

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

META PLATFORMS, INC.,
Petitioner,

v.

JAWBONE INNOVATIONS, LLC,
Patent Owner.

IPR2023-01291
Patent 8,467,543 B2

Before GEORGIANNA W. BRADEN, NORMAN H. BEAMER,
and JASON M. REPKO, *Administrative Patent Judges*.

BEAMER, *Administrative Patent Judge*.

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

On August 31, 2023, Meta Platforms, Inc. (“Petitioner”) filed a Petition (“Pet.”) pursuant to 35 U.S.C. §§ 311–319 to institute an *inter partes* review of claims 1–26 of U.S. Patent No. 8,467,543 B2 (“the ’543 patent”). Paper 1. On December 11, 2023, Jawbone Innovations, LLC (“Patent Owner”) filed a Preliminary Response (“Prelim. Resp.”). Paper 6. As authorized by the Board, Petitioner filed a Reply (“Prelim. Reply”) and Patent Owner filed a Sur-Reply (“Prelim. Sur-Reply”), directed to a claim construction issue. Papers 8, 9.

The standard for instituting an *inter partes* review is set forth in 35 U.S.C. § 314(a), which provides that an *inter partes* review may not be instituted unless the information presented in the Petition and any preliminary response shows that “there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.”

For the reasons explained below, we determine that Petitioner has established a reasonable likelihood that it would prevail with respect to at least one challenged claim. Accordingly, we institute an *inter partes* review as to the challenged claims and grounds raised in the Petition.

II. BACKGROUND

A. The ’543 Patent

The ’543 patent, titled “Microphone and Voice Activity Detection (VAD) Configurations for Use with Communication Systems,” was filed on

March 27, 2003, issued on June 18, 2013, and lists a related provisional application filed March 27, 2002.¹ Ex. 1001, codes (54), (22), (45), (60).

The '543 patent is directed to handset and headset systems with a two-microphone array to receive acoustic signals and a Voice Activity Detector (VAD) device to provide human voicing activity information. Ex. 1001, code (57). The systems receive a control signal from the VAD to automatically select a denoising method appropriate to data of frequency subbands of the acoustic signals, which is applied to the acoustic signals to generate denoised acoustic signals when the acoustic signal includes speech and noise. *Id.* Figure 1 is reproduced below.

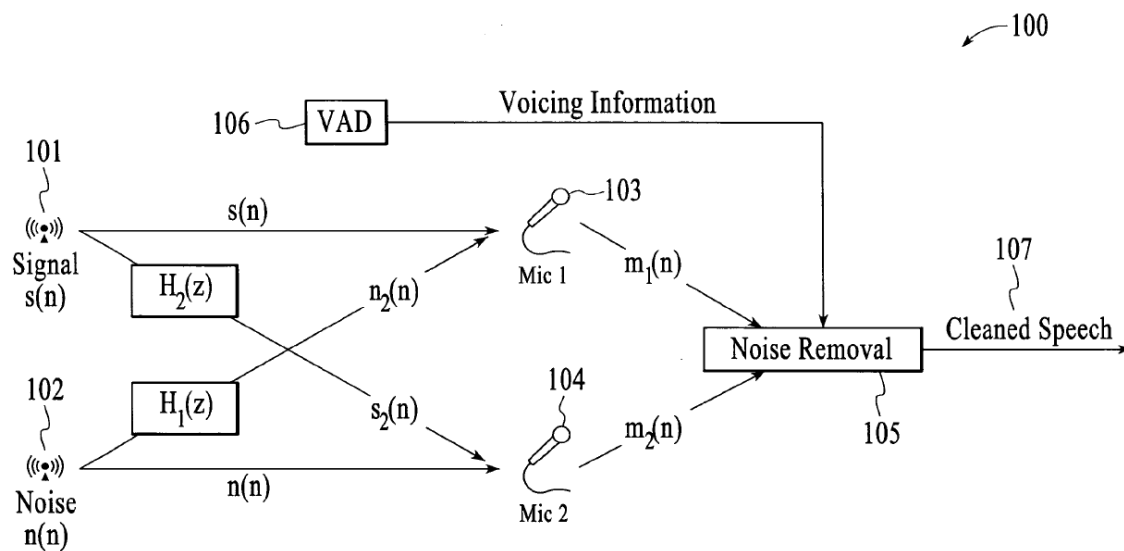


Figure 1 is a block diagram of the noise removal system. Ex. 1001, 2:23–25. Microphones Mic 1 (103) and Mic 2 (104) receive acoustic information from speech signal source 101 and noise source 102, and the acoustic information received at each microphone is provided to Noise Removal system 105. *Id.*

¹ It is unnecessary at this stage to determine whether the '543 patent is entitled to priority based on the application date of the provisional. *See* Anderson Decl. ¶ 15.

at 5:18–24, 14:40–54. VAD 106 detects the presence of speech by detecting vibrations of the trachea, neck, cheek, and head associated with the production of speech, and can be an electromagnetic device, such as a General Electromagnetic Sensor (GEMS), an accelerometer, or a skin surface microphone. *Id.* at 6:9–12, 11:50–60. VAD 106 provides a control signal to Noise Removal system 105 to indicate the occurrence of speech, which is used to control the method of noise removal. *Id.* at 5:33–36, 14:51–52. An example of a control signal is described:

A common representation of VAD information [i.e, a control signal] is a one-bit digital signal sampled at the same rate as the corresponding acoustic signals, with a zero value representing that no speech has occurred during the corresponding time sample, and a unity value indicating that speech has occurred during the corresponding time sample.

Ex. 1001, 4:52–57.

The system processes the acoustic information in multiple subbands in the frequency domain, by determining the noise components in the subbands when speech is absent, and subtracting those noise components from the overall signal to generate cleaned speech 107. *Id.* at 14:52–56, 16:9–12, 16:31–40. According to the '543 patent:

Significant noise suppression can only be achieved through the use of multiple subbands in the processing of acoustic signals.

. . . .

The signals from both the primary and secondary microphones are filtered into multiple subbands, and the resulting data from each subband . . . is sent to its own adaptive filter. . . . The noise-suppressed results from each subband can be added together to form the final denoised signal at the end.

Ex. 1001, 16:9–11, 31–40.

One arrangement of the microphones is illustrated in Figure 7A reproduced below.

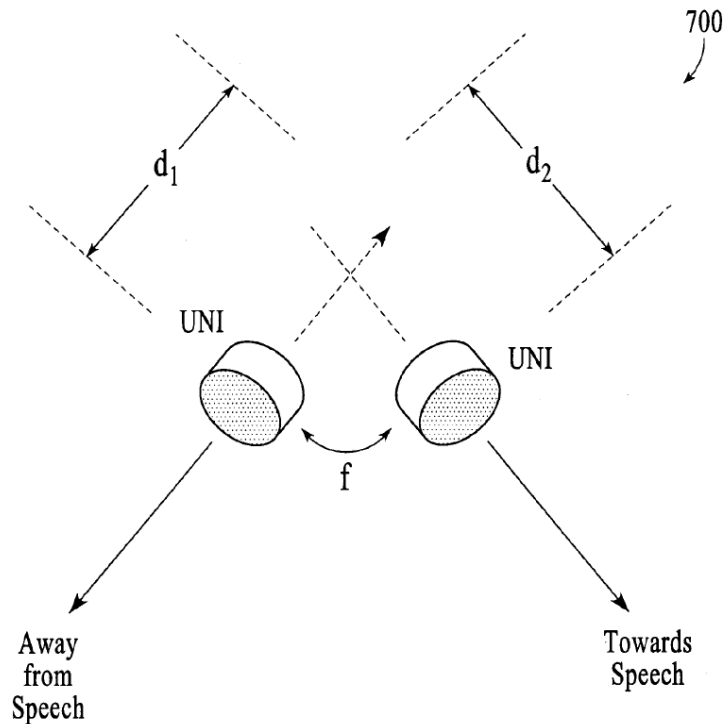


Figure 7A shows a microphone configuration using a unidirectional speech microphone and a unidirectional noise microphone, in which the speech microphone is directed toward speech and the noise microphone is directed away from speech, and the microphones are at an angle f of 60–135 degrees, and distances d_1 and d_2 of 0–15 cm. Ex. 1001, 3:4–6, 9:46–52. Other disclosed embodiments use a unidirectional speech microphone and an omnidirectional noise microphone, or an omnidirectional speech microphone and a unidirectional noise microphone. *Id.* at Figs. 3A, 5A, 2:34–37, 2:41–43.

The '543 Specification asserts that, compared to the prior art, the disclosed invention “make[s] all the difference in terms of noise suppression performance, including using VAD information to control adaptation of the

noise suppression system to the received signals, [and] using numerous subbands to ensure adequate convergence across the spectrum of interest” Ex. 1001, 16:44–52.

B. Illustrative Claim

Independent claim 1 is reproduced below.²

1. A communications system, comprising:
 - [a] a voice detection subsystem configured to receive voice activity signals that includes information associated with human voicing activity,
 - [b] the voice detection subsystem configured to automatically generate control signals using the voice activity signals; and
 - [c] a denoising subsystem coupled to the voice detection subsystem, the denoising subsystem comprising a microphone array including a plurality of microphones,
 - [d] wherein a first microphone of the array is fixed at a first position relative to a mouth, wherein the first position orients a front of the first microphone towards the mouth,
 - [e] wherein a second microphone of the array is fixed at a second position relative to the mouth, wherein the second position orients a front of the second microphone away from the mouth such that the second position forms an angle relative to the first position, wherein the angle is greater than zero degrees,

² The bracketed letters and paragraph arrangement are taken from the Petition but do not impact our analysis. Pet. xiii–xiv.

- [f] the microphone array providing acoustic signals of an environment to components of the denoising subsystem,
- [g] components of the denoising subsystem automatically selecting at least one denoising method appropriate to data of at least one frequency subband of the acoustic signals using the control signals and processing the acoustic signals using the selected denoising method to generate denoised acoustic signals,
- [h] wherein the denoising method includes generating a noise waveform estimate associated with noise of the acoustic signals and subtracting the noise waveform estimate from the acoustic signal when the acoustic signal includes speech and noise,
- [i] wherein the voice detection subsystem is configured to receive the voice activity signals using a sensor independent from the microphone array and to output the control signals generated from the voice activity signals to the denoising system, the denoising system configured to use the control signals to denoise the acoustic signals from the microphone array.

Ex. 1001, 24:2–37.

C. Evidence of Record

Petitioner relies on the following references (Pet. 1–2):

- Andrea et al., US 5,732,143, filed June 7, 1995, issued March 24, 1998. Ex. 1005 (“Andrea”).
- Hussain et al., *A New Metric for Selecting Sub-band Processing in Adaptive Speech Enhancement Systems*, Proc. 5th European Conference on Speech Communication and Technology (Eurospeech ’97), 2611–14, published September 1997. Ex. 1006 (“Hussain”).

- Holzrichter, US 6,006,175, filed February 6, 1996, issued December 21, 1999. Ex. 1007 (“Holzrichter”).
- Stevens et al., *A Miniature Accelerometer for Detecting Glottal Waveforms and Nasalization*, Journal of Speech and Hearing Research, September 1975, Vol. 18 (No. 3) 594–99. Ex. 1008 (“Stevens”).
- Alcivar, US 3,746,789, filed October 20, 1971, issued July 17, 1973. Ex. 1009 (“Alcivar”).

Petitioner also filed the Declaration of Dr. David V. Anderson in support of the Petition. Ex. 1003 (“Anderson Decl.”).

D. Asserted Challenges to Patentability

Petitioner challenges the patentability of claims 1–26 of the ’543 patent on the following bases (Pet. 2):

Claims Challenged	35 U.S.C. § ³	References
1–2, 5–26	103	Andrea, Hussain, Holzrichter
3	103	Andrea, Hussain, Holzrichter, Stevens
4	103	Andrea, Hussain, Holzrichter, Alcivar

E. Real Parties in Interest

The parties identify themselves as the real parties in interest. Pet. 87; Paper 5, 2.

³ The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) (“AIA”), included amendments to 35 U.S.C. §§ 102 and 103 that became effective after the filing of the application for the ’543 patent. Therefore, we apply the pre-AIA versions of these sections.

F. Related Proceedings

The parties identify the following related proceedings: *Jawbone Innovations, LLC v. Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc.*, Case No. 2:21-cv-00186-JRG (E.D. Tex.); *Jawbone Innovations, LLC v. Amazon.com, Inc. and Amazon.com Services, Inc.*, Case No. 2:21-cv-00435-JRG (E.D. Tex.); *Jawbone Innovations, LLC v. Apple Inc.*, Case No. 6:21-cv-00984-ADA (W.D. Tex.); *Jawbone Innovations, LLC v. Google LLC*, Case No. 6:21-cv-00985-ADA (W.D. Tex.) (“Google case”); *Jawbone Innovations, LLC v. Guangdong OPPO Mobile Telecommunications Corp., Ltd., d/b/a OPPO*, Case No. 3:23-cv-00079 (E.D. Tex.); *Jawbone Innovations, LLC v. HTC Corporation*, Case No. 3:23-cv-00077 (E.D. Tex.); *Jawbone Innovations, LLC v. LG Electronics, Inc.*, Case No. 2:23-cv-00078 (E.D. Tex.); *Jawbone Innovations, LLC v. Meta Platforms, Inc.*, Case No. 6:23-cv-00158 (W.D. Tex.); *Jawbone Innovations, LLC v. Panasonic Holdings Corporation*, Case No. 2:23-cv-00081 (E.D. Tex.); *Jawbone Innovations, LLC v. Sony Electronics Inc.*, Case No. 2:23-cv-01161-MEF-LDW (D.N.J.); and *Jawbone Innovations, LLC v. ZTE Corporation*, Case No. 3:23-cv-00082 (E.D. Tex.). Pet. 88–89; Paper 5, 2–3.

The parties also identify *Samsung and Apple v. Jawbone Innovations, LLC*, IPR2022-00865; *Google v. Jawbone Innovations, LLC*, IPR2022-01027; *Amazon v. Jawbone Innovations, LLC*, IPR2023-00275; *Sony Electronics Inc. v. Jawbone Innovations, LLC*, IPR2023-01222; and *LG Electronics Inc. v. Jawbone Innovations, LLC*, IPR2023-01248. *Id.*

III. ANALYSIS OF PETITIONER’S CHALLENGE

A. *Legal Standards*

To prevail in its challenge, Petitioner must demonstrate by a preponderance of the evidence that the claims are unpatentable. 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d). “In an IPR, the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (2012) (requiring *inter partes* review petitions to identify “with particularity . . . the evidence that supports the grounds for the challenge to each claim”)). This burden of persuasion never shifts to the patent owner. *See Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015) (discussing the burden of proof in *inter partes* review).

A patent claim is unpatentable under 35 U.S.C. § 103 if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) when in evidence, objective indicia of non-obviousness (also called secondary considerations), such as commercial success, long-felt but unsolved needs, and failure of others. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). We analyze grounds based on obviousness in accordance with the above-stated principles.

B. Level of Skill in the Art

In determining whether an invention would have been obvious at the time it was made, 35 U.S.C. § 103(a) requires us to resolve the level of ordinary skill in the pertinent art at the time of the invention. *Graham*, 383 U.S. at 17. The person of ordinary skill in the art is a hypothetical person who is presumed to have known the relevant art at the time of the invention. *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995). Factors that may be considered in determining the level of ordinary skill in the art include, but are not limited to, the types of problems encountered in the art, the sophistication of the technology, and educational level of active workers in the field. *Id.* In a given case, one or more factors may predominate. *Id.*

Petitioner asserts that a person of ordinary skill in the art at the time of the alleged invention of the '543 patent:

[W]ould have had a minimum of a bachelor's degree in computer engineering, computer science, electrical engineering, mechanical engineering, or a similar field, and approximately three years of industry or academic experience in a field related to acoustics, speech recognition, speech detection, or signal processing. Work experience can substitute for formal education and additional formal education can substitute for work experience.

Pet. 4–5 (citing Anderson Decl. ¶ 31). Patent Owner does not dispute Petitioner's proposal at this stage of the proceeding. Prelim. Resp. 11–12.

Petitioner's proposal is consistent with the level of ordinary skill in the art as reflected by the asserted prior art. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001); *GPAC*, 57 F.3d at 1579. On this record, the level of ordinary skill is neither in dispute nor dispositive of any challenge. For purposes of this Decision, we apply Petitioner's articulation.

C. Claim Construction

The Petition was accorded a filing date of August 31, 2023. Paper 3, 1. In an *inter partes* review for a petition filed on or after November 13, 2018, a claim “shall be construed using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. 282(b).” 37 C.F.R. § 42.100(b). We apply the claim construction standard from *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (*en banc*).

Claim terms need only be construed to the extent necessary to resolve the controversy. *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017).

The parties submit that no claim construction is necessary. Pet. 5; Prelim. Resp. 11. Yet, issues regarding the scope of the requirements of claim 1 arise, and are resolved for purposes of this Decision, in Section III.D.5 below.

D. Alleged Obviousness of Claims 1–2 and 5–26 over Andrea, Hussain, and Holzrichter

Petitioner challenges claims 1–2 and 5–26 as obvious over the combination of Andrea, Hussain, and Holzrichter. Pet. 5–70.

1. Andrea

Andrea, titled “Noise Cancellation Apparatus,” issued March 24, 1998 from an application filed June 7, 1995. Ex. 1005, codes (54), (22), (45). Andrea describes techniques to reduce ambient noise, using signal processing circuitry to cancel background noise signals detected at a sensor microphone. *Id.* at code (57). Figure 2 is reproduced below.

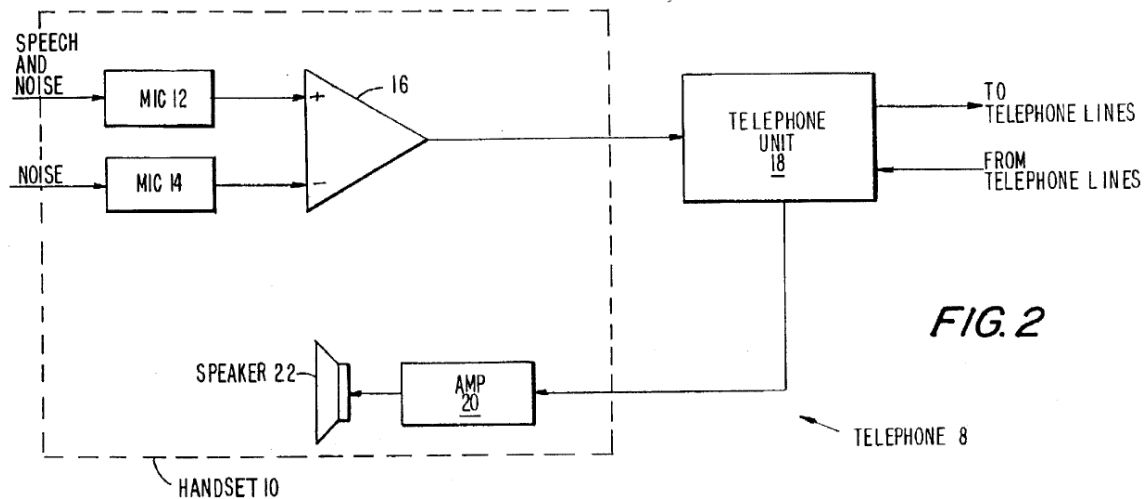


Figure 2 is a block diagram of a noise cancellation apparatus, including microphone 12, which receives speech and background noise, microphone 14, which receives background noise, and operational amplifier 16, which subtracts the noise signal from microphone 14 from the speech and noise signal from microphone 12, thus supplying an electrical signal representing substantially the speech. Ex. 1005, 12:41–66.

Embodiments are disclosed for use in handsets and headsets, with the microphones positioned so that one receives speech and noise, and the other primarily receives noise. Ex. 1005, Figs. 1, 3A, 3B, 9A, 9B, 9C, 13:65–14:34, 14:49–53, 19:11–43, 19:65–20:14. The microphones are arranged such that “the second microphone 14 essentially receives only the same background acoustic noise which is received by the first microphone.” *Id.* at 14: 25–29.

An “enhancement” of the noise cancellation system includes a “talk-thru” capability with a “VOX [voice activated transmission] circuit” that senses speech based on the microphone inputs, which allows audio transmission of voice to be heard in an earphone speaker without removal of a headset. Ex. 1005, Fig. 28, 33:44–34:61.

2. Hussain

Hussain is a conference submission titled “A New Metric for Selecting Subband Processing in Adaptive Speech Enhancement Systems.” Ex. 1006. Petitioner offers evidence that Hussain was publicly available at a “Speech Communication and Technology” conference held September 22–25, 1997, and catalogued at a number of libraries prior to the earliest claimed priority date the ’543 patent. Pet. 9–10. Patent Owner raises no issue as to the prior art status of this reference at this time, and we treat it as prior art pursuant to pre-AIA 35 U.S.C. § 102(a) and § 102(b) for purposes of this Decision.

Hussain discloses an “adaptive noise cancellation scheme” that improves performance in reverberant environments by processing acoustic signals as separate subbands to produce a denoised signal. Ex. 1006, 10–11, 13. Figure 1 is reproduced below.

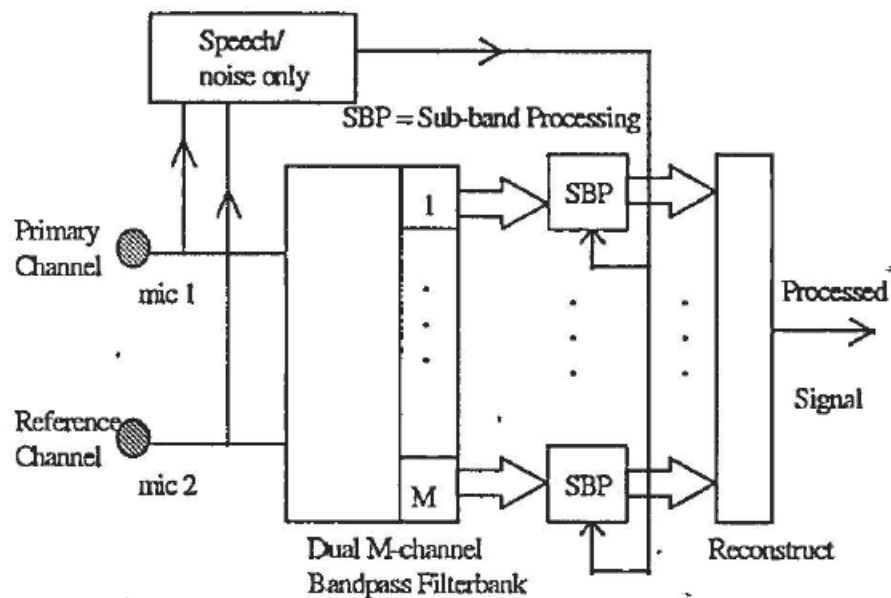


Figure 1: The MMSBA system

Figure 1 is a block diagram of a “Multi-Microphone subband Adaptive (MMSBA) speech enhancement system” including primary channel microphone mic 1 and reference channel microphone mic 2, a “speech/noise only” component that is an “effective voice activity detector (VAD),” and a dual M-channel bandpass filter bank. Ex. 1006, 10–11. The filter bank transforms the acoustic signals into M subbands in the frequency domain, which are provided to subband processing circuits SPB to perform adaptive intermittent noise cancellation, and reconstructed to provide enhanced speech output. *Id.*

3. *Holzrichter*

Holzrichter, titled “Methods and Apparatus for Non-Acoustic Speech Characterization and Recognition,” issued December 21, 1999 from an application filed February 6, 1996. Ex. 1007, codes (54), (22), (45). Holzrichter enhances speech recognition by simultaneously recording electromagnetic wave reflections caused by speech organs and acoustic speech information. *Id.* at code (57). Figure 4 is reproduced below.

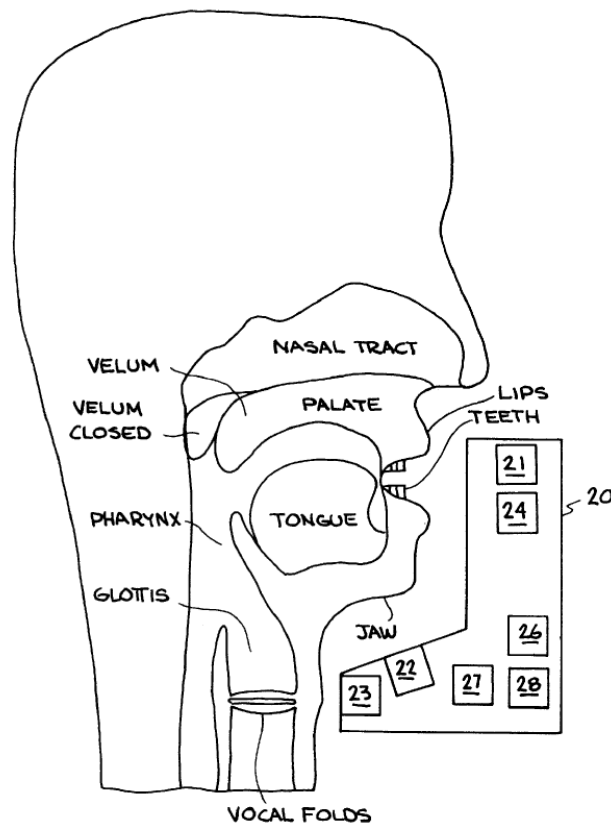


FIG. 4

Figure 4 is a cross sectional view of a head showing speech organs and position of speech recognition module 20 with three electromagnetic (EM) sensors 21–23 or vocal folds, tongue-jaw, and lips, and acoustic sensor 24. Ex. 1007, 7:25–27, 15:11–13, 17:25–26. Signals from acoustic sensor 24 and EM sensors 21–23 are combined to form a vocal tract feature vector, and signals from sensors 21–23 can also be used to generate individual feature vectors, which vectors are pattern matched against stored feature vectors for speech recognition. *Id.* at 17:24–36. The EM sensors can be used to determine if speech is occurring. *Id.* at 12:3–6.

4. *The Combination of Andrea, Hussain, and Holzrichter*

Petitioner argues that one of ordinary skill would have been motivated to combine Andrea's noise cancellation system with Hussain's subband processing and VAD configured to receive voice activity signals including information associated with human voicing activity, because of the known advantages of Hussain's ability to adaptively select the best form of processing for individual frequency subbands to combat reverberation effects and improve noise cancellation, and one of ordinary skill would have reasonably expected to succeed in making such a combination. Pet. 14–17 (citing Anderson Decl. ¶¶ 76–83, 100). Petitioner argues that one of ordinary skill would have been motivated to use Hussain's VAD to receive voice activity signals to determine “noise alone” and “speech plus noise” periods so the system can use Hussain's “adaptive filter” to determine the proper transfer function for each subband. *Id.* at 16–17 (citing Anderson Decl. ¶ 82). Petitioner notes that Hussain explains that subband processing “is capable of outperforming conventional noise cancellation schemes,” like Andrea's full-band processing. *Id.* at 16 (citing Ex. 1006, 10, 12).

Given that Hussain assumes the presence of an “effective voice activity detector (VAD),” Petitioner further argues that it would have been obvious to use the EM sensors of Holzrichter to perform voice detection in the combination because of the known advantages of using such sensors as compared to detecting voice by analyzing acoustic information, and would have reasonably expected to succeed in making such a combination. Pet. 8, 21–23, 38–40 (citing Ex. 1006, 11; Ex. 1007, 10:35–37, 17:4–23, 22:56–63, 24:5–7; Anderson Decl. ¶¶ 88, 91–94, 129–130). Petitioner relies in part on the disclosure in Holzrichter that the EM sensors “provide the information

required for accurate speech recognition” and “provide a significantly better and more accurate representation of the feature vector coefficients.” *Id.* at 21 (citing Ex. 1007, 17:4–23, 24:5–7).

Patent Owner does not address the rationale for combining Andrea and Hussain, but argues that a person of ordinary skill would not have been motivated to remove Holzrichter’s inventive functionality to only extract its EM sensor for use as the VAD in Hussain. Prelim. Resp. 24–28. Patent Owner argues that Holzrichter’s inventive concept is to combine feature vectors obtained from the EM sensor with those obtained from acoustic microphones, to accurately measure the sound to be used for speech recognition. *Id.* at 25 (citing Ex. 1007, Abstract, 7:21–24). Patent Owner submits that Holzrichter’s acoustic sensor is necessary because it detects unvoiced speech that is missed by the EM sensor monitoring vocal-fold motion. *Id.* at 25–26 (citing Ex. 1007, 31:53–57, 32:4–10). Patent Owner argues that Petitioner uses hindsight as the basis for only incorporating the EM sensor of Holzrichter as the VAD of Hussain, leaving behind that acoustic sensor. *Id.* at 26.

Moreover, Patent Owner further argues one of ordinary skill would not have been motivated to only use the EM sensor of Holzrichter as the VAD because that would not have provided the Hussain system with a correct indication of “speech plus noise” versus “noise only,” which is used by the Hussain noise cancellation system to select a denoising method, because it would not have detected unvoiced speech. Prelim. Resp. 27–28 (citing Ex. 1006, Fig. 1, 11, 13).

For purposes of this Decision, we determine that Petitioner has provided sufficiently articulated reasoning with rational underpinnings for

the proffered combined teachings of Andrea, Hussain, and Holzrichter. The Holzrichter system uses both EM and acoustic sensors to detect both voiced and unvoiced speech in order to accurately perform its speech recognition process, determining “onset of speech, rejection of external noise, vocalized pitch periods, articulator conditions, accurate timing, the identification of the speaker, acoustic speech unit recognition, and organ mechanical parameters.” Ex. 1007, Abstract. Voiced speech occurs when the vocal cords are vibrating, and unvoiced speech occurs when the vocal cords are not vibrating.⁴ *Id.* at 22:24–26. Holzrichter explains, and provides examples underscoring, the importance of detecting both voiced and unvoiced speech in a speech recognition application. E.g., *id.* at Figs. 9A–B, 25A–H, 13:19–27, 22:15–29, 31:51–57, 45:2–7.

The record does not support, however, Patent Owner’s attorney argument that one of ordinary skill would accord the same importance to detecting both voiced and unvoiced speech in a noise cancellation application such as is disclosed in the ’543 patent, Andrea and Hussain. “Speech recognition systems . . . are known to experience problems due to levels of background noise that are in fact, considered quite acceptable to human listeners.” Ex. 1006, 10. Andrea does not distinguish between voiced and unvoiced speech. *See generally* Ex. 1005. Hussain simply assumes that “an effective voice activity detector (VAD) is available.” Ex. 1006, 11. The ’543 patent indicates that the degree of precision in

⁴ For example, the “f” in “fox” and the “s” in “Sam” or “sixteen” are unvoiced. Ex. 1007, 22:17, 31:54. Most American English sounds are voiced and almost all words contain one or more voiced sounds within each second of speech. *Id.* at 31:45–47.

distinguishing voice from unvoiced speech is less critical in a noise cancellation context, stating for example, that the transfer function from the speech source to the noise microphone can be ignored. Ex. 1001, Fig. 1, 5:27–28, 15:64–16:8, 17:57–59. Likewise, the ’543 patent indicates that perfect speech detection by the VAD is not necessarily expected, and some errors are acceptable. *Id.* at 18:4–19:10. The only mention of unvoiced speech in the ’543 patent indicates that unvoiced speech is not generally required for the disclosed denoising method:

“[V]oice” is generally understood to include human voiced speech, unvoiced speech, or a combination of voiced and unvoiced speech.

. . . .

The terms “speech” or “voice” as used herein generally refer to voiced, unvoiced, or mixed voiced and unvoiced human speech. Unvoiced speech or voiced speech is distinguished where necessary.

Ex. 1001, 1:47–49, 4:33–39. Indeed, the ’543 patent provides several examples of the claimed “voice detection subsystem”: a “glottal electromagnetic micropower sensor (GEMS)”; an “accelerometer sensor”; and a “skin-surface microphone sensor.” Ex. 1001, 19:53–67, claims 2–4.

Those sensors

detect vibrations of the trachea, neck, cheek, and head associated with the production of speech. These vibrations occur due to the opening and closing of the vocal folds associated with speech production

Id. at 11:55–58, *see* 12:20–23. It appears that these sensors detect vibrations of voiced speech, rather than unvoiced speech that does not cause vibrations.

At this stage, we credit the testimony of Petitioner’s declarant that one of ordinary skill would have has reason to make the combination even if the

VAD of Hussain only detects voiced speech. Anderson Decl. ¶¶ 88, 90–94. As Petitioner argues, one of ordinary skill would have been motivated to use the EM sensor of Holzrichter given its recognized ability to detect speech:

The EM sensor signals provide explicit evidence of specific articulator activities which are very difficult to reliably extract from the acoustic signal. Many speech organ motions are “hidden” and are not extractable from acoustic signals. . . .

. . . .

By using a Single EM sensor to measure the presence or absence of vocal fold motions, one can provide valuable information to a speech recognition system to determine if voiced speech is occurring.

. . . .

[The EM sensor] allows a much better and more accurate model of the vocal organ positions and motions during the speech time frame under measurement, and therefore a significantly better and more accurate representation of the feature vector coefficients.

. . . .

EM sensor measurements of organ location and motion provide the information required for accurate speech recognition.

Pet. 18–23 (citing Ex. 1007, Fig. 3, 10:35–37, 12:3–6, 17:4–23, 24:5–7).

Accordingly, for purposes of this Decision, we accept Partitioner’s proffered combination of combined teachings of Andrea, Hussain, and Holzrichter.

5. Independent Claim 1

a) Petitioner’s Challenge To Independent Claim 1

For the “communications system” preamble of independent claim 1, Petitioner generally relies on the disclosures in Andrea of an “active noise reduction” and “noise cancellation apparatus” for use with “telecommunication,” “audio communication,” and “communication

systems.” Pet. 12–13 (citing Ex. 1005, 6:58–61, 7:9–19, 9:13–21; Anderson Decl. ¶ 72).⁵

For claim requirement 1[a] of a voice detection subsystem,⁶ Petitioner relies on VOX circuit 1950 of Andrea alone, and alternatively on the VAD of Hussain in combination with Andrea. Pet. 13–15 (citing Ex. 1005, 33:44–35:7; Ex. 1006, 10–12; Anderson Decl. ¶¶ 74–76).

For claim requirement 1[b] of generating control signals, Petitioner relies on the “speech signal” at point C 1955, output from VOX circuit 1950 of Andrea. Pet. 17–18 (citing Ex. 1005, 34:22–24; Anderson Decl. ¶ 86). Alternatively, Petitioner relies on the Andrea/Hussain/Holzrichter combination, and in particular on the feature vectors generated by the EM vocal fold sensors of Holzrichter. *Id.* at 18–21 (citing Ex. 1006, 11; Ex. 1007, Figs. 3, 4, 9:42–47, 10:35–37, 12:3–6, 16:44–47, 17:4–29, 17:54–56, 17:61–65, 24:5–7, 58:45–46; Anderson Decl. ¶¶ 87–90). Included in the feature vector is a “voiced/unvoiced” attribute. Ex. 1007, 1:21–24. As Petitioner points out, Holzrichter explains that the vocal fold information signal of the feature vectors “provide[s] valuable information to a speech recognition system to determine if voiced speech is occurring,” and “provide[s] the information required for accurate speech recognition.” *Id.* at 20–21 (citing Ex. 1007, Fig. 3, 12:3–6, 24:5–7).

For claim requirement [1c] of a denoising subsystem including a microphone array, Petitioner relies on microphones MIC12, MIC14, and

⁵ Based on the present record, we make no determination at this stage of the proceeding that the preamble of claim 1 (or of claim 26) is limiting.

⁶ For economy of presentation, we refer to the portions of claim 1 identified by bracketed letters at Section II.B above.

operational amplifier 16 of Andrea, and mic 1, mic 2, and other components of Figure 1 of Hussain. Pet. 23–25 (citing Ex. 1005, Fig. 2, 11:19–20, 12:46–54; Ex. 1006, Fig. 1, 10–11; Anderson Decl. ¶¶ 96–100).

For claim requirement 1[d] of a first microphone, Petitioner relies on the disclosures in Andrea of handset microphone 12, and headset microphone 300, with both microphones pointed towards the mouth. Pet. 25–29 (citing Ex. 1005, Figs. 1, 3A, 3B, 9A, 9C, 13:65–14:29, 19:11–43, 19:65–20:14, 26:19–35; Anderson Decl. ¶¶ 102–106).

For claim requirement 1[e] of a second microphone, Petitioner relies on the disclosures in Andrea of handset microphone 14, and headset microphone 302, with both microphones pointed away from the mouth at an angle greater than zero degrees. Pet. 29–32 (citing Ex. 1005, Figs. 3B, 9A, 9C, 13:65–14:1, 14:7–29, 14:30–34, 19:11–43, 19:65–20:14; Anderson Decl. ¶¶ 108–116).

For claim requirement 1[f] of microphones providing acoustic signals, Petitioner relies on the microphones of Figure 2 of Andrea, which provide acoustic signals to operational amplifier 16. Pet. 33–34 (citing Ex. 1005, Fig. 2, 12:46–66, 35:33–42; Anderson Decl. ¶¶ 118–120).

For claim requirement 1[g] of automatically selecting a denoising method, Petitioner relies on the Andrea/Hussain/Holzrichter combination, in which noise is subtracted from the speech/noise acoustic signal by dividing the signals into multiple subbands and processing each subband by performing adaptive intermittent noise cancellation using an EM sensor VAD, and, based on a control signal (based on the Holzrichter feature vectors) generated by the VAD, detecting “noise alone” periods, when differential acoustic-path transfer functions for each subband are determined,

and “speech plus noise” periods, when the transfer functions are used to denoise the speech. Pet. 35–38 (citing Ex. 1005, Fig. 2, 12:55–66; Ex. 1006, Fig. 1, 10–11, 13; Ex. 1007, Fig. 3, 12:3–6, 17:24–29; Anderson Decl. ¶¶ 122–127).

For claim requirement 1[h] of subtracting noise waveform estimates from the acoustic signals, Petitioner relies on the disclosure in Andrea of operational amplifier 16 subtracting the noise signals from the speech/noise signals. Pet. 40–41 (citing Ex. 1005, Fig. 2, 12:55–66, 14:23–29, 15:29–34, 16:20–23; Anderson Decl. ¶¶ 132–133); Prelim. Reply , 1–3.

For claim requirement 1[i] of using a voice activity sensor independent from the microphone array, Petitioner relies on the EM sensors of Holzrichter. Pet. 41–46 (citing Ex. 1007, Figs. 3, 4, 10:35–47, 16:44–47, 17:24–29, 17:54–58, 27:55–59; Anderson Decl. ¶¶ 135–140). As Petitioner points out, Holzrichter explains that the “EM sensor signals” provide voice activity indications that “are very difficult to reliably extract from the acoustic signal” and these “nonacoustic organ measurements provide important additional information ... for use in increasing the accuracy of speech recognition.” *Id.* at 44 (citing Ex. 1007, 10:35–47).

b) Patent Owner’s Response To Petitioner’s Challenge To Independent Claim 1

With respect to claim requirement 1[a] of a voice detection subsystem, Patent Owner contends that Petitioner’s reliance on VOX circuit 1950 of Andrea is insufficient because Petitioner fails to explain why the VOX circuit’s determination of whether the microphone signal is useable audio satisfies the claim requirement of “receiv[ing] voice activity signals.” Prelim. Resp. 12–13. Patent Owner argues that, to the extent Petitioner

argues that this requirement is inherently disclosed, Petitioner fails to satisfy the legal requirements for proving inherency. *Id.* at 13. In any event, Patent Owner then argues that VOX circuit 1950 receives output from microphones, and thus cannot meet claim requirement 1[i] that “the voice detection subsystem is configured to receive the voice activity signals using a sensor independent from the microphone array.” *Id.* at 13–14.

Patent Owner further argues, with respect to claim requirement 1[a], that Petitioner’s reliance on the combination of Andrea with Hussain, and in particular on the VAD of Hussain, is insufficient because Petitioner does not identify what it contends the voice activity signals are that are received by the VAD. Prelim. Resp. 14. Moreover, Patent Owner argues there is no showing that the VAD includes a “sensor independent from the microphone array,” as required by claim requirement 1[i]. *Id.*

With respect to claim requirement 1[b] of generating control signals, Patent Owner first argues that Petitioner’s reliance on the “speech signal” output of VOX circuit 1950 of Andrea cannot satisfy this requirement because of the above failure to satisfy the requirement of a voice activity sensor independent from the microphone array. Prelim. Resp. 15. Patent Owner further takes issue with Petitioner’s reliance on the combination of Hussain and Holzrichter, and in particular on the feature vectors generated by the EM vocal fold sensors of Holzrichter. *Id.* at 15–16. Patent Owner argues that the feature vectors merely contain “numerical attributes of a set of . . . phonetic descriptions,” which are “compared to a library of feature vectors to identify sounds, syllables, phonemes, or phone-like units,” and thus a feature vector “is not a ‘control signal’ because it does not control anything.” *Id.* at 15–16 (citing Ex. 1007, 1:24–25, 9:63–10:8, 17:27–33).

With respect to claim requirement 1[g] of automatically selecting a denoising method, Patent Owner contends that the Hussain does not use the VAD to select a denoising method. Prelim. Resp. 19. Rather, Patent Owner argues Hussain calculates a “Magnitude Squared Coherence (MSC)” value which is used to select the “best SBP [Sub-Band Processing] option” — i.e., to select the denoising method. *Id.* at 8–10, 19–21 (citing Ex. 1007, 10–12). Patent Owner asserts that the VAD is only used “to determine whether to cancel noise or to adapt the filter during the intermittent noise cancellation SBP option.” *Id.* at 20–21.

With respect to claim requirement 1[h] of subtracting noise waveform estimates from the acoustic signals, Patent Owner argues that Petitioner’s reliance on the electrical signal output from Noise Microphone 14 of Andrea is not a “noise waveform estimate” as required by claim 1. Prelim. Resp. 22. Patent Owner argues, “Petitioner’s position is particularly tenuous in light of the ’543 Patent’s use of transfer functions to estimate the noise waveform.” *Id.* (citing Ex. 1001, 14:40–16:3); *see* Prelim. Sur-Reply , 3. Patent Owner further argues that the fact that the amplitude of the signal from the noise microphone is weighted to match the amplitude of the output of the first microphone does not satisfy the claim requirement at issue. *Id.* at 22–23.

With respect to claim requirement 1[i] of using a voice activity sensor independent from the microphone array, as discussed above, Patent Owner argues that a person of ordinary skill would not have been motivated to remove Holzrichter’s inventive functionality to only extract its EM sensor for use as the VAD in Hussain. Prelim. Resp. 24–28.

Patent Owner does not specifically respond to Petitioner’s arguments regarding the other requirements of independent claim 1. Nonetheless, the

burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015).

c) Analysis of Petitioner’s Challenge To Independent Claim 1

With respect to claim requirement 1[a] of a voice detection subsystem, given that claim requirement 1[i] further modifies the voice detection subsystem to require “using a sensor independent from the microphone array,” we consider those claim requirements together. Accordingly, we agree with Patent Owner that considering Andrea alone is not a fruitful approach given that the VOX circuit uses microphone inputs to detect speech and therefore is not independent from the microphone array. Prelim Resp. 12–13. Petitioner’s alternative challenge to this claim requirement cites the VAD of Hussain, which Patent Owner also argues is not shown to be independent from the microphone array. *Id.* at 14. As Patent Owner acknowledges, however, for claim requirement 1[i], Petitioner relies on the argument that it would have been obvious to incorporate the EM sensor of Holzrichter as the VAD of Hussain. Prelim Resp. 14; Pet. 13–15, 17–18, 41–46. As discussed above, we determine for purposes of this Decision that the record supports Petitioner’s argument incorporating the EM sensor of Holzrichter as the VAD of Hussain. Given that combination, the requirement that the sensor be independent from the microphone array is satisfied.

With respect to claim requirement 1[b] of generating control signals, Patent Owner’s attorney argument that the feature vectors of Holzrichter do not control anything (Prelim. Resp. 15–16) is an unpersuasive challenge to the reference individually, whereas the relevant issue is whether the

combination of references, taken as a whole, would have suggested the patentee's invention to a person having ordinary skill in the art. *In re Keller*, 642 F.2d 413, 425 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986). We credit Petitioner's declarant's testimony that one of ordinary skill would have been motivated to adapt the EM sensor circuitry of Holzrichter to generate the necessary control signals of the combination. Anderson Decl. ¶¶ 87–94, 136–140. Figure 1 of Hussain shows an output signal from the VAD to the Sub-band processing components, and Hussain explains that this signal has two states: “noise alone” and “speech plus noise.” Ex. 1006, Fig. 1, 11. This dovetails with the exemplary control signal of the '543 patent, in which the VAD information is a one-bit digital signal, with a zero value representing that no speech has occurred, and a unity value indicating that speech has occurred. Ex. 1001, 4:52–57. Although the feature vectors as used in Holzrichter are a “set of attributes like formants, pitch, voiced/unvoiced, energy, nasality, and frication, associated with each distinct phoneme” (Ex. 1007, 1:21–25), the feature vectors in the Andrea/Hussain/Holzrichter combination need only convey the one-bit, “noise alone”/“speech plus noise” dichotomy.

With respect to claim requirement 1[g] of automatically selecting a denoising method, we rely on the fact that the MSC values used to select the denoising method are calculated “during the noise alone period,” and that period is determined by an “effective voice activity detector.” Ex. 1006, 11. Thus, the control signal of the VAD (which indicates when the “noise alone period” occurs) is indeed used to select the denoising method. As Petitioner argues, “Hussain's sub-band processing adaptive noise cancellation system

relies on a VAD to determine the ‘noise alone’ and ‘speech plus noise’ periods.” Pet. 37–38 (citing Ex. 1006, 11).

With respect to claim requirement 1[h] of subtracting noise waveform estimates from the acoustic signals, at this stage, we are not persuaded by Patent Owner’s attorney arguments that “noise waveform estimate” must be construed to exclude the noise signal that is applied to operational amplifier 16 of Andrea. Prelim. Resp. 21–23. We see no reason why the noise microphone electrical outputs of Andrea cannot be characterized as noise waveforms. Patent Owner’s argument that the ’543 patent uses transfer functions to estimate the noise waveform is an unpersuasive attempt to limit claim coverage to an illustrative embodiment of the Specification. *See Superguide Corp. v. DirecTV Enter., Inc.*, 358 F.3d 870, 875 (Fed. Cir. 2004); *see* Prelim. Reply, 3. The transfer functions referenced in the ’543 patent are needed to account for the effect of the voice source on the noise microphone and of the noise source on the voice microphone. Ex. 1001, Fig. 1, 14:48–50; Paper 9, 3. However, transfer functions are not needed in the Andrea illustrative embodiment because the microphones are placed such that the noise level is the same at each microphone. Ex. 1005, Figs. 2, 3A–B, 14:7–12, 23–29. In either case, the voice microphone outputs, whether or not modified by a transfer function, are noise waveform estimates.

In sum, mindful that the burden remains on Petitioner to demonstrate unpatentability, *see Dynamic Drinkware*, 800 F.3d at 1378, we determine, on the current record and for purposes of this Decision, that the information presented in the Petition demonstrates a reasonable likelihood that Petitioner will prevail in establishing that claim 1 is unpatentable under 35 U.S.C. § 103(a) over the combination of Andrea, Hussain, and Holzrichter.

6. Dependent Claims 2 and 5–26

Claim 2 requires the voice detection subsystem of claim 1 to further comprise:

- at least one glottal electromagnetic micropower sensor (GEMS) including at least one antenna for receiving the voice activity signals; and
- at least one voice activity detector (VAD) algorithm for processing the GEMS voice activity signals and generating the control signals.

Ex. 1001, 24:38–45. For the claim 2 requirements, Petitioner relies on the EM sensors of Holzrichter, as adapted to the Andrea/Hussain/Holzrichter combination. Pet. 63–67 (citing Ex. 1007, Fig. 4, 9:23–63, 10:64–67, 17:53–63, 21:35–42, 35:2–5, 42:8–12, 50:44–50, 53:22–37; Anderson Decl. ¶¶ 227–242).

Claim 5 requires the voice detection subsystem of claim 1 to further comprise “at least one manually activated voice activity detector (VAD) for generating the voice activity signals.” Ex. 1001, 24:60–63. For the claim 5 requirement, Petitioner relies on the disclosure in Holzrichter of “[using] a finger or other body part to actuate a button or similar sensor device to start the operation of the EM sensor system.” Pet. 67–68 (citing Ex. 1007, 17:43–48; Anderson Decl. ¶¶ 244–245).

Claim 6 adds to claim 1 the requirement of
a portable handset that includes the microphones, wherein the portable handset includes at least one of cellular telephones, satellite telephones, portable telephones, wireline telephones, Internet telephones, wireless transceivers, wireless communication radios, personal digital assistants (PDAs), and personal computers (PCs).

Ex. 1001, 24:63–25:3. Claim 7 adds to claim 6 the requirement that “the portable handset includes at least one of the voice detection subsystem and the denoising subsystem.” *Id.* at 25:4–6. For these requirements, Petitioner relies on the disclosure in Andrea of the handset embodiment including microphones 12 and 14. Pet. 46–48 (citing Ex. 1005 Figs. 1, 2, 12:35–54, 11:20–21, 12:46–54; Anderson Decl. ¶¶ 141–148).

Claim 8 adds to claim 1 the requirement of a “portable headset that includes the microphones along with at least one speaker device.” Ex. 1001, 25:7–9. Petitioner relies on the disclosure in Andrea of the headset embodiment including microphones 300 and 302 and a speaker. Pet. 48–49 (citing Ex. 1005, Figs. 9A, 9C, 6:50–53, 10:14–15, 11:39–47, 19:11–18, 19:65–20:14, 36:64–66; Anderson Decl. ¶¶ 149–152).

Claim 9 adds to claim 8 the requirement that “the portable headset couples to at least one communication device selected from among cellular telephones, satellite telephones, portable telephones, wireline telephones, Internet telephones, wireless transceivers, wireless communication radios, personal digital assistants (PDAs), and personal computers (PCs).” Ex. 1001, 25:10–15. Petitioner relies on the disclosure in Andrea that the headset “can interface with computers, telephones or other equipment.” Pet. 50 (citing Ex. 1005, 26:9–13; Anderson Decl. ¶¶ 153–155).

Claim 10 adds to claim 9 the requirement that “the portable headset couples to the communication device using at least one of wireless couplings, wired couplings, and combination wireless and wired couplings.” Ex. 1001, 25:16–19. Petitioner relies on the disclosure in Andrea that the headset “includes a cable assembly 411 for supplying signals to and from

outside or host equipment.” Pet. 50–51 (citing Ex. 1005, Fig. 9D, 20:42–48, 26:19–21, 26:55–67; Anderson Decl. ¶¶ 156–159).

Claim 11 adds to claim 9 the requirement that “the communication device includes at least one of the voice detection subsystem and the denoising subsystem.” Ex. 1001, 25:20–22. Petitioner relies on the disclosure in Andrea of a telephone device that includes a noise cancellation subsystem. Pet. 51–52 (citing Ex. 1005, Fig. 1, 11:19–20; Anderson Decl. ¶¶ 160–162).

Claim 12 adds to claim 8 the requirement that “the portable headset includes at least one of the voice detection subsystem and the denoising subsystem.” Ex. 1001, 25:23–25. Petitioner relies on the disclosure in Andrea of a headset that includes a noise cancellation subsystem. Pet. 52 (citing Ex. 1005, 11:42–47, 19:65–66; Anderson Decl. ¶¶ 163–164).

Claim 13 adds to claim 8 the requirement that “the portable headset is a portable communication device selected from among cellular telephones, satellite telephones, portable telephones, wireline telephones, Internet telephones, wireless transceivers, wireless communication radios, personal digital assistants (PDAs), and personal computers (PCs).” Ex. 1001, 25:26–31. Petitioner relies on the disclosure in Holzrichter of a headset with wireless capabilities, which Petitioner argues satisfies the “wireless transceiver” option of the claim requirement. Pet. 53–55 (citing Ex. 1007, 8:50–60, 18:4–6, 18:26–29, 18:42–48, 17:53–61, 18:51–53; Anderson Decl. ¶¶ 168–171).

Claim 14 adds to claim 1 the requirement that “the first microphone is a unidirectional microphone and the second microphone is a unidirectional microphone.” Ex. 1001, 25:33–34. For this requirement, Petitioner relies on

the disclosure in Andrea that microphones 12 and 14 of Figure 2 may be implemented with “microphones with other-than-omnidirectional characteristics.” Pet. 55–56 (citing Ex. 1005, 7:20–23; Anderson Decl. ¶¶ 176–178).

Claim 15 adds to claim 14 the requirement that “the first microphone and the second microphone are separated by a distance in a range of approximately zero (0) centimeters to 15 centimeters.” Ex. 1001, 25:35–38. For this requirement, Petitioner relies on the disclosure in Andrea that the microphones are in “relatively close proximity to each other,” such as “within a range of 0.10 to 0.50” inches. Pet. 56–57 (citing Ex. 1005, Fig. 9A, 19:25–28, 19:47–55; Anderson Decl. ¶¶ 179–186).

Claims 16–18 each add to claim 14 the requirement that the angle specified in claim 1 (the angle that the position of the second microphone forms relative to the position of the first microphone) is “approximately greater than zero (0) degrees and one of equal to and less than 180 degrees” for claim 16, “. . . . equal to and less than 135 degrees” for claim 17, and “. . . . equal to and greater [sic] than 90 degrees” for claim 18. Ex. 1001, 25:36–47. For these requirements, Petitioner relies on the disclosure in Andrea that the angle between microphones 12 and 14 in Figure 3B is “preferably . . . between 30° and 60°,” and the angle between the microphones in Figure 9A may be up to 180°. Pet. 57–60 (citing Ex. 1005, Figs. 3B, 9A, 14:9–12, 19:14–17, 19:39–43; Anderson Decl. ¶¶ 188–200).

Claim 19 adds to claim 1 the requirement that “the first microphone is an omnidirectional microphone and the second microphone is a unidirectional microphone,” and claim 24 requires the opposite. Ex. 1001, 25:48–50, 26:3–5. Petitioner relies on the disclosures in Andrea regarding

the use of unidirectional and omnidirectional microphones. Pet. 60–61, 62–63 (citing Ex. 1005, 7:31–37, 14:14–15, 19:11–15, 20:33–38, 34:43, 38:34–37; Anderson Decl. ¶¶ 202–204, 221–225).

Claims 20 and 25 add to claims 19 and 24, respectively, the requirement that “the first microphone and the second microphone are separated by a distance approximately in a range of zero (0) centimeters to 15 centimeters.” Ex. 1001, 25:51–54, 26:6–9. Petitioner refers to the arguments for claim 15, discussed above, which adds the same requirement to claim 14. Pet. 61, 63.

Claims 21–23 each add to claim 19 the requirement that the angle specified in claim 1 (the angle that the position of the second microphone forms relative to the position of the first microphone) “is approximately in a range of 30 degrees to 180 degrees.” for claim 21, “is approximately in a range of 60 degrees to 180 degrees” for claim 22, and “is approximately in a range of 90 degrees to 180 degrees.” for claim 23. Ex. 1001, 25:55–26:2. For these requirements, Petitioner refers to the arguments for claims 16–18, discussed above, which adds the same requirements to claim 14. Pet. 61–62.

Claim 26 essentially adds the requirements of claims 8, 9, and 11 to claim 1. Ex. 1001, 26:10–57. Petitioner refers to the arguments for those claims. Pet. 69–70.

Other than its arguments directed to independent claim 1, Patent Owner does not specifically respond to Petitioner’s arguments regarding dependent claims 2 and 5–26. *See generally* Prelim. Resp. Nonetheless, the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378. We determine, on the current record and for purposes of this Decision, that the information presented in the Petition

demonstrates a reasonable likelihood that Petitioner will prevail in establishing that claims 2 and 5–26 are unpatentable under 35 U.S.C. § 103(a) over the combination of Andrea, Hussain, and Holzrichter.

E. Alleged Obviousness of Claim 3 over Andrea, Hussain, Holzrichter, and Stevens and of Claim 4 over Andrea, Hussain, Holzrichter, and Alcivar

Petitioner challenges claim 3 as obvious over the combination of Andrea, Hussain, Holzrichter, and Stevens, and claim 4 over the combination of Andrea, Hussain, Holzrichter, and Alcivar. Pet. 70–81.

Claim 3 requires the voice detection subsystem of claim 1 to further comprise:

- at least one accelerometer sensor in contact with skin for receiving the voice activity signals; and

- at least one voice activity detector (VAD) algorithm for processing the accelerometer sensor voice activity signals and generating the control signals.

Ex. 1001, 24:46–53. For claim 3, Petitioner relies on Stevens, which discloses using a “lightweight accelerometer” “attached to the neck of a speaker” to “obtain a waveform related to the glottal acoustic output.”⁷

Ex. 1008, Fig. 1, pp. 4–5. Petitioner argues that it would have been obvious to one of ordinary skill in the art to use the accelerometer of Stevens as the VAD in the Andrea/Hussain/Holzrichter combination. Pet. 72–76 (citing Ex. 1008, Fig. 1, pp. 4–5; Anderson Decl. ¶¶ 262–275).

⁷ Petitioner offers evidence that Stevens was publicly available in 1975 when it was published in a journal and cataloged in a library. Pet. 71–72 (citing Ex. 1015 ¶¶ 13–15, Appx. B (Field 245), Appx. C). Patent Owner raises no issue as to the prior art status of this reference at this time, and we treat it as prior art pursuant to pre-AIA 35 U.S.C. § 102(a) and § 102(b) for purposes of this Decision.

Claim 4 requires a “skin-surface microphone sensor in contact with skin for receiving the voice activity signals,” along with a VAD algorithm to generate the control signals. Ex. 1001, 24:53–59. For claim 4, Petitioner relies on Alcivar, which discloses speech detection using a “tissue-conduction microphone” “positioned in contact with the user’s neck tissue in the vicinity of the larynx” to detect “tissue vibrations due to modulation of the vocal chords [sic] (speech).” Ex. 1009, code (57), 4:67–5:6. Petitioner argues that it would have been obvious to one of ordinary skill in the art to use the tissue-conduction microphone of Alcivar as the VAD in the Andrea/Hussain/Holzrichter combination. Pet. 77–81 (citing Ex. 1009, code (57), 4:66–5:31, 6:6–9; Anderson Decl. ¶¶ 281–293).

Other than its arguments discussed above regarding the combination of Andrea, Hussain, Holzrichter, which we find unpersuasive, Patent Owner does not specifically respond to any other of Petitioner’s arguments regarding claims 3 and 4. *See generally* Prelim. Resp. Nonetheless, the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378. We determine, on the current record and for purposes of this Decision, that the information presented in the Petition demonstrates a reasonable likelihood that Petitioner will prevail in establishing that claim 3 is unpatentable under 35 U.S.C. § 103 over the combination of Andrea, Hussain, Holzrichter, and Stevens, and claim 4 is unpatentable under 35 U.S.C. § 103(a) over the combination of Andrea, Hussain, Holzrichter, and Alcivar.

IV. CONCLUSION

After considering the evidence and arguments presented in the Petition and the Preliminary Response, Petitioner has established a

reasonable likelihood of prevailing on its assertion that at least one claim of the '543 patent is unpatentable. Accordingly, we institute an *inter partes* review on all the challenged claims and all of the grounds presented in the Petition. At this stage of the proceeding, we have not made a final determination as to the patentability of these challenged claims.

V. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that pursuant to 35 U.S.C. § 314, *inter partes* review is instituted as to the challenged claims of the '543 patent with respect to all grounds of unpatentability presented in the Petition; and

FURTHER ORDERED that *inter partes* review is commenced on the entry date of this Order, and pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial.

IPR2023-01291
Patent 8,467,543 B2

For PETITIONER:

Lisa Nguyen
David Tennant
Alan Billharz
Colby Davis
Grace Wang
ALLEN & OVERY LLP
Lisa.nguyen@allenoverly.com
David.tennant@allenoverly.com
Alan.billharz@allenoverly.com
Colby.dais@allenoverly.com
Grace.wang@allenoverly.com

For PATENT OWNER:

Peter Lambrianakos
Vincent Rubino
Enrique Iturralde
Richard Cowell
Jacob Ostling
FABRICANT LLP
plambrianakos@fabricantllp.com
vrubino@fabricantllp.com
eiturralde@frabricantllp.com
rcowell@fabricantllp.com
jostling@fabricantllp.com