

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

BOSE CORPORATION,
Petitioner,

v.

INGENIOSPEC, LLC,
Patent Owner.

Case No. IPR2025-01549
Patent No. 11,852,901

DECLARATION OF ANDREW P. DEJACO

Bose Exhibit 1003 Bose v. IngenioSpec
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I, Andrew P. DeJaco, declare:

1. I have been retained by Wolf, Greenfield & Sacks, P.C., counsel for Petitioner Bose Corporation, to assess claims 1-32 (the “challenged claims”) of U.S. Patent No. 11,852,901 (“the ‘2901 patent”). I am being compensated for my time at my standard rate of \$350.00 per hour, plus actual expenses. My compensation is not dependent in any way upon the outcome of the *inter partes* review of the ‘2901 patent.

I. PERSONAL AND PROFESSIONAL BACKGROUND

2. I received a Bachelor of Science in Electrical Engineering from the University of Dayton in 1986. I received a Master of Science in Electrical Engineering from the University of Michigan in 1989. During my time at the University of Michigan, I completed all the required coursework for a Ph.D. in Digital Signal Processing and Communication.

3. From 1991 to 1997 I worked as an Electrical Engineer for Qualcomm focusing on the research, development, and implementation of digital signal processing algorithms. From 1997 to 2003 I worked as a Vice President of Engineering for Qualcomm, directing the functional group covering voice processing, digital media and digital signal processing needs in a cell phone, in addition to the electro-acoustic systems required in the handset and carkit products that included microphones, speakers, and dual mic noise suppression designs.

4. I am currently self-employed as a business broker and advisor having a franchise with WebsiteClosers LLC. From 2013 to January 2021, I was a co-owner of Judee's Gluten Free Ingredient brand where we doubled Amazon sales each year from 2013-2020 and sold the brand in 2021. From 2003 to June 2012, I taught High School Advanced Placement Calculus/Statistics and Computer Science at St. Charles Preparatory School in Bexley, Ohio.

5. I have over 15 years experience working in the field of digital signal processing. This includes algorithmic development, product implementation and testing, as well as system wide testing and optimization. I have designed and built speech coders ranging in bit rates from 600 bits per second for military use up to 13000 bits per second for high quality CDMA cellular applications. I have improved coding techniques using Multi-pulse, LPC, RELP, and CELP coding structures and have many patents in the area of variable rate speech coding techniques for CDMA cellular use. These patents include handling severe background noise using speech enhancement techniques, detecting voice activity (VAD) in noisy cellular environments, protecting against channel errors, and optimizing speech quality at the lowest average encoding rate possible. I have participated in speech coding standardization processes and have authored coding standards for CDMA for the IS-96-A, IS-733 speech codecs, and the IS-125 speech coding performance specification.

6. Patents and Publications: I am a named inventor on the following patents:

- 7,590,096 (2009) Method and Apparatus for Improved Detection of Rate Errors in Variable Rate Receivers
- 7,577,563 (2009) Enhanced Conversion of Wideband Signals to Narrowband Signals
- 7,483,520 (2009) Method and Apparatus for Prompting a Cellular Telephone User with Instructions
- 7,426,466 (2008) Method and Apparatus for Quantizing Pitch, Amplitude, Phase and Linear Spectrum of Voiced Speech
- 7,289,461 (2007) Communications Using Wideband Terminals
- 7,184,954 (2007) Method and Apparatus for Detecting Bad Data Packets Received by a Mobile Telephone Using Decoded Speech Parameters
- 7,146,174 (2006) Method and Apparatus for Determining the Transmission Data Rate in a Multi-User Communication System
- 7,113,522 (2006) Enhanced Conversion of Wideband Signals to Narrowband Signals
- 7,061,934 (2006) Method and Apparatus for Interoperability Between Voice Transmission Systems During Speech Inactivity
- 6,950,799 (2005) Speech Converter Utilizing Preprogrammed Voice Profiles

- 6,941,265 (2005) Voice Recognition System, Method and Apparatus
- 6,836,758 (2004) System and Method for Hybrid Voice Recognition
- 6,804,218 (2004) Method and Apparatus for Improved Detection of Rate Errors in Variable Rate Receivers
- 6,789,059 (2004) Reducing Memory Requirements of a Codebook Vector Search
- 6,766,289 (2004) Fast Code-Vector Searching
- 6,766,176 (2004) Method and Apparatus for Automatically Adjusting Speaker and Microphone Gains Within a Mobile Telephone
- 6,754,624 (2004) Codebook Re-Ordering to Reduce Undesired Packet Generation
- 6,745,024 (2004) System and Method for Preparing and Sending an Electronic Mail Communication Using a Wireless Communications Device
- 6,744,882 (2004) Method and Apparatus for Automatically Adjusting Speaker and Microphone Gains Within a Mobile Telephone
- 6,631,139 (2003) Method and Apparatus for Interoperability Between Voice Transmission Systems During Speech Inactivity
- 6,574,596 (2003) Voice Recognition Rejection Scheme
- 6,519,479 (2003) Spoken User Interface for Speech-Enabled Devices

- 6,484,138 (2002) Method and Apparatus for Performing Speech Frame Encoding Mode Selection in a Variable Rate Encoding System
- 6,477,502 (2002) Method and Apparatus for Using Non-Symmetric Speech Coders to Produce Non-Symmetric Links in a Wireless Communication System
- 6,449,496 (2002) Voice Recognition User Interface for Telephone Handsets
- 6,438,518 (2002) Method and Apparatus for Using Coding Scheme Selection Patterns in a Predictive Speech Coder to Reduce Sensitivity to Frame Error Conditions
- 6,434,519 (2002) Method and Apparatus for Identifying Frequency Bands to Compute Linear Phase Shifts Between Frame Prototypes in a Speech Coder
- 6,330,532 (2001) Method and Apparatus for Maintaining a Target Bit Rate in a Speech Coder
- 6,324,509 (2001) Method and Apparatus for Accurate Endpointing of Speech in the Presence of Noise
- 6,324,503 (2001) Method and Apparatus for Providing Feedback from Decoder to Encoder to Improve Performance in a Predictive Speech Coder Under Frame Erasure Conditions
- 6,260,009 (2001) CELP-Based to CELP-Based Vocoder Packet Translation

- 6,240,387 (2001) Method and Apparatus for Performing Speech Frame Encoding Mode Selection in a Variable Rate Encoding System
- 6,205,339 (2001) Method and Apparatus for Establishing TDD/TTY Service Over Vocoded Channels
- 6,205,130 (2001) Method and Apparatus for Detecting Bad Data Packets Received by a Mobile Telephone Using Decoded Speech Parameters
- 6,169,763 (2001) Characterizing a Communication System Using Frame Aligned Test Signals
- 5,915,235 (1999) Adaptive Equalizer Preprocessor for Mobile Telephone Speech Coder to Modify Nonideal Frequency Response of Acoustic Transducer
- 5,911,128 (1999) Method and Apparatus for Performing Speech Frame Encoding Mode Selection in a Variable Rate Encoding System
- 5,903,862 (1999) Method and Apparatus for Detection of Tandem Vocoding to Modify Vocoder Filtering
- 5,857,147 (1999) Method and Apparatus for Determining the Transmission Data Rate in a Multi-User Communication System
- 5,790,632 (1998) Method and Apparatus for Echo Canceling Accounting for Companding Induced Quantization Error

- 5,784,406 (1998) Method and Apparatus for Objectively Characterizing Communications Link Quality
- 5,751,901 (1998) Method for Searching an Excitation Codebook in a Code Excited Linear Prediction (CELP) Coder
- 5,742,734 (1998) Encoding Rate Selection in a Variable Rate Vocoder
- 5,528,593 (1996) Method and Apparatus for Controlling Power in a Variable Rate Communication System
- 5,341,456 (1994) Method for Determining Speech Encoding Rate in a Variable Rate Vocoder

7. I also have authored a number of publications including the following:

- SC Greer, A DeJaco, “Standardization of the selectable mode vocoder”, 2001 IEEE International Conference on Acoustics, Speech, and Signal Processing. Proceedings.
- A. Das; A. DeJaco; S. Manjunath; A. Ananthapadmanabhan; J. Huang; E. Choy, “Multimode variable bit rate speech coding: an efficient paradigm for high-quality low-rate representation of speech signal”, 1999 IEEE International Conference on Acoustics, Speech, and Signal Processing. Proceedings.
- Ning Bi; Harinath Garudadri; Chienchung Chang; Andrew DeJaco; Yingyong Qi; Naren Malayath; William Huang, “A robust

speech recognition system embedded in CDMA cellular phone chipsets,” 2002 IEEE International Conference on Acoustics, Speech, and Signal Processing.

- A. DeJaco; W. Gardner; P. Jacobs; Chong Lee, “Qcelp: The North American Cdma Digital Cellular Variable Rate Speech Coding Standard”, Proceedings., IEEE Workshop on Speech Coding for Telecommunications.
- A.P. DeJaco, “Method for determining speech encoding rate in a variable rate vocoder”, The Journal of the Acoustical Society of America 97, 3927 (1995).
- A.P. DeJaco; N. Bi, “Method for searching an excitation codebook in a code excited linear prediction (CELP) coder”, The Journal of the Acoustical Society of America, Volume 104, Issue 6, December 1998, p. 3158.

8. My curriculum vitae is provided as Exhibit 1004.

II. MATERIALS REVIEWED AND CONSIDERED

9. In forming my opinions, I have reviewed the following documents, and any other document cited in this declaration:

Exhibit	Description
1001	U.S. Patent No. 11,852,901 (“the ’2901 patent”)
1002	Prosecution History of U.S. Patent No. 11,852,901

Exhibit	Description
1005	W.O. Pub. No. 2003/056790 A1 (“Goh”)
1006	U.S. Patent No. 7,925,029 (“Hollemans”)
1008	U.S. Patent No. 4,882,745 (“Silver”)
1009	U.S. Patent Application Publication No. 2002/0137530
1010	U.S. Patent No. 5,113,428 (“Fitzgerald”)
1011	U.S. Patent Application No. 11/546,685 (“the ’685-Application”)
1012	U.S. Patent Application Publication No. 2007/0030442 (“Howell-442”)
1013	U.S. Patent Application No. 11/183,262 (“the ’262-Application”)
1014	U.S. Patent Application No. 11/006,343 (“the ’343-Application”)
1015	U.S. Patent Application No. 11/183,283 (“the ’283-Application”)
1020	U.S. Patent Application Publication No. 2001/0041602 (“Berger”)
1021	W.O. Pub. No. 2001/63888 A1 (“Irvin”)
1022	U.S. Patent No. 5,359,647 (“Regen”)
1024	U.S. Patent Application Publication No. 2002/0094806
1025	U.S. Provisional Application No. 60/583,169 (“the ’169-Provisional”)
1026	U.S. Patent No. 5,429,889
1027	U.S. Patent Application Publication No. 2003/0222622
1028	U.S. Patent Application Publication No. 2003/0214268
1029	U.S. Patent No. 7,283,635
1030	U.S. Patent Application Publication No. 2001/0011964
1031	U.S. Patent No. 6,453,018
1032	U.S. Patent No. 6,122,510
1033	W.O. Pub. No. 2000/005861 A1
1034	U.S. Statutory Invention Registration H417
1035	U.S. Patent No. 6,549,586

10. I have also relied on my education, experience, research, training, and knowledge in the relevant art, and my understanding of any applicable legal principles described in this declaration.

III. MY UNDERSTANDING OF PATENT LAW

11. In developing my opinions, I discussed various relevant legal principles with Petitioner's attorneys. Though I do not purport to have prior knowledge of such principles, I understood them when they were explained to me and have relied upon such legal principles, as explained to me, in the course of forming the opinions set forth in this declaration. My understanding in this respect is as follows:

12. I understand that "*inter partes* review" (IPR) is a proceeding before the United States Patent & Trademark Office for evaluating the patentability of an issued patent's claims based on prior-art patents and printed publications.

13. I understand that, in this proceeding, Petitioner has the burden of proving that the challenged claims of the '2901 patent are unpatentable by a preponderance of the evidence. I understand that "preponderance of the evidence" means that a fact or conclusion is more likely true than not true.

14. I understand that, in IPR proceedings, claim terms in a patent are given their ordinary and customary meaning as understood by a person of ordinary skill in the art ("POSA") in the context of the entire patent and the prosecution history pertaining to the patent. If the specification provides a special definition for a claim term that differs from the meaning the term would otherwise possess, the specification's special definition controls. If a claim element is expressed as a "means" for performing a specified function, I understand that it covers the

corresponding structure described in the specification and equivalents of the described structure. I have applied these standards in preparing the opinions in this declaration.

15. I understand that determining whether a particular patent or printed publication constitutes prior art to a challenged patent claim can require determining the effective filing date (also known as the priority date) to which the challenged claim is entitled. I understand that for a patent claim to be entitled to the benefit of the filing date of an earlier application to which the patent claims priority, the earlier application must have described the claimed invention in sufficient detail to convey with reasonable clarity to the POSA that the inventor had possession of the claimed invention as of the earlier application's filing date. I understand that a disclosure that merely renders the claimed invention obvious is not sufficient written description for the claim to be entitled to the benefit of the filing date of the application containing that disclosure.

16. I understand that for an invention claimed in a patent to be patentable, it must be, among other things, new (novel—*i.e.*, not anticipated) and not obvious from the prior art. My understanding of these two legal standards is set forth below.

A. Anticipation

17. I understand that, for a patent claim to be “anticipated” by the prior art (and therefore not novel), each and every limitation of the claim must be found,

expressly or inherently, in a single prior-art reference. I understand that a claim limitation is disclosed for the purpose of anticipation if a POSA would have understood the reference to disclose the limitation based on inferences that a POSA would reasonably be expected to draw from the explicit teachings in the reference when read in light of the POSA's knowledge and experience.

18. I understand that a claim limitation is inherent in a prior art reference if that limitation is necessarily present when practicing the teachings of the reference, regardless of whether a person of ordinary skill recognized the presence of that limitation in the prior art.

B. Obviousness

19. I understand that a patent claim may be unpatentable if it would have been obvious in view of a single prior-art reference or a combination of prior-art references.

20. I understand that a patent claim is obvious if the differences between the subject matter of the claim and the prior art are such that the subject matter as a whole would have been obvious to a person of ordinary skill in the relevant field at the time the invention was made. Specifically, I understand that the obviousness question involves a consideration of:

- the scope and content of the prior art;
- the differences between the prior art and the claims at issue;

- the knowledge of a person of ordinary skill in the pertinent art; and
- if present, objective factors indicative of non-obviousness, sometimes referred to as “secondary considerations.” To my knowledge, the Patent Owner has not asserted any such secondary considerations with respect to the ’2901 patent.

21. I understand that in order for a claimed invention to be considered obvious, a POSA must have had a reason for combining teachings from multiple prior-art references (or for altering a single prior-art reference, in the case of obviousness in view of a single reference) in the fashion proposed.

22. I further understand that in determining whether a prior-art reference would have been combined with other prior art or with other information within the knowledge of a POSA, the following are examples of approaches and rationales that may be considered:

- combining prior-art elements according to known methods to yield predictable results;
- simple substitution of one known element for another to obtain predictable results;
- use of a known technique to improve similar devices in the same way;
- applying a known technique to a known device ready for improvement to yield predictable results;

- applying a technique or approach that would have been “obvious to try,” *i.e.*, choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success.
- known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations would have been predictable to one of ordinary skill in the art;
- some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior-art reference or to combine prior-art reference teachings to arrive at the claimed invention. I understand that this teaching, suggestion or motivation may come from a prior-art reference or from the knowledge or common sense of one of ordinary skill in the art.

23. I understand that for a single reference or a combination of references to render the claimed invention obvious, a POSA must have been able to arrive at the claimed invention by altering or combining the applied references.

IV. PERSON OF ORDINARY SKILL IN THE ART (“POSA”)

24. In rendering the opinions set forth in this declaration, I have been asked to consider the claims of the '2901 patent and the prior art through the eyes of a POSA. I have considered factors such as the educational level and years of

experience of those working in the pertinent art, the types of problems encountered in the art, the teachings of the prior art, patents and publications of other persons or companies, and the sophistication of the technology

25. As I discuss in more detail below in Section V, the '2901 patent generally relates techniques for integrating electrical components (such as those commonly found in conventional cellular phones) into consumer wearable products like eyeglasses or headphones.

26. I have been instructed to assume a person of ordinary skill in the art is not a specific real individual, but rather a hypothetical individual having the qualities reflected by the factors discussed above.

27. I have been asked to provide my opinions as to the state of the art in this field in the time frame of both 2004 and 2010. I understand that the face of the '2901 patent indicates an earliest claimed priority date of October 12, 2004, but that Bose disputes whether the '2901 patent is entitled to a priority date earlier than July 1, 2010. The substantive difference between a person of ordinary skill's knowledge in 2004 versus 2010 is largely immaterial for the purposes of this declaration. Regardless, I apply the knowledge a POSA would have had in 2010 when addressing Ground 1, and then apply the knowledge a POSA would have had in 2004 when addressing Grounds 2A-2D.

28. In my opinion, a person of ordinary skill in the art in the 2004 and in 2010 timeframe (“POSA”) would have had a Bachelor’s or graduate degree in electrical engineering, mechanical engineering, signal processing, or a related field, and at least two years of experience with designing personal wireless communication devices. More education could substitute for experience, and vice versa. This hypothetical person would have been capable of understanding and applying the teachings of the ’2901 patent and the prior-art references discussed in this declaration.

29. By 2004, I held a Bachelor of Science degree in Electrical Engineering from the University of Dayton and a Master of Science degree in Electrical Engineering from the University of Michigan, and I had over 15 years of experience with developing and implementing wireless communications in personal communication devices such as hand-held cellphones. Therefore, I was a person of more than ordinary skill in the art during the relevant timeframe. However, I worked with many people who fit the characteristics of the POSA, and I am familiar with their level of skill. When developing the opinions set forth in this declaration, I assumed the perspective of a person having ordinary skill in the art, as set forth above.

V. THE '2901 PATENT

30. The '2901 patent is titled “[w]ireless headset supporting messages and hearing enhancement.” In introducing its alleged invention, the '2901 patent says that although conventional mobile phones “support both voice calls and text messages,” using both simultaneously can be difficult. EX1001, 3:41-45. For example, when on a phone call, “the user often holds the mobile phone against their ear,” preventing her from reading a text message on the phone. *Id.*, at 3:42-44. Even if a conventional wireless headset is used with the phone for calling in a “handsfree manner” (which the '2901 patent acknowledges was known in the art), “the user would need to view a screen of the mobile phone to participate in text messaging.” *Id.*, at 3:48-52.

31. To address these problems, the patent discloses an “eyeglass frame” with electrical components in or attached thereto. *Id.*, at 3:59-64. These components allow the glasses to perform text messaging. For example, an “incoming text message can be presented to the recipient with an audio or textual presentation” and “[t]hereafter, a reply text message can be sent back to the initiator.” *Id.*, at 43:9-12.

32. Although the patent focuses on eyeglasses, its independent claims recite a generic “*wearable device*” or “*headset*.” They and the dependent claims also recite

various conventional components, with conventional capabilities, that are “*provided at least partially in*” the wearable device or headset.

A. Prosecution History of the '2901 Patent

33. The originally-filed claims were allowed on April 19, 2023 without any rejections. EX1002, 487-496. The applicants subsequently amended the original claims and added new claims. EX1002, 573-583. All claims were ultimately allowed without rejections. EX1002, 668.

B. The Challenged Claims

34. Claims 1-32 are reproduced in the Claim Listing (*infra* §VIII), and independent claim 1 is reproduced below with labels added:

[1PRE] A wireless headset for a user comprising:

[1A] a printed circuit board provided in the headset, the printed circuit board having at least one electrical component attached thereon, the at least one electrical component being electrically connected to a plurality of other electrical components, each of the plurality of other electrical components being provided at least partially in the headset;

[1B] a speaker in the headset;

[1C] a microphone in the headset; and

[1D] wireless communication circuitry,

[1E] wherein the at least one electrical component or the plurality of other electrical components include at least a controller,

[1F] wherein the at least a controller is configured to facilitate modifying power within a range of frequencies based on at least one hearing characteristic of the user, to help the user hear audio outputs presented to the user via at least the speaker,

[1G] wherein the wireless communication circuitry is configured to wirelessly receive a message,

[1H] wherein if the message is a text message, the at least a controller is configured to have at least a portion of the text message presented to the user,

[1I] wherein if the message is an audio message, the at least a controller is configured to have at least a portion of the audio message presented to the user, and

[1J] wherein at least the speaker is configured to present at least a portion of the message, when the at least a portion of the message is to be presented in an audio manner.

35. Independent claims 10, 31, and 32 are similar except they are directed to a wearable “*device*” instead of a “*headset*” and they lack claim 1’s recitations of

a “*hearing characteristic*” ([1F]) and the speaker presenting an audio message ([1J]).

36. Claims 10, 31, and 32 additionally recite well-known features recited in claims depending from claim 1, including conductive pads (claim 3), Bluetooth (claim 4), voice recognition (claim 5), and a second microphone for noise reduction (claim 9). Claims 31-32 recite well-known features recited in claims depending from claim 10, including hands-free usage (claim 13), use sensor/indicator (claim 14), motion sensor (claim 15), pressure sensor (claim 19), display (claim 22) and camera (claim 23).

VI. CLAIM INTERPRETATION

37. I am informed by counsel that claim terms are construed according to their ordinary meaning in light of the specification and prosecution history.

VII. THE CHALLENGED CLAIMS ARE UNPATENTABLE IN LIGHT OF THE PRIOR ART IDENTIFIED IN THE PETITION

38. I have been asked to provide my opinion concerning whether claims 1-32 of the '2901 patent are anticipated or would have been obvious to a POSA in light of the prior-art references identified in the Petition. For the reasons explained below, it is my opinion that each of claims 1-32 is anticipated and/or would have been obvious to a POSA.

A. Ground 1: Howell-442, Incorporating Or In Combination With Its Incorporated Applications, Renders Claims 1-32 Unpatentable

1. The '685-Application Does Not Disclose a Controller Configured to Present a “Portion” or “Notification” of a Text Message to the User

39. As part of my analysis of Ground 1, I have been asked to analyze Application Serial No. 11/546,685 (EX1011, the “’685-Application”), which I understand the ’2901 patent claims priority to. *See* EX1001, 1:7-28.

40. Specifically, I have been asked to analyze whether the ’685-Application provides written description support of the claims of the ’2901 patent. I have been further instructed to not consider any material the ’685-Application attempts to incorporate by reference when performing this analysis.

41. Each of the challenged independent claims (1, 10, 31, 32) claim a “headset” or “wearable device” with a “controller...configured” to present either a “portion of” a “text message” (claim 1) or a “notification of” a “text message,” (claims 10, 31, and 32) to the user (the “text message limitations”).

42. It is my opinion, as explained below, that the ’685-Application does not provide written description support for the text message limitations.

43. I note that the specification of the ’2901 patent appears to provide written description support for the text message limitation at 45:34-37, in which it discloses “Tom is alerted by his mobile phone of an incoming text message, such as

by displaying at least a portion of the text message and/or otherwise notifying Tom of the text message.” The ’2901 patent further describes this functionality in Figure 30, specifically step 3610 labeled “DISPLAY THE INCOMING TEXT MESSAGE.”

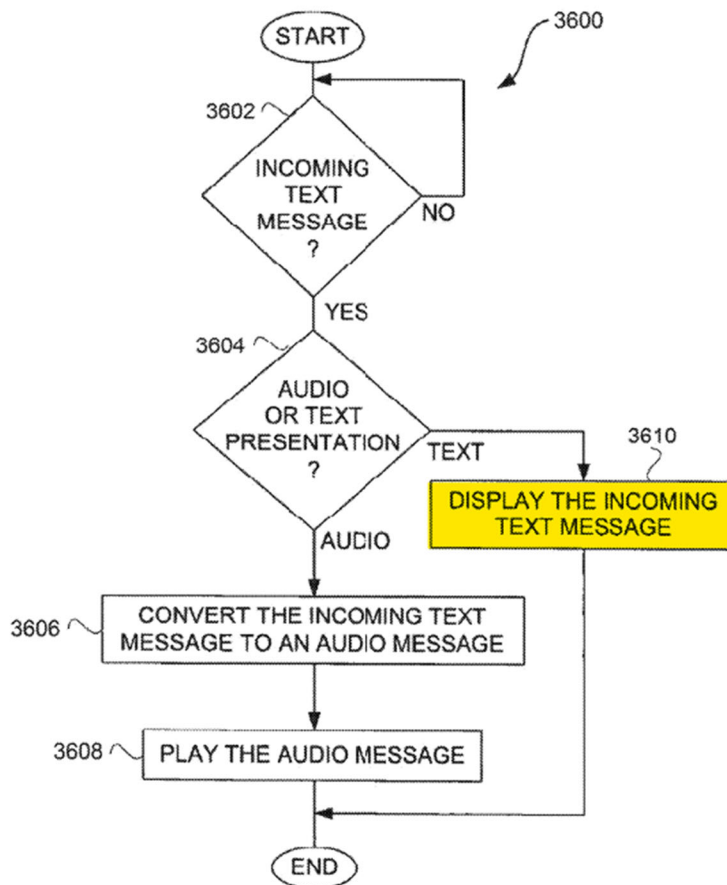


FIG. 30

44. The ’685-Application does not disclose presenting a text message or otherwise notifying a user of a text message as claimed in the text message limitations. Instead, the only messages described by the ’685-Application are

“voice” or “audio” messages. For example, the ’685-Application discloses that “A user can speak into the microphone and his message can be transmitted from the glasses in a more directional manner.” EX1011, [000106].

45. As another example, the ’685-Application discloses, in relation to Figure 16, an embodiment where a “user is a paramedic helping a patient” and in which “[t]he glasses continually take pictures 852 of objects directly in front of the paramedic.” EX1011, [000152]. The images are sent to “a remote site, such as a hospital, to be viewed by a doctor” and “[b]ased on the images, the doctor sends out voice messages to the paramedic” (emphasis added) that are “wirelessly transmitted to and received 856 by the glasses,” and “[t]he speaker in the glasses outputs 858 the messages to the paramedic.” *Id.*, [000152]-[000153].

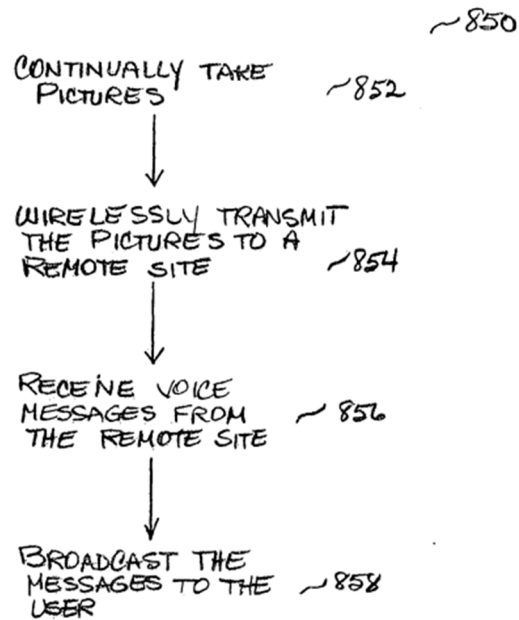


FIG. 16

EX1011, Fig. 16.

46. Similarly, the '685-Application describes a user taking a picture with the glasses and then "leav[ing] a specific audio message to be associated with the picture." EX1011, [000197]; *see also id.*, claim 23.

47. In none of these examples does the '685-Application disclose "text" messages, let alone presenting a portion or notification of them. Indeed, the '685-Application does not mention or describes a "text message" in any context or even use the word "text."

48. Thus, it is my opinion that the '685-Application does not provide written description support for the text message limitations of the '2901 patent.

2. Howell-442 (EX1012) and Its Incorporated Applications

49. U.S. Patent Publication No. 2007/0030442 ("Howell-442" EX1012) is a publication in the '2901 patent family, specifically the publication of the '685-Application (EX1011) and is directed to "glasses utilizing electrical components." Howell-442, [0005].

50. I have been instructed by counsel to treat Howell-442 as prior art to the '2901 patent.

51. Howell-442 contains disclosure matching, almost identically, much of the text and many figures of the '2901 patent. *Compare* EX1012, [0045]-[0212], Figs. 1-24 *with* EX1001, 9:48-36:4, Figs. 1-24.

52. As such, many of the limitations of the '2901 patent are clearly anticipated by Howell-442 because the exact same disclosure regarding those limitations is provided in Howell-442 as it is in the '2901 specification itself. The remaining portions of the '2901 patent's disclosure relevant to supporting its claims are found in the following applications Howell-442 incorporates by reference: 60/583,169 ("the '169-Provisional"), 11/183,262 ("the '262-Application"), 11/006,343 ("the '343-Application") and 11/183,283 ("the '283-Application") (collectively, the "Incorporated Applications").

53. Because Howell-442 incorporates each of the “Incorporated Applications” by reference, I have been instructed to consider the contents of these references as part of the disclosure of Howell-442 itself. However, I have also been informed that the Patent Owner may dispute that Howell-442 can be considered to include all the contents of the Incorporated References.

54. Thus, I have been requested consider to (1) whether Howell-442 (including the disclosures of the Incorporated References) anticipates and/or renders obvious the claims of the '2901 patent and (2) whether Howell-442 (not including the disclosure of the Incorporated References) renders the claims of the '2901 patent obvious in combination with the Incorporated References, each of which I have been instructed to consider as a separate prior art reference.

55. It is my opinion that to the extent Howell-442 is considered to include the disclosures of the Incorporated References, it anticipates every claim of the '2901 patent as well as renders every claim obvious.

56. It is my further opinion that even if Howell-442 is considered to not include the disclosures of the Incorporated References, POSAs would find it obvious to combine Howell-442 with the teachings of the Incorporated References and the resulting combination would render obvious each of the claims of the '2901 patent.

57. POSAs would be motivated to combine Howell-442 with each of the Incorporated References because Howell-442 explicitly identifies each of the

Incorporated References. *See* Howell-442, [0001], [0004]. Thus, POSAs would naturally look to these references when considering modifications to the eyeglasses disclosed by Howell-442.

58. Further, like Howell-442 (and the '2901 Patent) each of the Incorporated References are similarly directed to eyeglasses with a speaker and other electronic components.

59. For example, the '169-Provisional is directed to “a pair of glasses with one or more embedded or partially embedded electrical components” including a speaker. '169-Provisional, §A, ¶¶[0001], [0004].

60. In similar fashion, the '262-Application “relates generally to glasses and more particularly to eyeglasses with hearing-enhanced capabilities” and discloses various electrical components such as a microphone and speaker within the eyeglasses. '262-Application, [0004], [0012]-[0013].

61. Similarly, the '343-Application is directed to “communication techniques for electronic devices” that use a speaker and microphone in a “electronic device” such as electronic eyeglasses and explicitly notes that its processing “can be performed in electrical components integral or tethered to eyeglasses.” '343-Application, [0002]-[0003], [0093], [0095].

62. And the '283-Application “relates to eyeglasses and, more particularly, to eyeglasses for events” and discloses various electrical components such as a radio,

microphone, and speaker within the eyeglasses. '283-Application, [0004], [0012], [0050]-[0051].

63. Given the similarities between the subject matter of each of the Incorporated References and Howell-442 (i.e. eyeglasses with speakers and other electronic components), POSAs would be motivated to look to the disclosures of the Incorporated References when considering modifying the eyeglasses of Howell-442.

64. Further, POSAs would have a reasonable expectation of success in making such modification given that the electrical components were all well-known in the art, and each of the Incorporated References disclose including such electrical components on eyeglasses similar to those of Howell-442.

65. I have mapped each limitation of the '2901 patent against the disclosures of Howell-442 and the Incorporated References in Ground 1 below.

3. Claim 1

66. The chart below maps claim 1 to Howell-442, incorporating or in combination with several earlier-filed applications to which it claims priority.

Claim Language	<u>Howell-442 and Incorporated References</u>
[1PRE]: A wireless headset for a user comprising:	<u>Howell-442</u> “For example, the glasses can be a cell phone wireless head set, such as a Bluetooth cordless headset.” EX1012, [0120]; <i>see also</i> [0123], [0136], [0189], [0198].
[1A]: printed circuit board provided in the headset, the	<u>Howell-442</u>

Claim Language	<u>Howell-442 and Incorporated References</u>
printed circuit board having at least one electrical component attached thereon, the at least one electrical component being electrically connected to a plurality of other electrical components, each of the plurality of other electrical components being provided at least partially in the headset;	“Regarding printed circuit boards, there can be one or more circuit boards in the glasses.” EX1012, [0066]. Howell-442 discloses a processor 608 (electrical component) electrically connected to other electrical components, <i>e.g.</i>, antenna, transceiver circuits, memory, speaker, and microphone. EX1012, [0110]-[0113], Fig. 11A. Howell-442 discloses that each of these electrical components (including the processor 608) can be on “circuit boards in the glasses.” EX1012, [0066], [0202] (“A number of electrical components have been described. They can be on circuit boards.”); <i>see also</i> [0048]-[0050], [0058]; [0062], [0065]-[0067]. <u>’169-Provisional</u> “A number of embodiments have been described regarding electrical components in a temple of a pair of glasses. All of the electronic components can be self-contained inside the temple of the glasses. The components can be coupled to a printed circuit board.” EX1025, §C, ¶[0072]. To the extent the disclosure of the ’169-Provisional is not considered to be part of Howell-442 via incorporation, placing the electrical components on a printed circuit

Claim Language	<u>Howell-442 and Incorporated References</u>
	board in the glasses would also be obvious in view of the '169-Provisional. Given the similarities between the subject matter of the '169-Provisional and Howell-442, POSAs would be motivated to look to the disclosure of the '169-Provisional when considering modifying the eyeglasses of Howell-442. Further, POSAs would have a reasonable expectation of success in making such modification given that the electrical components were well-known in the art.
[1B]: a speaker in the headset;	<u>Howell-442</u> EX1012, [0046]-[0047] & Fig. 1 (speaker 102); <i>see also</i> [0013], [0106], [0114], [0189], [0198].
[1C]: a microphone in the headset;	<u>Howell-442</u> EX1012, [0103]-[0106] & Fig. 1 (microphone 110); <i>see also</i> [0122]-[0123], [0189], [0198].
[1D]: wireless communication circuitry,	<u>Howell-442</u> “In FIG. 11A, a high frequency or RF antenna 602 wirelessly captures high frequency or RF signals for RF transceiver circuits 604.” EX1012, [0110]; <i>see also</i> [0109] (glasses can wirelessly “couple to Bluetooth network, the Internet, a WiFi network”); [0111-0114]. POSAs would have understood the disclosed “RF transceiver circuits” as well as the circuitry needed to couple to Bluetooth and/or a WiFi network to be “ <i>wireless communication circuitry.</i> ”

Claim Language	<u>Howell-442 and Incorporated References</u>
	<u>'262-Application</u> “[D]eactivation 324 can...sleep the wireless communication capabilities (e.g., circuitry) of the glasses.”) EX1013, [0131]. To the extent the disclosure of the '262-Application is not considered to be part of Howell-442 via incorporation, including wireless communication circuitry would also be obvious in view of the '262-Application. Given the similarities between the subject matter of the '262-Application and Howell-442, POSAs would be motivated to look to the disclosure of the '262-Application when considering modifying the eyeglasses of Howell-442. Further, POSAs would have a reasonable expectation of success in making such modification given that the electrical components were well-known in the art.
[1E]: wherein the at least one electrical component or the plurality of other electrical components include at least a controller,	<u>Howell-442</u> “FIGS. 11A-11B show examples of some of the electrical components in or tethered to a pair of glasses for wireless connections....Outputs from the processor 608 are fed to a D-to-A converter 610 to generate audio signals for a speaker 612.” EX1012, [0110]-[0111], Figs. 11A-11B. POSAs would understand that the processor 608 is a “controller.” For example, Howell-

Claim Language	<u>Howell-442 and Incorporated References</u>
	442 notes that “[t]he processor 506” can “be a microprocessor or controller.” EX1012, [0092].
[1F]: wherein the at least a controller is configured to facilitate modifying power within a range of frequencies based on at least one hearing characteristic of the user, to help the user hear audio outputs presented to the user via at least the speaker,	<u>'262-Application</u> “The electrical components enhance audio signals, such as audio signals received by a microphone at the glasses. Then the enhanced signals are sent to the speakers for the user to hear...[T]he processor, using digital signal processing techniques, operates on the digitized signals, such as boosting specific frequency bands.” EX1013, [0099] “[A]mplification across frequencies is tailored to the hearing needs of the user.” EX1013, [0107]. <i>See also</i>, EX1013, [0099]-[0115]. To the extent the disclosure of the '262-Application is not considered to be part of Howell-442 via incorporation, it would be obvious to configure Howell-402's processor 608 to boost specific frequencies, to benefit a user's hearing, in view of the '262-Application. Given the similarities between the subject matter of the '262-Application and Howell-442, POSAs would be motivated to look to the disclosure of the '262-Application when considering modifying the eyeglasses of Howell-442. Further, POSAs would have a reasonable

Claim Language	<u>Howell-442 and Incorporated References</u>
	expectation of success in making such modification given that the electrical components were well-known in the art.
[1G]: wherein the wireless communication circuitry is configured to wirelessly receive a message,	<u>Howell-442</u> <i>See</i> [1D] (e.g., transceiver circuit 604). “messages are wirelessly transmitted to and received 856 by the glasses.” EX1012, [0153], Fig. 16.
[1H]: wherein if the message is a text message, the at least a controller is configured to have at least a portion of the text message presented to the user,	To the extent the disclosure of the '343-Application is not considered to be part of Howell-442 via incorporation, it would be obvious in light of the '343-Application for POSAs to configure processor 608 to present at least a portion of a received text message to the user through audio as processor 608 is already used in generating audio outputs (<i>see</i> EX1012, [0110]-[0111]). Given the similarities between the subject matter of the '343-Application and Howell-442, POSAs would be motivated to look to the disclosure of the '343-Application when considering modifying the eyeglasses of Howell-442. Further, POSAs would have a reasonable expectation of success in making such modification given that the electrical components were well-known in the art <u>'343-Application</u>

Claim Language	<u>Howell-442 and Incorporated References</u>
	“[I]ncoming text message can be presented to the recipient with an audio or textual presentation.” EX1014, [0067]; <i>see also</i> , [0080]-[0082].
[1I]: wherein if the message is an audio message, the at least a controller is configured to have at least a portion of the audio message presented to the user, and	<u>Howell-442</u> “The speaker in the glasses outputs 858 the messages...” EX1012, [0153]; <i>see also</i> Fig. 16 (step 858); [0110]-[0111], Fig. 11A (processor 608).
[1J]: wherein at least the speaker is configured to present at least a portion of the message, when the at least a portion of the message is to be presented in an audio manner.	<i>See</i> [1H]-[1I].

4. Claim 2

67. A wireless headset as recited in claim 1 *comprising an accelerometer* is disclosed at Howell-442, [0160] (accelerometer in glasses).

5. Claim 3

68. A wireless headset as recited in claim 1 comprising a first connector that includes a plurality of conductive pads that are configured to couple with a second connector external to the headset, wherein each of the conductive pads is configured to be in contact with a corresponding metallic contact of the second connector when the first connector is connected to the second connector is disclosed by Howell-442. “There can be one or more electrically-conductive contacts, such as

304 and 306, on one or both of the flat surfaces of the temple.” Howell-442, [0064]; Fig. 5. *See id.*, [0069] (“FIG. 6B shows...364 and 366, are...the metal contacts in the female connector 310.”), Fig. 6B, [0071] (“Referring to both FIG. 5 and FIG. 6B, when the male connector 300 is inserted into the slot 314 of the female connector 310, the metal pads, 304 and 306, will get in contact, or mate, with the metal sheets, 364 and 366.”).

6. Claim 4

69. A wireless headset as recited in claim 1, wherein the wireless communication circuitry is configured to couple to at least a Bluetooth network is disclosed at Howell-442, [0109] (“The glasses with wireless coupling capabilities can be used to couple to a Bluetooth network...”); *see also id.*, [1D].

7. Claim 5

70. A wireless headset as recited in claim 1, wherein the at least a controller is configured to facilitate voice recognition, including facilitating recognizing at least a word received via at least the microphone in the headset is disclosed at Howell-442, [0125] (“In one embodiment, a pair of glasses ...[includes] a microphone and voice recognition software. The user can indicate his preference vocally.”); *see also id.*, [0094], [0119].

71. To the extent the disclosure of the ’262-Application is not considered to be part of Howell-442 via incorporation, it would also be obvious to facilitate

recognizing words in view of the '262-Application. *See* EX1013, [0117] (“The glasses are trained to recognize specific recitation, such as specific sentences or phrases, and/or the user's voice.”). Given the similarities between the subject matter of the '262-Application and Howell-442, POSAs would be motivated to look to the disclosure of the '262-Application when considering modifying the eyeglasses of Howell-442. Further, POSAs would have a reasonable expectation of success in making such modification given that the electrical components were well-known in the art.

8. Claim 6

72. A wireless headset as recited in claim 1, *wherein the headset includes at least an ear bud configured to be placed in an ear of the user* is disclosed at Howell-442, [0057] (“[I]n one approach, there is a plug 156 at the end of the tube for inserting into an ear of the user. The plug can be an ear bud.”); *see also id.*, [0195], [0211].

9. Claim 7

73. A wireless headset as recited in claim 1, wherein at least the microphone in the headset is configured to receive an audio response for the message from the user is disclosed and/or rendered obvious by Howell-442 including its Incorporated References.

74. Using the microphone (*see* [1C], [5]) in Howell-442's eyeglasses to receive an audio response from the user for the message (*see* [1G]-[1I]) would have been obvious in view of the '343-Application, to the extent the disclosure of the '343-Application is not considered to be part of Howell-442 via incorporation. The '343-Application discloses a user providing, via a microphone, a reply audio message to a received text message. EX1014, [0080]-[0085]; *see also id.*, [0093], claim 27. Given the similarities between the subject matter of the '343-Application and Howell-442, POSAs would be motivated to look to the disclosure of the '343-Application when considering modifying the eyeglasses of Howell-442. Further, POSAs would have a reasonable expectation of success in making such modification given that the electrical components were well-known in the art.

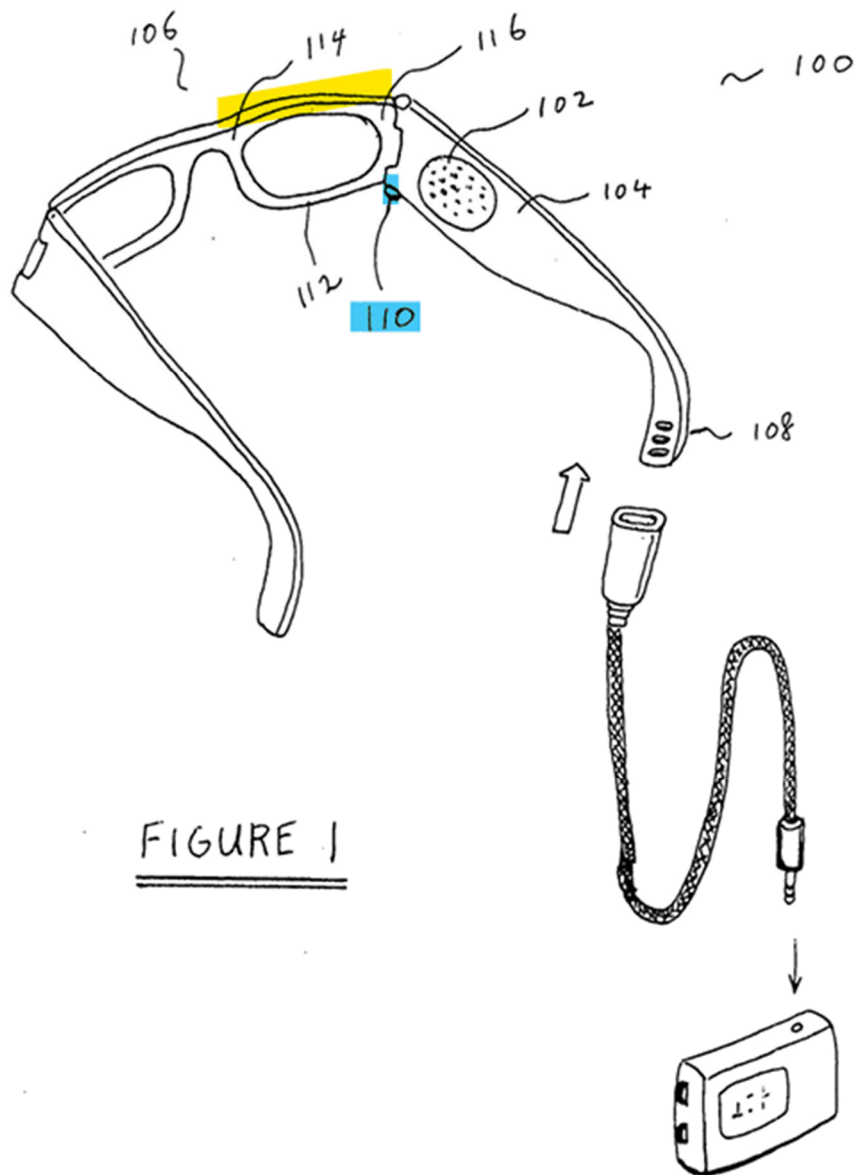
10. Claim 8

75. A wireless headset as recited in claim 7, wherein the at least a controller is configured to facilitate converting the audio response into text to be wirelessly transmitted would be obvious in view of the '343-Application. EX1014, [0084] ("If an audio message is initially created, such audio message must be converted to a text message prior to transmission."); *see also id.*, claims 27-28. Given the similarities between the subject matter of the '343-Application and Howell-442, POSAs would be motivated to look to the disclosure of the '343-Application when considering modifying the eyeglasses of Howell-442. Further, POSAs would have a reasonable

expectation of success in making such modification given that the electrical components were well-known in the art.

11. Claim 9

76. A wireless headset as recited in claim 1, wherein wireless headset comprises another microphone, wherein the microphone is configured to be located closer to mouth of the user than the another microphone when the headset is worn by the user, wherein at least the another microphone is configured to capture at least ambient noise, and wherein at least a portion of signals from the microphone is configured to be reduced based on signals from the another microphone at least for reducing at least a portion of the ambient noise in signals from the microphone is disclosed at Howell-442, [0122] (“[T]he glasses include two microphones. One microphone is for capturing the voice of the user...It can be embedded in a protrusion extending from the end of the temple close to a lens holder, towards the mouth of the user, as the microphone 110 in FIG. 1. Another microphone can be located at the top of one of the lens holders pointing away from the mouth of the user. This microphone is for capturing ambient noise...outputs from the two microphones could be subtracted from each other to provide voice signals with noise reduced.”).



EX1012, Fig.1, (annotated: first microphone 110 (blue); second microphone (yellow)).

12. Claim 10

77. Claim 10 repeats limitations found in several previously-discussed claims. The chart below does not repeat claim language that is the same limitation.

Claim Language	Howell-442 and Incorporated References
[10PRE] A wireless wearable device configured to secure to the head of a user, with the device proximate to at least one ear of the user to at least help the user hear, the wireless wearable device comprising:	<i>See</i> [1PRE], [1C], [1G], [6].
[10A] ⁶	<i>See</i> [1A].
[10B]	<i>See</i> [1B].
[10C]	<i>See</i> [1C].
[10D]	<i>See</i> [1D].
[10E]	<i>See</i> [1E].
[10F]	<i>See</i> [1F].
[10G] wherein the wireless communication circuitry is configured to wirelessly receive a message from a mobile phone via at least a Bluetooth network,	<i>See</i> [1G], [4].
[10H]	<i>See</i> [1H].
[10I] wherein if the message is an audio message, the at least a controller is configured to have at least a notification of the audio message presented to the user,	<i>See</i> [1I] (audio message). <u>Howell-442</u> “[T]he glasses also include a notification electrical component to provide a notification to the user wearing the

Claim Language	Howell-442 and Incorporated References
	glasses. The notification can be to notify, alert or display information to the user.” EX1012, [0107]. <u>’262-Application</u> “There can be an operation indicator on the frame of the glasses to indicate that there is an incoming call. The indicator can be based on, for example, sound, light or vibration.” EX1013, [0125]. “The user of the glasses is then notified 310 of the incoming call.” EX1013, [0128]. <u>’343-Application</u> “2. Tom is alerted by his mobile phone of an incoming call.” EX1014, [0056]; <i>see also</i> [0082]. Given that the above disclosures mirror any disclosure by the ’2901 patent regarding providing notifications of

Claim Language	Howell-442 and Incorporated References
	audio messages, POSAs would understand these disclosures as meeting the claimed limitations. To the extent the disclosure of the '262 and '343 Applications is not considered to be part of Howell-442 via incorporation, POSAs would find it obvious to configure processor 608 (<i>see</i> [1E]) to provide a notification to the user in this manner. And given the similarities between the subject matter of these applications and Howell-442, POSAs would be motivated to look to their disclosures and would have a reasonable expectation of success in making such modification given that the electrical components were all well-known in the art.
[10J]	<i>See</i> [9].
[10K]	<i>See</i> [9].
[10L]	<i>See</i> [9].
[10M]	<i>See</i> [9].

13. Claim 11

78. A wireless wearable device as recited in claim 10 comprising a storage medium configured to store at least computer program codes for facilitating voice recognition, wherein at least the microphone is configured to receive at least a word, with the at least a word recognized using at least the computer program codes for facilitating voice recognition is disclosed at Howell-442, [0090] (“In one embodiment of the invention, the glasses have a storage medium (i.e., memory).”); *see also id.*, [0119] (“In one embodiment, a pair of glasses has access to voice recognition software. The software can be embedded in (a) the glasses...”). *See also* discussion regarding claim [5]. POSAs would find it obvious to store the voice recognition software in the storage medium.

14. Claim 12

79. A wireless wearable device as recited in claim 10 comprising an optical indicator configured to illuminate in a predetermined manner to provide an indication regarding a status of the wireless wearable device is disclosed at Howell-442, [0107] (“[T]he glasses also include a notification electrical component to provide a notification to the user wearing the glasses...The display can be one or more light emitting diodes....”).

80. Using Howell-442’s optical indicator to indicate a status of the device would have been obvious in view of the ’262-Application to the extent the disclosure

of the '262-Application[7] is not considered to be part of Howell-442 via incorporation,. See EX1013, [112] (“The glasses...can also periodically alert the user for re-calibration.”), [0125] (“There can be an operation indicator on the frame of the glasses to indicate that there is an incoming call....[T]he indication is based on light...”). Given the similarities between the subject matter of the '262-Application and Howell-442, POSAs would be motivated to look to the disclosure of the '262-Application when considering modifying the eyeglasses of Howell-442. Further, POSAs would have a reasonable expectation of success in making such modification given that the electrical components were well-known in the art.

15. Claim 13

81. A wireless wearable device as recited in claim 10, wherein the wireless wearable device is configured to enable the user to receive and respond to the message hands-free, using at least the speaker and at least the microphone is disclosed and/or rendered obvious by Howell-442 including its incorporated applications. See [1B], [1C], [1G]-[1J], [7].

16. Claim 14

82. A wireless wearable device as recited in claim 10 *comprising a sensor configured to at least provide an indication regarding the wireless wearable device being used* is disclosed at Howell-442, [0159] (“In one embodiment, the sensor is a

“being worn” sensor. The ‘being worn’ sensor indicates whether the glasses are being worn by its user.”); *see also id.*, [0160]-[0163].

17. Claim 15

83. *A wireless wearable device as recited in claim 10 comprising a motion sensor* is disclosed and/or rendered obvious by Howell-442 including its incorporated applications. *See* [2], [10].

18. Claim 16

84. Claim 16 is disclosed and/or rendered obvious by Howell-442 including its incorporated applications. *See* [2], [10].

19. Claim 17

85. A wireless wearable device as recited in claim 10 comprising a touch-sensitive input surface configured to receive at least a touch input to generate at least an electrical signal for an operation of the wireless wearable device is disclosed at Howell-442, [0094] (“In another embodiment, the display is a touch-screen display, allowing entries to be entered directly on the display.”); *see also id.*, [0132]-[0136] (describing various “control knobs” to control operation of eyeglasses).

86. It also would have been obvious to incorporate a touch-sensitive switch from the ’283-Application to the extent the ’283-Application is not considered part of Howell-442 by incorporation. The ’283-Application teaches “a switch” that “is at least partially embedded in the glasses” to, for example, “turn the speaker on, or to tune the frequency of a radio.” *See* EX1015, [0074]; *see id.*, [0082] (switch can

be “turned on and off” based on change of capacitance when a user places a “finger over a metallic pad.”), [0088]-[0091] (switch can be “two photodiodes or photo detectors” that detect whether they are covered by a finger and can thereby detect sliding movement). Given the similarities between the subject matter of the ’283-Application and Howell-442, POSAs would be motivated to look to the disclosure of the ’283-Application when considering modifying the eyeglasses of Howell-442. Further, POSAs would have a reasonable expectation of success in making such modification given that the electrical components were well-known in the art.

20. Claim 18

87. A wireless wearable device as recited in claim 17, wherein the touch input received at the touch-sensitive input includes a movement with a direction, and wherein the direction of movement is determined, with the operation of the wireless wearable device dependent on the determined direction is disclosed and/or rendered obvious by Howell-442 including its incorporated applications. *See* [17].

21. Claim 19

88. *A wireless wearable device as recited in claim 10 comprising a pressure sensor* is disclosed at Howell-442, [0164] (“The environmental sensor can sense...pressure...”).

22. Claim 20

89. A wireless wearable device as recited in claim 19, *wherein the pressure sensor includes a Hall-effect sensor* is disclosed and/or rendered obvious by Howell-442 including its incorporated applications.

90. For example, it would have been obvious to incorporate a Hall effect sensor from the '283-Application to the extent the disclosure of the '283-Application is not considered part of the disclosure of Howell-442 via incorporation. EX1015, [0081] (Hall effect detector 254). Given the similarities between the subject matter of the '283-Application and Howell-442, POSAs would be motivated to look to the disclosure of the '283-Application when considering modifying the eyeglasses of Howell-442. Further, POSAs would have a reasonable expectation of success in making such modification given that the electrical components were well-known in the art.

23. Claim 21

91. Claim 21 is disclosed and/or rendered obvious by Howell-442 including its incorporated applications. *See* [3].

24. Claim 22

92. A wireless wearable device as recited in claim 10 *comprising a display* is disclosed at Howell-442, [0107] (listing several locations in the glasses for a display).

25. Claim 23

93. A wireless wearable device as recited in claim 10 *comprising a camera* is disclosed at Howell-442, [0137] (“In one embodiment, the glasses further serve as a camera.”).

26. Claims 24-30

94. Claims 24-30 repeat limitations found in several previously-discussed claims as shown in the chart below. These claims are thus anticipated and/or rendered obvious by Howell-442 and/or its Incorporated References for the same reason as discussed with regard to those limitations.

Claim	Corresponding Limitation(s)
Claim 24	<i>See</i> [11], [13]
Claim 25	<i>See</i> [3], [14], [17].
Claim 26	<i>See</i> [23].
Claim 27	<i>See</i> [3], [14], [19].
Claim 28	<i>See</i> [17].
Claim 29	<i>See</i> [2], [14], [22], [23].
Claim 30	<i>See</i> [19].

27. Claim 31

95. Claim 31 repeats limitations found in several previously-discussed claims as shown in the chart below. These claims are thus anticipated and/or rendered obvious by Howell-442 and/or its Incorporated References for the same reason as discussed with regard to those limitations.

Claim	Corresponding Limitation(s)
[31PRE]	<i>See</i> [1PRE], [1C], [1G], [6].

[31A]	<i>See</i> [1A].
[31B]	<i>See</i> [1B].
[31C]	<i>See</i> [1C].
[31D]	<i>See</i> [1D].
[31E]	<i>See</i> [11].
[31F]	<i>See</i> [14].
[31G]	<i>See</i> [19].
[31H]	<i>See</i> [3].
[31I]	<i>See</i> [11].
[31J]	<i>See</i> [1E].
[31K]	<i>See</i> [1F].
[31L]	<i>See</i> [4].
[31M]	<i>See</i> [10H].
[31N]	<i>See</i> [10I].
[31O]	<i>See</i> [13].
[31P]	<i>See</i> [9].
[31Q]	<i>See</i> [9].
[31R]	<i>See</i> [9].
[31S]	<i>See</i> [9].

28. Claim 32

96. Claim 32 repeats limitations found in several previously-discussed claims as shown in the chart below. These claims are thus anticipated and/or rendered obvious by Howell-442 and/or its Incorporated References for the same reason as discussed with regard to those limitations.

Claim	Corresponding Limitation(s)
[32PRE]	<i>See</i> [1PRE].
[32A]	<i>See</i> [1A].
[32B]	<i>See</i> [1B].
[32C]	<i>See</i> [1C].

[32D]	<i>See</i> [23].
[32E]	<i>See</i> [15].
[32F]	<i>See</i> [22].
[32G]	<i>See</i> [1D].
[32H]	<i>See</i> [1E].
[32I]	<i>See</i> [1F].
[32J]	<i>See</i> [1G].
[32K]	<i>See</i> [10H].
[32L]	<i>See</i> [10I].
[32M]	<i>See</i> [13].
[32N]	<i>See</i> [9].
[32O]	<i>See</i> [9].
[32P]	<i>See</i> [9].
[32Q]	<i>See</i> [9].

B. Ground 2A: Goh in view of Berger Renders Claims 1, 3-11, 13, 21-22, and 24 Obvious.

97. As I explained above in Section V, the '2901 Patent relates generally to a wireless headset or other wearable device supporting messages and hearing enhancement. EX1001, Title. Although the patent focuses primarily on an eyeglass frame, a person of ordinary skill in the art would have understood that the headsets and wearable devices are described therein more broadly to include headsets, earphones/earbuds, and other electronic head-ware.

98. In my opinion, each of the Relevant Prior Art references falls within the same field of endeavor as the '2901 Patent, namely headsets. Indeed, all of the Relevant Prior Art relates specifically to headsets/headphones. *See infra* Sections VII.B-VII.E. For these reasons, the Relevant Prior Art references are also

reasonably pertinent to the problem addressed by the '2901 patent—*i.e.*, how to improve conventional headsets and other wearable devices as well as mobile phones.

99. I have been instructed by counsel for Bose to assume that Goh (EX1005) and Berger (EX1020) qualify as prior art to the Challenged Claims. With that assumption, it is my opinion that Goh in view of Berger renders obvious claims 1, 3-11, 13, 21-22, and 24 for the reasons I discuss below.

1. Goh (EX1005)

100. Goh discloses a multifunctional wireless headset. Goh, Title, 5:11-12 (“One main aspect of the invention is to provide a digital wireless headset for multifunctional usage, which offers the user a wide range of functionality.”). The headset includes conventional electronic components like a speaker and a microphone, and it also includes a short-range wireless network interface, *e.g.*, Bluetooth, that allows the headset to communicate wirelessly with nearby devices. *See* Goh:

- 3:28-29, 9:18-20 (“The headset circuit 100 comprises above all a digital processing device 101, which comprises a central processing unit 102 for processing binary data and an audio processing unit 103 for processing audio signals.”);
- 11:21-27 (“A multiplexer (MUX) 114 is used in the headset circuit 100 to connect different communication interfaces to the digital processing device

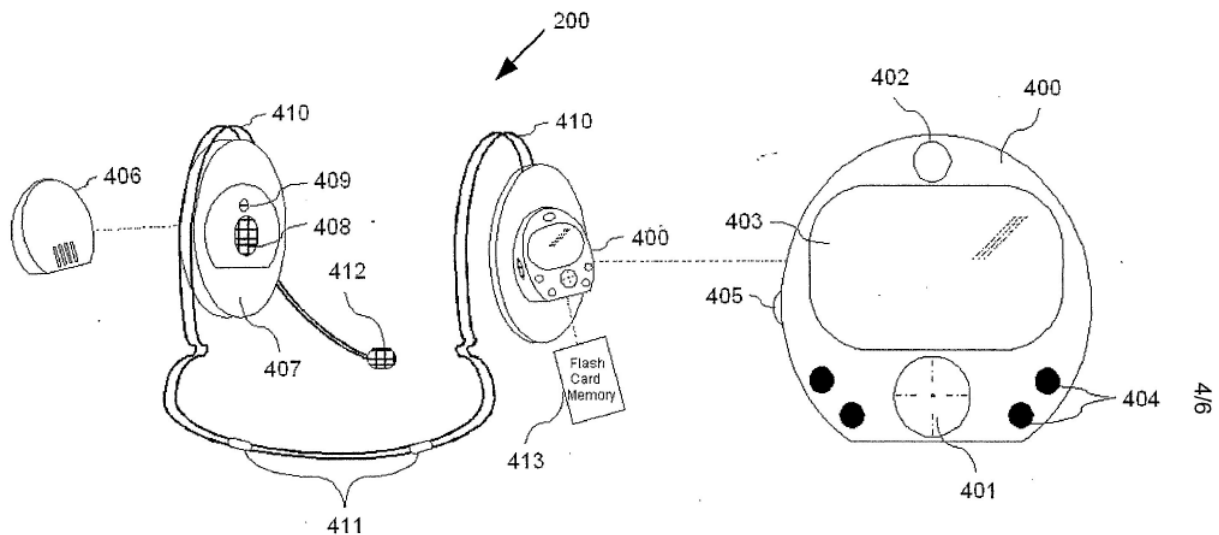
101. A short-range wireless network interface based on the Bluetooth™ technology as well as on the IEEE 802.11 standard is incorporated into the headset circuit 100 and comprises a transceiver 115, preferably a Bluetooth™ transceiver, which is electrically coupled to an antenna 116. The digital processing device 101 is able to connect to and communicate with a surrounding communication device comprising a suitable transceiver interface.”);

- 17:26-18:2, 19:20-22, claim 1.

101. The headset also has a display. *Id.*:

- 13:4-11 (“Finally, the central processing unit 102 is connected to an optional display controller and driver 122 for controlling and driving an optional display like a liquid crystal display (LCD). Such a LCD can be used to display a setting control menu to the user, wherein the setting control menu is provided from the operating system running in the central processing unit 102 to control the headset circuit 100....”);
- 15:8-9 (“[T]he headset 200 can be controlled via...user voice commands.”);
- 16:15-25 (“The-headset 200 comprises a controller 400 with a multifunctional control button 401, a microphone 402, a display 403, function buttons 404, and at the case side a volume control button 405....”).

102. One embodiment of Goh's headset is depicted below in Figure 4:



103. Among other things, the headset can function as “as a reader of written text messages like electronic mails or messages transmitted using the short message service (SMS).” *Id.*, 11:27-12:1; *see also* 11:21-12:4, 15:24-28, claim 7. The headset allows the user to send text messages too. *Id.*, 14:4-10. This text-messaging functionality—and other functionality—is depicted in Figure 2:

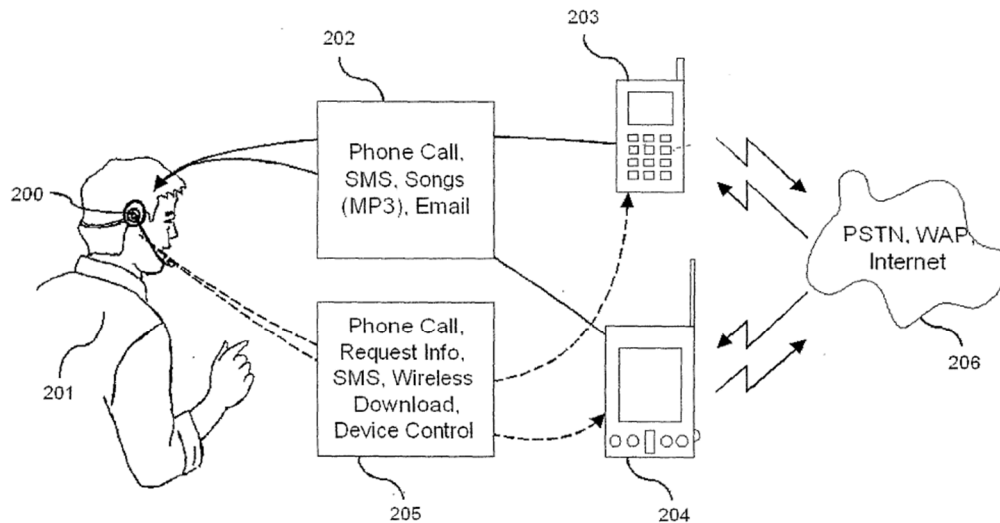


Figure 2

2. Berger (EX1020)

104. Berger integrates hearing-aid functionality into various electronic devices. Berger, [0041] (“In alternative embodiments, a hearing aid component can be integrated into a headset, handset, or speaker.”). An embodiment in which hearing-aid functionality is incorporated into a wireless headset is shown in Figure 6 ([0041]):

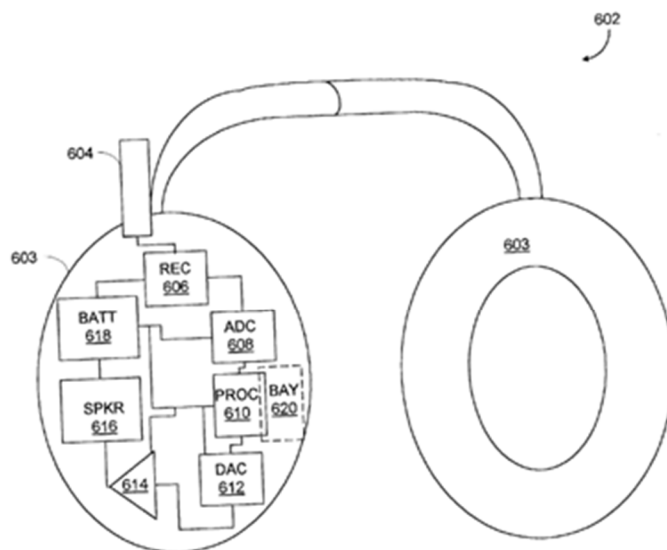


FIGURE 6

105. As seen above, Figure 6's headset includes various electronic components including a receiver 606 and a processor 610. *Id.*, [0041]. The wireless headset can be used with various electronic devices, including a television and/or cellphone. *Id.*, [0008] ("The present invention includes an apparatus and method which allow a hearing aid to be integrated into a sound-producing device. Sound-producing devices compatible with the invention include wireless communications devices such as cellular telephones."); [0039] ("In this specification, wireless includes analog cellular, digital cellular, personal communication systems (PCS) and cordless phones, along with other wireless applications such as headsets for televisions, radios, hi-fi sound systems, home entertainment, movie theater seats, auditory loop systems, and other uses."); [0041].

106. Berger describes the functionality of its electronic components in the context of the handset shown in Figures 1 and 2A ([0017]-[0022]), but POSAs would have understood the components perform the same functionality in Figure 6's wireless headset, *e.g.*, processor 610 performs the same functions as processor 210, etc. This understanding arises from both the structure of Berger's disclosure and the general knowledge and expectations in the field of audio signal processing and hearing aid technology.

107. For example, first Berger explicitly describes the functionality of components like processor 210 in detail in connection with the wired handset embodiment, including that the user's hearing-aid prescription is programmed into the processor and used to adjust audio output. *See* Berger, [0019] ("A user's prescription is programmed into processor 210. Processor 210 transforms the signal by applying a transfer function with more gain in the frequency ranges where the user has lost hearing."). While these descriptions are situated in the context of the handset figures, Berger also discloses in Figure 6 a wireless headset that includes analogous components, such as processor 610, which is similarly labeled and positioned within the system architecture. As a result, a POSA would understand that Berger's Figure 6 represents an alternative embodiment—not a functionally distinct system.

108. The wireless headset's receiver "receives [a] digital wireless signal" picked up by antenna 604 and generates a digital audio signal that is transmitted to the processor. *Id.*, [0018]; [0041]. "A user's [hearing] prescription is programmed into" the processor, which "transforms the [digital audio] signal by applying a transfer function with more gain in the frequency ranges where the user has lost hearing." *Id.*, [0019]; [0041] ("In alternative embodiments, a hearing aid component can be integrated into a headset, handset, or speaker."). The modified signal is then transmitted to digital-to-analog converter 612 where it is converted to an analog signal, amplified by an amplifier 614, and output by speaker 616. *Id.*, [0019]; [0041].

3. Motivation to Combine Goh and Berger

109. In view of Berger, POSAs had reason to implement Goh's headset such that an individual's hearing-aid prescription was programmed into Goh's headset so that audio signals the headset outputs are modified—*e.g.*, certain frequency ranges are amplified—to account for a user's hearing-impairment.

110. Berger explicitly motivates the combination as it teaches that while hearing-aids compensate for hearing deficits, such hearing-aids are not compatible with many electronic devices like wireless telephones. Berger, [0006]. Berger thus discloses a wireless headset that advantageously compensates for a user's hearing

impairment while also being compatible with electronic devices like wireless telephones. *Id.*, [0007]-[0008].

111. Implementing Goh's headset to include Berger's hearing-aid functionality would have also been the use of a known technique (Berger's hearing-aid functionality) to improve a similar device (a wireless headset) in a predictable manner.

112. In the Goh-Berger combination, Goh's headset would maintain its original functionality, but its "digital processing device 101" would be programmed with a user's hearing-aid prescription. Berger, [0019] ("A user's prescription is programmed into processor 210."); Goh, 9:18-20 ("The headset circuit 100 comprises above all a digital processing device 101, which comprises a central processing unit 102 for processing binary data and an audio processing unit 103 for processing audio signals."); *id.*, 9:23-10:16 (discussing various memory devices resident on Goh's headset); *id.*, 9:17-18 ("The central processing unit 102 is able to manipulate the binary audio data for achieving an advanced audio processing."). Goh's system also includes memory components and processing capabilities suitable for modifying audio signals based on input data. Goh, 9:23-10:16.

113. POSAs would have had a reasonable expectation of success in achieving the combination as Goh's CPU (which is part of its digital processing

device) performs “advanced audio processing,” including “audio signal amplifying” (*id.*, 10:17-29); Goh’s CPU is already designed to manipulate binary audio data and perform complex processing tasks. Therefore, integrating the functionality taught by Berger into Goh’s existing architecture would involve straightforward implementation without needing substantial redesign.

114. Therefore, only routine software programming would be needed for Goh to amplify audio signals based on a user’s hearing-aid prescription. The combination would be logical and predictable, addressing the known goal of customizing audio output for hearing-impaired users.

4. Claim 1

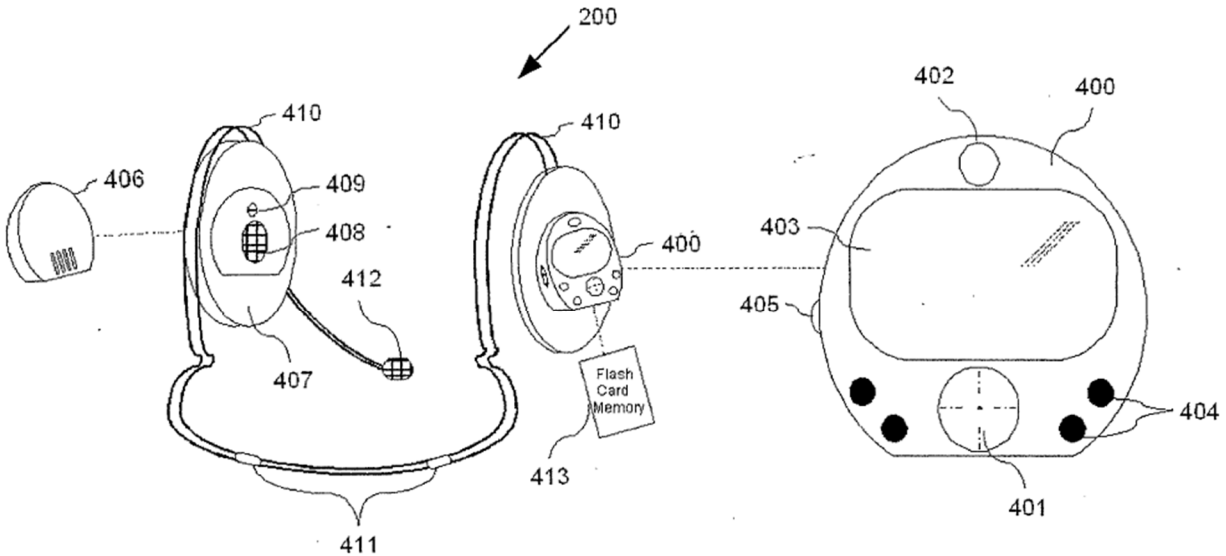
a. [1PRE]

115. The Goh in view of Berger combination discloses or renders obvious *a wireless headset for a user*. Goh’s headset is “a digital wireless headset for multifunctional usage,” and which includes “at least one speaker” for playing an “audio signal,” *e.g.*, for “a phone call” or “music.” *See* Goh:

- 5:11-25 (“One main aspect of the invention is to provide a digital wireless headset for multifunctional usage, which offers the user a wide range of functionality. ... A headset for multifunctional usage comprises at least one speaker, a microphone, a central processing unit for processing binary data, an audio processing unit for processing an audio signal, a memory device, a short-range wireless network interface for enabling a binary data

communication of the headset with surrounding communication devices, and an operating system being executable in the central processing unit.....”);

- Abstract (“A headset for multifunctional usage comprises at least one speaker (110), a microphone (111, 118), a central processing unit (102) for processing binary data, an audio processing unit (103) for processing an audio signal, a memory device (105, 106, 107), a short-range wireless network interface (115, 116) for enabling a binary data communication of the headset with surrounding communication devices, and an extensible operating system executable in the central processing unit (102).”);
- 7:27-8:10 (“The headset has preferably the functions of a sound card or is arranged to work as an audio player, e.g. a MP3 player, which is able to play music from binary audio data representing an audio signal. The necessary binary audio data are saved in the memory device or transmitted during an audio communication via the short-range wireless network interface or via the wired communication connection.”);
- 11:1-10 (“The audio processing unit 103 is necessary to convert audio signals into corresponding binary audio data processable by the central processing unit 102 as well as to convert binary audio data into corresponding audio signals. Audio signals converted from corresponding binary audio data by the audio processing unit 103 are transferred via a digital to analog converter (DAC) 108 and a first amplifier 109 to a speaker 110.”);
- *See also* 14:4-10 , 18:3-7, FIG. 4 (copied below).



- b. [1A]: “printed circuit board provided in the headset... having at least one electrical component attached thereon, the at least one electrical component being electrically connected to a plurality of other electrical components...”**

116. The Goh in view of Berger combination discloses or renders obvious a printed circuit board provided in the headset, the printed circuit board having at least one electrical component attached thereon, the at least one electrical component being electrically connected to a plurality of other electrical components, each of the plurality of other electrical components being provided at least partially in the headset.

117. Goh’s headset includes a “headset circuit 100” that contains, *inter alia*, a “central processing unit.” Goh, 9:18-20 (“Figure 1 shows a diagram of a headset circuit 100 according to a preferred embodiment of the invention. The headset circuit

100 comprises above all a digital processing device 101, which comprises a central processing unit 102 for processing binary data and an audio processing unit 103 for processing audio signals. For the power supply of the headset circuit 100 a power source 104 like a battery or an accumulator is installed and connected to the digital processing device 101.”), FIG. 1 (copied below).

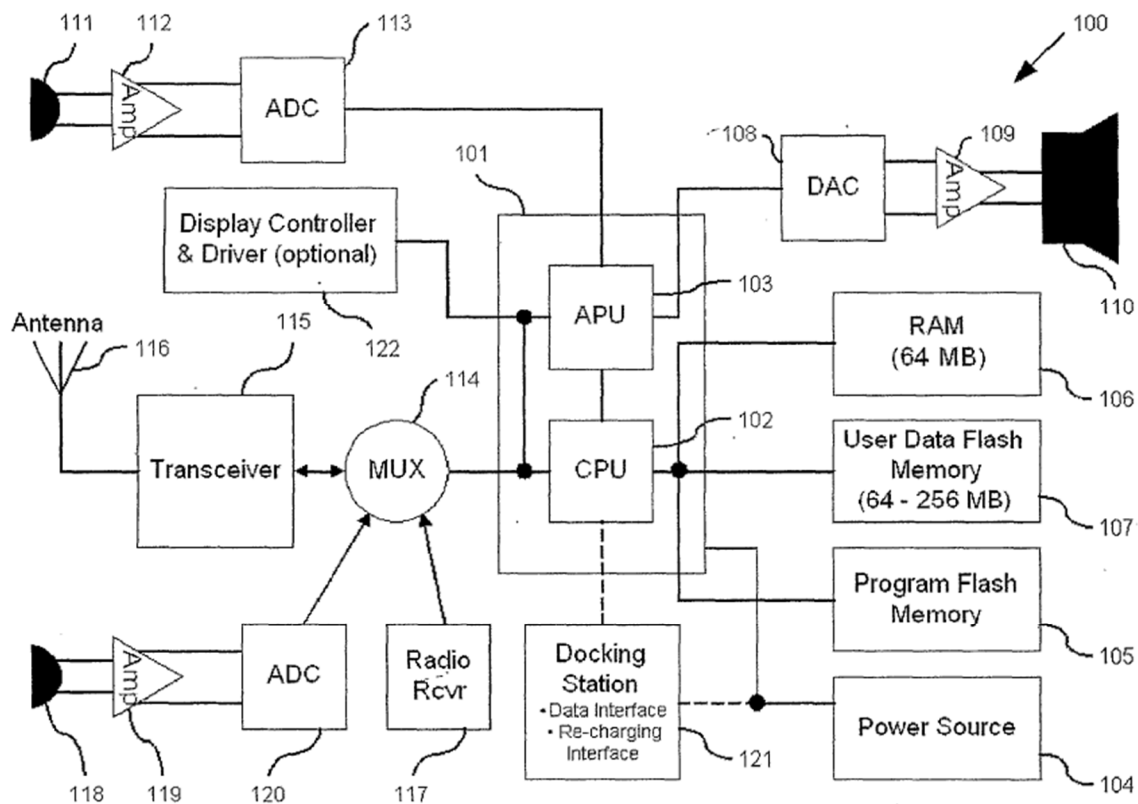


Figure 1

118. Goh’s central processing unit is “*at least one electrical component.*”

As of 2004, most consumer electronic products, *e.g.*, wireless headsets, used printed circuit boards (PCBs) to organize, secure, and electronically connect an electrical

component like Goh’s CPU with other electrical components on the board. POSAs would readily understand that the electrical components disclosed in Goh—such as the “central processing unit 102,” “audio processing unit 103,” and memory devices—would be affixed to and interconnected via a printed circuit board (PCB). This understanding is grounded in both the standard practices in consumer electronics design at the time and the nature of Goh’s disclosed headset system, and is further corroborated by at least:

- EX1029, 1:21-46 (background describing that the “design and manufacture of headsets normally requires that adjustments be made to the headset transducers and the accompanying filtering/compensation circuitry [i.e., signal processing components],” “which are coupled directly to the printed circuit board (PCB) within the headset capsule”), 5:51-53 (“The memory is preferably a digital read-write non-volatile memory that is implemented on a printed circuit board (PCB)...”);
- EX1030, [0007] (background stating that consumer electronics such as “[m]obile terminals, and especially mobile telephones and headsets, are becoming increasingly smaller,” and that these “mobile communication terminals” are “of particular interest” in the present invention), [0029]-[0032] (describing “a mobile communication device, such as a cellular telephone,” where the “transceiver circuitry or radio communications circuit is typically contained on a printed circuit board 106 (FIGS. 3-4) disposed in the phone’s housing,” where the “transceiver unit 24” includes various processing components such as a receiver 40 and its “digital signal processor 46 [that] separates control and signaling data from speech data,” and where the signals

are processed and passed from amplifier 42 to demodulator 44, and further to processor 46, all of which are interconnected with each other and are components of the transceiver circuitry contained on the PCB).

119. By 2004, PCBs were the dominant and well-established platform for organizing and interconnecting electronic components in virtually all consumer electronic products, including portable and wireless devices like headsets. PCBs allowed for compact, robust, and cost-effective construction, especially given that the process of manufacturing and populating PCBs with components was already highly automated, enabling rapid and economical mass production. Given the commercial context of Goh’s invention—a wireless headset intended for widespread consumer use—POSAs would have expected such a design to leverage the benefits of PCB-based assembly.

120. Moreover, while Goh does not explicitly mention a PCB, it discloses a “headset circuit 100” comprising a range of electronic components that require physical mounting and electrical interconnection, including a CPU, audio processing unit, and memory devices. Goh, 9:18–10:5 (“In a read only memory, preferably a programmable memory, which is part of the central processing unit 102, the binary data for a core operating system are saved. The application-specific operating system or the operating system extension will reside in an external erasable and programmable memory device, e.g. a program flash memory 105. The operating system, which is the combination of the core operating system and the operating

system extension, is executed in the central processing unit 102 for operating the headset circuit 100. For executing the operating system in the central processing unit 102 the program flash memory 105 or a miniaturized hard disk drive such as an IBM MicroDrive™ extends the processing capacity of the central processing unit 102.”); *see also id.*, 10:5-16.

121. POSAs would recognize that for these components to function together as described—e.g., enabling “advanced audio processing,” including audio signal amplification—they must be part of an integrated electrical circuit, with reliable and precisely defined electrical connections. In 2004, the practical and well-understood way to achieve this in a consumer-grade headset was through mounting those components on a PCB and using copper traces (or other conductive pathways) to route signals between them.

122. Alternatively, implementing Goh’s headset to use a PCB to organize, secure, and electronically connect Goh’s various electronic components would have a been routine design choice for POSAs to pursue given their background knowledge regarding the ubiquitous use of PCBs in consumer electronics.

123. Therefore, a POSA would either (1) have understood that Goh’s design inherently included a PCB, even if not explicitly stated, or (2) would consider it a routine and obvious implementation detail to realize Goh’s disclosed functionality using a PCB. This would not involve inventive effort, but rather standard design

engineering choices consistent with how such devices were commonly constructed in the relevant time frame.

124. The process for manufacturing and assembling PCBs is often automated which allows them to be mass produced quickly and cost effectively, making their use an ideal design choice for consumer electronics like headsets.

125. Given their background knowledge, POSAs would have understood Goh's "central processing unit" and various other electrical components were affixed to a PCB and electronically connected to one another via copper traces or similar conductive pathways. Goh's "central processing unit...is connected to" various other electronic components including Goh's "*audio processing unit*," its "*memory device[s]*," and its "*short-range wireless network interface*." Goh, claim 1. Each of these other components is "*provided at least partially in [Goh's] headset*." *Id.*, FIG. 4 (depicting headset). In summary, the use of a PCB in Goh's headset would be viewed by a POSA as a standard design detail, necessary for practical implementation and consistent with industry norms for portable consumer electronics in 2004.

c. [1B]: "a speaker in the headset;"

126. The Goh in view of Berger combination discloses or renders obvious *a speaker in the headset*. Goh's headset includes a "*speaker*." Abstract ("A headset for multifunctional usage comprises at least one speaker (110)..."); *see also* 5:18-22

(“A headset for multifunctional usage comprises at least one speaker...”), *see also* 11:3-5, claim 1, FIG. 1 (element 110), FIG. 4 (elements 408, 409).

d. [1C]: “a microphone in the headset;”

127. The Goh in view of Berger combination discloses or renders obvious *a microphone in the headset*. Goh’s headset includes a “*microphone*.” Goh, Abstract (“A headset for multifunctional usage comprises at least ... a microphone (111, 118)...”); 8:11-13 (“The at least one speaker of the headset and/or the microphone are/is preferably incorporated in an earpiece of the headset...”), 11:11-14 (“Further, the headset circuit 100 comprises a first microphone 111 which is located in the mouth-piece of the headset adjacent to the mouth of the user of the headset...”), FIG. 1 (elements 111), FIG. 4 (element 412), FIGS. 5-6; claim 1.

e. [1D]: “wireless communication circuitry”

128. The Goh in view of Berger combination discloses or renders obvious *wireless communication circuitry*. Goh’s headset includes a “short-range wireless network interface [that] connects the headset via a short-range wireless network communication, e.g. a Bluetooth™ network communication, with the surrounding communication devices.” Goh, 7:9-15 (“Preferably, the short-range wireless network interface connects the headset via a short-range wireless network communication, e.g. a Bluetooth™ network communication...”); *see also id.*, 1:19-2:5 (describing prior-art Bluetooth headsets), 13:13-16 (“makes a phone call...via a

surrounding mobile phone 203 which comprises a short-range wireless communication interface”), 14:27-15:6 (“Third party communication devices will be identified through a short-range wireless communication protocol like Bluetooth™...”). Preferably, the network interface comprises a “Bluetooth™ transceiver, which is electrically coupled to an antenna.” *Id.*, 11:21-27 (“A short-range wireless network interface based on the Bluetooth™ technology as well as on the IEEE 802.11 standard is incorporated into the headset circuit 100 and comprises a transceiver 115, preferably a Bluetooth™ transceiver, which is electrically coupled to an antenna 116.”).

f. [1E]: “wherein the ... other electrical components include at least a controller,”

129. The Goh in view of Berger combination discloses or renders obvious *wherein the at least one electrical component or the plurality of other electrical components include at least a controller*. As discussed for limitation [1A], Goh’s headset, which is used in Goh-Berger, includes a “central processing unit.” *Supra* VI.B.4.b. Goh’s CPU controls the headset’s functionality and is thus “*a controller*.” *See* Goh:

- 9:23-10:5 (“In a read only memory, preferably a programmable memory, which is part of the central processing unit 102, the binary data for a core operating system are saved. The application-specific operating system or the operating system extension will reside in an external erasable and programmable memory device, e.g. a program flash memory 105. The

operating system, which is the combination of the core operating system and the operating system extension, is executed in the central processing unit 102 for operating the headset circuit 100. For executing the operating system in the central processing unit 102 the program flash memory 105 or a miniaturized hard disk drive such as an IBM MicroDrive™ extends the processing capacity of the central processing unit 102.”);

- 10:17-29 (“The central processing unit 102 is able to manipulate the binary audio data for achieving an advanced audio processing. Therefore, the headset circuit 100 comprises the functions of a sound card for computers. The advanced audio processing could be executed and/or configured by a functional/application program which is loaded into one of the memories 105, 106, 107. Advanced audio processing feasible by the central processing unit 102 of the headset circuit 100...”);
- 11:14-17 (“The user generated sound waves represent, for instance, commands for controlling the central processing unit 102 or a surrounding communication device, spoken text to be converted in written text, or a user-part of a conversation of the user with somebody else via a communication connection.”);
- 12:3-4 (“The transceiver 115 is controlled via the multiplexer 114 from the central processing unit 102 and enables both sending and receiving of wireless communication data.”);
- 12:7-10 (“The central processing unit 102 controls the radio receiver 117 for selecting a desired radio station and the radio receiver 117 transmits the received radio signals as audio signals via the audio processing device 103 to the speaker 110.”);

- 13:4-8 (“Finally, the central processing unit 102 is connected to an optional display controller and driver 122 for controlling and driving an optional display like a liquid crystal display (LCD). Such a LCD can be used to display a setting control menu to the user, wherein the setting control menu is provided from the operating system running in the central processing unit 102 to control the headset circuit 100.”); claims 1, 4 (reciting the CPU as controlling various system components).

g. **[1F]: “...controller is configured to facilitate modifying power within a range of frequencies based on at least one hearing characteristic of the user...”**

130. The Goh in view of Berger combination discloses or renders obvious wherein the at least a controller is configured to facilitate modifying power within a range of frequencies based on at least one hearing characteristic of the user, to help the user hear audio outputs presented to the user via at least the speaker. In the Goh-Berger combination, Goh’s CPU—i.e., “the controller—has been programmed with a user’s prescription, which POSAs knew would identify the amount of amplification needed to account for a user’s unique hearing impairment, i.e., “at least one hearing characteristic of the user,” and uses that user-specific prescription to “transform[] an electrical signal to compensate for a hearing impairment.” Berger, Abstract (“A system integrates a hearing aid with devices such as wireless telephones, advantageously avoiding radio frequency (RF) interference. In one embodiment, a processor transforms an electrical signal to compensate for a hearing impairment...”); *see also id.*, [0003] (describing prior art hearing aids), [0019] (“A

user's prescription is programmed into processor 210. Processor 210 transforms the signal by applying a transfer function with more gain in the frequency ranges where the user has lost hearing...”), [0021] (same), claim 1. POSAs would understand that a user’s hearing-aid prescription is specifically tailored to an individual user’s hearing impairment and therefore only routine software programming would be needed for Goh to amplify audio signals based on a user’s hearing-aid prescription.

131. The processor “transforms the signal by applying a transfer function with more gain [*i.e.*, more power] in the frequency ranges where the user has lost hearing” (*id.*, [0019]), and therefore the processor is “*configured to facilitate modifying power within a range of frequencies based on at least one hearing characteristic of the user.*” See also Berger, [0003] (explaining hearing aids “can often be programmed to remedy a specific pattern of frequency loss specified by a user’s prescription”). The modified audio signal is then output via Goh’s speakers for the user.

132. See Goh:

- 5:18-22 (“A headset for multifunctional usage comprises at least one speaker, a microphone, a central processing unit for processing binary data, an audio processing unit for processing an audio signal...”);
- 9:18-20 (“Figure 1 shows a diagram of a headset circuit 100 according to a preferred embodiment of the invention. The headset circuit 100 comprises above all a digital processing device 101, which comprises a central

processing unit 102 for processing binary data and an audio processing unit 103 for processing audio signals.”);

- 11:1-10 (“...Due to the fact that binary audio data as well as digital audio signals are usually normalized to be processed in digital processing devices, the converted analog audio signals have to be amplified in the first amplifier 109 for operating the speaker 110...”);
- 12:7-10 (“The central processing unit 102 controls the radio receiver 117 for selecting a desired radio station and the radio receiver 117 transmits the received radio signals as audio signals via the audio processing device 103 to the speaker 110.”);
- 12:20-23 (“These digital audio signals are now directly transmitted via the multiplexer 114 and the audio processing unit 103 to the speaker 110 or admixed in the audio processing unit 103 to other digital sound signals originating from the radio receiver 117 or from a short-range wireless communication.”).

h. [1G]: “...configured to wirelessly receive a message,”

133. The Goh in view of Berger combination discloses or renders obvious wherein the wireless communication circuitry is configured to wirelessly receive a message.

134. As discussed for limitation [1D], Goh’s headset includes a “short-range wireless network interface,” e.g., a Bluetooth transceiver and antenna, that enables the headset to connect with nearby communication devices such as a mobile phone or a personal digital assistant (PDA). *See* Goh, 13:13-22 (“Further, the headset 200 is worn and used by a user 201 who, for instance, makes a phone call 202, 205 via a

surrounding mobile phone 203 which comprises a short-range wireless communication interface...Alternatively, the user 201 of the headset 200 let the headset 200 read an email 202 received via a surrounding personal 20 digital assistant (PDA) 204, which has to comprise a short-range wireless communication interface, according to the present embodiment of the invention a Bluetooth™ communication interface.), *see generally id.*, 13:12-14:3 (describing headset as in communication with a mobile phone and/or PDA), FIG. 2, claims 6-7.

135. Using its wireless interface, Goh's headset can be used "as a mobile phone, as a walkie-talkie, as a reader of written text messages like electronic mails or messages transmitted using the short message service (SMS)." Goh, 11:27-12:4; *see also* 11:21-27 ("short-range wireless network interface based on the Bluetooth™ technology as well as on the IEEE 802.11 standard is incorporated into the headset circuit 100"). For example, Goh's headset can "read an email" that the headset "received" via its wireless connection with a PDA. *Id.*, 13:18-22. Likewise, Goh's headset can receive audio, *e.g.*, a telephone conversation, via its wireless connection with a mobile phone. *Id.*, 13:13-16. Goh's wireless network interface is therefore "*configured to wirelessly receive a message,*" *e.g.*, an audio message, an email, or an SMS message.

- i. **[1H]: "wherein if the message is a text message, the at least a controller is configured to have at least a portion of the text message presented to the user,"**

136. The Goh in view of Berger combination discloses or renders obvious wherein if the message is a text message, the at least a controller is configured to have at least a portion of the text message presented to the user.

137. Goh teaches that if the message its headset receives is an email message or a SMS text message, *i.e.*, either of which a person of ordinary skill in the art would consider to be “*a text message*,” then Goh’s CPU is configured to have the message “read to the user,” *i.e.*, “*presented to the user*.” Goh, 13:18-22; *see also id.*, 11:27-12:3 (describing the headset as a “reader of written ***text messages*** like electronic mails or messages transmitted using the short messages services (SMS)...”); *see also* EX1001, 36:50-54 (identifying e-mail as using a “messaging protocol” similar to “short messages,” *i.e.*, SMS messages).

- i. **[1I]: “wherein if the message is an audio message, the at least a controller is configured to have at least a portion of the audio message presented to the user, and”**

138. The Goh in view of Berger combination discloses or renders obvious wherein if the message is an audio message, the at least a controller is configured to have at least a portion of the audio message presented to the user.

139. As discussed for limitation [1G], Goh’s headset can be “arranged to work as a mobile phone.” Goh, claim 7. To do so, Goh’s headset either communicates (*e.g.*, via Bluetooth) with a nearby mobile phone or the headset itself performs the functionality of a mobile phone. *Id.*, 8:3-4 (“[T]he headset may

alternatively or additionally provide the functions of a mobile phone.”); 11:27-28 (“The deployed short-range wireless communication technology enables the user of the headset to use the headset as a mobile phone...”); 13:13-15 (“[T]he headset 200 is worn and used by a user 201 who, for instance, makes a phone call...via a surrounding mobile phone 203 which comprises a short-range wireless communication interface”).

140. As of 2004, POSAs would have understood that its headset, which is described as being capable of functioning “as a mobile phone” or working with a mobile phone (see e.g., Goh, 1:14–20), supports typical mobile phone functionalities—including voicemail playback. POSAs would have known that mobile phones include the ability for calling parties to leave an audio message (a.k.a. a voicemail) and for the called party to access those messages for later playback. My opinion that a person of ordinary skill in the art would have known that mobile phones include the ability for calling parties to leave an audio message (a.k.a. a voicemail) and for the called party to access those messages for later playback is corroborated by the following references: .

- EX1031, 1:33-48 (background explaining that voicemail is already a “popular alternative” service and that calling parties can leave an audio message, e.g., “[i]ntegrated voice mail systems are preferred because they can provide the capability of receiving messages while the phone is being used, or even while another caller is **leaving a message**”), 1:62-

65 (background explaining that the called party can access those messages for later playback, e.g., that “[t]he user may **access the voice mailbox** to which it is assigned from any telephone in the network”), 2:6-8 (disclosing that the user may “**access and retrieve messages**” from “the voice mail system”);

- EX1032, 7:13-19 (describing voice mail as a “a network-specific service” for a “mobile subscriber,” e.g., a user that has subscribed with a mobile/cellular phone service and has been assigned a mobile/cellular phone number, where the mobile subscriber is permitted to “**access [the] mobile subscriber's voice mailbox and listen** to the stored messages”);
- EX1033, 21:21-31 (“The voice mail unit 74 can **store voice mail messages from users or other parties trying to send messages to users** of the node. When a user accesses the telecommunication node 60, the voice mail unit 74 can notify the user of new and stored messages. The **user can access the messages to play**, delete, store and forward the messaged.”).

141. POSAs would thus have understood Goh’s disclosure that its headset can “work as a mobile phone” or work with a mobile phone to disclose that Goh’s headset is configured (via its CPU) to have “*at least a portion of [an] audio message presented to the user,*” e.g., when the user access his or her voicemails.

142. Alternatively, it would have been obvious to implement Goh’s teachings such that the headset allowed for playback of audio messages since the headset already allows for real-time voice communication and playback of recorded

audio would require similar audio processing. By 2004, voicemail was a standard and ubiquitous feature in mobile telephony. POSAs were well aware that mobile phones routinely included voicemail systems that allowed calling parties to leave audio messages and permitted the called user to access and listen to those stored messages. As such, a POSA would expect any system described as functioning as or with a mobile phone—including Goh’s headset—to support the ability to play back audio messages left on voicemail.

143. Moreover, Goh discloses that its headset includes a “digital processing device” with a central processing unit (CPU 102) and an audio processing unit (103), both of which are designed to process audio signals—including binary audio data—and perform “advanced audio processing,” such as audio signal amplification and filtering. Goh, 9:17-29. POSAs thus would have understood that when Goh discloses that its headset can function “as a mobile phone” or operate in conjunction with one, that includes enabling the user to listen to voicemail.

144. Alternatively, even if Goh’s system were not initially configured for voicemail playback, it would have been obvious to implement such functionality using the same components. Goh’s audio processing pipeline is capable of receiving and processing incoming audio signals regardless of whether they are transmitted live or retrieved from storage. Thus, adapting Goh’s system to allow playback of

stored audio messages—such as voicemails—would involve only routine adaptation of existing features, not any significant design innovation.

- j. **[1J]: “wherein at least the speaker is configured to present at least a portion of the message, when the at least a portion of the message is to be presented in an audio manner.”**

145. The Goh in view of Berger combination discloses or renders obvious wherein at least the speaker is configured to present at least a portion of the message, when the at least a portion of the message is to be presented in an audio manner.

146. As discussed for limitation [1I], Goh discloses (or it would have been obvious in view of Goh’s disclosures) using its headset to playback voicemails that the headset-user received from a calling party. This audio would have been presented to the headset-user via Goh’s speaker. *Supra* limitation [1B]; *see also* Goh, Abstract; *see also* 5:18-22, 11:3-5, claim 1, FIG. 1 (element 110), FIG. 4 (elements 408, 409).

147. POSAs would have understood Goh’s disclosure that its headset acts as “a reader of text messages” (Goh, 11:29) to mean that the device converts the text of received messages—such as SMS text messages or e-mails—into audio and plays them back to the user through the headset’s speaker. *Supra* limitations [1B], [1H].

148. This interpretation aligns with both the language of Goh and the technical context at the time. Goh does not merely say that the headset displays text messages, but that it functions as a reader, which implies an auditory presentation.

In the field of consumer electronics, especially with respect to wearable or hands-free communication devices like headsets, “reading” a text message was commonly understood by POSAs to involve text-to-speech (TTS) technology—i.e., converting textual content into spoken output. TTS functionality was well established by 2004 and commonly used in mobile and assistive technologies, especially where screen space was limited or user attention needed to remain on other tasks (e.g., driving or walking).

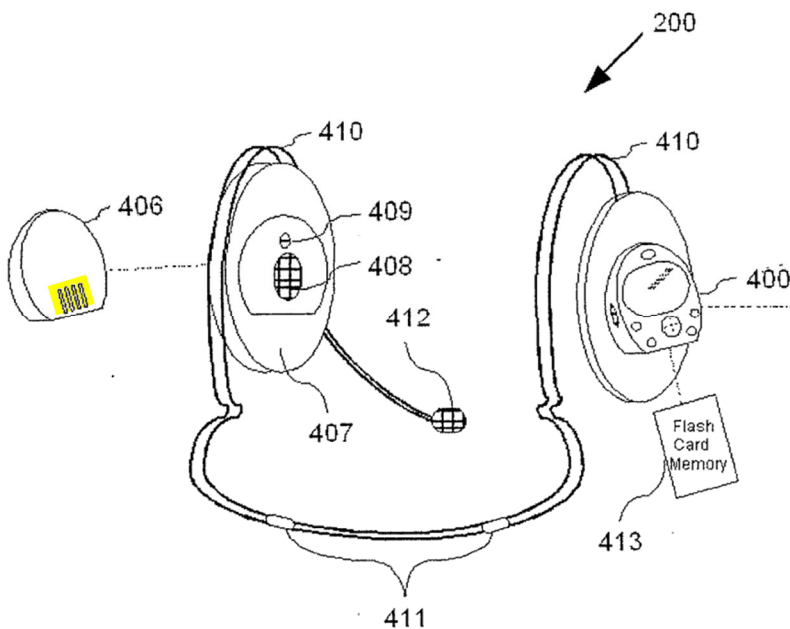
149. Goh also discusses that its headset connects wirelessly with mobile devices and serves as an interface for functions like messaging and calling. Goh, 3:15–4:6. Since mobile phones at that time already supported receiving SMS and e-mails, POSAs would expect Goh’s headset—functioning in conjunction with such phones—to support access to that message content. In a hands-free context, the most practical way to communicate text message content to the user is by converting it to audio.

5. Claim 3: “...a plurality of conductive pads..., wherein each of the conductive pads is configured to be in contact with a corresponding metallic contacts of the second connector when the first connector is connected to the second connector.”

150. The Goh in view of Berger combination discloses or renders obvious the device of claim 1 also comprising a first connector that includes a plurality of conductive pads that are configured to couple with a second connector external to

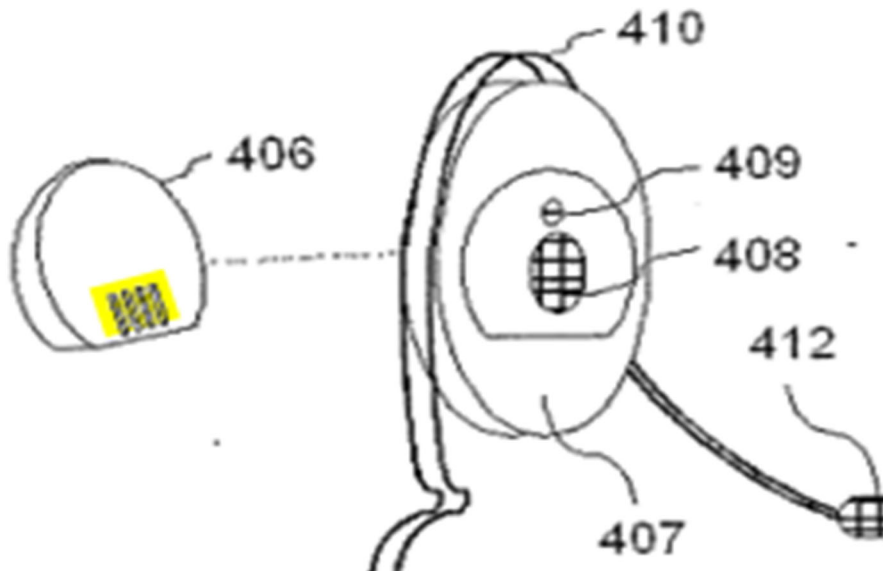
the headset, wherein each of the conductive pads is configured to be in contact with a corresponding metallic contact of the second connector when the first connector is connected to the second connector.

151. As seen below in Goh's Figure 4, Goh's headset includes "a detachable power source 406 for supplying the headset 200 with power." Goh, 17:12-13.



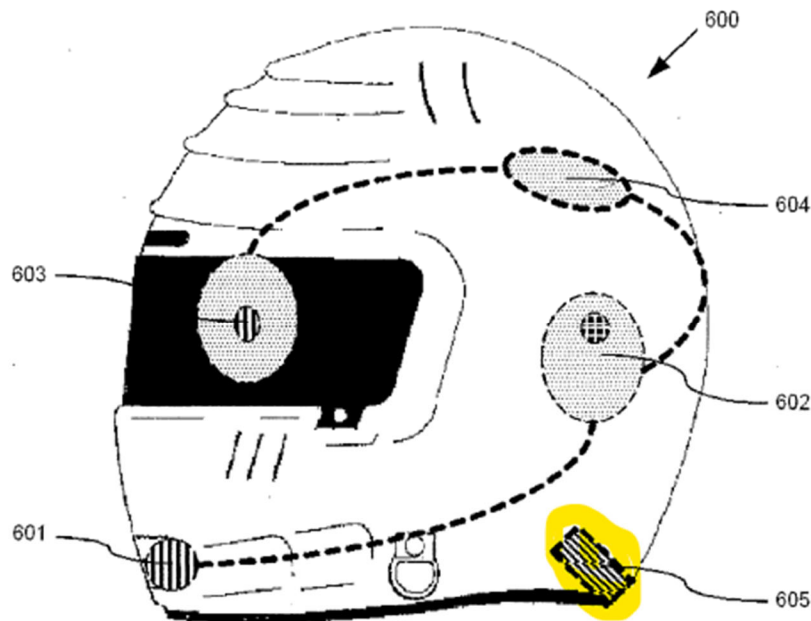
152. As seen in the close-up below, Figure 4 depicts the "detachable power source 406" as including contacts that a POSA would have interpreted to be metallic charging contacts used to establish an electrical connection with the headset via corresponding metallic charging contacts on the headset. While Goh does not explicitly label them in Figure 4 as "metallic contacts," the physical interface shown—rectangular elements at the end of the power source—would be interpreted by a POSA as conductive contacts based on common practice in the design of

rechargeable electronic devices. This interpretation is consistent with both the visual depiction in the figures and the broader context of Goh's disclosure and confirmed by the prior art. *See, e.g.*, EX1008, 1:28-41 (charging contacts for providing electrical connection between the headset and the base), EX1010, Abstract, 4:25-30, FIG. 4 (external battery pack contacts contact the recharging terminals).



153. If Patent Owner argues Goh's headset, as used in the Goh-Berger combination, does not disclose claim 3, then modifying Goh such that its "detachable power source 406" used metallic contacts that contacted with charging pads on the headset would have been the obvious in view of Goh's teachings. For example, Goh explicitly discloses a helmet embodiment with an "accumulator" (i.e., battery) and "accumulator charger contacts 605." . Goh, 19:19-22, FIG. 6 (accumulator charger

contacts 605); *see also id.*, 6:19-20, 9:20-22 (headset embodiment). These “accumulator charger contacts 605” are the functional equivalent of the contacts shown on the detachable power source in Figure 4. A POSA would understand that whether in the context of the helmet or the headset, the power supply components are intended to deliver power to the system via physical electrical connection—most straightforwardly achieved using metallic contact surfaces.



154. As I discuss in more detail below at paragraph 199, an accumulator, in the context of electronic devices, is another term for a rechargeable battery. Using a similar method for recharging Goh’s headset would have been the use of a known technique to improve similar devices in a similar manner. As of 2004, using metallic charging contacts for detachable or rechargeable batteries was a well-known and widespread design practice in consumer electronics, including wireless

communication headsets. Goh already teaches the use of charger contacts in the helmet embodiment (element 605 in Fig. 6), and the same concept naturally applies to Goh's headset embodiment. Goh, 6:19-20; 9:20-22.

6. Claim 4: "...Bluetooth."

155. The Goh in view of Berger combination discloses or renders obvious wherein the wireless communication circuitry is configured to couple to at least a Bluetooth network.

156. As discussed with respect to limitation [1D] and [1G], Goh's wireless interface includes a Bluetooth transceiver. Goh, 1:26-2:5, 7:9-12, 11:21-12:4, 13:13-22, 14:17-15:6 (numerous mentions of Bluetooth throughout).

7. Claim 5: "...facilitate voice recognition, including facilitating recognizing at least a word received via at least the microphone in the headset"

157. The Goh in view of Berger combination discloses or renders obvious wherein the at least a controller is configured to facilitate voice recognition, including facilitating recognizing at least a word received via at least the microphone in the headset.

158. The CPU in Goh's headset is configured to "recognize voice commands of a user," and "it can control the headset [] via recognized voice commands." Goh, claim 2; *see also id.*, 7:22-24 ("[T]he central processing unit...can recognize voice commands of a user, and...can control the headset via recognized voice

commands.”); 15:8-9 (“[T]he headset 200 can be controlled via...user voice commands.”), 16:20-21 (“The relevant settings can also be controlled via user voice commands....”), 17:5-6 (“A similar volume control could also be realized via voice commands.”).

159. The voice command(s), *i.e.* “*at least a word*,” is received by the headset’s microphone. Goh, 11:11-20 (explaining Goh’s “microphone 111” “detects sound waves generated by the mouth of the user” and those sounds waves “represent, for instance, commands for controlling the central processing unit 102 or a surrounding communication device”).

8. Claim 6: “...in an ear of the user.”

160. The Goh in view of Berger combination discloses or renders obvious wherein the headset includes at least an ear bud configured to be placed in an ear of the user.

161. In describing the prior art, Goh teaches that communication headsets include a speaker that is usually “placed next to an ear of a user or inside of the ear.” Goh, 1:20-22. Goh thus identifies in-the-ear speakers (*i.e.*, earbuds), and near-the-ear speakers as two known designs for communication headsets.

162. Although Goh’s Figure 4 headset uses a near-the-ear speaker, implementing the headset such that its speakers were configured as earbuds to be placed in the user’s ear would have been a routine design choice, a fact Goh itself

confirms. Goh, 1:20-22. As Goh teaches, the use of headsets with earbud speakers that were configured to be placed in the user's ear was well known and conventional before 2004. *See also* EX1006, Abstract, 1:44-49, 1:63-2:4, FIG. 2, claim 10 (remote control device that takes the form of an earbud-type headphone with a touch-sensitive surface). Implementing Goh's Figure 4 headset using an in-the-ear earbud design would have been the simple substitution of one known element (near-the-ear speakers) for another (in-the-ear earbud speakers) to yield a predictable result.

9. Claim 7: "...receive an audio response for the message from the user."

163. The Goh in view of Berger combination discloses or renders obvious wherein at least the microphone in the headset is configured to receive an audio response for the message from the user.

164. Goh discloses that its microphone "detects sounds waves generated by the mouth of the user" and that these sound waves represent, *inter alia*, "spoken text to be converted in written text." Goh, 11:11-20; *see also id.*, 13:18-25 ("[T]he user 201 can dictate into the headset 200, which converts the detected sound waves into a corresponding email 205 and sends it via the surrounding personal digital assistant 204 to the addressee of the email."). Goh's microphone is thus "*configured to receive an audio response for the message from the user,*" *i.e.*, spoken text the user utters in response to a text or email message.

10. Claim 8

165. The Goh in view of Berger combination discloses or renders obvious wherein the at least a controller is configured to facilitate converting the audio response into text to be wirelessly transmitted.

166. As discussed above for claim 7, Goh's headset uses its microphone to convert speech to text. In one example, Goh's headset "converts the detected sound waves into a corresponding email 205 and sends it via the surrounding personal digital assistant 204 to the addressee of the email." Goh, 13:23-25; *see also id.*, 10:17-18 ("central processing unit 102 is able to manipulate the binary audio data for achieving an advanced audio processing"); 11:11-20 (explaining Goh's "microphone 111" "detects sound waves generated by the mouth of the user" and those sounds waves "represent, for instance, commands for controlling the central processing unit 102 or a surrounding communication device").

167. The "personal digital assistant" is connected to the headset via a wireless Bluetooth connection (Goh, 7:9-11), and therefore the audio response has been converted into "*into text to be wirelessly transmitted,*" *i.e.*, from the headset to the PDA and/or from the PDA to the Internet for transmission.

11. Claim 9

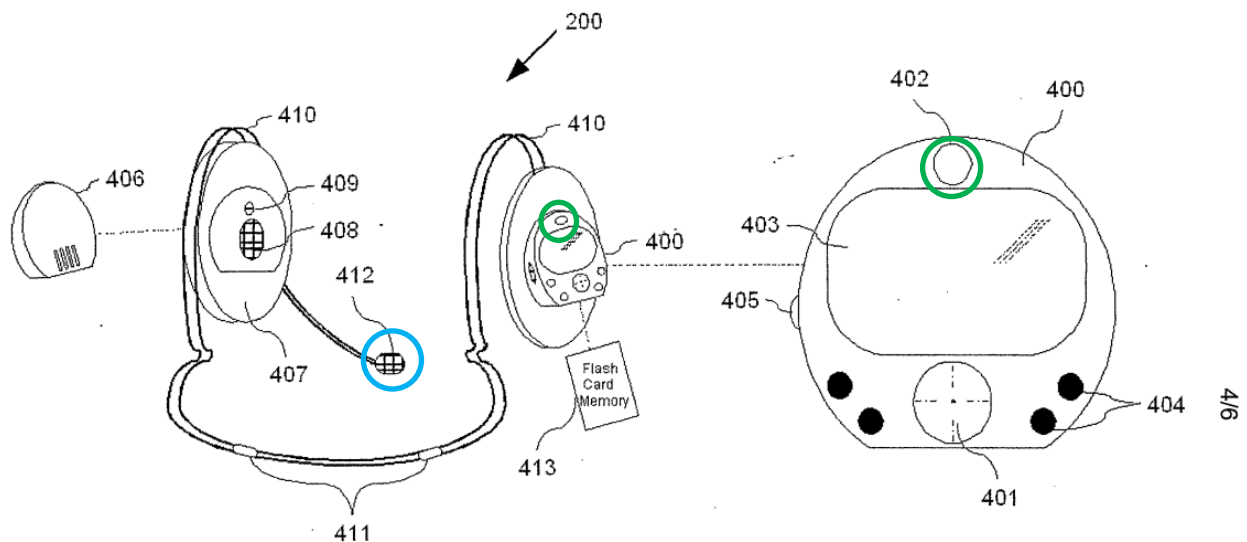
a. [9A]: “wherein wireless headset comprises another microphone”

168. The Goh in view of Berger combination discloses or renders obvious *wherein wireless headset comprises another microphone.*

169. Goh’s headset includes a “second microphone,” *i.e.*, “*another microphone,*” to “offer more convenience to the user.” Goh, 12:11-23; *see also id.*, 17:6-11 (“The microphone 402 in the controller 400 is used to enable an audio connection of the user to the real world outside of the headset 200. This will offer more convenience to the user since usually a headset shields or lowers a user’s hearing of sounds generated in the adjacent real world. Therefore, the microphone 402 adds the sounds of the real 10 world adjacent to the headset 200 to the sounds of the technical world of wireless communication.”), FIG. 1 (element 118), FIG. 4 (element 402). Goh’s second microphone captures “sounds generated in the adjacent real world,” *i.e.*, ambient noise. Goh, 12:11-23.

170. As seen in Figure 4 below, the second microphone (element 402 in green) is located on a controller on the side of the headset whereas the first microphone (element 412 in blue) is located at the end of a mouthpiece closer to the user’s mouth. Goh, 18:10-11 (“retractable mouthpiece 412 comprising a microphone is provided for receiving the user’s voice commands or conversation”); *see also id.*, 11:11-14 (“[A] first microphone 111 [] is located in the mouth-piece of

the headset adjacent to the mouth of the user of the headset. The first microphone 111 detects sound waves generated by the mouth of the user which are detected as analog audio signals.”).



b. [9B]: “wherein the microphone is configured to be located closer to mouth of the user than the another microphone when the headset is worn by the user”

171. The Goh in view of Berger combination discloses or renders obvious wherein the microphone is configured to be located closer to mouth of the user than the another microphone when the headset is worn by the user.

172. As discussed above for limitation [9A], Goh’s second microphone is depicted as element 402 in Figure 4, and it is located on controller 400 apart from the first microphone 412 which is located on a mouthpiece. Goh, 17:6-11; *see also id.*, 18:9-13 (“At one earpiece a retractable mouthpiece 412 comprising a microphone is provided for receiving the user's voice commands or conversation.

Further, the retractable mouthpiece 412 can be installed with a sound channeling attachment (not shown) to facilitate “silent-mode” and “private” voice communications....”). The first microphone 412, i.e., “*the microphone*” is thus configured to be “*closer to the mouth of the user*” than the second microphone 402, i.e., “*the another microphone*.”

c. [9C]: “wherein at least the another microphone is configured to capture at least ambient noise.”

173. The Goh in view of Berger combination discloses or renders obvious *wherein at least the another microphone is configured to capture at least ambient noise*. As discussed above for limitation [9A], Goh’s second microphone captures “sounds generated in the adjacent real world,” i.e., “*ambient noise*.” Goh, 12:11-23.

d. [9D]: “wherein at least a portion of signals from the microphone is configured to be reduced based on signals from the another microphone at least for reducing at least a portion of the ambient noise in signals from the microphone.”

174. Goh’s headset performs “advanced audio processing,” including “real-time acoustic noise reduction.” Goh, 8:17-22; *see also* 3:4-5, 10:17-29 (“Advanced audio processing feasible by the central processing unit 102 of the headset circuit 100 comprises respective units for providing: **real-time acoustic noise reduction**....”).

175. It is my opinion that POSAs would have understood that Goh’s real-time noise reduction uses Goh’s second microphone to detect ambient sounds and

then subtracts those sounds from speech audio captured by Goh’s first microphone positioned closer to the user’s mouth thereby reducing ambient noise from the captured speech audio. That is, the second microphone—given its location away from the user’s mouth—captures primarily ambient noise and that noise is the subtracted from the audio that the first microphone captures which—given its location close to the user’s mouth—is a combination of the user’s speech and ambient noise. The end result is that the audio the headset captures for transmission, *e.g.*, for a phone call, is primarily the user’s speech with ambient noise having been reduced or canceled. This was a well-known signal processing technique at the time, where background noise was suppressed using digital processing algorithms that analyze and modify the microphone's input signal to improve clarity, especially in voice communications.

176. My understanding of Goh is consistent with the fact that Goh’s “advanced audio processing” includes audio amplification and filtering. Goh, 10:17-29. Although Goh does not describe a specific noise reduction algorithm, a person of ordinary skill would have recognized that Goh’s disclosed processing hardware (*e.g.*, its DSP) is capable of performing noise reduction directly on the signal from the primary microphone as part of standard audio signal conditioning

177. While one embodiment in Goh suggests that ambient noise may be intentionally played through the speaker to help the user remain aware of their

surroundings, a person of ordinary skill would have readily understood that the same second microphone was also used to perform Goh's real-time acoustic noise reduction in contexts like a phone call. My opinion that a person of ordinary skill in the art would have readily understood that Goh's second microphone that is used to capture ambient noise was used to perform noise reduction is corroborated by at least the following references which confirm the use of a second microphone to reduce noise was conventional:

- **EX1034**, which discloses a headset with two microphones including a first microphone called "communication microphone 38" (Fig. 1, 2:36-45) positioned close to the user's mouth to capture the user's voice, and a second microphone 10 (Fig. 1, 2:22-35) positioned on the top of the headphone so as to isolate the microphone from the user's mouth and the headphone's speakers. Abstract, 1:53-57 ("The system includes a directional microphone mounted on a headset/helmet, isolated from both voice and earphone output"), 2:22-45 (explaining that microphone 10 "picks up the ambient noise" and such ambient noise signal, "is then inverted ... to provide destructive interference" by adding it to the "voice input signal" from microphone 38, i.e., the noise signal is subtracted from the voice input signal, which "will effectively cancel noise at the mouthpiece") 2:14-16 ("The figure is generic to account for many variances among headsets, helmets, input levels, etc."), Fig. 1.
- **EX1035**, Figs. 5-6 (disclosing a mobile telephone 582 that includes a far-mouth microphone 586 that primarily captures the background noise and a near-mouth microphone 584 that primarily captures the user's speech, where the near-mouth microphone 584 is closer to the user's mouth than the far-mouth microphone 586), Abstract (same), 12:2-18 (explaining that the signals picked up by the "far-mouth microphone 586" is used to generate an enhanced "noise estimate" by removing the speech components, which is "[f]inally ... used to enhance the near-mouth signal by filtering out the enhanced background noise"; that is, the background noise estimate is subtracted

from signal captured from the near-mouth microphone 584 so as to provide a clean speech signal).

178. Alternatively, implementing Goh's headset such that the ambient noise captured by its second microphone was used to perform Goh's real-time noise reduction would have been the use of a known technique to a known device ready for improvement. I recognize that Goh discloses an embodiment in which the ambient noise is added to the audio output by the headset's speaker so that a user can hear the real-world environment (see Goh, 12:11-23), and this might provide a safety measure to users who use the headset while riding a bike as they would be able to hear vehicles approaching when they are using the headset while riding a bike (see Goh, FIG. 3). However, in my opinion POSAs would have understood that there are other scenarios, e.g., during a stationary phone call (see Goh, FIG. 2), when a user would want to use that same captured ambient noise to reduce or cancel out the noise from the speech audio captured by the microphone closer to the user's mouth.

12. Claim 10

179. The Goh in view of Berger combination discloses or renders obvious claim 10, which repeats limitations found in several previously-discussed claims. The chart below does not repeat claim language that is the same limitation. *See supra* Claims 1, 4, 6, 9.

Claim 10 Limitations	Corresponding Limitation(s)
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[10PRE] A wireless wearable device configured to secure to the head of a user, with the device proximate to at least one ear of the user to at least help the user hear, the wireless wearable device comprising:	<i>See supra</i> [1PRE], [1G], claim 6.
[10A] a printed circuit board ...;	<i>See supra</i> [1A].
[10B] a speaker...;	<i>See supra</i> [1B].
[10C] a microphone ...	<i>See supra</i> [1C].
[10D] wireless communication circuitry,	<i>See supra</i> [1D].
[10E] wherein the at least one electrical component or the plurality of other electrical components include at least a controller,	<i>See supra</i> [1E].
[10F] wherein the at least a controller is configured to facilitate modifying power within a range of frequencies, to help the user hear outputs presented to the user via at least the speaker,	<i>See supra</i> [1F].
[10G] ... Bluetooth network,	<i>See supra</i> [1G], claim 4.
[10H] wherein if the message is a text message, the at least a controller is configured to have at least a notification of the text message presented to the user,	<i>See supra</i> [1H]; Goh's headset may "provide the functions of a mobile phone." Goh, 8:3-4, 11:27-28. As of 2004 alert notifications for received calls, voice mail messages, and texts was standard functionality of mobile phones and telecommunication systems generally. <i>See, e.g.</i> , EX1033, 11:3-7 (telecommunication system that includes "mobile phone" (<i>see</i>

	<i>id.</i>, 7:11-16, 12:6-10) could “notify a user of voice or text messages, such as voice mail messages, emails, faxes, etc.”); EX1009, [0012] (describing prior art: “[Short Message Service (SMS)] is also commonly used for notifying mobile phone users that they have new voice, fax or Internet mail messages waiting (unified messaging).”); EX1024, [0004]-[0005] (describing prior art: “Cellular phones can be programmed to select a ringing tone for notifying a called party of an incoming call or a received message.”). Thus, POSAs would understand the Goh headset to include such functionality. Alternatively, POSAs would find it obvious to program the headset to provide alert notifications for received calls, voice mail messages and texts to a user as doing so would be motivated by Goh’s teaching that its headset could “provide the functions of a mobile phone.” Goh, 8:3-4, 11:27-28. Further such a modification would involve only routine adaptation of existing features and not any significant design innovation so a POSITA would have a reasonable expectation of success.
[10I] wherein if the message is an audio message, the at least a controller is configured to have at least a notification of the audio message presented to the user,	<i>See supra</i> [1I]; [10H].

[10J] wherein the wireless wearable device comprises another microphone,	<i>See supra</i> [9A].
[10K] wherein the microphone is configured to be located closer to mouth of the user than the another microphone when the wireless wearable device is worn by the user,	<i>See supra</i> [9B].
[10L] wherein at least the another microphone is configured to capture at least ambient noise, and	<i>See supra</i> [9C].
[10M] wherein at least a portion of signals from the microphone is configured to be reduced based on signals from the another microphone at least for reducing at least a portion of the ambient noise in signals from the microphone.	<i>See supra</i> [9D].

13. Claim 11: “...storage medium configured to store at least computer program codes for facilitating voice recognition...”

180. The Goh in view of Berger combination discloses or renders obvious the device of claim 10 comprising a storage medium configured to store at least computer program codes for facilitating voice recognition, wherein at least the microphone is configured to receive at least a word, with the at least a word recognized using at least the computer program codes for facilitating voice recognition. Goh’s headset includes a “memory device,” i.e., “a storage medium,”

to which the headset's CPU is connected. Goh, Abstract ("A headset for multifunctional usage comprises... a memory device (105, 106, 107)..."), 5:18-22, 9:23-10:16, FIG.1, claim 1.

181. As discussed above with respect to claim 5, Goh's CPU "can recognize voice commands of a user" and "can control the headset...via recognized voice commands." Goh, claim 2; *see also id.*, 7:22-24 ("Further, the central processing unit of the headset can preferably be arranged in such a manner, that it can recognize voice commands of a user, and that it can control the headset via recognized voice commands..."), 11:11-20, 15:8-9 ("It should be mentioned, that the headset 200 can be controlled via function buttons and a display (for details see Figure 4) as well as via user voice commands."), 17:5-6.

182. Goh explains that "voice commands" are conventionally provided via "a software library or a look-up table" that is stored in memory on the device providing the voice-control functionality. *Id.*, 2:25-3:4. POSAs would have understood that the headset's voice-command functionality is implemented using software—specifically, computer program code stored in the device's memory. Goh explains that prior-art systems often offloaded voice-command processing to external devices and criticizes this approach for its limitations. *Id.* Goh presents an improvement in which the headset itself provides voice-control functionality, which a POSA would recognize requires local processing and storage of the relevant

software and would have understood that Goh's voice-command functionality is facilitated by similar software, *i.e.*, "*computer program codes*," and that such software is stored in Goh's memory device because the headset is providing the voice-command functionality in Goh's system. Goh, 2:25-3:4 (describing drawbacks of prior-art systems that offloaded voice-control functionality to external devices). POSAs would have seen local storage and execution of the voice-command software not only as consistent with the disclosure, but as the most efficient and expected architecture—requiring no inventive step beyond what Goh already teaches.

183. Alternatively, implementing Goh's headset such that the software for its voice-control functionality is stored in Goh's memory would have been a routine choice given Goh's teaching that such an implementation was known. Goh, 2:25-3:4. Given this context and Goh's disclosure that such functionality is typically implemented via a "software library or a look-up table," a POSA would understand that Goh's improved system stores and runs this software within the headset, using its own memory and processor. Goh describes that the headset includes memory devices and a CPU capable of executing stored program code to carry out various audio processing and control tasks. *Id.*, 10:17-29 (describing advanced audio processing that the headset can perform based on programs stored in memory). As

such, the logical and technically appropriate implementation would involve storing the voice-command software in the headset's memory and executing it locally.

14. Claim 13: "...enable the user to receive and respond to the message hands-free...."

184. The Goh in view of Berger combination discloses or renders obvious the device of claim 10 wherein the wireless wearable device is configured to enable the user to receive and respond to the message hands-free, using at least the speaker and at least the microphone. Goh's headset "enables hands-free and eyes-free receipt of desired information items." Goh, 3:24-26.

185. For example, as discussed above for limitations [1G]-[1J] and claim 7, a user wearing Goh's headset (used in Goh-Berger) can receive **(a)** audio messages that are played back to a user via the headset's speaker and/or **(b)** text messages that are "read" to the user via the headset's speaker. The user can then respond to either form of message by speaking into the headset microphone which speech is then, for example, converted into a text or email response to the received message. *See* Goh, 5:18-22, 8:3-4 ("the headset may alternatively or additionally provide the functions of a mobile phone"), 11:3-5, 11:21-12:4 ("...enables the user of the headset to use the headset as a mobile phone, as a walkie-talkie, as a reader of written text messages like electronic mails or messages transmitted using the short message service (SMS), as a playing device for playing computer based music like MP3, or as a control center for any surrounding communication device comprising a suitable

transceiver interface...”), 13:12-14:3 (“...the user 201 can dictate into the headset 200, which converts the detected sound waves into a corresponding email 205 and sends it... the headset 200 is able to use the mobile phone 203 and/or the PDA 204 for data exchange...”), claim 1, FIGS. 1, 4.

15. Claim 21

186. The Goh in view of Berger combination discloses or renders obvious the device of claim 10 comprising a first connector that includes a plurality of conductive pads that are configured to couple with a second connector external to the wireless wearable device, wherein each of the conductive pads is configured to be in contact with a corresponding metallic contact of the second connector when the first connector is connected to the second connector. Claim 21 recites a similar limitation as Claim 3. EX1001, Claim 21. See *supra* Claim 3.

16. Claim 22: “...a display...”

187. The Goh in view of Berger combination discloses or renders obvious the device of claim 10 *comprising a display*. Goh’s headset includes a display. Goh 13:4-11 (optional display such as a liquid crystal display (LCD)), 15:8-9 (“the headset 200 can be controlled via function buttons and a display”), 16:15-20, FIG. 4 (element 403).

17. Claim 24

188. The Goh in view of Berger combination discloses or renders obvious the device of claim 10 *comprising a storage medium configured to store at least*

computer program codes for facilitating voice recognition. Goh discloses a headset that is used in the Goh-Berger combination and which includes all of the functions recited in claim 24 as discussed above with respect to claims 5, 11, and 13.

189. Goh describes, for example, that its headset includes: a microphone that detects voice commands from the user and transmits audio (Goh, 11:11–20); a digital processing device (including CPU and audio processing unit) that performs advanced audio processing, including signal amplification (Goh, 9:17–20; 10:17–29); and memory components for storing programs used in voice-command recognition and other functionality (Goh, 9:23–10:16).

190. Alternatively, even if Goh describes these features individually rather than as an expressly unified implementation, a POSA would have understood that integrating them into a single headset design would be a routine design decision. As each feature—voice control, noise reduction, audio processing, memory storage—was known in the art and is described as part of Goh’s system, implementing them together in one device would simply reflect combining known functionalities in a predictable way, consistent with both Goh’s teachings and standard practices in headset design as of 2004.

C. Ground 2B: The Goh-Berger Combination in View of Irvin Renders Claims 2, 14-16, 19, 27, and 31 Obvious.

191. I have been instructed by counsel for Bose to assume that Irvin (EX1021) qualifies as prior art to the Challenged Claims. With that assumption,

Goh-Berger-Irvin renders obvious claims 2, 14-16, 19, 27, and 31 for the reasons I discuss below.

1. Irvin (EX1021)

192. Irvin is directed to a “wireless headset for use with a separate communications device, such as a cellular telephone,” depicted in Figure 1 below.

Irvin, Abstract.

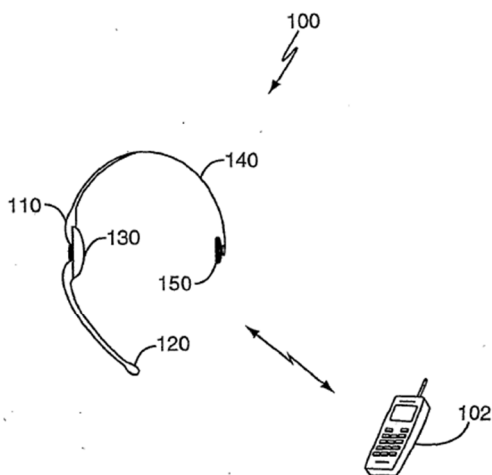


FIG. 1

193. Irvin teaches that “several obstacles impede wireless headset designers in their efforts to provide consumers with small but reliable and convenient headsets.” Irvin, 1:18-20. One of these obstacles noted by Irvin is that “[h]eadset miniaturization places severe limitations on the physical size of batteries that may be included within the headset.” Irvin, 2:12-21. As Irvin teaches, “[e]ven with the significant energy densities afforded by newer battery technologies, these very small

battery cells have significantly limited capacity” and “[b]ecause battery life is a key component of operator convenience, it is important that wireless headset design incorporates provisions maximizing battery life.” *Id.*

194. Irvin further notes that “[a] manually operated on-off switch works against this need to maximize battery life” as “a user may forget to turn off the wireless headset after usage, thereby needlessly expending valuable battery life.” Irvin, 2:19-21.

195. In order to solve this problem, Irvin teaches that “[b]y detecting a user's interaction, such as picking up the headset or placing it upon the user's body, the wireless headset automatically transitions from an inactive state to an active state.” Irvin, Abstract. Thus, “[w]hen not in use, the wireless headset reverts to an inactive state and draws essentially no power.” *Id.*, 3:1-2. This allows the headset to “minimize power consumption, thereby maximizing the life of its power source, such as a battery.” *Id.*, 2:29-31.

196. Irvin further discloses a “sensor,” which “may be based on a variety of technologies” and whose “purpose is to provide a signal responsive to a natural stimulus associated with use of the headset by a user.” Irvin, 7:10-14. Irvin’s sensor can “provide[] indication that a user has placed the wireless headset 100 upon their body.” 9:12-13; *see also id.*, Abstract, 7:10-17. Irvin discloses various sensors that can be used “individually or in any combination,” such as an “accelerometer” that

can detect movement of the headset and/or a “contact sensor” that detects when the headset contacts the user’s head. Irvin, Abstract, 7:15-17, 8:28-9:8, claim 11.

2. Motivation to Combine Goh-Berger and Irvin

197. POSAs would have been motivated to combine the teachings of Goh, Berger, and Irvin to improve the functionality, personalization, and power efficiency of a wireless headset, and would have had a reasonable expectation of success in doing so based on the compatibility and complementary nature of the references.

198. Irvin adds to the disclosure of Goh-Berger above that conserving battery life is a critical design goal in wireless headset systems. Irvin, 2:17-21. Irvin proposes the use of sensors—such as accelerometers or contact sensors—that detect whether the headset is in use. These sensors output data to a processor, which then determines whether to power the headset on or off. Irvin, Abstract, 5:7-30, 7:10-22. Given that Goh’s headset uses a battery (or rechargeable accumulator), a POSA would have readily seen the benefit of incorporating Irvin’s sensor-based power management to extend battery life, especially since Goh does not describe any specific power conservation mechanism.

199. Goh’s headset includes “an integrated power source like a battery or an accumulator.” Goh, 6:18-20. POSAs would have known that an accumulator is another term for a rechargeable battery. My opinion that POSAs would have known that an accumulator is another term for a rechargeable battery is corroborated by,

e.g., EX1026 (granted in 1995), 1:6-12 (background section, explaining that “[d]ue to their convenience of use, and also due to the increasing use of portable electrical and electronic apparatus, so-called rechargeable batteries or accumulators have become an established part of everyday domestic life”); EX1027, [0004] (background section, stating that “DE4409736 depicts a method and a device for caring for an accumulator (i.e., a rechargeable battery) incorporated in an accumulator-operated device...”); EX1028, [0004] (using the two terms “rechargeable batteries” and “accumulator[s]” interchangeably, *e.g.*, “it is recommendable to use rechargeable batteries (hereinafter called accumulator)”).

200. In view of Irvin, POSAs would have had reason to add a sensor to the headset in the Goh-Berger combination that outputs data indicating whether the headset is in use so as to conserve the life of the headset’s battery. As Irvin explains, “battery life is a key component of operator convenience,” and therefore “it is important that wireless headset design incorporates provisions maximizing battery life.” Irvin, 2:17-21. Such teachings motivate the combination.

201. In an obvious implementation, the sensor would be either an accelerometer that detects movement of the headset or a contact sensor that detects when the user’s head is in contact with the headset. Irvin, 7:15-17, 8:28-9:8; Abstract, claim 11. Data from the sensor would be used by the CPU in Goh’s headset to control whether the headset should transition from an inactive to an active state.

See supra limitation 1E in Ground 2A (discussing Goh’s CPU); Irvin, Abstract, 2:17-34, 5:7-30, 7:10-22.

202. In a combined Goh-Berger-Irvin system, the sensor data (from Irvin) would be read by the CPU (from Goh), which is already capable of controlling headset functions, to determine whether the headset should transition from inactive to active mode. For instance, if the headset detects movement or contact with the user's head, it can wake from a low-power state, conserving energy when not in use. Such a configuration would have been viewed as a predictable enhancement using known techniques—namely, sensor-triggered power management—to improve a known device (Goh’s headset) in a way that aligns with Irvin’s express motivation to extend battery life.

a. Claim 2

203. The Goh-Berger-Irvin combination discloses or renders obvious the device of claim 1 *comprising an accelerometer*. As discussed *supra* § VIII.C.2, an obvious implementation of the Goh-Berger-Irvin combination uses an “*accelerometer*” as the sensor for detecting whether Goh’s headset is being used. Irvin, 7:15-17 (“Movement may be detected based on vibration or by sensing acceleration, such as with an accelerometer.”).

b. Claim 14: “...a sensor configured to at least provide an indication regarding the wireless wearable device being used”

204. The Goh-Berger-Irvin combination discloses or renders obvious the device of claim 10 *comprising a sensor configured to at least provide an indication regarding the wireless wearable device being used*. As discussed with respect to claim 2 above, an obvious implementation of the Goh-Berger-Irvin combination uses Irvin’s accelerometer to detect whether the headset is being worn. Irvin, 7:15-17. Irvin’s accelerometer is a “sensor,” and it provides data regarding whether the headset is being used, i.e., “an indication regarding the wireless wearable device being used.”

c. Claim 15: “...a motion sensor.”

205. The Goh-Berger-Irvin combination discloses or renders obvious the device of claim 10 *comprising a motion sensor*. As discussed *supra* § VIII.C.2., an obvious implementation of the Goh-Berger-Irvin combination uses an “accelerometer” as the sensor for detecting whether headset is being used, i.e., by detecting motion of the headset. Irvin, 7:15-17; *see also id.*, claims 8, 22. POSAs would have considered an “accelerometer” to be a form of “motion sensor” because an accelerometer detects movement or motion.

206. Irvin specifically teaches the use of motion-detecting sensors, including accelerometers, to help determine whether a wireless headset is in active use. An

accelerometer measures acceleration forces, which are used to detect motion and/or orientation changes. As of the early 2000s, POSAs were well aware that accelerometers were commonly used as motion sensors in portable electronics, including phones and headsets, to detect movement, determine device orientation, or enable power-saving functions based on user activity.

207. In the context of the Goh-Berger-Irvin combination, adding an accelerometer to Goh's headset would enable the system to determine when the headset is moving—such as being picked up, worn, or adjusted by the user. Irvin, 2:17-21 (“Because battery life is a key component of operator convenience, it is important that wireless headset design incorporates provisions maximizing battery life. A manually operated on-off switch works against this need to maximize battery life. For example, a user may forget to turn off the wireless headset after usage, thereby needlessly expending valuable battery life.”). Thus, a POSA would have seen the use of an accelerometer in the Goh-Berger-Irvin combination not only as a form of motion sensing fully supported by Irvin's disclosure, but also as a predictable, low-complexity implementation of a known technique to improve a known system in a well-understood way.

d. Claim 19: “...pressure sensor.”

208. The Goh-Berger-Irvin combination discloses or renders obvious the device of claim 10 *comprising a pressure sensor*. As discussed *supra* § VIII.C.2, an

obvious implementation of the Goh-Berger-Irvin combination uses a “contact sensor” as the sensor for detecting whether headset is being used. Irvin, Abstract (“Techniques for automatic headset enabling include but are not limited to motion sensors, attitude or position sensors, proximity sensors, and contact sensors.”), 8:28-9:8, claim 11. POSAs would have considered a “contact sensor” to be a form of pressure sensor because a contact sensor detects force, *i.e.*, pressure, applied to it.

209. By 2004, contact sensors were well understood to function as a type of pressure sensor, commonly used in wearable and handheld devices to detect user interaction or device engagement. In the context of the Goh-Berger-Irvin combination, implementing a contact sensor would have been a routine and predictable design choice. Goh already includes a digital processing device (CPU) capable of responding to sensor inputs, and Irvin provides both the rationale (battery conservation) and the specific implementation details for using a contact sensor in this way.

e. Claims 16, 27, and 31

210. The Goh-Berger-Irvin combination discloses or renders obvious claims 16, 27, and 31. Claims 16, 27, and 31 repeat limitations found in several previously-discussed claims. *See supra* Claims 1-5, 9-11, 13-14, 19.

Claims	Corresponding limitation(s)
Claim 16	<i>See supra</i> Claims 2, 10.
Claim 27	<i>See supra</i> Claims 3, 10, 14, 19.

Claim 31	<i>See supra</i> Claims 1, 3, 4, 5, 9, 10, 11, 13, 14, 19.
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D. Ground 2C: The Goh-Berger-Irvin Combination in view of Hollemans Renders Claims 17-18, 23, 25-26, 28-30 and 32 Obvious.

211. I have been instructed by counsel for Bose to assume that Hollemans (EX1006) qualifies as prior art to the Challenged Claims. With that assumption, Goh-Berger-Irvin-Hollemans renders obvious claims 17-18, 23, 25-26, 28-30 and 32 for the reasons I discuss below.

1. Hollemans (EX1006)

212. Hollemans discloses a remote control device that takes the form of an earbud-type headphone with a touch-sensitive surface. Hollemans, Abstract (“In a personal audio system (100), a remote controller (120) has a touch-sensitive area (122) and is worn in or by a human ear...”, 1:44-49 (“This object is realized in that the controller has an outer surface with a touch-sensitive area, the controller being arranged to be substantially worn in or by a human ear, the controller being further arranged to detect the touch-sensitive area being touched, and to send the control signal in response to detecting the touch-sensitive area being touched.”), 1:63-2:4 (“Advantageously, the controller is arranged to fit substantially in a human ear concha, such that the area is accessible for touching when the controller is fitted substantially in the concha...”), FIG. 2 (shown below), claim 10.

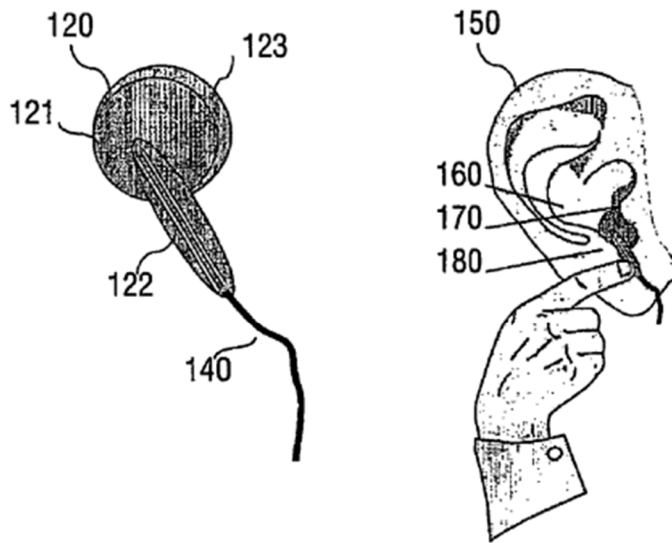


FIG. 2

213. The earbud detects “temporal patterns” that a user makes on the touch-sensitive surface and controls the functionality of a remote device, e.g., a mobile phone or MP3 player, based on those detected patterns. *Id.*, 1:12-19, 2:5-18 (“An example is a single short tap for pause/play, double short tap for next track, triple short tap for next artist/album and a long tap for adjusting the volume.”). Hollemans also teaches that its earbud can detect directional motion, “gestures made on the [touch-sensitive] area” in various ways, including with “a small camera.” *Id.*, 6:14-18.

214. Hollemans touts its touch-sensitive design over prior-art designs that relied on “tiny button[s] to activate the desired function” and which “require[]

considerable time and attention from the user, which may lead to dangerous situations when the user takes part in traffic.” *Id.*, 1:28-40.

2. Motivation to Combine The Goh-Berger-Irvin with Hollemans

215. Hollemans demonstrates that the use of touch-sensitive surfaces on a headset for controlling/adjusting functions was known. In view of Hollemans, POSAs had reason to augment Goh’s pre-existing controller by adding to the controller a touch-sensitive surface that a user could touch to control the functionality of the headset and/or the electronic device(s) with which the headset is wirelessly connected. Hollemans also encourages POSAs to include a “small camera” in the earbud as one means for detecting more complex user interactions with the touch-sensitive surface such as gestures.

216. POSAs would have recognized that Hollemans’ touch-sensitive surface would beneficially allow users to adjust the functionality of Goh’s headset and/or the electronic device to which it is wirelessly connected in a convenient manner that did not require locating and pressing small physical buttons, and Hollemans’ camera would extend this functionality by allowing Goh’s headset to detect more complex user interactions like gestures. Hollemans explicitly motivates the use of its touch-sensitive surface to increase user safety in scenarios such as driving. Hollemans, 1:28-40 (prior art devices “require[] considerable time and attention from the user, which may lead to dangerous situations when the user takes part in traffic.”). The

use of Hollemans' touch-sensitive surface as well as its small camera on Goh's headset is merely the use of a known technique to improve similar devices in the same way.

217. In the Goh-Berger-Irvin-Hollemans combination, Goh's headset would maintain all the functionality associated with the Goh-Berger-Irvin combination discussed in Ground 2B, but the headset would also be designed to include, e.g., on the surface of controller 400, a touch-sensitive surface and the headset would use that surface—and a small camera—to detect touch-based commands from a user for adjusting the functionality, e.g., volume. Such a touch-sensitive surface would either replace one or more of the physical buttons on Goh's controller 400 or be added to the controller as another means to control the headset's functionality in situations where the physical buttons are not easily accessed, e.g., when driving.

a. Claim 17: “...touch-sensitive input surface...”

218. The Goh-Berger-Irvin-Hollemans combination discloses or renders obvious the device of claim 10 comprising a touch-sensitive input surface configured to receive at least a touch input to generate at least an electrical signal for an operation of the wireless wearable device. In the Goh-Berger-Irvin-Hollemans combination, Goh's headset would include Hollemans' touch-sensitive surface, e.g., a surface on controller 400, such that the headset is “configured to receive at least a touch input.” Such operations include changing the volume of a telephone call, the

song being played on a connected MP3 player, and/or a mode of operation for the headset. Hollemans, 2:17-18 (“a long tap for adjusting volume”); claim 15; *see also id.*, 2:15-19 (“An example is a single short tap for pause/play, double short tap for next track, triple short tap for next artist/album and a long tap for adjusting the volume.”), 4:46-56 (“A basic temporal pattern that can be detected is a short tap, which consists of the touch-sensitive area 122 being initially untouched and subsequently being touched for a short while, and subsequently being untouched again. The short while typically lasts between 40 and 300 milliseconds. Another basic temporal pattern is the long tap, which typically lasts between 400 milliseconds to several seconds. Yet another basic temporal pattern is a repeated long or short tap or another sequence of long and short taps. All of these temporal patterns may each be mapped to functions or capabilities of the device 110.”), 5:55-6:64 (“In a first way, the touch-sensitive area is used to detect a tempo of being tapped. The tempo detected may be used to adjust a rhythm of a sound, e.g. as transferred by the personal audio system. The tempo detected may also be used to find or select matching content, for example, a song with a tempo that resembles the tempo detected. The tempo detected may also be used to adapt the speed of playback of the current music to the tempo detected. The tempo detected may also be used to enter metadata that pertains to the currently played music, by tapping along in the same

tempo.... In a third way, the touch-sensitive area is used for picking up a gesture made on the area with...a finger”).

b. Claim 18: “...touch input...includes a movement with a direction”

219. The Goh-Berger-Irvin-Hollemans combination discloses or renders obvious the device of claim 17 wherein the touch input received at the touch-sensitive input includes a movement with a direction [18A], and wherein the direction of movement is determined, with the operation of the wireless wearable device dependent on the determined direction [18B].

220. As discussed above for claim 17, in the Goh-Berger-Irvin-Hollemans combination, Goh’s headset would include Hollemans’ touch-sensitive surface. Hollemans explains that its touch-sensitive surface, alone and/or in combination with a small camera, “is used for picking up a gesture made on the [surface] with e.g., ...a finger.” Hollemans, 6:14-15. “The gesture detected may be a character, like a letter from an alphabet. The character detected may be used for jumping in a list to an entry with a first letter corresponding to the character detected.” *Id.*, 6:26-29.

221. When, for example, a user makes a gesture on the touch-sensitive surface that corresponds to the letter “I,” “*the touch input received at the touch-sensitive input includes a movement with a direction,*” i.e., down or up to create the “I.” Based on the direction of movement of the user’s finger on the touchpad, the

letter “I” is detected, and an “*operation*” of Goh’s headset is “*dependent on the determined direction*” because the determination of the “I” gesture results in a jump in a list (e.g., of song titles) to the letter I. POSAs would understand that implementing directional gestures on a touch-sensitive surface to control headset functionality—such as scrolling or navigating a list—is a natural and predictable application of the technologies disclosed in these references.

222. Separately, Hollemans also teaches that the gestures that the touch-sensitive surface can detect include a “planar gesture,” and the gesture can be used to “scroll[] content on a display.” Hollemans, 6:21-35. This planar gesture is “*touch input received at the touch-sensitive input [that] includes a movement with a direction*” and the resulting scrolling is “*wherein the direction of movement is determined, with the operation of the wireless wearable device dependent on the determined direction.*” In view of these teachings, POSAs would have had reason to implement the Goh-Berger-Hollemans combination such that a user could scroll content (e.g., a list of phone numbers) shown on either Goh’s display (or on a display of a phone being controlled by Goh’s headset) by sliding his or her finger up and down on the touch-sensitive surface.

223. POSAs would know that gesture-based navigation was already common in portable electronic devices by the early 2000s, and Hollemans reinforces its use in headsets to simplify user input and improve accessibility, especially in

scenarios where visual attention or fine motor control is limited. Hollemans, 1:28-40; 6:21-35.

224. POSAs would be motivated to incorporate all of the respective features of these references into a single, integrated headset system because the enhancements they offer—touch-sensitive input, personalized audio processing, sensor-based power management, and gesture recognition—are complementary, well-known, and directed at improving usability, efficiency, and user experience.

225. Goh-Berger-Irvin already provides a wireless headset that: (1) uses Goh’s digital processing and audio hardware as a foundation; (2) implements Berger’s hearing-aid prescription personalization for user-specific audio output; and (3) incorporates Irvin’s sensors (e.g., accelerometers or contact/pressure sensors) to determine when the headset is in use, enabling battery-saving behaviors like automatic wake or sleep modes.

226. Adding Hollemans’ touch-sensitive surface and optional camera to this setup would provide a more intuitive, gesture-based user interface, offering significant usability improvements, especially in scenarios where accessing physical buttons is difficult or unsafe. Hollemans explicitly promotes this in the context of enhancing user safety while driving (Hollemans, 1:28-40), which would resonate strongly with a POSA designing wearable devices intended for mobile or real-world use.

227. A POSA would recognize that the motivations for adding a touch-sensitive surface to Goh-Berger still apply to the Goh-Berger-Irvin combination. The presence of Irvin’s motion and contact sensors does not conflict with, but rather complements, the touch interface. The touch surface offers a more convenient and flexible input mechanism, while Irvin’s sensors enhance power efficiency—together creating a more capable and user-friendly headset. Thus, POSAs would have been motivated to integrate all of these features in order to improve control and extend battery life simultaneously, without sacrificing one for the other.

228. A POSA would be motivated to offset that increased power draw by using Irvin’s well-established, low-power sensing techniques to prevent unnecessary energy usage when the device is not in use. Irvin directly emphasizes the importance of maximizing battery life in wireless headsets (Irvin, 2:17-21), providing a clear and specific motivation for combining its teachings with those of Hollemans.

c. Claim 23: “...camera.”

229. The Goh-Berger-Irvin-Hollemans combination discloses or renders obvious the device of claim 10 *comprising a camera*. As discussed above, in the Goh-Berger-Irvin-Hollemans combination, Goh’s headset would include both Hollemans’ touch-sensitive surface and its “small camera” to better detect more complex user interactions with the surface such as gestures. Hollemans, 6:15-17.

d. Claims 25, 26, 28-30, and 32

230. The Goh-Berger-Irvin- Hollemans combination discloses or renders obvious claims 25, 26, and 28-30, and 32. Claims 25, 26, and 28-30, and 32 repeat limitations found in several previously-discussed claims. The chart below does not repeat claim language that is the same limitation. *See supra* Claims 1-3, 9-10, 13-15, 17, 19, 22, 23.

Claims	Corresponding limitation(s)
Claim 25	<i>See supra</i> claims 3, 14, 17.
Claim 26	<i>See supra</i> claim 23.
Claim 28	<i>See supra</i> claim 17.
Claim 29	<i>See supra</i> claims 2, 14, 22, 23
Claim 30	<i>See supra</i> claim 19.
Claim 32	<i>See supra</i> claims 1, 9-10, 13, 15, 22-23.

E. Ground 2D: The Goh-Berger Combination in view of Regen Renders Claim 12 Obvious.

231. I have been instructed by counsel for Bose to assume that Regen (EX1022) qualifies as prior art to the Challenged Claims. With that assumption, Goh-Berger-Regen renders obvious claim 12 for the reasons I discuss below.

1. Regen (EX1022)

232. Regen is titled “Headset In-use Indicator.” Regen, Title. Regen discloses a “headset” with “an in-use indicator for notifying passers-by when the wearer of the headset is carrying on a telephone conversation.” *Id.*, Abstract.

233. Regen explains that headsets for allowing “hands-free” use of telephones were well known, but that one problem with such headsets “is that passers-by may be unaware that the user of a headset telephone is carrying on a conversation, and may therefore not afford the headset user the same common courtesies as when a telephone user is holding a telephone handset to his or her ear.” *Id.*, 1:14-20. To address this problem, Regen discloses the use of a light-emitting diode at the end of a microphone boom. *Id.*, Abstract, 2:55-59, FIGS. 1, 2 (item 32, LED in-use indicator). “The indicator is illuminated when the user is conversing over the headset, so that passers-by are made aware of the telephone conversation, and can extend the usual telephone courtesies only when appropriate.” *Id.*, 1:33-39.

2. Motivation to Combine Goh-Berger with Regen

234. POSAs would have been motivated to combine Goh, Berger, and Regen to improve the usability and social functionality of the Goh-Berger headset. Regen teaches the use of an LED in-use indicator to signal to bystanders that a user is currently engaged in a call or otherwise using the device. Regen, 1:33-39. A POSA would have recognized that this feature would be beneficial in public or professional settings, where such a visual cue helps others avoid interrupting the user.

235. POSAs would have recognized that Regen’s LED in-use indicator would beneficially allow a passer-by to know when Goh-Berger’s headset is in use thereby allowing the passer-by to extend appropriate courtesies. Regen, 1:33-39;

Moreover, the use of Regen's LED in-use indicator on Goh-Berger's headset is merely the use of a well-known technique to improve similar devices in the same way.

236. In the Goh-Berger-Regen combination, Goh's headset would be modified to include an LED in-use indicator, e.g., at the end of the microphone boom depicted in Goh's Figure 4. The indicator would illuminate to provide an indication that Goh's headset is being used. This modification would be a routine design choice requiring no more than standard electrical design techniques. POSAs would have had a reasonable expectation of success in making the modification as adding an LED indicator to the headset requires only routine design skill.

237. Ultimately, this combination reflects the predictable use of a known feature (Regen's LED indicator) to improve a similar device (the Goh-Berger headset) in the same way—enhancing usability without altering core functionality.

a. Claim 12

238. The Goh-Berger-Regen combination discloses or renders obvious the device of claim 10 comprising an optical indicator configured to illuminate in a predetermined manner to provide an indication regarding a status of the wireless wearable device. For the reasons discussed above, the Goh-Berger-Regen headset provides this function via an LED in-use indicator. Regen, Abstract, 1:33-39, 2:55-59, FIGS. 1, 2 (item 32, LED in-use indicator). The use of Regen's LED in-use

indicator on Goh-Berger's headset is merely the use of a well-known technique to improve similar devices in an already-known way, and POSAs would have recognized that Regen's LED in-use indicator would beneficially allow a passer-by to know when Goh-Berger's headset is in use.

VIII. CLAIM LISTING APPENDIX

Claim 1
[1PRE] A wireless headset for a user comprising:
[1A] a printed circuit board provided in the headset, the printed circuit board having at least one electrical component attached thereon, the at least one electrical component being electrically connected to a plurality of other electrical components, each of the plurality of other electrical components being provided at least partially in the headset;
[1B] a speaker in the headset;;
[1C] a microphone in the headset; and
[1D] wireless communication circuitry,
[1E] wherein the at least one electrical component or the plurality of other electrical components include at least a controller,
[1F] wherein the at least a controller is configured to facilitate modifying power within a range of frequencies based on at least one hearing characteristic of the user, to help the user hear audio outputs presented to the user via at least the speaker,
[1G] wherein the wireless communication circuitry is configured to wirelessly receive a message,
[1H] wherein if the message is a text message, the at least a controller is configured to have at least a portion of the text message presented to the user,
[1I] wherein if the message is an audio message, the at least a controller is configured to have at least a portion of the audio message presented to the user, and
[1J] wherein at least the speaker is configured to present at least a portion of the message, when the at least a portion of the message is to be presented in an audio manner.
Claim 2
A wireless headset as recited in claim 1 comprising an accelerometer.
Claim 3
A wireless headset as recited in claim 1 comprising a first connector that includes a plurality of conductive pads that are configured to couple with a second connector external to the headset, wherein each of the conductive pads is configured to be in contact with a corresponding metallic contact of the second connector when the first connector is connected to the second connector.
Claim 4

A wireless headset as recited in claim 1, wherein the wireless communication circuitry is configured to couple to at least a Bluetooth network.
Claim 5
A wireless headset as recited in claim 1, wherein the at least a controller is configured to facilitate voice recognition, including facilitating recognizing at least a word received via at least the microphone in the headset.
Claim 6
A wireless headset as recited in claim 1, wherein the headset includes at least an ear bud configured to be placed in an ear of the user.
Claim 7
A wireless headset as recited in claim 1, wherein at least the microphone in the headset is configured to receive an audio response for the message from the user.
Claim 8
A wireless headset as recited in claim 7, wherein the at least a controller is configured to facilitate converting the audio response into text to be wirelessly transmitted.
Claim 9
A wireless headset as recited in claim 1,
[9A] wherein wireless headset comprises another microphone,
[9B] wherein the microphone is configured to be located closer to mouth of the user than the another microphone when the headset is worn by the user,
[9C] wherein at least the another microphone is configured to capture at least ambient noise, and
[9D] wherein at least a portion of signals from the microphone is configured to be reduced based on signals from the another microphone at least for reducing at least a portion of the ambient noise in signals from the microphone.
Claim 10
[10PRE] A wireless wearable device configured to secure to the head of a user, with the device proximate to at least one ear of the user to at least help the user hear, the wireless wearable device comprising:
[10A] a printed circuit board provided in the wireless wearable device, the printed circuit board having at least one electrical component attached thereon, the at least one electrical component being electrically connected to a plurality of other electrical components, each of the plurality of other electrical components being provided at least partially in the wireless wearable device;
[10B] a speaker in the wireless wearable device;
[10C] a microphone in the wireless wearable device; and
[10D] wireless communication circuitry,

[10E] wherein the at least one electrical component or the plurality of other electrical components include at least a controller,
[10F] wherein the at least a controller is configured to facilitate modifying power within a range of frequencies, to help the user hear outputs presented to the user via at least the speaker,
[10G] wherein the wireless communication circuitry is configured to wirelessly receive a message from a mobile phone via at least a Bluetooth network,
[10H] wherein if the message is a text message, the at least a controller is configured to have at least a notification of the text message presented to the user,
[10I] wherein if the message is an audio message, the at least a controller is configured to have at least a notification of the audio message presented to the user,
[10J] wherein the wireless wearable device comprises another microphone,
[10K] wherein the microphone is configured to be located closer to mouth of the user than the another microphone when the wireless wearable device is worn by the user,
[10L] wherein at least the another microphone is configured to capture at least ambient noise, and
[10M] wherein at least a portion of signals from the microphone is configured to be reduced based on signals from the another microphone at least for reducing at least a portion of the ambient noise in signals from the microphone.
Claim 11
A wireless wearable device as recited in claim 10 comprising a storage medium configured to store at least computer program codes for facilitating voice recognition, wherein at least the microphone is configured to receive at least a word, with the at least a word recognized using at least the computer program codes for facilitating voice recognition.
Claim 12
A wireless wearable device as recited in claim 10 comprising an optical indicator configured to illuminate in a predetermined manner to provide an indication regarding a status of the wireless wearable device.
Claim 13
A wireless wearable device as recited in claim 10, wherein the wireless wearable device is configured to enable the user to receive and respond to the message hands-free, using at least the speaker and at least the microphone.
Claim 14
A wireless wearable device as recited in claim 10 comprising a sensor configured to at least provide an indication regarding the wireless wearable device being used.

Claim 15
A wireless wearable device as recited in claim 10 comprising a motion sensor.
Claim 16
A wireless wearable device as recited in claim 10 comprising an accelerometer.
Claim 17
A wireless wearable device as recited in claim 10 comprising a touch-sensitive input surface configured to receive at least a touch input to generate at least an electrical signal for an operation of the wireless wearable device.
Claim 18
A wireless wearable device as recited in claim 17,
[18A] wherein the touch input received at the touch-sensitive input includes a movement with a direction, and
[18B] wherein the direction of movement is determined, with the operation of the wireless wearable device dependent on the determined direction.
Claim 19
A wireless wearable device as recited in claim 10 comprising a pressure sensor.
Claim 20
A wireless wearable device as recited in claim 19, wherein the pressure sensor includes a Hall-effect sensor.
Claim 21
A wireless wearable device as recited in claim 10 comprising a first connector that includes a plurality of conductive pads that are configured to couple with a second connector external to the wireless wearable device, wherein each of the conductive pads is configured to be in contact with a corresponding metallic contact of the second connector when the first connector is connected to the second connector.
Claim 22
A wireless wearable device as recited in claim 10 comprising a display.
Claim 23
A wireless wearable device as recited in claim 10 comprising a camera.
Claim 24
A wireless wearable device as recited in claim 10 comprising a storage medium configured to store at least computer program codes for facilitating voice recognition,
[24A] wherein at least the microphone is configured to receive at least a word, with the at least a word recognized using at least the computer program codes for facilitating voice recognition, and
[24B] wherein the wireless wearable device is configured to enable the user to receive and respond to the message hands-free, using at least the speaker and at least the microphone.

Claim 25
A wireless wearable device as recited in claim 24 comprising:
[25A] a sensor configured to at least provide an indication regarding the wireless wearable device being used;
[25B] a touch-sensitive input surface configured to receive at least a touch input to generate at least an electrical signal for an operation of the wireless wearable device; and
[25C] a first connector that includes a plurality of conductive pads that are configured to couple with a second connector external to the wireless wearable device, wherein each of the conductive pads is configured to be in contact with a corresponding metallic contact of the second connector when the first connector is connected to the second connector.
Claim 26
A wireless wearable device as recited in claim 25 comprising a camera.
Claim 27
A wireless wearable device as recited in claim 24 comprising:
[27A] a sensor configured to at least provide an indication regarding the wireless wearable device being used;
[27B] a pressure sensor; and
[27C] a first connector that includes a plurality of conductive pads that are configured to couple with a second connector external to the wireless wearable device, wherein each of the conductive pads is configured to be in contact with a corresponding metallic contact of the second connector when the first connector is connected to the second connector.
Claim 28
A wireless wearable device as recited in claim 27 comprising a touch-sensitive input surface configured to receive at least a touch input to generate at least an electrical signal for an operation of the wireless wearable device.
Claim 29
[29PRE] A wireless wearable device as recited in claim 24 comprising:
[29A] sensor configured to at least provide an indication regarding the wireless wearable device being used;
[29B] an accelerometer;
[29C] a display; and
[29D] a camera.
Claim 30
A wireless wearable device as recited in claim 29 comprising a pressure sensor.

Claim 31

[31PRE] A wireless wearable device configured to secure to the head of a user, with the device proximate to at least one ear of the user to at least help the user hear, the wireless wearable device comprising:

[31A] a printed circuit board provided in the wireless wearable device, the printed circuit board having at least one electrical component attached thereon, the at least one electrical component being electrically connected to a plurality of other electrical components, each of the plurality of other electrical components being provided at least partially in the wireless wearable device;

[31B] a speaker in the wireless wearable device;

[31C] a microphone in the wireless wearable device;

[31D] wireless communication circuitry;

[31E] a storage medium configured to store at least computer program codes for facilitating voice recognition;

[31F] a sensor configured to at least provide an indication regarding the wireless wearable device being used;

[31G] a pressure sensor; and

[31H] a first connector that includes a plurality of conductive pads that are configured to couple with a second connector external to the wireless wearable device, wherein each of the conductive pads is configured to be in contact with a corresponding metallic contact of the second connector when the first connector is connected to the second connector,

[31I] wherein at least the microphone is configured to receive at least a word, with the at least a word recognized using at least the computer program codes for facilitating voice recognition,

[31J] wherein the at least one electrical component or the plurality of other electrical components include at least a controller,

[31K] wherein the at least a controller is configured to facilitate modifying power to help the user hear outputs presented to the user via at least the speaker,

[31L] wherein the wireless communication circuitry is configured to wirelessly receive a message from a mobile phone via at least a Bluetooth network,

[31M] wherein if the message is a text message, the at least a controller is configured to have at least a notification of the text message presented to the user,

[31N] wherein if the message is an audio message, the at least a controller is configured to have at least a notification of the audio message presented to the user,

[31O] wherein the wireless wearable device is configured to enable the user to receive and respond to the message hands-free, using at least the speaker and at least the microphone,

[31P] wherein the wireless wearable device comprises another microphone,
[31Q] wherein the microphone is configured to be located closer to mouth of the user than the another microphone when the wireless wearable device is worn by the user,
[31R] wherein at least the another microphone is configured to capture at least ambient noise, and
[31S] wherein at least a portion of signals from the microphone is configured to be reduced based on signals from the another microphone at least for reducing at least a portion of the ambient noise in signals from the microphone.

Claim 32

[32PRE] A wearable device configured to secure to the head of a user, with the device proximate to at least one ear of the user to at least help the user hear, the wearable device comprising:
[32A] a printed circuit board provided in the wearable device, the printed circuit board having at least one electrical component attached thereon, the at least one electrical component being electrically connected to a plurality of other electrical components, each of the plurality of other electrical components being provided at least partially in the wearable device;
[32B] a speaker in the wearable device;
[32C] a microphone in the wearable device;
[32D] a camera;
[32E] a motion sensor;
[32F] a display; and
[32G] communication circuitry,
[32H] wherein the at least one electrical component or the plurality of other electrical components include at least a controller,
[32I] wherein the at least a controller is configured to facilitate modifying power within a range of frequencies, to help the user hear outputs presented to the user via at least the speaker,
[32J] wherein the communication circuitry is configured to receive a message from a mobile phone,
[32K] wherein if the message is a text message, the at least a controller is configured to have at least a notification of the text message presented to the user,
[32L] wherein if the message is an audio message, the at least a controller is configured to have at least a notification of the audio message presented to the user,

[32M] wherein the wearable device is configured to enable the user to receive and respond to the message hands-free, using at least the speaker and at least the microphone,
[32N] wherein the wearable device comprises another microphone,
[32O] wherein the microphone is configured to be located closer to mouth of the user than the another microphone when the wearable device is worn by the user,
[32P] wherein at least the another microphone is configured to capture at least ambient noise, and
[32Q] wherein at least a portion of signals from the microphone is configured to be reduced based on signals from the another microphone at least for reducing at least a portion of the ambient noise in signals from the microphone.

I declare that all statements made herein of my own knowledge are true, that all statements made on information and belief are believed to be true, and that these statements were made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

I declare under penalty of perjury that the foregoing is true and correct.

Dated: 9/2/2025



Andrew DeJaco