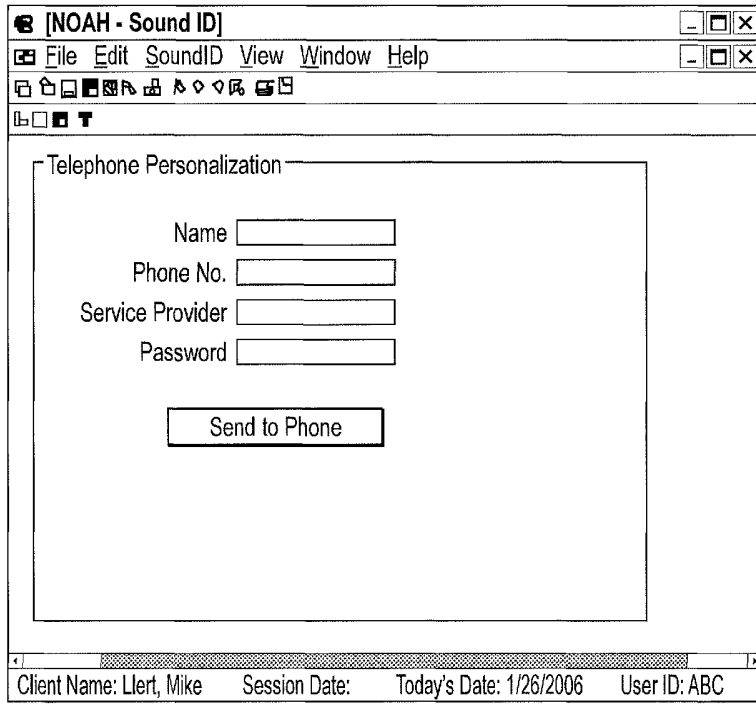


FIG. 7