

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

META PLATFORMS, INC.,

Petitioner,

v.

JAWBONE INNOVATIONS, LLC,

Patent Owner.

Patent No. 8,467,543

Filing Date: March 27, 2003

Issue Date: June 18, 2013

Inventor: Gregory C. Burnett, Nicolas J. Petit,
Alexander M. Asseily, and Andrew E. Einaudi

Title: MICROPHONE AND VOICE ACTIVITY DETECTION (VAD)
CONFIGURATIONS FOR USE WITH COMMUNICATION SYSTEMS

PATENT OWNER'S SUR-REPLY

Case No. IPR2023-01291

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EXHIBIT LIST

Exhibit No.	Description of Document
2001	Deposition of David Anderson, taken June 14, 2024
2002	<i>unused</i>
2003	Declaration of Akbar M. Sayeed, Ph.D.
2004	Curriculum Vitae of Akbar M. Sayeed, Ph.D.
2005	Deposition of David V. Anderson, Ph.D., taken March 1, 2023, in IPR2022-01027

Meta's Reply demonstrates that no claims are rendered obvious under the proposed combination. Indeed, Meta and its expert are unable to even agree on what the combination would be. But even assuming Meta's combination is the one proposed in the Petition, notwithstanding its expert's express disavowal of that combination, Meta fails to show that any claim is obvious.

For example, Meta ignores the '543 Patent's specification to argue that the "generating a noise waveform estimate" claim term essentially has no meaning and encompasses the prior art that the inventors designed the '543 Patent to specifically improve upon. Indeed, Meta does not even address the relevant portions of the specification. Reading the generating term to encompass Andrea's simple microphone output is contrary to the specification and common sense.

Moreover, Meta attempts to rely on the non-prior art '162 Patent's specific disclosure of a GEMS sensor to argue that one piece of Holzrichter's voice recognition system could be the claimed sensor independent from the microphone array. As discussed below, Holzrichter cannot detect the full range of speech necessary to meet the claims of the '543 Patent.

Accordingly, the Board should issue a Final Written Decision finding all claims not shown to be unpatentable.

I. CLAIM CONSTRUCTION

A. “voice detection subsystem,” “voice activity signals,” “human voicing activity”

Jawbone’s Construction	Petitioner’s Construction
“a subsystem that detects the presence of speech, including voiced and unvoiced speech”	No construction necessary.
“signals that indicate speech activity, including voice and unvoiced speech activity”	Alternatively, “voice detection subsystem,” includes at least a “GEMS” (which solely detects voiced speech), an “accelerometer sensor in contact with skin,” or a “skin-surface microphone sensor,”
“human speech activity, including voiced speech and unvoiced speech”	

Meta argues that the VAD-related terms should not be construed to include both voiced and unvoiced speech because the intrinsic record permits the terms to refer to voice speech alone, unvoiced speech alone, or a combination of both voice and unvoiced speech. Reply at 1. As Jawbone explained, however, the specification explains that “[u]nvoiced speech or voiced speech is distinguished where necessary” and that no distinction is made in the VAD context. POR, 16 (quoting ’543 Patent, 4:35-36). Bizarrely, Meta quotes the same passage, but does not explain how it helps Meta’s case, merely (erroneously) stating that “PO ignores this.” Reply, 2. Because the specification uses “speech” in the context of voice detection without qualification, a POSITA would understand that the voice detection includes both voiced and unvoiced speech. POR 14-16.

Meta resorts to misquoting the '543 Patent's specification to argue that a GEMS sensor sensing only voiced speech is a sufficient VAD. The specification states that a GEMS sensor that senses vocal fold vibrations “*can* lead to a very accurate noise-robust VAD,” '543 Patent at 11:57-60 (emphasis added), but Meta modified this disclosure to state that a GEMS sensor “*lead[s]* to a very accurate noise-robust VAD,” Reply at 2 (citing '543 Patent at 11:55-60) (emphasis added). This modification was apparently made to give the impression that the specification implied that a GEMS sensor *alone* could be a sufficient VAD, even though the specification merely states that a GEMS sensor “can lead to” an accurate VAD.

Meta further relies on statements in U.S. Application No. 10/383,162 (the “'162 Application”) —“denoising using the GEMS-based VAD information is effective”—that relate to the invention claimed in that application and are inapplicable to the invention claimed in the '543 Patent. Reply, 2. The cited statements describe the '162 Application's denoising embodiments, not the '543 Patent's different process. Indeed, Petitioner does not provide any expert testimony as to how one of skill in the art would read the incorporated reference, especially when the relied-on passage is absent from the '543 Patent. Absent that evidence, the '162 Application's disclosure is not relevant to this issue. *Finjan LLC v. ESET, LLC*, 51 F.4th 1377, 1382 (Fed. Cir. 2022) (“[I]ncorporation by reference does not convert the invention of the incorporated patent into the invention of the host patent. Rather,

the disclosure of the host patent provides context to determine what impact, if any, a patent incorporated by reference will have on construction of the host patent claims.”) (internal citations omitted). Indeed, the use of a term in an earlier application does not necessarily apply to a later patent that has deleted the term. *Id.* at 1383.

Meta next relies on claim 2. However, claim 2 undermines Meta’s position and supports Patent Owner’s because it requires using at least one GEMS sensor *in addition to* “the sensor independent from the microphone array” that is part of the voice detection system of claim 1. Claim 2 recites “[t]he system of claim 1, wherein the voice detection subsystem *further comprises*” at least one GEMS sensor. ’543 Patent, 24:38-42 (emphasis added). Thus, the claim 2 system includes the voice detection subsystem and sensor of claim 1 *and* at least one GEMS sensor that can sense voiced speech. Meta misunderstands claim construction law by arguing that Patent Owner’s construction would exclude a GEMS sensor. Reply, 4. But that is not the case; the voice detection subsystem could include a GEMS sensor in addition to the portion of the system that detects unvoiced speech.

Meta’s citation to the ’162 Application suggests that the inventors of that application, which are common to the ’543 Patent, had invented a GEMS sensor that was a sufficient VAD notwithstanding its inability to sense unvoiced speech. *Id.* at 2-3. This evidence, which addresses only one of the many types of sensors disclosed

in the '543 Patent, does not suggest that the claimed “voice detection system” can rely solely on a GEMS sensor or that Patent Owner’s construction would “read out the express limitation of dependent claim 2.” *Id.* at 4. As discussed, claim 2 does not include *only* a GEMS sensor in its voice detection subsystem. Rather, claim 2 *adds* a GEMS sensor to the voice detection subsystem of claim 1, which contains its own “sensor independent from the microphone array.” Had the inventors believed that a GEMS sensor was sufficient to support the claimed “voice detection subsystem,” they could have included a dependent claim in which the *sensor* of claim 1 *comprises* a GEMS. They did not. In fact, claim 2’s addition of at least one GEMS sensor to the voice detection subsystem of claim 1 suggests that the sensor in claim 1 is not a GEMS sensor. Since the claims do not teach that a GEMS sensor (or claims 3’s accelerometer or claims 4’s skin-surface microphone) is sufficient on its own to constitute a VAD, Meta’s repeated arguments that the claimed “sensor independent from the microphone array” of claim 1 must be broad enough to include a GEMS sensor that detects only voiced speech should be rejected. *Id.* at 4-6.

Meta also minimizes the specification’s teaching that the purpose of a VAD is “to instruct the Pathfinder system when to adapt the coefficients of H_1 (noise only) and H_2 (if needed, when speech is being produced)” by observing that a system without a VAD would not realize the advantages of a VAD. *Id.* at 3 (quoting Ex. 1001, 16:65-67). This argument actually supports Patent Owner’s construction

because it requires that a VAD be capable of discerning a noise-only period which requires that the speech period include all speech, not merely voiced speech.

Meta further irrelevantly argues that the GEMS being a preferred embodiment of a different patent's "voicing sensor" somehow applies here. Reply, 4-5. But the terms are different ("voicing sensor" vs. "sensor independent from the microphone array"), and the patents are not continuations of one or the other. Thus, those statements do not control the construction of the terms here, especially in the absence of any evidence tying them together.

Finally, Petitioner argues that the Board may alternatively construe the term "voice detection subsystem configured to receive voice activity signals that includes information associated with human voicing activity" such that it "includes at least a 'GEMS' (which solely detects voiced speech), an 'accelerometer sensor in contact with skin,' or a 'skin-surface microphone sensor.'" Reply, 6. Such a construction would render claims 2-4 redundant, and is contrary to claim 2-4's express language wherein the voice detection subsystem *further* comprises such sensors.

Meta does not address the '543 Patent's explicit discussion of how its invention is different from, and improves on, an Andrea-type system where the output of a microphone is simply subtracted. POR, 21-23. Meta provides no distinction between Andrea and the "classical ANC configuration" from which the inventors specifically distinguished the '543 Patent.

Accordingly, the Board should construe the terms as Jawbone suggests.

B. “generating a noise waveform estimate associated with noise of the acoustic signals”

Jawbone’s Construction	Petitioner’s Construction
“calculating a noise estimate based on the noise associated with all the acoustic signals”	No construction necessary.

As Jawbone explained, its proposed construction is compelled by the intrinsic evidence. Petitioner raises no valid argument to the contrary.

Petitioner first argues that the use of “subtracting” in the claims means that “generating” must be broader than “calculating.” Reply, 7. According to Petitioner, because subtracting is a form or subset of calculating, the applicants would have used something other than “generating” to specify a calculation. Petitioner’s argument is nonsensical. *Id.* The POR explains in detail that the embodiment’s calculation that results in the noise waveform estimate ($M_2(z)H_1(z)$, where $H_1(z) = \frac{M_{1n}(z)}{M_{2n}(z)}$) is not a subtraction. POR, 19-21. Thus, the applicants did not draft “generating” as “subtracting,” but used a broader term to allow for other calculations. Moreover, the cases Petitioner cites are off-topic; both stand for the unremarkable proposition that different words have different meanings. Reply, 7. Here, the claims and construction use different words.

Petitioner misrepresents the specification as never using “calculate” with the noise waveform estimate. But the specification repeatedly explains that, for example, $H_1(z)$ (a component of the noise waveform estimate) is the result of a calculation. *E.g.*, ’543 Patent, 9:19 (“calculation of $H_1(z)$ ”); 15:9-19 (setting out $H_1(z) = \frac{M_{1n}(z)}{M_{2n}(z)}$ and explaining “[n]ow, $H_1(z)$ can be **calculated** using any of the available system identification algorithms and the microphone outputs when only noise is being received.”); 15:35-50; 17:52-55.

Petitioner further mischaracterizes Jawbone’s argument as limiting the claims to one embodiment. Reply, 7-8. But despite referring to “multiple embodiments,” Petitioner identifies no embodiments that would be excluded. Indeed, $S(z)$ is specifically defined as:

$$S(z) = \frac{M_1(z) - M_2(z)H_1(z)}{1 - H_2(z)H_1(z)}.$$

Id., 14:61-15:63 (noting that “[t]his is the general case for **all** realistic two-microphone systems.”).

Petitioner next attempts to conflate this term with “generate control signals” and “generate denoised acoustic signals.” First, the term at issue is “generating a noise waveform estimate”; both “estimate” and “generating” in form a POSITA that a calculation is necessary. POR, 18. Second, the “generate[d] denoised acoustic signals” are the result of a calculation, as Petitioner admits. Reply, 8. Finally, the

precise scope of “generate[d] control signals” is not at issue here; thus no party has briefed the term. *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017).

Next, Petitioner misrepresents Patent Owner’s argument with regard to “the acoustic signals.” Reply, 9. As the POR explained, the noise waveform is generated from “the noise of ***the acoustic signals***.” POR, 17-19. Petitioner ignores “the,” which must refer back to the only defined set of “acoustic signals”—those “provid[ed]” from the microphone array. *Haemonetics Corp. v. Baxter Healthcare Corp.*, 607 F.3d 776, 781-82 (Fed. Cir. 2010) (holding that later reference to “the centrifugal unit” had to refer to the entire centrifugal unit defined earlier in the claim).

Instead, Petitioner focuses, out of context, on other uses of “acoustic signals.” Reply, 9. For example, Petitioner tries to show some inconsistency between “denoised acoustic signals” and “the acoustic signals.” *Id.* But the “denoised acoustic signals” are a different set of acoustic signals, distinguished by the label “denoised.”

Finally, Petitioner quibbles with the use of “based on.” Reply, 10. As Jawbone’s expert explained, the difference between “associated with” and “based on” is that the “based on” relationship is “going one way.” Ex. 1018, 101:10-19. This is only logical in the context of the claims because the noise waveform estimate

is generated from the noise of the acoustic signals, and there is no suggestion or possibility that the noise of the acoustic signals is somehow influenced by the noise waveform estimate.

Accordingly, the Board should adopt Jawbone's construction.

II. GROUND 1: ANDREA, HUSSAIN, AND HOLZRICHTER DO NOT RENDER OBVIOUS CLAIMS 1-2 AND 5-26

A. Meta's Combination Does Not Render Obvious "wherein the denoising method includes generating a noise waveform estimate associated with noise of the acoustic signals," [1H]

1. The Combination Does Not Render the Limitation Obvious under the Proper Construction

Petitioner first repeats its claim construction arguments with respect to "generating control signals," "acoustic signals," and "associated with," which, as explained above, find no support in law or the intrinsic evidence.

Petitioner next offers a new argument, lacking any evidentiary support, that Hussain discloses this limitation. Reply, 13-14. Petitioner's new position is at odds with its Petition, which identifies Andrea, alone, as rendering this limitation obvious. Pet., 40; *see also* Ex. 1003, ¶¶ 131-133. The governing IPR statute requires a Petitioner to identify "with particularity . . . the grounds on which the challenge to each claim is based, and the evidence that supports the grounds for the challenge to each claim." 35 U.S.C. § 312(a)(3). The Board should thus decline to consider this new Reply argument, which is unsupported by any expert testimony, utilizes a

different reference to meet the element, and denied Jawbone the chance to respond with expert testimony. *In re Magnum Oil Tools Int'l, Ltd.*, 829 F.3d 1364, 1381 (Fed. Cir. 2016) (“Instead, the Board must base its decision on arguments that were advanced by a party, and to which the opposing party was given a chance to respond.”); *Intelligent Bio-Systems, Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1369 (Fed. Cir. 2016) (“Unlike district court litigation – where parties have greater freedom to revise and develop their arguments over time and in response to newly discovered material – the expedited nature of IPRs bring with it an obligation for petitioners to make their case in their petition to institute.”).

Even if the Board were to consider it, the argument must fail. Petitioner simply states “Hussain’s SBP modules perform calculations to extract noise from the acoustic signals.” Reply, 14. Even if true, there is no disclosure of calculating a noise waveform estimate as required; Petitioner does not even attempt to identify one. The Board should reject this unsupported attorney argument.

Accordingly, the combination does not render any claims obvious under the proper construction.

2. The Combination Does Not Render the Limitation Obvious under the Claim Language as Written

The POR explains that the combination does not render the “generating” limitation obvious under the claim language as written. POR, 28-30. Meta

acknowledges this portion of the POR, but does not respond to it in Reply. Reply,

10. *See generally* Reply, 10-14.

**B. Meta’s Combination Does Not Disclose or Render Obvious
“subtracting the noise waveform estimate from the acoustic
signal when the acoustic signal includes speech and noise,”
[1H] Because a POSITA Would Not Make the Combination**

Meta’s Reply lays bare a significant problem with its Petition: the Petition fails to describe the combination with sufficient particularity. Indeed, neither Petitioner nor its expert can seem to keep the combination straight.

The Petition identifies only Andrea’s op-amp as performing the subtraction. Pet., 40-41. In an earlier deposition regarding his declaration,¹ Dr. Anderson repeatedly and specifically stated that *only* Andrea’s microphones and pre-amps were included into the resulting combination, and that the op-amp that performed the subtraction was “scrapped.” Ex. 2005 58:13-18 (“What I’m scrapping is the differentiating amplifier”); 41:14-24. *See also id.*, 42:13-20 (“In the drop-in replacement that you mentioned between Andrea and Hussain, would the op-amp of Andrea be included in the combination? A. So Andrea has multiple op-amps. Are you referring to the one shown in Figure 2? Q. Yes, I am. *A. No.*”); 43:8-10 (“Andrea

¹ When deposed in this case, Dr. Anderson confirmed that his answers in the earlier deposition were accurate, and that his opinions had not changed. Ex. 2001, 12:23-13:15.

used an op-amp to subtract the two -- or the two signals. That's where you would *instead use Hussain.*"); 53:16-20 ("Andrea. . . provides all the signals that would be needed to use the algorithm which is what is disclosed in Hussein.") (emphases added).

When deposed in this case, Dr. Anderson presented a *third* theory, where the subtraction could be performed using Andrea or Hussain. Ex. 2001, 31:3-32:22. The Reply makes no effort to clear the confusion. Reply, 16-19. Indeed, while the Reply recites "The Petition does not argue for replacing the entire denoising system of Andrea with the noise-suppression system of Hussain," Dr. Anderson testified the opposite:

Q. So you're saying that Andrea provided a good system, but in your combination except for the microphones and perhaps some preprocessing, *you would scrap the entirety of the rest of Andrea's noise suppression apparatus and replace it with Hussain's*, correct?

THE WITNESS: Andrea describes microphones and their configuration and in a system that's very effective. The acoustics are hard to design. Andrea's licked that. *What I'm scrapping is the differentiating amplifier. What I'm replacing it with is improved processing. So I'm scrapping the wide band differencing operation with a sub-band operation that can do both estimation and differencing and other methods.*

Ex. 2005, 58:1-18 (objection omitted).

These competing combinations (all emanating from Petitioner) demonstrate that Petitioner failed to set forth its combination with sufficient particularity. *See* 35 U.S.C. § 312 (a)(3). Moreover, they demonstrate that Petitioner’s expert testimony is not entitled to any weight because that expert did not even understand the combination.

In any event, Jawbone addressed the theory presented in the Petition: that Andrea’s op-amp would perform the subtraction. POR, 32-33. As explained therein, a POSITA would not combine Andrea and Hussain as proposed, because Andrea’s analog subtraction is not compatible with Hussain’s digital process. *Id.* Importantly, the issue is not, as Petitioner suggests, whether a POSITA *could* convert from analog to digital, but whether a POSITA *would* do so. *Belden Inc. v. Berk-Tek LLC*, 805 F.3d 1064, 1073 (Fed. Cir. 2015) (“[O]bviousness concerns whether a skilled artisan not only *could have made* but *would have been motivated to make* the combinations or modifications of prior art to arrive at the claimed invention.”).

Petitioner’s inconsistent description of its own combination demonstrates that a POSITA would not. Even assuming a conversion from analog to digital, the combination is nonsensical. Petitioner never explains when the subtraction takes place in its combination: either before or after Hussain’s sub-band processing. Pet. 15-17, 40-46; Reply, 15-19. Dr. Anderson’s testimony that the subtraction is performed within Hussain does not answer the question. If the subtraction is

performed *before* conversion to digital as an input to Hussain, then the signal is already denoised and Hussain has no benefit. POR, 32. If the subtraction is performed *after* Hussain's sub-band denoising, the denoised signal would be converted back to analog and then subtracted with something that is not specified, also providing no benefit. *Id.*

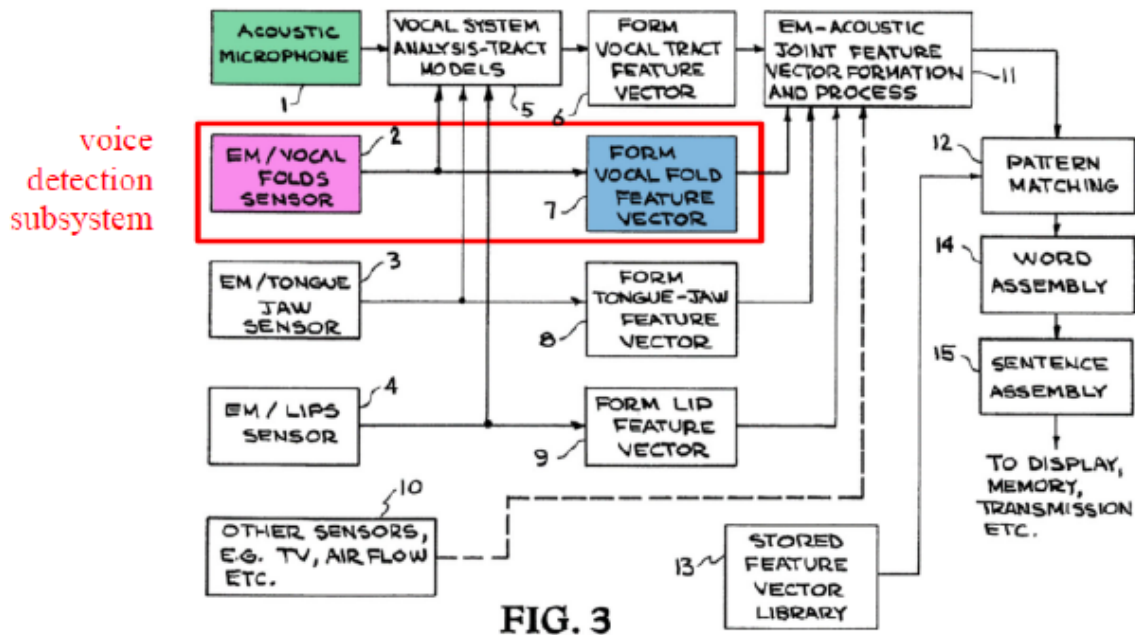
Accordingly, a POSITA would not make the combination, and the combination would not be successful.

C. Meta's Combination Does Not Disclose or Render Obvious "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," as Required by Claims 1-2 and 5-26 [1I]

The parties agree that Andrea does not teach the limitation. Petitioner repeats its claim construction arguments discussed *supra*. Reply, 20-21. The remaining dispute is thus whether, under Jawbone's construction, the limitation is rendered obvious. It is not.

Petitioner first argues that Andrea or Holzrichter's microphones could meet this limitation. Reply, 22. But such microphones would not be "independent from the microphone array" as required.

Petitioner next states that Holzrichter *can* detect unvoiced speech using *other* sensors. Reply, 22-24. In the Petition, Holzrichter's EM/Vocal Folds Sensor was specifically identified as the only sensor in the combination. Pet. 43.



Pet., 43.

Now realizing that the identified sensor fails to provide the necessary functionality, Petitioner provides a new, altered version of Holzrichter's Fig. 3 that would supposedly include the other sensors and feature vectors:

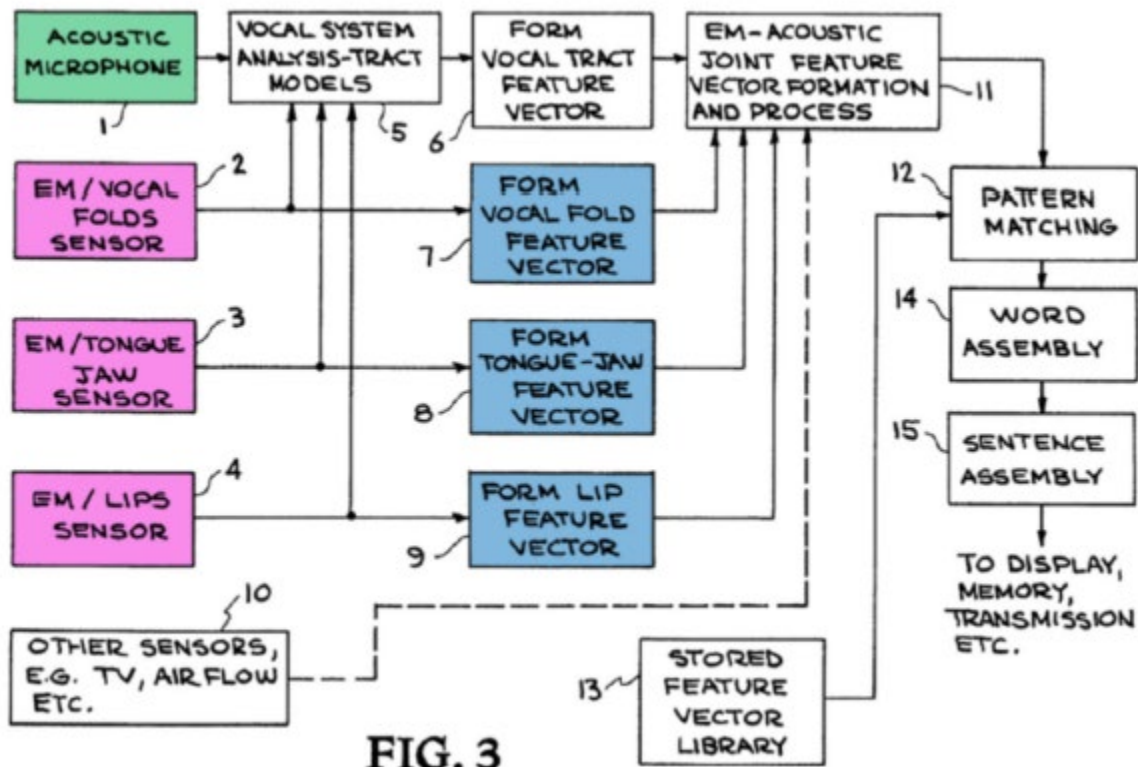


FIG. 3

Reply, 23.

This inclusion is plainly a new argument, and the Board should reject it. Moreover, Holzrichter explains that sensors 3 and 4 are separate from sensor 2, and Petitioner has never provided any evidence that a POSITA would include them in the combination. Ex. 1007, 15:8-10, 17:24-36 (“three EM sensors 2, 3, 4 for vocal folds, tongue-jaw, and lips...”). Holzrichter further explains that the acoustic sensor is required even when there are “one or more EM sensors.” Ex. 1007, 31:51-57.

Accordingly, under the proper construction, this limitation is not rendered obvious.

D. A POSITA Would Not Combine Holzrichter with Hussain

The POR explained that a POSITA would not combine Holzrichter with Hussain because it would degrade Hussain's capability. POR, 34-38. In Reply, Petitioner conflates the GEMS with Holzrichter and relies on the '543 Patent's own disclosure as motivation to combine. Reply, 24-27. Petitioner is wrong.

Assessing a motivation to combine must consider the perspective of one of skill in the art at the time of the invention. There is no evidence that the GEMS and Holzrichter are the same sensor. Thus, even if the GEMS could act as a proper VAD and detect the requisite voiced and unvoiced speech, its disclosure does not support that Holzrichter's sensor could so perform. Moreover, the statement that the GEMS “*can lead* to a very accurate noise-robust VAD” does not turn every EM sensor into a proper VAD.

Moreover, it is improper to use the '543 Patent's disclosure (including the non-prior art '162 Application) as evidence of a motivation to combine. *E.g., Orexo AB v. Actavis Elizabeth LLC*, 903 F.3d 1265, 1271 (Fed. Cir. 2018) (“It is inappropriate to use the template provided by the inventor, to render the inventor's contribution obvious.”); *Interconnect Plan. Corp. v. Feil*, 774 F.2d 1132, 1138 (Fed. Cir. 1985) (“The invention must be viewed not with the blueprint drawn by the inventor, but in the state of the art that existed at the time.”).

Accordingly, a POSITA would not combine Holzrichter and Hussain.

**E. Andrea, Hussain, and Holzrichter Do Not Disclose or
Render Obvious Claim 26**

Petitioner relies on the same arguments for limitations [26A]-[26I] as it does for Claim 1. For the same reasons as stated above, Petitioner's combination therefore does not render obvious Claim 26.

**III. GROUND 2-3: THESE GROUNDS FAIL BASED ON THE
FAILURE OF GROUND 1**

Petitioner relies on the combination of Andrea, Hussain, and Holzrichter with Stevens (Ground 2) or Alcivar (Ground 3) with respect to dependent Claims 3 and 4. Neither of the Grounds 2 or 3 combinations remedies the deficiencies of Ground 1. Accordingly, no claims are rendered obvious under Grounds 2 and 3.

IV. CONCLUSION

As discussed above, Petitioner's combinations fail to disclose key limitations of each claim of the '543 Patent, and therefore, do not render obvious any claims. The Board should, therefore, issue a Final Written Decision finding all Challenged Claims not unpatentable.

Respectfully submitted,

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CERTIFICATE OF WORD COUNT

The undersigned hereby certifies that the portions of the above-captioned PATENT OWNER'S SUR-REPLY specified in 37 C.F.R. § 42.24 has 3,840 words in compliance with the 5,600 word limit set forth in 37 C.F.R. § 42.24. This word count was prepared using Microsoft Word for Office 365.

November 1, 2024

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CERTIFICATE OF SERVICE

A copy of the foregoing Patent Owner's Sur-Reply has been served on
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