

Meta Platforms, Inc. v. Jawbone Innovations, LLC

IPR2023-01127 (U.S. Patent No. 8,019,091)

Petitioner's Demonstratives
September 20, 2024

Overview

Ground 1: Ikeda + Puthuff

- First Combination: Motivation to Combine (No Disputed Limitations)
- Second Combination: Motivation to Combine and Disputed Limitations

Ground 2: Ikeda + Alcivar

- Motivation to Combine (No Disputed Limitations)

Challenged Patent

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Challenged Patent



US008019091B2

(12) **United States Patent**
Burnett et al.

(10) **Patent No.:** US 8,019,091 B2
(45) **Date of Patent:** *Sep. 13, 2011

(54) **VOICE ACTIVITY DETECTOR (VAD)-BASED MULTIPLE-MICROPHONE ACOUSTIC NOISE SUPPRESSION**

(75) **Inventors:** Gregory C. Burnett, Dodge Center, MN (US); Eric F. Breitfelder, Dublin, CA (US)

(73) **Assignee:** Allphcom, Inc., San Francisco, CA (US)

(*) **Notice:** Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 713 days.
This patent is subject to a terminal disclaimer.

(21) **Appl. No.:** 10/667,207
(22) **Filed:** Sep. 18, 2003
(65) **Prior Publication Data**
US 2004/0133421 A1 Jul. 8, 2004
Related U.S. Application Data
(63) Continuation-in-part of application No. 09/905,361, filed on Jul. 12, 2001, now abandoned.
(60) Provisional application No. 60/219,297, filed on Jul. 19, 2000.

(51) **Int. Cl.** H04B 29/00 (2006.01)
(52) **U.S. Cl.** 381/71.8; 704/215
(58) **Field of Classification Search** 381/70, 381/94.1-94.7, 71.8, 91-92, 122, 71.1; 704/200, 704/231, 235, 246, 214-215
See application file for complete search history.

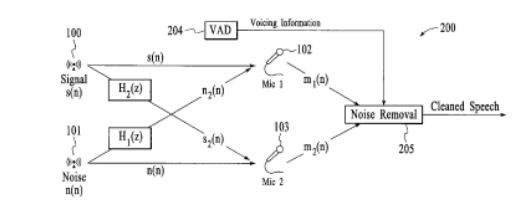
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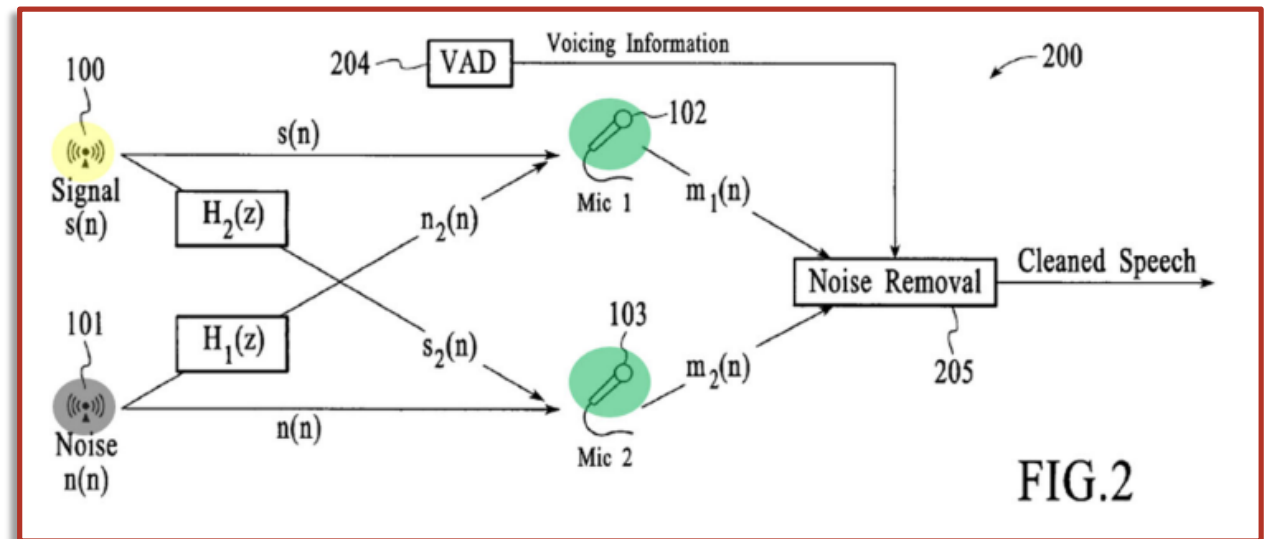
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Zhao Li et al. "Robust Speech Coding Using Microphone Arrays", Signals Systems and Computers, 1997. Conf. record of 31st Asilomar Conf., Nov. 2-5, 1997, IEEE Comput. Soc. Nov. 2, 1997. USA. (Continued)

ABSTRACT
Acoustic noise suppression is provided in multiple-microphone systems using Voice Activity Detectors (VAD). A host system receives acoustic signals via multiple microphones. The system also receives information on the vibration of human tissue associated with human voicing activity via the VAD. In response, the system generates a transfer function representative of the received acoustic signals upon determining that voicing information is absent from the received acoustic signals during at least one specified period of time. The system removes noise from the received acoustic signals using the transfer function, thereby producing a denoised acoustic data stream.

20 Claims, 10 Drawing Sheets



'091 Patent
Filed: Sep. 18, 2003
Issued: Sep. 13, 2011



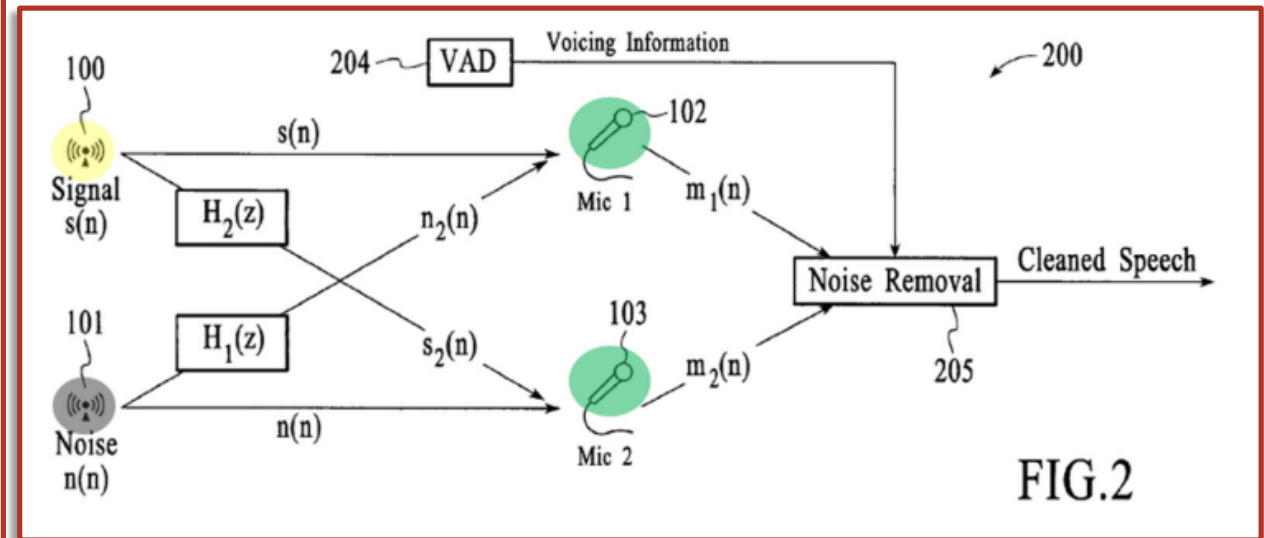
'091 Patent at Fig. 2 (annotated);
Pet. at 9, 16; Ex. 1002 ¶¶36, 57.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Challenged Patent

1. A method for removing noise from acoustic signals, comprising:

- receiving at least two acoustic signals using at least two acoustic microphones positioned in a plurality of locations;
- receiving a voice activity signal that includes information on vibration of human tissue associated with human voicing activity of a user;
- generating a voice activity detection (VAD) signal using the voice activity signal;
- generating at least two transfer functions representative of a ratio of energy of the acoustic signal received using at least two different acoustic microphones of the at least two acoustic microphones when the VAD indicates that user voicing activity is absent, wherein the at least two transfer functions comprise a first transfer function and a second transfer function; and
- removing acoustic noise from at least one of the acoustic signals by applying the first transfer function and at least one combination of the first transfer function and the second transfer function to the acoustic signals and generating denoised acoustic signals.



'091 Patent at Fig. 2 (annotated);
Pet. at 9, 16; Ex. 1002 ¶¶36, 57.

'091 Patent, cl. 1.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

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Challenged Patent

11. A system for removing acoustic noise from the acoustic signals, comprising:

a receiver that receives at least two acoustic signals via at least two acoustic microphones positioned in a plurality of locations;

at least one sensor that receives human tissue vibration information associated with human voicing activity of a user;

a processor coupled among the receiver and the at least one sensor that generates a plurality of transfer functions, wherein the plurality of transfer functions includes a first transfer function representative of a ratio of energy of acoustic signals received using at least two different acoustic microphones of the at least two acoustic microphones, wherein the first transfer function is generated in response to a determination that voicing activity is absent from the acoustic signals for a period of time, wherein the plurality of transfer functions includes a second transfer function representative of the acoustic signals, wherein the second transfer function is generated in response to a determination that voicing activity is present in the acoustic signals for the period of time, wherein acoustic noise is removed from the acoustic signals using the first transfer function and at least one combination of the first transfer function and the second transfer function to produce the denoised acoustic data stream.

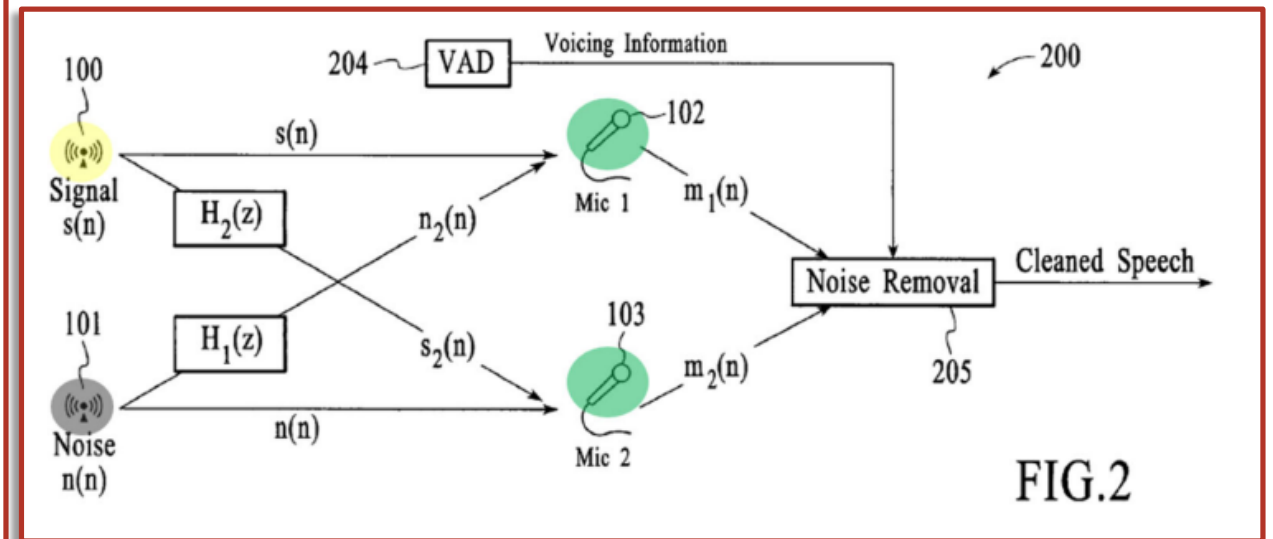


FIG.2

'091 Patent at Fig. 2 (annotated);
Pet. at 9, 16; Ex. 1002 ¶¶36, 57.

Challenged Patent

18. A signal processing system coupled among a user and an electronic device, wherein the signal processing system includes a denoising subsystem for removing acoustic noise from acoustic signals, the denoising subsystem comprising a processor coupled among a receiver and at least one sensor, wherein the receiver is coupled to receive the acoustic signals via at least two microphones, wherein the at least one sensor detects human tissue vibration associated with human voicing activity of a user, wherein the processor generates a plurality of transfer functions, wherein a first transfer function representative of a ratio of acoustic energy received by the two microphones is generated in response to a determination that voicing activity is absent from the acoustic signals for a specified period of time, wherein a second transfer function representative of the acoustic signals is generated in response to a determination that voicing activity is present in the acoustic signals for a specified period of time, wherein acoustic noise is removed from the acoustic signals using the first transfer function and at least one combination of the first transfer function and the second transfer function to produce a denoised acoustic data stream.

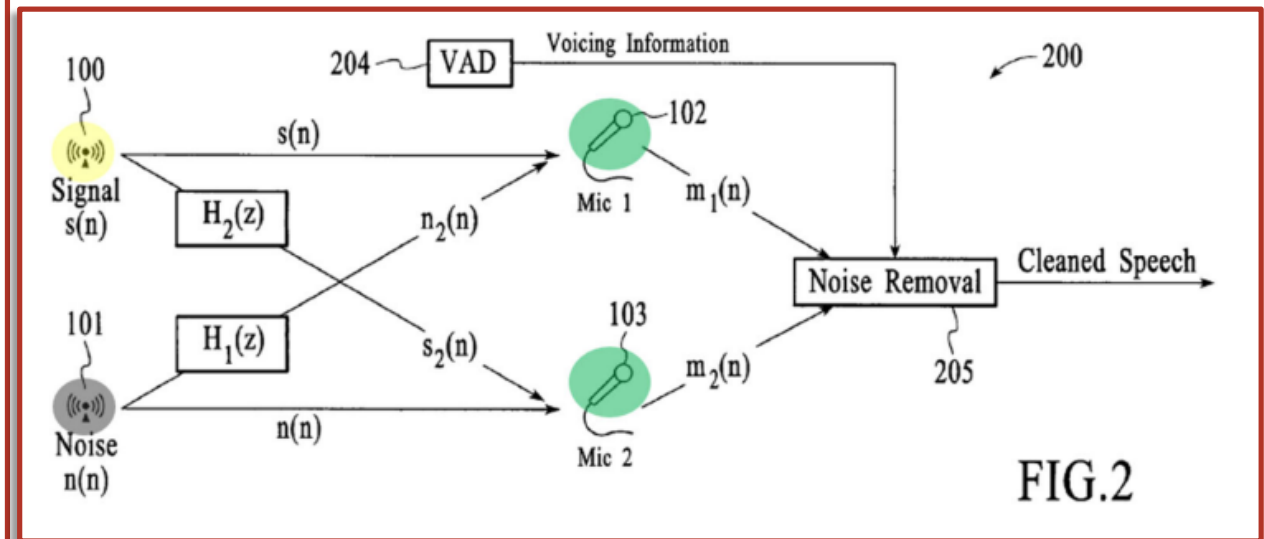


FIG.2

'091 Patent at Fig. 2 (annotated);
Pet. at 9, 16; Ex. 1002 ¶¶36, 57.

'091 Patent, cl. 18.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Asserted Prior Art

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Overview of Instituted Grounds

- Ground 1: Claims 1-8, 11-14, 16, 18-20 obvious over **Ikeda** in view of **Puthuff**
- Ground 2: Claims 1-8, 11-14, 16, 18-20 obvious over **Ikeda** in view of **Alcivar**
- Ground 3: Claims 3, 9, 15 obvious over Ikeda, Puthuff or Alcivar, and **Hussain**
- Ground 4: Claims 10, 17 obvious over Ikeda, Puthuff or Alcivar, and **Sasaki**
- Ground 5: Claims 11-20 obvious over Ground 1-4 references and **Bartlett**

Ikeda's "Conventional" Teaching

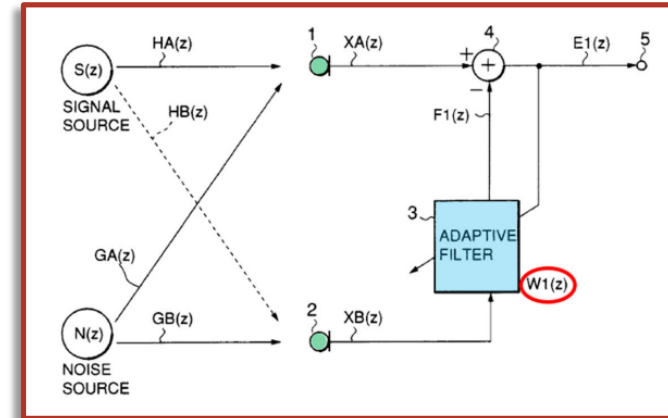
United States Patent [19] **Patent Number:** 5,978,824
Ikeda [45] **Date of Patent:** Nov. 2, 1999

[54] **NOISE CANCELER**
 [75] **Inventor:** Shigeji Ikeda, Tokyo, Japan
 [73] **Assignee:** NEC Corporation, Tokyo, Japan
 [21] **Appl. No.:** 09/015,525
 [22] **Filed:** Jan. 29, 1998
 [30] **Foreign Application Priority Data**
 Jan. 29, 1997 [JP] Japan 9-014410
 [51] **Int. Cl.** G06F 17/10
 [52] **U.S. Cl.** 708/322
 [58] **Field of Search** 708/322-323, 375/232-233, 381/71.12

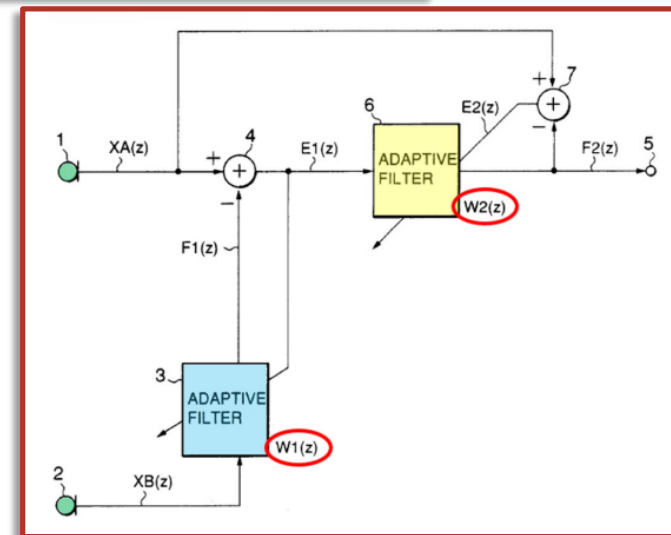
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 0 751 619 1/1997 European Pat. Off.
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ABSTRACT
 A noise canceler of the present invention includes a signal-to-noise power ratio estimator to which a main signal and a reference signal are input. The estimator 10 estimates the signal-to-noise power ratio of the main signal from the mean power of a desired signal contained in the main signal and a mean power of a noise signal also contained in the main signal. In addition, the estimator estimates the signal-to-noise power ratio of the reference signal from the mean power of a desired signal contained in the reference signal and the mean power of a noise signal also contained in the reference signal. An adaptive filter for estimating the noise signal of the main signal has its step size for coefficient updating controlled in accordance with the estimated signal-to-noise power ratio of the noise signal. On the other hand, an adaptive filter for estimating the desired signal of the reference signal has its step size for coefficient updating controlled in accordance with the estimated signal-to-noise power ratio of the reference signal. Delay circuits are provided for compensating for a delay attributable to a power averaging procedure which a signal-to-noise power ratio estimator executes to calculate the estimated signal-to-noise power ratios.

6 Claims, 6 Drawing Sheets



"conventional noise canceler"



Ikeda (Ex. 1003), Figs. 5, 6 (annotated);
 Pet. 4-5, 15, 19; Ex. 1002 ¶¶44, 46, 57, 66. 10

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

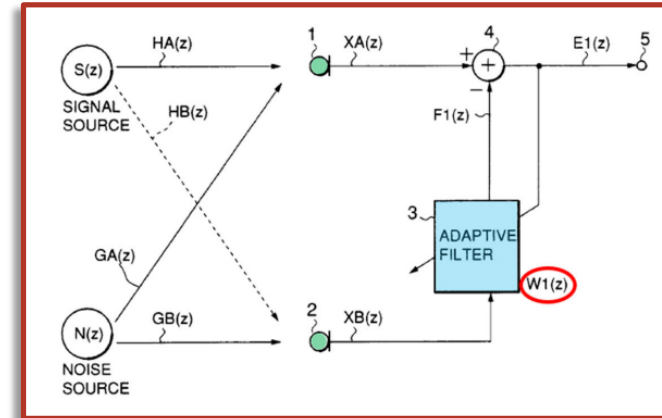
Ikeda's "Conventional" Teaching

Uses the "outside"

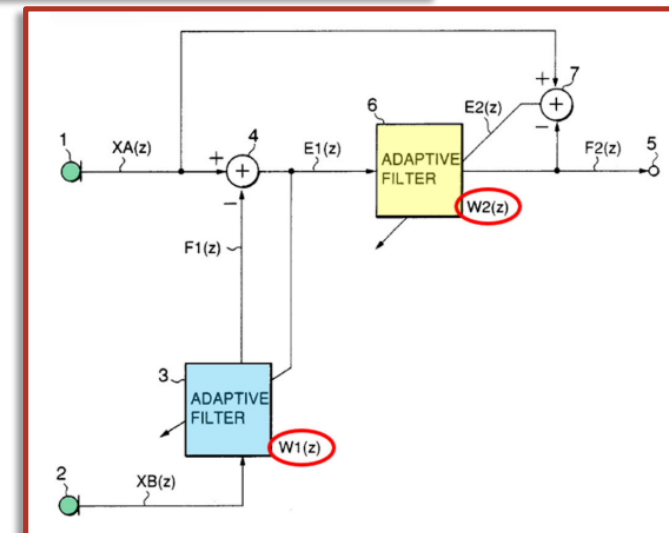
As stated above, the conventional noise canceler updates the coefficient of the adaptive filter 3 and learns the acoustic characteristic of noise in sections where the noise signal $N(z)$ is present and the desired signal component $S(z)$ is absent or negligibly small. Further, the noise canceler updates the coefficient of the adaptive filter 4 and learns a signal distortion correction filter in sections where the desired signal component $S(z)$ is present and the noise component $N(z)$ is absent or negligibly small. It is therefore necessary to detect the above sections where the desired signal component $S(z)$ is absent (or little) and the sections where the noise signal component $N(z)$ is absent (or little) and to command the adaptive filters to perform learning in such sections from the outside.

However, it is, in many cases, difficult to command the adaptive filters to perform learning from the outside in accordance with the level of the desired signal and that of the noise signal, depending on the situation in which the noise canceler is located. With the conventional noise canceler, a sufficient noise canceling ability and a sufficient distortion correction characteristic are not achievable unless adequate learning sections are indicated to each adaptive filter for the learning purpose.

Ex. 1003, 3:32-54; see Pet. 4-6, 21, 32, 50;
Ex. 1021 ¶¶6.



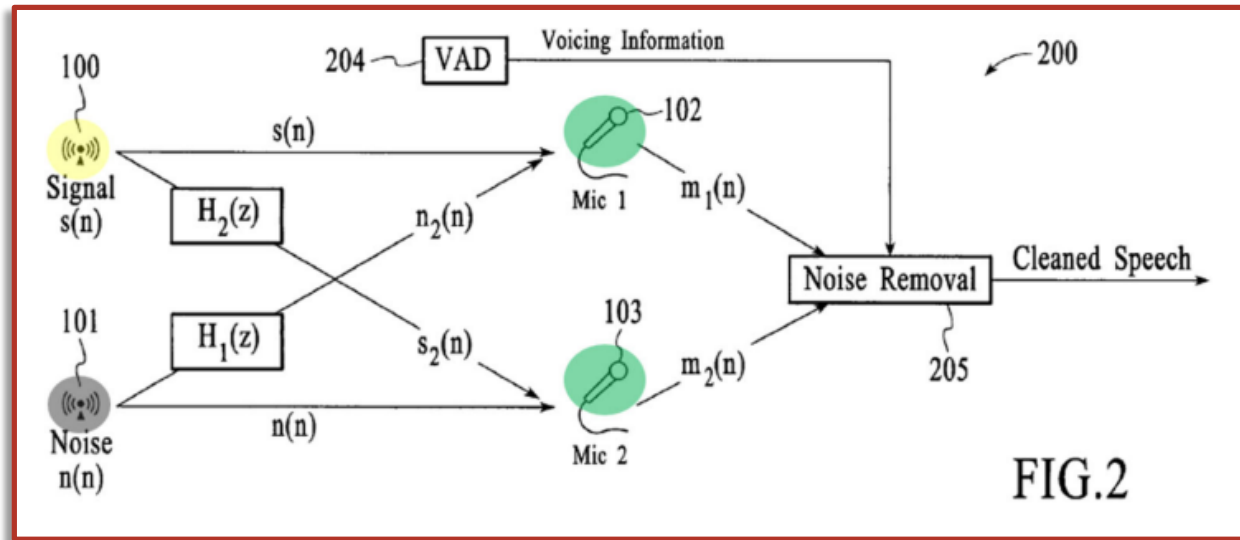
"conventional noise canceler"



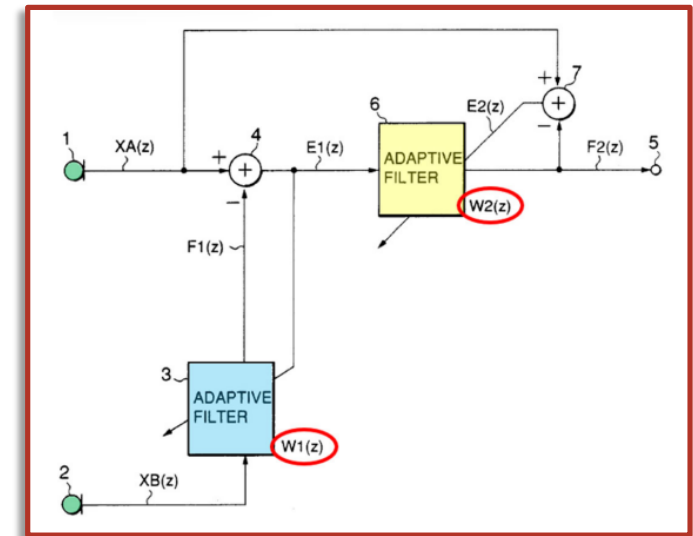
Ikeda (Ex. 1003), Figs. 5, 6 (annotated);
Pet. 4-5, 15, 19; Ex. 1002 ¶¶44, 46, 57, 66. 11

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Ikeda's "Conventional" Teaching

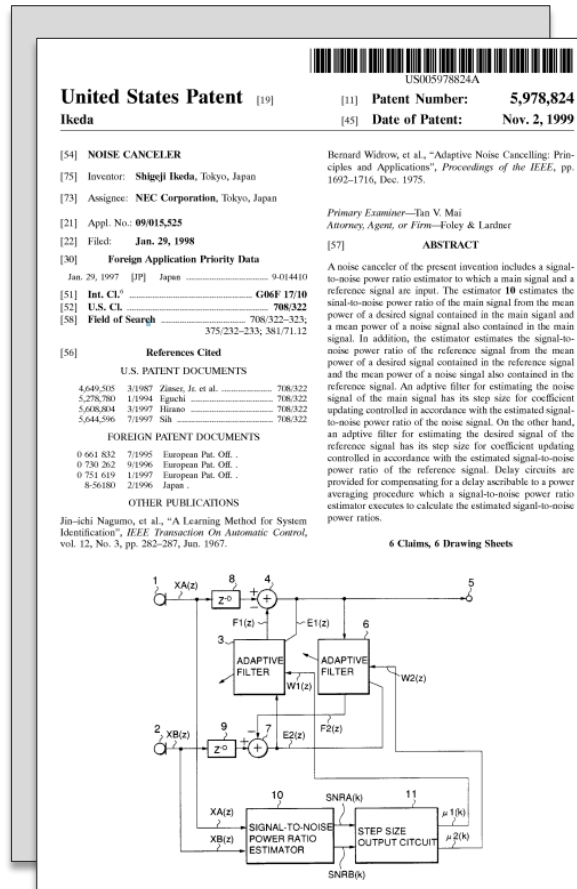


'091 Patent at Fig. 2 (annotated);
Pet. at 9, 16; Ex. 1002 ¶¶36, 57.

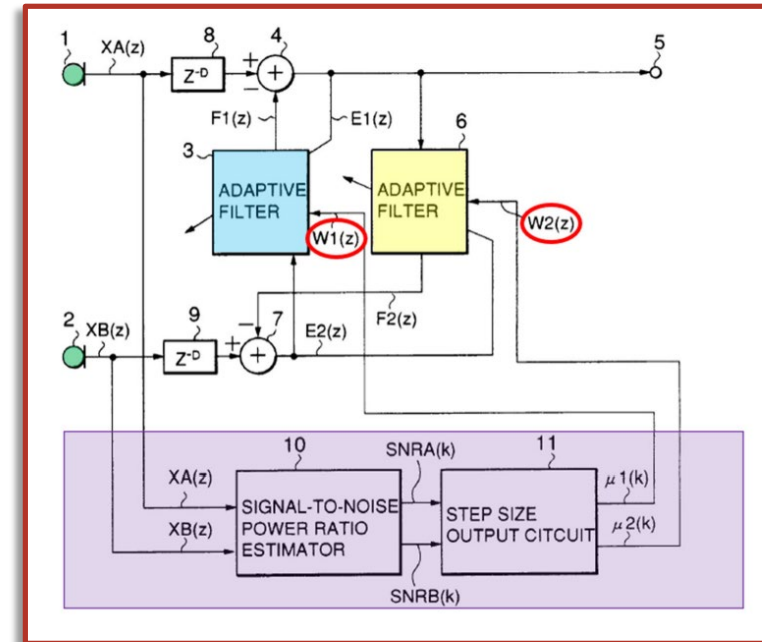


Ikeda (Ex. 1003), Figs. 5, 6 (annotated);
Pet. 4-5, 15, 19; Ex. 1002 ¶¶44, 46, 57, 66.

Ikeda's "Invention" Teaching



"noise canceler embodying the present invention"



Ex. 1003, Fig. 1 (annotated);
 see Pet. 6, 22; Ex. 1002 ¶¶32, 48, 58, 68, 70.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

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Ikeda's "Invention" Teaching

SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide a noise canceler capable of achieving a sufficient noise canceling ability and reducing signal distortion even when adequate learning sections cannot be indicated from the outside.

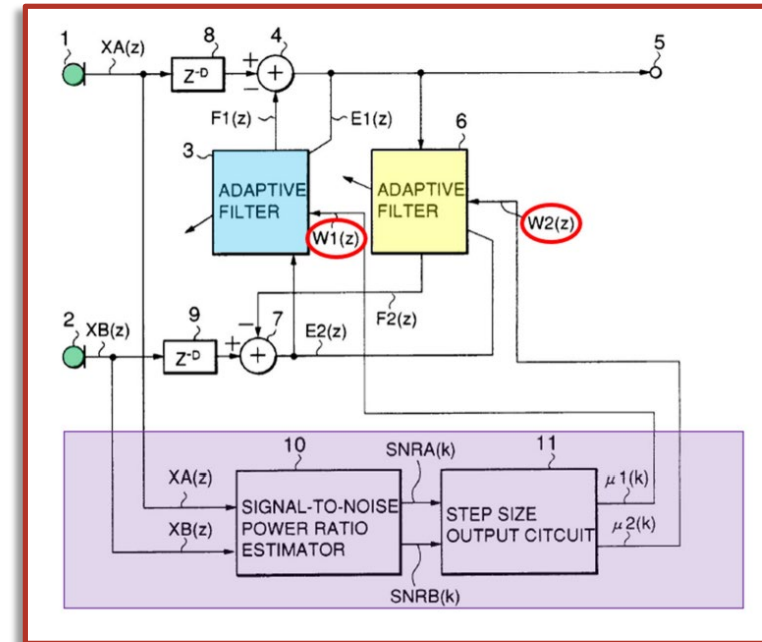
Ex. 1003, 3:55-61;
see Pet. 21; Ex. 1002 ¶¶70.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 1 of the drawings, a noise canceler embodying the present invention is shown. As shown, the noise canceler includes a first microphone 1 for a main signal, a second microphone 2 for a reference signal, an output terminal 5, adaptive filters 3 and 6, subtracters 4 and 7, delay circuits 8 and 9, a signal-to-noise power ratio estimator 10, and a step size output circuit 11. The operation of the adaptive filters 3 and 6 will be described first.

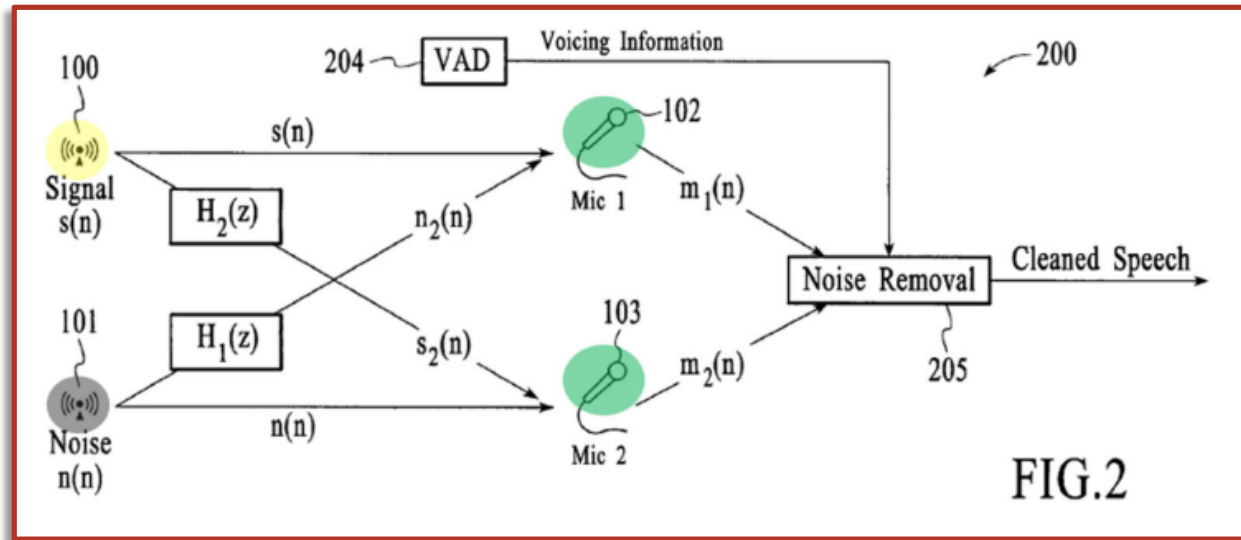
Ex. 1003, 4:49-56;
see Pet. 6, 16, 22.

“noise canceler embodying the present invention”



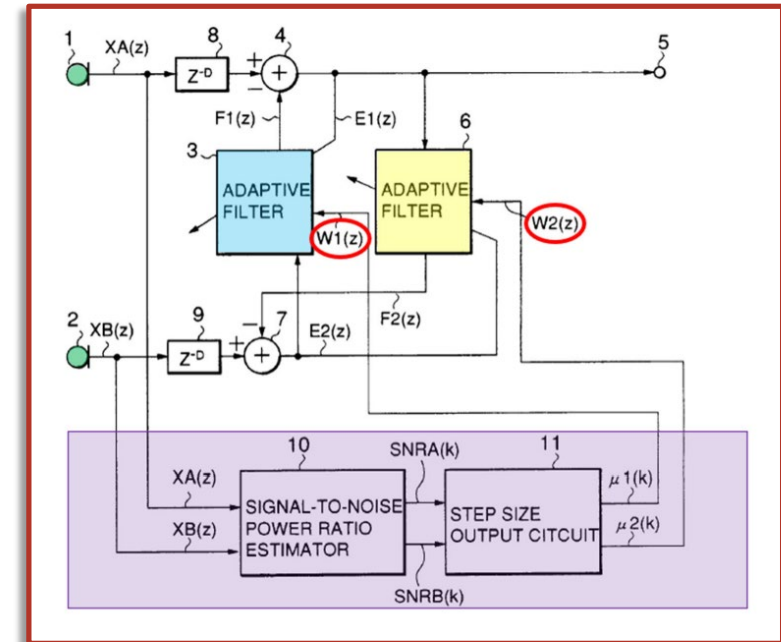
Ex. 1003, Fig. 1 (annotated);
see Pet. 6, 22; Ex. 1002 ¶¶32, 48, 58, 68, 70.

Ikeda's “Invention” Teaching



'091 Patent at Fig. 2 (annotated);
Pet. at 9, 16; Ex. 1002 ¶¶36, 57.

“noise canceler embodying the present invention”

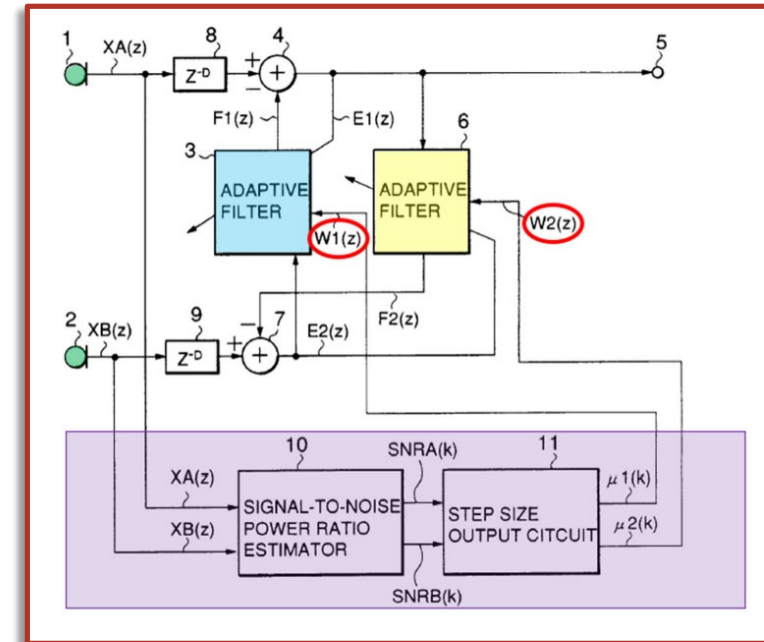


Ex. 1003, Fig. 1 (annotated);
see Pet. 6, 22; Ex. 1002 ¶¶ 32, 48, 58, 68, 70.

Proposed Combinations

First Comb.	Gd. 1	Ikeda + Puthuff	"[U]se Puthuff's vibration sensor... in place of... Ikeda's VAD." Pet. 32-34.
Second Comb.	Gd. 1	Ikeda + Puthuff	"[U]se Puthuff's vibration sensor... in addition to, Ikeda's VAD." Pet. 32, 34-36.
Third Comb.	Gd. 2	Ikeda + Alcivar	"[S]ubstitute Alcivar's tissue-conduction microphone and VAD for Ikeda's VAD." Pet. 50-52.

"noise canceler embodying the present invention"



Ex. 1003, Fig. 1 (annotated);
Pet. 6, 22; Ex. 1002 ¶¶32, 48, 58, 68, 70.

Puthuff

PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION International Bureau INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)	
(51) International Patent Classification: H03G 3/20, H04B 15/00, H04R 25/00	(11) International Publication Number: WO 00/21194 (43) International Publication Date: 13 April 2000 (13.04.00)
(21) International Application Number: PCT/US99/23234 (22) International Filing Date: 5 October 1999 (05.10.99) (30) Priority Data: 09/165,101 8 October 1998 (08.10.98) US (71) Applicant: RESOUND CORPORATION (US/US); Seagoville Centre, 220 Saginaw Drive, Redwood City, CA 94063 (US). (72) Inventors: PUTHUFF, Steven, H.; 13001 Serrano-Sunnyvale Road, Sunnyvale, CA 95070 (US); TAIENGER, Jon, C.; 888 Laverne Way, Los Altos, CA 94022-1107 (US); GEDDES, Earl, R.; 1388 Medinah Drive, Itasca, IL 60143 (US). (74) Agent: KREBS, Robert, E.; Burns, Doane, Swecker & Marulis, LLP, P.O. Box 1404, Alexandria, VA 22313-1404 (US).	(80) Designated States: AU, CA, JP, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GR, GB, IE, IT, LI, MC, NL, PT, SE). Published With international search report.
(54) Title: DUAL-SENSOR VOICE TRANSMISSION SYSTEM	
(57) Abstract A pickup system (10) utilizes both sound pressure disturbances sensed by a microphone (20) and bone conduction sensed by a vibration sensor (30) such as an accelerometer, velocity sensor or displacement sensor to pick up and faithfully transmit a talker's voice despite acoustically noisy ambient environments. The system senses the microphone signal amplitude and adjusts the gain of associated amplification circuitry (24, 26) to effectively and sensibly fade in the microphone signal and fade out the vibration sensor signal as ambient noise increases. The pickup system (10) may be part of a stand alone ear level communication transmitter worn behind the talker's ear, or it may be implemented in a telephone system or other communication systems.	

SUMMARY OF THE INVENTION

The present invention exploits the phenomenon of bone conduction to suppress the deleterious effects of high acoustic noise environments without suffering the degradation of voice pickup quality in low noise environments demonstrated by prior art bone conduction pickup systems. The above-described human speech characteristics are exploited by providing a device which adaptively senses sound through bone conduction when acoustic noise levels are high. As discussed above, bone conduction alone is generally a poor expedient for transfer of intelligible speech, and in an acoustically quiet environment an air pressure microphone is much better suited to picking up a talker's voice. It is only when acoustic noise levels are high that the quality of air pressure microphone detection is degraded enough to make bone conduction a better alternative. The device in accordance with the invention accordingly relies on both bone conduction and air pressure vibration to pick up the talker's voice.

Puthuff (Ex. 1004), 4:12-25

The bone conducted speech is detected using a motion transducer comprising a vibration sensor, and specifically, in a preferred embodiment, an accelerometer, although use of other types of vibration sensors, such as displacement and velocity sensors, is also contemplated. When ambient noise levels are low,

Puthuff (Ex. 1004), 5:1-4.

26 while increasing that of amplifier 36. In this manner, the bone conduction component of the audio signal, comprising primarily the talker's speech, is amplified to a greater extent than the ambient noise signal at high ambient noise levels. At low ambient noise levels, the microphone signal is permitted to dominate as the output signal. The microphone signal under lower ambient noise levels provides a qualitatively better signal despite a measure of equalization applied to the accelerometer signal by equalization circuit 32 to improve the quality thereof. Typically, the value of the threshold will depend on the

Puthuff (Ex. 1004), 10:10-17.

See Pet. 8, 30-36; Ex. 1002 ¶¶35, 52-53, 84-98.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

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United States Patent [19]
Alcivar [11] 3,746,789
[45] July 17, 1973

[54] TISSUE CONDUCTION MICROPHONE
UTILIZED TO ACTIVATE A VOICE
OPERATED SWITCH

[75] Inventor: Ernesto A. Alcivar, Guayaquil,
Ecuador

[73] Assignees: Dennis J. Johnson, Swampscott;
Brian N. McCarthy, Cambridge,
Mass.

[22] Filed: Oct. 20, 1971

[21] Appl. No.: 191,006

[52] U.S. Cl. 179/1 VC
[51] Int. Cl. G10 1/04
[50] Field of Search 179/1 VC; 1 SW, 1 SA,
179/121 C, 167, 168, 164, 187, 188, 1 P, 1
VW, 157, 1 ST; 340/8 R, 5 R, 5 T

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3,646,376 2/1972 Griggs 179/1 SA

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734,732 3/1943 Germany 179/121 C

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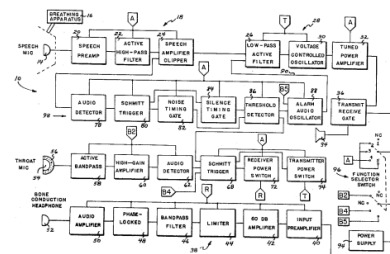
Gaszy and Morris, An Underwater Acoustic Telephone
for Free-Swimming Divers, Electronic Engineering,
Vol. 36, No. 436, 6/1964 p. 364-368.

Primary Examiner—Kathleen H. Claffy
Assistant Examiner—Jon Bradford Leahy
Attorney—C. Yardley Chittick, Richard J. Birch et al.

ABSTRACT

A voice-activated transmit switch (VOX) for high noise environment voice communication systems which employ a speech microphone, a transmitter and a receiver. A separate tissue-conduction microphone is employed to generate a signal which activates a transmitter enabling and receiver disabling circuit. The tissue-conduction microphone is positioned in contact with the user's neck tissue in the vicinity of the larynx. A bandpass filter eliminates the unwanted signal from the tissue-conduction microphone output and passes the desired speech signals to an amplifier. The amplifier output actuates a Schmitt trigger which in turn operates a transmitter enable-receiver disable switching circuit. Delay means are provided so that the transmitter does not turn off during brief intersyllabic pauses.

13 Claims, 2 Drawing Figures



The present invention utilizes a separate tissue-conduction microphone 54 to generate a transmitter keying signal. Preferably, the tissue conduction microphone 54 is a throat microphone which is located in the vicinity of the larynx of the diver, in such a position that the tissue vibrations due to modulation of the vocal chords (speech) have a much higher amplitude than those due to gas flow or breathing and swallowing noises. However, the tissue conduction microphone also can be placed against the chest cavity to detect the speech sounds. The detection of the speech sounds at very favorable signal-to-noise ratios makes it possible to discriminate against unwanted noises on the basis of amplitude alone, without having to resort to more elaborate signal processing techniques. At the same time, optimum speech intelligibility is assured by the use of the separate speech microphone 14 positioned directly in front of the mouth of the diver.

Alcivar (Ex. 1005), 4:65-5:15

Motivation to Combine Ikeda with Puthuff (First Combination)

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

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Overview

Ground 1: Ikeda + Puthuff

- **First Combination: Motivation to Combine (No Disputed Limitations)**
- Second Combination: Motivation to Combine and Disputed Limitations

Ground 2: Ikeda + Alcivar

- Motivation to Combine (No Disputed Limitations)

Ikeda + Puthuff (First Combination)

Replace Ikeda's VAD with Puthuff's vibration sensor audio component

1. PO does not address the proposed combination and improperly relies on bodily incorporation
2. No teaching away because no dispute that Ikeda's "outside" is not Puthuff's sensor
3. No teaching away even if Ikeda's "outside" is the same as Puthuff's sensor

Ikeda + Puthuff (First Combination)

Replace Ikeda's VAD with Puthuff's vibration sensor audio component

1. PO does not address the proposed combination and improperly relies on bodily incorporation

with the level of the desired signal and that of the noise signal.” Instead, Puthuff’s sensor could only command the filters based on vibrations, not on signal levels. Ex. 2002, ¶ 69. In other words, Puthuff’s sensor has no way to determine that the vibrations it senses indicate intelligible speech in the acoustic signals or that the level of the desired signal exceeds the level of the noise signal. *Id.* Thus, the use of an

POR 17.

Ikeda + Puthuff (First Combination)

Replace Ikeda's VAD with Puthuff's vibration sensor audio component

1. PO does not address the proposed combination and improperly relies on bodily incorporation

Filed: June 27, 2023

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

META PLATFORMS, INC.,
Petitioner,

v.

JAWBONE INNOVATIONS, LLC,
Patent Owner.

IPR2023-01127
U.S. Patent No. 8,019,091

PETITION FOR INTER PARTES REVIEW
OF CLAIMS 1-20 OF U.S. PATENT NO. 8,019,091

(*Id.*, 10:13-14; *id.*, 5:4-7.) At “high ambient noise levels[.]” however, the system prioritizes output of “the bone conduction component of the audio signal, comprising primarily the talker’s speech[.]” (*Id.*, 10:10-25; 4:13-16.) Puthuff discloses that a transition circuit fades out the acoustic microphone signal and fades in the “bone vibration sensor signal” as ambient noise levels increase. (*Id.*, 5:7-9, 10:5-11:5.)

Pet. 31; see *also* Ex. 1002 ¶¶86.

phone 1. (*Id.* ¶97.) But during periods of high ambient noise, the signal transmitted to the signal-to-noise power ratio estimator would be predominantly the “bone conduction component of the audio signal, comprising primarily the talker’s speech.” (Ex. 1004, 10:10-13.) A POSITA would have been motivated to modify Ikeda in

Pet. 35 see *also* Ex. 1002 ¶¶97.

See Reply 4-5; Ex. 1021 ¶¶3-4.

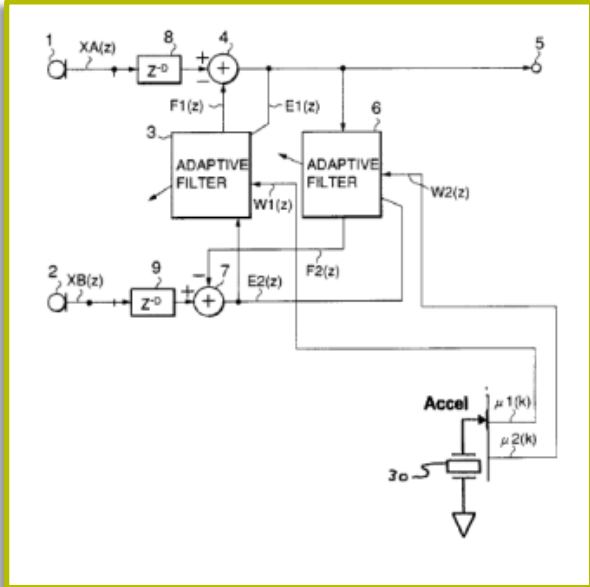
DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

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Ikeda + Puthuff (First Combination)

Replace Ikeda's VAD with Puthuff's vibration sensor audio component

1. PO does not address the proposed combination and improperly relies on bodily incorporation



POR 15.

Ikeda + Puthuff (First Combination)

Replace Ikeda's VAD with Puthuff's vibration sensor audio component

1. PO does not address the proposed combination and improperly relies on bodily incorporation

“It is well-established that a determination of obviousness based on teachings from multiple references does not require an actual, physical substitution of elements.”

In re Mouttet, 686 F.3d 1322, 1332 (Fed. Cir. 2012)

The test “is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference.”

In re Keller, 642 F.2d 413, 425 (Cust. & Pat. App. 1981)

Ikeda + Puthuff (First Combination)

Replace Ikeda's VAD with Puthuff's vibration sensor audio component

2. No teaching away because no dispute that Ikeda's "outside" is not Puthuff's sensor

Ikeda's "outside" sensor must detect absence of noise.

As stated above, the conventional noise canceler updates the coefficient of the adaptive filter 3 and learns the acoustic characteristic of noise in sections where the noise signal $N(z)$ is present and the desired signal component $S(z)$ is absent or negligibly small. Further, the noise canceler updates the coefficient of the adaptive filter 4 and learns a signal distortion correction filter in sections where the desired signal component $S(z)$ is present and the noise component $N(z)$ is absent or negligibly small. It is therefore necessary to detect the above sections where the desired signal component $S(z)$ is absent (or little) and the sections where the noise signal component $N(z)$ is absent (or little) and to command the adaptive filters to perform leaning in such sections from the outside.

Ikeda, Ex. 1003, 3:32-45.

Dr. Sayeed concedes that a VAD (and Puthuff's sensor) does not detect absence of noise.

15	THE WITNESS: That does -- can you -- that
16	question doesn't quite -- noise is absent, no, VAD is
17	not detecting when noise is absent. It's hard to detect
18	generally, absence of -- well, I won't say anything.
19	It's not detecting when noise is absent, no.
20	BY MS. WANG:

Sayeed Tr., Ex. 1020, 21:15-19 (see also 28:16-22, 21:4-11, 32:16-33:4, 33:25-34:3, 34:16-23).

Ikeda + Puthuff (First Combination)

Replace Ikeda's VAD with Puthuff's vibration sensor audio component

3. No teaching away even if Ikeda's "outside" is the same as Puthuff's sensor

However, it is, in many cases, difficult to command the adaptive filters to perform learning from the outside in accordance with the level of the desired signal and that of the noise signal, depending on the situation in which the noise canceler is located. With the conventional noise canceler, a sufficient noise canceling ability and a sufficient distortion correction characteristic are not achievable unless adequate learning sections are indicated to each adaptive filter for the learning purpose.

Ikeda, Ex. 1003, 3:46-54.

Ikeda + Puthuff (First Combination)

Replace Ikeda's VAD with Puthuff's vibration sensor audio component

3. No teaching away even if Ikeda's "outside" is the same as Puthuff's sensor

"Text descriptions—even if cursory or cryptic—and graphical previews both help a user to determine whether a link is relevant to the information he is looking for. And nothing in either reference indicates that descriptive text would render Finseth's rollover area inoperative for its intended purpose."

Meiresonne v. Google, Inc., 849 F.3d 1379, 1383-84 (Fed. Cir. 2017)

Motivation to Combine Ikeda with Puthuff (Second Combination)

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

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Overview

Ground 1: Ikeda + Puthuff

- First Combination: Motivation to Combine (No Disputed Limitations)
- **Second Combination: Motivation to Combine** and Disputed Limitations

Ground 2: Ikeda + Alcivar

- Motivation to Combine (No Disputed Limitations)

Ikeda + Puthuff (Second Combination)

Combine Ikeda's VAD with Puthuff's vibration sensor and transition circuit

1. PO does not address the proposed combination and improperly relies on bodily incorporation
2. The combination denoises properly
3. The combination reduces false triggering
4. No teaching away because no dispute that Ikeda's "outside" is not Puthuff's sensor
5. No teaching away even if Ikeda's "outside" is the same as Puthuff's sensor

Ikeda + Puthuff (First Combination)

Combine Ikeda's VAD with Puthuff's vibration sensor and transition circuit

1. PO does not address the proposed combination and improperly relies on bodily incorporation

with the level of the desired signal and that of the noise signal.” Instead, Puthuff’s sensor could only command the filters based on vibrations, not on signal levels. Ex. 2002, ¶ 69. In other words, Puthuff’s sensor has no way to determine that the vibrations it senses indicate intelligible speech in the acoustic signals or that the level of the desired signal exceeds the level of the noise signal. *Id.* Thus, the use of an

POR 17.

Ikeda + Puthuff (Second Combination)

Combine Ikeda's VAD with Puthuff's vibration sensor and transition circuit

1. PO does not address the proposed combination and improperly relies on bodily incorporation

Filed: June 27, 2023

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

META PLATFORMS, INC.,
Petitioner,

v.

JAWBONE INNOVATIONS, LLC,
Patent Owner.

IPR2023-01127
U.S. Patent No. 8,019,091

PETITION FOR INTER PARTES REVIEW
OF CLAIMS 1-20 OF U.S. PATENT NO. 8,019,091

(*Id.*, 10:13-14; *id.*, 5:4-7.) At “high ambient noise levels[.]” however, the system prioritizes output of “the bone conduction component of the audio signal, comprising primarily the talker’s speech[.]” (*Id.*, 10:10-25; 4:13-16.) Puthuff discloses that a transition circuit fades out the acoustic microphone signal and fades in the “bone vibration sensor signal” as ambient noise levels increase. (*Id.*, 5:7-9, 10:5-11:5.)

Pet. 31; see *also* Ex. 1002 ¶¶86.

phone 1. (*Id.* ¶97.) But during periods of high ambient noise, the signal transmitted to the signal-to-noise power ratio estimator would be predominantly the “bone conduction component of the audio signal, comprising primarily the talker’s speech.” (Ex. 1004, 10:10-13.) A POSITA would have been motivated to modify Ikeda in

Pet. 35 see *also* Ex. 1002 ¶¶97.

See Reply 4-5; Ex. 1021 ¶¶3-4.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

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Ikeda + Puthuff (Second Combination)

Combine Ikeda's VAD with Puthuff's vibration sensor and transition circuit

1. PO does not address the proposed combination and improperly relies on bodily incorporation

“It is well-established that a determination of obviousness based on teachings from multiple references does not require an actual, physical substitution of elements.”

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The test “is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference.”

In re Keller, 642 F.2d 413, 425 (Cust. & Pat. App. 1981)

Ikeda + Puthuff (Second Combination)

Combine Ikeda's VAD with Puthuff's vibration sensor and transition circuit

2. The combination denoises properly

As shown below, a POSITA would not combine Ikeda with Puthuff in this manner, both because Ikeda teaches away from using an outside sensor, and because the second Ikeda/Puthuff system would not denoise properly. Moreover, even if a POSITA made the combination, it does not meet the elements of the claims. Ex. 2002, ¶¶ 89-90.

POR 26.

For example, in a situation with high environmental noise, $XA(z)$ is composed mostly or entirely of accelerometer signals. The $N(z)$ *acoustic* noise component would be close to 0. However, the subtracter would still subtract out a full acoustic $N(z)$ as received at the reference microphone and as part of $XB(z)$. This subtraction would distort the desired signal in $XA(z)$. Ex. 2002, ¶ 98.

POR 29.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Ikeda + Puthuff (Second Combination)

Combine Ikeda's VAD with Puthuff's vibration sensor and transition circuit

2. The combination denoises properly

18. Dr. Sayeed alleges the second combination “would not effectively cancel noise.” Sayeed Decl. ¶92. I disagree. The second combination would be very effective at operating to canceling noise. Dr. Sayeed's entire argument for the

Ex. 1021 ¶18; see Reply 16.

signal. By incorporating Puthuff's vibration sensor and transition circuit into Ikeda, the combination relies on an acoustic signal from Puthuff that represents a cleaner version of Ikeda's acoustic signal, by fading in the bone conduction component of the audio signal during times of high acoustic noise. Thus, a POSITA would have known that when Puthuff's acoustic signal is incorporated into Ikeda's system, the combination's input is simply a cleaned up acoustic version of itself.

Ex. 1021 ¶19; see Reply 16.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

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Ikeda + Puthuff (Second Combination)

Combine Ikeda's VAD with Puthuff's vibration sensor and transition circuit

2. The combination denoises properly

20. Moreover, Dr. Sayeed appears to misunderstand the general principles behind the operation of adaptive filters, which would have been readily understood by a POSITA. Specifically, Dr. Sayeed contends that when $XA(z)$ is mostly accelerometer signal, $N(z)$ is close to noise, but “the subtractor would still subtract out a full $N(z)$ as received at the reference microphone and as part of $XB(z)$.” Sayeed Decl. ¶98. Even setting aside Dr. Sayeed's misunderstanding that $XA(z)$ can be an accelerometer signal, Dr. Sayeed completely omits the operation of the adaptive filter in his analysis.

Ex. 1021 ¶20; see Reply 17-18.

Ikeda + Puthuff (Second Combination)

Combine Ikeda's VAD with Puthuff's vibration sensor and transition circuit

2. The combination denoises properly

21. To be clear, adaptive filters (including the adaptive filters in Ikeda) manipulate the undesirable component in the reference channel that correlates with the undesirable component in the primary channel, so as to cause the output of the adaptive filter to resemble the undesirable component in the primary channel. When the undesirable component is noise, this means that the output of the adaptive filter resembles the portion of noise in the reference channel that correlates with the noise in the primary channel.

Ex. 1021 ¶¶21; see Reply 17-18.

Ikeda + Puthuff (Second Combination)

Combine Ikeda's VAD with Puthuff's vibration sensor and transition circuit

2. The combination denoises properly

For example, in a situation with high environmental noise, $XA(z)$ is composed mostly or entirely of accelerometer signals. The $N(z)$ *acoustic* noise component would be close to 0. However, the subtracter would still subtract out a full acoustic $N(z)$ as received at the reference microphone and as part of $XB(z)$. This subtraction would distort the desired signal in $XA(z)$. Ex. 2002, ¶ 98.

POR 29.

22. This means that when the output of the adaptive filter is subtracted from the primary channel, only the portion of noise actually correlates to the noise in the primary channel is subtracted, not the “full $N(z)$ ” as Dr. Sayeed alleges. Thus, the subtraction reflects removal of the undesirable component from the primary channel, and there is no added distortion to the desired signal, as Dr. Sayeed alleges. Therefore, Ikeda's circuit adaptive filters (which Dr. Sayeed omits in his analysis in ¶98) operate to improve (not worsen) the output signal by estimating the noise in the primary channel, so that the noise is canceled.

Ex. 1021 ¶¶22; see Reply 17-18.

Ikeda + Puthuff (Second Combination)

Combine Ikeda's VAD with Puthuff's vibration sensor and transition circuit

3. The combination reduces false triggering

An additional advantage of the invention is its particular suitability to voice-activated applications, as the bone conduction expedient improves system immunity to false triggering due to noisy environments. The invention realizes power conservation advantages by for example turning off a radio transmitter in the absence of the user's voice.

Puthuff (Ex. 1004), 6:6-10;
see Pet. 32; Ex. 1002 ¶89.

Puthuff's sensor would reduce 'false triggering' compared to Ikeda's circuit." False triggers occur when the noise in the system resembles the desired signal, or speech or voice activity. There are various reasons for this, including for example when "noise" is actually interfering speech or voice activity from someone else in the background. In general, sensors relying on physiological information to detect voicing, such as Puthuff's vibration sensor and accelerometer, and Alcivar's tissue conduction microphone, are significantly less responsive to that ambient background noise. They are therefore less likely to respond to that background noise, and are less likely to result in false triggering than an acoustic-based system, including Ikeda's system. Therefore, combining Puthuff's (or Alcivar's) teachings with Ikeda's system would reduce false triggering, because the input signal already represents a cleaner signal with effectively reduced noise. A POSITA would have recognized this improvement, and would have therefore been motivated to make the combination.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Ex. 1021 ¶17;
see Reply 14. 40

Ikeda + Puthuff (Second Combination)

Combine Ikeda's VAD with Puthuff's vibration sensor and transition circuit

4. No teaching away because no dispute that Ikeda's "outside" is not Puthuff's sensor

Ikeda's "outside" must detect absence of noise.

As stated above, the conventional noise canceler updates the coefficient of the adaptive filter 3 and learns the acoustic characteristic of noise in sections where the noise signal $N(z)$ is present and the desired signal component $S(z)$ is absent or negligibly small. Further, the noise canceler updates the coefficient of the adaptive filter 4 and learns a signal distortion correction filter in sections where the desired signal component $S(z)$ is present and the noise component $N(z)$ is absent or negligibly small. It is therefore necessary to detect the above sections where the desired signal component $S(z)$ is absent (or little) and the sections where the noise signal component $N(z)$ is absent (or little) and to command the adaptive filters to perform leaning in such sections from the outside.

Ikeda, Ex. 1003, 3:32-45.

PO's expert concedes a VAD (and Puthuff's sensor) does not detect absence of noise.

15 THE WITNESS: That does -- can you -- that
16 question doesn't quite -- noise is absent, no, VAD is
17 not detecting when noise is absent. It's hard to detect
18 generally, absence of -- well, I won't say anything.
19 It's not detecting when noise is absent, no.

Sayeed Tr., Ex. 1020, 21:15-19 (see also 28:16-22, 21:4-11, 32:16-33:4, 33:25-34:3, 34:16-23).

Ikeda + Puthuff (Second Combination)

Combine Ikeda's VAD with Puthuff's vibration sensor and transition circuit

5. No teaching away even if Ikeda's "outside" is the same as Puthuff's sensor

However, it is, in many cases, difficult to command the adaptive filters to perform learning from the outside in accordance with the level of the desired signal and that of the noise signal, depending on the situation in which the noise canceler is located. With the conventional noise canceler, a sufficient noise canceling ability and a sufficient distortion correction characteristic are not achievable unless adequate learning sections are indicated to each adaptive filter for the learning purpose.

Ikeda, Ex. 1003, 3:46-54.

Ikeda + Puthuff (Second Combination)

Combine Ikeda's VAD with Puthuff's vibration sensor and transition circuit

5. No teaching away even if Ikeda's "outside" is the same as Puthuff's sensor

"Text descriptions—even if cursory or cryptic—and graphical previews both help a user to determine whether a link is relevant to the information he is looking for. And nothing in either reference indicates that descriptive text would render Finseth's rollover area inoperative for its intended purpose."

Meiresonne v. Google, Inc., 849 F.3d 1379, 1383-84 (Fed. Cir. 2017)

Disputed Limitations Ikeda with Puthuff (Second Combination)

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

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Overview

Ground 1: Ikeda + Puthuff

- First Combination: Motivation to Combine (No Disputed Limitations)
- **Second Combination:** Motivation to Combine and **Disputed Limitations**

Ground 2: Ikeda + Alcivar

- Motivation to Combine (No Disputed Limitations)

Ikeda + Puthuff (Second Combination)

Generating Transfer Functions Limitations (claims 11, 18)

11. A system for removing acoustic noise from the acoustic signals, comprising:

- a receiver that receives at least two acoustic signals via at least two acoustic microphones positioned in a plurality of locations;
- at least one sensor that receives human tissue vibration information associated with human voicing activity of a user;
- a processor coupled among the receiver and the at least one sensor that generates a plurality of transfer functions, wherein the plurality of transfer functions includes a first transfer function representative of a ratio of energy of acoustic signals received using at least two different acoustic microphones of the at least two acoustic microphones, wherein the first transfer function is generated in response to a determination that voicing activity is absent from the acoustic signals for a period of time, wherein the plurality of transfer functions includes a second transfer function representative of the acoustic signals, wherein the second transfer function is generated in response to a determination that voicing activity is present in the acoustic signals for the period of time, wherein acoustic noise is removed from the acoustic signals using the first transfer function and at least one combination of the first transfer function and the second transfer function to produce the denoised acoustic data stream.

18. A signal processing system coupled among a user and an electronic device, wherein the signal processing system includes a denoising subsystem for removing acoustic noise from acoustic signals, the denoising subsystem comprising a processor coupled among a receiver and at least one sensor, wherein the receiver is coupled to receive the acoustic signals via at least two microphones, wherein the at least one sensor detects human tissue vibration associated with human voicing activity of a user, wherein the processor generates a plurality of transfer functions, wherein a first transfer function representative of a ratio of acoustic energy received by the two microphones is generated in response to a determination that voicing activity is absent from the acoustic signals for a specified period of time, wherein a second transfer function representative of the acoustic signals is generated in response to a determination that voicing activity is present in the acoustic signals for a specified period of time, wherein acoustic noise is removed from the acoustic signals using the first transfer function and at least one combination of the first transfer function and the second transfer function to produce a denoised acoustic data stream.

Ikeda + Puthuff (Second Combination)

Generating Transfer Functions Limitations (claims 11, 18)

The key flaw in Petitioner's logic is that the Ikeda SNR and Step Size units operate, in the combination, on the Puthuff acoustic/accelerometer signal. Thus, when the input to Ikeda (Puthuff's signal 40) is composed mostly or entirely of accelerometer signals, which occurs with high environmental noise (Ex. 1004, 5:13-16), the Ikeda circuit will act unpredictably. The SNR estimator will show a high

POR 30.

22. This means that when the output of the adaptive filter is subtracted from the primary channel, only the portion of noise actually correlates to the noise in the primary channel is subtracted, not the "full $N(z)$ " as Dr. Sayeed alleges. Thus, the subtraction reflects removal of the undesirable component from the primary channel, and there is no added distortion to the desired signal, as Dr. Sayeed alleges. Therefore, Ikeda's circuit adaptive filters (which Dr. Sayeed omits in his analysis in ¶98) operate to improve (not worsen) the output signal by estimating the noise in the primary channel, so that the noise is canceled.

Ex. 1021 ¶¶22; see Reply 17-18.

Ikeda + Puthuff (Second Combination)

Generating Transfer Functions Limitations (claims 11, 18)

Moreover, the transfer functions will not be generated based on whether voicing activity is present in the *acoustic* signals. While Petitioner characterizes the output of Puthuff as an acoustic signal, it cannot be the acoustic signal of the claims, which must be received from the “at least two acoustic microphones.” There is no dispute that the accelerometer is not an acoustic microphone. Thus, even if the

PO Sur-Reply 20.

Ikeda further discloses generating transfer function $W2(z)$ when voicing activity is present. (Ex. 1002 ¶77.) Specifically, Ikeda discloses that most closely approximating the transfer function $W2(z)$ requires calculating $W2(z)$ when “signal component $S(z)$ is present and the noise component $N(z)$ is absent or negligibly small.” (Ex. 1003, 3:36-40; *see id.*, 2:45-51.) Ikeda determines when this occurs using the “signal-to-noise power ratio estimator” and a “step size output circuit.” (*Id.*, 5:64-6:15; *supra* §VI.A.1.c.i; Ex. 1002 ¶77.)

Pet. 26; *see also* Ex. 1002 ¶77.

Ikeda + Puthuff (Second Combination)

“generating a [VAD] signal using the voice activity signal” (claim 1)

1. A method for removing noise from acoustic signals, comprising:
receiving at least two acoustic signals using at least two acoustic microphones positioned in a plurality of locations;
receiving a voice activity signal that includes information on vibration of human tissue associated with human voicing activity of a user;
generating a voice activity detection (VAD) signal using the voice activity signal;
generating at least two transfer functions representative of a ratio of energy of the acoustic signal received using at least two different acoustic microphones of the at least two acoustic microphones when the VAD indicates that user voicing activity is absent, wherein the at least two transfer functions comprise a first transfer function and a second transfer function; and
removing acoustic noise from at least one of the acoustic signals by applying the first transfer function and at least one combination of the first transfer function and the second transfer function to the acoustic signals and generating denoised acoustic signals.

'091 Patent at 14:63-15:18, cl. 1.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

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Ikeda + Puthuff (Second Combination)

“generating a [VAD] signal using the voice activity signal”

The second Puthuff/Ikeda combination fails to disclose or render obvious this limitation because the alleged VAD signal is not generated “using the voice activity signal.” Petitioner makes no argument that the second combination teaches this limitation—instead it relies solely on the combination where “Puthuff’s VAD *replaces* Ikeda’s VAD.” Pet., 41-43. While Petitioner argues that “Ikeda discloses

POR 31.

Additionally, Ikeda discloses systems configured to “detect ... [when] the desired signal component $S(z)$ is absent (or little) ... and to command the adaptive filters to perform lea[r]ning [e.g., calculate a transfer function] in such sections.” (Ex. 1003, 3:40-45.) A POSITA would have understood that “command[ing] the adaptive filters” to calculate a transfer function at the appropriate time requires generating a VAD signal. (*Id.*, 3:50-54; Ex. 1002 ¶121.) Accordingly, to the extent Puthuff’s voice activity signal is used as an input into Ikeda’s VAD (*supra* §VLA.1.e), Ikeda’s VAD generates a voice activity detection signal using Puthuff’s voice activity signal. (Ex. 1002 ¶121.)

Pet. 42; *see also* Ex. 1002 ¶121.

Motivation to Combine Ikeda with Alcivar

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

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Overview

Ground 1: Ikeda + Puthuff

- First Combination: Motivation to Combine (No Disputed Limitations)
- Second Combination: Motivation to Combine and Disputed Limitations

Ground 2: Ikeda + Alcivar

- **Motivation to Combine (No Disputed Limitations)**

Ikeda + Alcivar

Substitute Ikeda's VAD with Alcivar's tissue conduction microphone

1. PO does not address the proposed combination and improperly relies on bodily incorporation of Alcivar's entire mask
2. Alcivar's tissue conduction microphone is not limited to near-field noise
3. Even considering PO's combination (with Alcivar's insulation and mask), Ikeda is not limited to far-field noise

Ikeda + Alcivar

Substitute Ikeda's VAD with Alcivar's tissue conduction microphone

1. PO does not address the proposed combination and improperly relies on bodily incorporation

correct.”). The Alcivar throat microphone would also have to be insulated from outside sounds, as described in Alcivar. Ex. 1005, 5:21-31; Ex. 2004, 44:19-45:11.

POR 32.

Alcivar discloses that its system determines whether voicing activity is present and controls a voice-activated switch. (Ex. 1005, Abstract, 4:65-68 (tissue-conduction microphone provides a “transmitter keying signal”), 8:3-16 (“throat microphone 54 detects the speech signal which ... turns OFF the receiver power switch” and “the receiver is turned ON again as soon as the [user] stops speaking”); Ex. 1002 ¶147.) Thus, Alcivar’s tissue-conduction microphone is used to determine when a voice signal is present or absent, and can be used to determine when a voice signal is likely greater or smaller than a noise signal (e.g., Alcivar’s tissue-conduction microphone and system is a VAD). (*Id.*) Accordingly, a POSITA would have understood that Alcivar’s tissue-conduction microphone could be used instead of Ikeda’s signal-to-noise power ratio estimator, and optionally instead of Ikeda’s step size output circuit, to control the generation of Ikeda’s transfer functions. (*See supra* §VI.A.1.c; Ex. 1002 ¶147.)

Pet. 49; *see also* Ex. 1002 ¶147, Ex. 1021 ¶23.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

54

Ikeda + Alcivar

Substitute Ikeda's VAD with Alcivar's tissue conduction microphone

1. PO does not address the proposed combination and improperly relies on bodily incorporation

“It is well-established that a determination of obviousness based on teachings from multiple references does not require an actual, physical substitution of elements.”

In re Mouttet, 686 F.3d 1322, 1332 (Fed. Cir. 2012)

The test “is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference.”

In re Keller, 642 F.2d 413, 425 (Cust. & Pat. App. 1981)

Ikeda + Alcivar

Substitute Ikeda's VAD with Alcivar's tissue conduction microphone

2. Alcivar's tissue conduction microphone is not limited to near-field noise

Alcivar would only be limited to addressing near-field noise if it is assumed that the throat microphone is insulated and is part of the rest of Alcivar's diver's mask. Without the layer of sound absorbing material, Alcivar's tissue conduction microphone would operate to provide an accurate voice activity signal, and would not be limited to detecting only near-field noise as Dr. Sayeed argues. Thus, the proposed combination does not present any of the near-field versus far-field complications that Dr. Sayeed assumes exist.

Ex. 1021 ¶23; see Reply 20.

Ikeda + Alcivar

Substitute Ikeda's VAD with Alcivar's tissue conduction microphone

3. Even considering PO's combination (with Alcivar's insulation and mask), Ikeda is not limited to far-field noise

24. Even if the combination were as Dr. Sayeed alleges, there is nothing in Ikeda that limits it to addressing only far-field noise. Ikeda does not specify any limits to the types of noise that it addresses, whether far-field or near-field noise, or any other types of noise. Thus, a POSITA would not have understood that Alcivar and Ikeda necessarily address different types of noise. But even if Alcivar were limited to near-field noise, and even if Ikeda were limited to far-field noise, this different would not have discouraged a POSITA from performing the proposed combination for the same reasons as discussed above regarding Ikeda's adaptive filters. Specifically, Ikeda's adaptive filters operate to remove the portion of the noise from the main microphone signal that is correlated with the noise in the reference microphone (and to remove the portion of the desired signal from the reference microphone signal that is correlated with the desired signal in the main microphone signal). Ikeda's system therefore still operates to reduce the portion of noise (or desired signal), as needed.

Ex. 1021 ¶¶24; see Reply 20-21.

11	Q. But the near-field noise signals, those
12	describe undesired signals; correct?
13	A. The far-field noise is also undesired so they
14	are both undesired.

Sayeed Tr., Ex. 1020, 52:11-14; see Reply 21.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

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