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Paper 30
Entered: November 28, 2023

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ROKU, INC.,
Petitioner,

v.

UNIVERSAL ELECTRONICS, INC.,
Patent Owner.

IPR2022-00943
Patent 10,930,276 B2

Before PATRICK M. BOUCHER, CHARLES J. BOUDREAU, and SHARON FENICK, *Administrative Patent Judges.*

FENICK, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining Some Challenged Claims Unpatentable
35 U.S.C. § 318(a)

We have jurisdiction to conduct this *inter partes* review under 35 U.S.C. § 6(b)(4) (2018). This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73 (2023). For the reasons discussed herein, we determine that Roku, Inc. ("Petitioner") has shown, by

a preponderance of the evidence, that claims 1–7, 9–13, 15, and 16 of U.S. Patent No. 10,930,276 B2 (Ex. 1001, "the '276 patent") are unpatentable, but has not shown that claims 8 and 14 of the '276 patent are unpatentable.

I. INTRODUCTION

A. Background and Summary

Petitioner filed a petition for *inter partes* review challenging claims 1–16 ("challenged claims") of the '276 patent. Paper 2 ("Pet." or "Petition"). Universal Electronics, Inc. ("Patent Owner") timely filed a Preliminary Response. Paper 6. We determined that the information presented in the Petition established that there was a reasonable likelihood that Petitioner would prevail with respect to its unpatentability challenges. Pursuant to 35 U.S.C. § 314, we instituted this proceeding on November 30, 2022, as to all challenged claims and all grounds of unpatentability. Paper 7 ("Dec. on Inst.").

Patent Owner filed a Patent Owner Response on March 9, 2023. Paper 17 ("PO Resp."). Petitioner filed a Reply (Paper 20, "Pet. Reply") on June 16, 2023. Patent Owner filed, on July 28, 2023, a Sur-reply. Paper 23 ("PO Sur-reply"). An Oral Hearing on this matter was held on September 7, 2023. The Hearing Transcript ("Tr.") is included in the record as Paper 29.

B. Real Parties in Interest

Petitioner identifies only itself as the real party in interest. Pet. 4.

Patent Owner identifies only itself as the real party in interest. Paper 4 (Patent Owner's Mandatory Notices), 1.

C. Related Matters

Petitioner does not identify any related matters. Pet. 4. Patent Owner lists as related matters, without indication of the relationship, seven district court cases, one ITC case, and twenty IPR proceedings, and identifies

several patent applications that are still pending and that are related to the '276 patent by a claim of priority. Paper 4, 1–3.

D. The '276 Patent

The '276 patent is titled "Apparatus, System and Method for Directing Voice Input in a Controlling Device" and generally relates to a device for controlling other appliances in an environment using speech input, for example to allow a user to use voice commands to control different types of consumer electronic devices. Ex. 1001, codes (54), (57), 1:29–33. The '276 patent describes, as an example, a situation in which a controlling device controls two or more smart appliances. *Id.* at 4:49–58. The controlling device may be, e.g., a standalone device, a tablet, PDA, cell phone, smart watch, computer, remote control, or intelligent digital assistant, among other possibilities. *Id.* at 4:50–63. The smart appliances may be, e.g., a TV, set top box, gaming system, or streaming device, among other media devices. *Id.* at 5:22–39.

The controlling device transmits a signal to a target device to communicate a command. *Id.* at 4:64–5:7. This may be in response to a voice command received by the controlling device from a user. *Id.* at 5:7–11. For example, the controlling device may have a soft key or a mechanical key that activates a coupled microphone, allowing the user's voice to be used to determine the user's intent to perform an action on an intended appliance. *Id.* at 5:45–58. Alternatively, the controlling device may continuously listen for a voice command. *Id.* at 5:66–6:10.

The '276 patent details a method that may be used by the controlling device. *Id.* at 13:5–14:50, Fig. 6. A user of a controlling device utters a voice command, which is received by the processor of the controlling device and typically is stored by the controlling device. *Id.* at 13:16–24. The

processor then determines an appliance the voice command relates to; this may be done at the controlling device or through consultation with a local or remote device. *Id.* at 13:25–14:34. The controlling device formats the voice command into a data format associated with the identified appliance and transmits it to that device via a transmitter/transceiver. *Id.* at 14:35–50.

In one embodiment, the controlling device controls appliance-generated sound levels in an environment in connection with receiving speech input, as shown in Figure 7, reproduced below. *Id.* at 3:52–54.

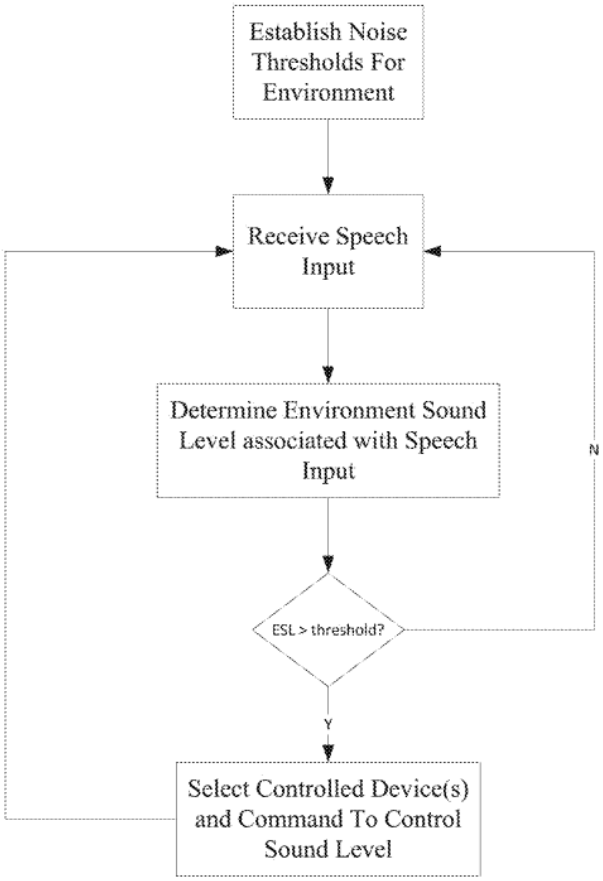


Figure 7

Figure 7 is a flow diagram that shows how one or more controlled devices may receive sound level commands in response to certain situations. *Id.* at 3:52–54, 19:21–29, Fig. 7. In this embodiment, a predetermined threshold may be established by calibrating the controlling device. *Id.* at 19:36–41. A speech processing service associated with the controlling device performs a loudness analysis to determine a loudness of speech being provided to the controlling device and/or a loudness of an environment (e.g., background noise) in which the controlling device is operating. *Id.* at 19:21–29, 19:31–35. Based on the loudness estimation as compared to the predetermined threshold, the system can determine whether the speech input is being provided loudly, softly, or normally and whether the environment is loud, quiet, or normal. *Id.* at 19:41–57. Using this information, the controlling device may perform additional functions, like adjusting the volume of music or other output of a controlled device. *Id.* at 19:58–20:15. This may be done when an environment is loud and the user is attempting to provide speech communications to the controlling device. *Id.* at 20:16–36. If desired, the controlled device can be automatically returned to the prior state when the system determines that no further speech communications are likely to be issued by the user. *Id.* at 20:51–60.

E. Challenged Claims

Challenged claim 1 is independent, and all other challenged claims (i.e., claims 2–16) depend directly or indirectly from claim 1.

Challenged claim 1 is reproduced below, with the addition of reference numbers in brackets, corresponding to the identification of limitations in the Petition.

> 1. A method for controlling a controllable appliance resident in an environment which includes a device adapted to receive speech input, comprising:
>
> [1.a] using a first sound data captured from the environment in which the device is operating to establish a noise threshold;
>
> [1.b] receiving at the device a speech input;
>
> [1.c] using a second sound data captured from the environment in which the device is operating at the time the speech input is received by the device to determine a noise level;
>
> [1.d] determining if the determined noise level is greater than the established noise threshold; and
>
> [1.e] in direct response to it being determined that the determined noise level is greater than the established noise threshold, causing one or more commands to be automatically issued to the controllable appliance to thereby cause the controllable appliance to transition from a first state having a first volume level to a second state having a second volume level that is less than the first volume level.

Ex. 1001, 22:36–56.

F. References Relied Upon

Petitioner relies upon the following prior art references:

Reference	Exhibit
Hart et al., US 9,251,787 B1, issued Feb. 2, 2016 ("Hart-787")	1004
Fu et al., US 2017/0126192 A1, published May 4, 2017 ("Fu")	1005
Rosenberg, US 9,509,269 B1, issued Nov. 29, 2016 ("Rosenberg")	1006
Hart et al., US 9,466,286 B1, issued Oct.11, 2016 ("Hart-286")	1007

Pet. 8.

Petitioner also relies on the Declaration of Mr. Bruce McNair (Ex. 1003). Patent Owner relies on Declarations of Dr. Michael S. Scordilis (Exs. 2001, 2005).

G. Prior Art and Asserted Grounds

Petitioner asserts that the claims are unpatentable on the following grounds:

Claim(s) Challenged	35 U.S.C. §[1]	Reference(s)/Basis
1–11, 13–16	103	Hart-787, Fu, Rosenberg
12	103	Hart-787, Fu, Rosenberg, Hart-286

Pet. 8.

II. ANALYSIS

A. Legal Standards

"In an [*inter partes* review], 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) (requiring [*inter partes*] review petitions to identify "with particularity . . . the evidence that supports the grounds for the challenge to each claim")). This burden never shifts to Patent Owner. *See Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015) (citing *Tech. Licensing Corp. v. Videotek, Inc.*, 545 F.3d 1316, 1326–27 (Fed. Cir. 2008)) (discussing the burden of proof in *inter partes* review).

Furthermore, Petitioner must explain with particularity how the prior art would have rendered the challenged claims unpatentable. 35 U.S.C. § 312(a)(3); 37 C.F.R. § 42.104 ("The petition must specify where each

[1] The Leahy-Smith America Invents Act ("AIA"), Pub. L. No. 112-29, 125 Stat. 284, 287–88 (2011), amended 35 U.S.C. § 103. The '276 patent does not contain a claim of priority relating to a date before March 16, 2013 (the effective date of the relevant amendment), so the AIA version of § 103 applies.

element of the claim is found in the prior art patents or printed publications relied upon.").

A claim is unpatentable under 35 U.S.C. § 103 if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious to a person having ordinary skill in the art to which said subject matter pertains. *See 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 skill in the art; and (4) objective evidence of nonobviousness, i.e., secondary considerations.[2] *See Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

B. Level of Ordinary Skill in the Art

The level of skill in the art is a factual determination that provides a primary guarantee of objectivity in an obviousness analysis. *Al-Site Corp. v. VSI Int'l Inc.*, 174 F.3d 1308, 1323–24 (Fed. Cir. 1999) (citing *Graham*, 383 U.S. at 17–18; *Ryko Mfg. Co. v. Nu-Star, Inc.*, 950 F.2d 714, 718 (Fed. Cir. 1991)).

Petitioner argues that:

> On or before 7/12/2017, [one of ordinary skill in the art] would have had a bachelor's degree in computer science, in electrical engineering, or a related field, and approximately three years of experience or equivalent study in voice-controlled devices in smart home systems. Additional graduate education could

[2] Neither party presents arguments or evidence relating to such objective evidence of nonobviousness.

> substitute for professional experience, or significant experience in the field could substitute for formal education.

Pet. 18. We adopted this definition for the purposes of the Decision on Institution. Dec. on Inst. 8–9. Patent Owner adopts Petitioner's definition. PO Resp. 4.

We again adopt Petitioner's definition, which is consistent with the level of skill as reflected in the prior art. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001).

C. Claim Construction

In interpreting the claims of the '276 patent, we "us[e] the same claim construction standard that would be used to construe the claim[s] in a civil action under 35 U.S.C. [§] 282(b)." 37 C.F.R. § 42.100(b). The claim construction standard includes construing claims in accordance with the ordinary and customary meaning of such claims as would have been understood by one of ordinary skill in the art and the prosecution history pertaining to the patent. *See id.*; *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–14 (Fed. Cir. 2005) (*en banc*).

"Importantly, the person of ordinary skill in the art is deemed to read the claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification." *Phillips*, 415 F.3d at 1312. An inventor may rebut the presumption that the term carries its ordinary and customary meaning by providing a definition of the term in the specification with reasonable clarity, deliberateness, and precision. *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994). In the absence of such a definition, limitations are not to be read from the specification into the claims. *In re Van Geuns*, 988 F.2d 1181, 1184 (Fed. Cir. 1993). Only those terms that are in controversy need be

construed, and only to the extent necessary to resolve the controversy. *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (citing *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

In the Decision on Institution, we determined that no claim term required construction for the purposes of institution. Dec. on Inst. 10–11.

Absent a recitation of order, or an order mandated by grammar or logic, the steps of a method claim are not construed to require a particular order. *See, e.g.*, *Altiris, Inc. v. Symantec Corp.*, 318 F.3d 1363, 1369 (Fed. Cir. 2003). Patent Owner argues that the steps of claim 1, a method claim, must be performed in sequential order. PO Resp. 13–16. Without commenting on or conceding Patent Owner's proposal, Petitioner contends that "the trial grounds meet this proposed construction." Pet. Reply 24–25; Tr. 8:25–11:16.

Our record does not reflect any indication that Patent Owner's proposed construction requiring the sequential ordering of the method steps is not at least encompassed by the correct construction of claim 1. Because of this, and because Petitioner agrees that the arguments in the Petition meet this construction, we accept Patent Owner's construction as correct for the purposes of this Decision.

D. Asserted Obviousness Over Hart-787, Fu, and Rosenberg

Petitioner contends claims 1–11 and 13–16 would have been obvious over Hart-787, Fu, and Rosenberg. Pet. 26–58.

1. Hart-787 (Ex. 1004)

Hart-787 is titled "Altering Audio To Improve Automatic Speech Recognition" and relates to "altering audio being output by a voice-controlled device to enable more accurate automatic speech recognition

(ASR) by the voice-controlled device." Ex. 1004, codes (54), (57). Hart-787 describes that, if speech is detected while a speech-recognizing device is outputting audio and the device determines that a user is going to provide a subsequent command, the device may attenuate or pause its audio output to facilitate speech recognition of the user's subsequent command. *Id.* at code (57), 1:49–51. "By altering the output of the audio, an audio signal generated from the sound subsequently captured by the device will have less noise and, hence, will have a higher signal-to-noise ratio (SNR)." *Id.* at 2:7–10. According to Hart-787, the increased SNR will increase the accuracy of speech recognition and the chances that the device will be able to decode the user's voice command. *Id.* at 2:10–13.

Hart-787 describes a system in which an electronic voice-controlled device is in a home environment with a user who may interact with the device. *Id.* at 3:54–58, Fig. 1. The voice-controlled device has a microphone and a speaker unit to facilitate audio interactions with the user. *Id.* at 4:15–18. The voice-controlled device has access to a speech recognition device to recognize speech captured by the microphone, such as utterances by the user. *Id.* at 4:22–25, 5:2–6. The device includes a media player that may output content, including audio output via its speaker. *Id.* at 5:26–30, 8:34–37. Audio may also be output by a speaker of another device. *Id.* at 5:34–36.

An audio modification engine used by the device may be used to modify the output of the audio being output by the speaker of the device or the speaker of the other device in order to increase efficacy of speech recognition. *Id.* at 5:34–37. "For instance, in response to receiving an indication that the user . . . is going to provide a voice command to the device, the audio modification engine . . . may somehow modify the output

of the audio to increase the accuracy of speech recognition performed on an audio signal generated from sound captured by the microphone." *Id.* at 5:37–43. Hart-787 describes that this be done by attenuating (i.e., turning down), pausing, or any other alteration to the audio being output. *Id.* at 2:26–27, 5:47–51.

In an exemplary process flow described, the device captures sound within the environment, generates an audio signal based on the sound, and determines, from that audio signal, that the user is going to provide a command to the device. *Id.* at 7:66–8:1, 8:34–53, Fig. 3 (steps 302, 304, 306, and 308). The device then determines how to alter the audio being output under the control of the device and alters the audio accordingly. *Id.* at 8:54–59, Fig. 3 (steps 310, 312). This may include a determination that audio should be attenuated (i.e., turned down) based on a volume of a user's utterance or a volume of the audio being output by the device. *Id.* at 9:18–25. For instance, it may alter the audio "based on a ratio between the user's utterance intended to gain the attention of the device (e.g. 'wake up') and the volume of the audio." *Id.*

2. Fu (Ex. 1005)

Fu is titled "Method, Device, and Computer-Readable Medium for Adjusting Volume." Ex. 1005, code (54). Fu relates to media player devices and to adjusting the volume of these devices automatically. *Id.* code (57), ¶¶ 2, 3, 5, 54. For example, a media player device may be playing media including a sound component. *Id.* ¶¶ 25–26, 53, 70, 77. The device captures ambient noise in the vicinity, such as via a microphone or decibel meter in the device or connected to the device. *Id.* ¶¶ 26–28, 53, 77. A volume adjustment may be made to the sound being output. *Id.* ¶¶ 29, 54.

For example, the volume may be increased if the ambient environment is noisy or decreased if the ambient noise decreases. *Id.*

In certain embodiments, the volume of sound may be adjusted based on a predetermined threshold. *Id.* ¶¶ 33–37, Fig. 2. Fu describes that, "[w]hen the amplitude of the ambient noise is large (i.e. exceeds the first predetermined threshold), the ambient environment is noisy, and thus the current volume of the sound may be increased automatically so as to improve the effect of playing sound." *Id.* ¶ 37. Fu additionally describes that, "[w]hen the amplitude of the ambient noise changes from high to low, the current volume of the sound may be decreased automatically so as to improve the effect of playing sound. Such an implementation may easily improve the efficiency of adjusting volume." *Id.*

3. Rosenberg (Ex. 1006)

Rosenberg is titled "Ambient Sound Responsive Media Player" and relates to capturing an ambient audio signal, determining whether certain "characteristic forms" are present within that ambient audio signal, and, if so, reducing the output of a media player from a first volume to a second volume. Ex. 1006, codes (54), (57), 2:16–44. Rosenberg explains that "[a] characteristic form is a sound or signal that when detected by the media player will cause an audible adjustment to the output of the media player." *Id.* at 8:17–20. Some provided examples for characteristic forms are: recognition of a particular user's voice; recognition of a particular verbal utterance such as a word, name, or phrase (e.g., pre-set utterances, or generic words commonly used to summon attention such as "help" or "excuse me"); and recognition of nonverbal sounds such as nonverbal human utterances, alarm/siren/emergency sounds, animal sounds, and characteristic environmental sounds. *Id.* at 7:20–61, 7:64–8:6, 8:21–27, 10:20–67.

One exemplary media player includes an audio subsystem with a microphone used for detection of sound signals from the user's local ambient environment. *Id.* at 4:49–54, 5:62–6:18, Fig. 1 (elements 100, 95, 95A). The audio subsystem also includes headphones. *Id.* at 7:19–24, Fig. 1 (element 95B).

In one exemplary process flow, ambient audio signals are captured through the microphone and signal processing is performed on them to determine whether a characteristic form is identified. *Id.* at 2:56–57, 6:66–7:22, 7:62–8:27, Fig. 2 (elements 201, 202, 203). If a characteristic form is identified, then the currently playing media audio signal is reduced in volume for a period of time so the user can better hear ambient sounds. *Id.* at 8:20–29, 8:32–54, 9:15–53, Fig. 2 (elements 203, 206, 208).

Rosenberg includes claim 5, dependent from Rosenberg's claim 2, itself dependent from Rosenberg's claim 1. Rewritten in independent form, this claim is directed to:

> A method comprising:
>
> capturing an ambient audio signal;
>
> processing the ambient audio signal to determine whether one or more characteristic forms are present within the ambient audio signal;
>
> automatically reducing an output of a media player from a first volume to a second volume gradually over a period of time if the one or more characteristic forms are present within the ambient audio signal, *wherein reducing the output further comprises reducing the output when one or more characteristic forms exceeds a volume threshold, <u>wherein the volume threshold is determined based on the volume of the ambient audio signal</u>*; and
>
> maintaining the output of the media player at the second volume for a predetermined time before returning the output from

> the media player to the first volume, wherein the length of the predetermined time is based on the one or more characteristic forms, and wherein a first characteristic form is associated with a first length of predetermined time and a second characteristic form is associated with a second length of predetermined time different from the first length of predetermined time.

Id. at 13:66–14:21, 14:28–30 (language from claim 2 in italics, language from claim 5 in italics and underlined).

4. Independent Claim 1

Petitioner contends claim 1 would have been obvious over a combination of Hart-787, Fu, and Rosenberg. Pet. 19–45. Petitioner contends that one of ordinary skill would have modified Hart-787's voice-controlled device to attenuate the audio output of a wirelessly linked device, to do so based on an ambient noise threshold as in Fu, and to use a threshold that advantageously adjusts to the environment as in Rosenberg. Pet. 26–31.

Patent Owner argues that the proposed combination does not teach or suggest limitations 1.a, 1.c, or 1.e and that Petitioner has not shown that one of ordinary skill in the art would have modified Hart-787, Fu, and Rosenberg as Petitioner proposes. PO Resp. 17–55; PO Sur-reply 3–22.

a) Petitioner's Contentions

(1) Preamble

The preamble of claim 1 describes the claimed method as being "[a] method for controlling a controllable appliance resident in an environment which includes a device adapted to receive speech input." Ex. 1001, 22:36–38.

Petitioner contends that "to the extent this preamble is limiting" it is taught by Hart-787, which describes a method for altering the audio being output from a controllable appliance resident in the same environment as a

voice-controlled device. Pet. 31–34 (citing Ex. 1004, 3:66–4:3, 4:15–18, 5:43–51, Figs. 1, 2; Ex. 1003 ¶¶ 34–42, 94–96).

(2) Limitation 1.a

With respect to limitation 1.a, "using a first sound data captured from the environment in which the device is operating to establish a noise threshold," Petitioner argues that a combination of Hart-787, Fu, and Rosenberg teaches this limitation. Pet. 34–41.

Describing its proposed combination, Petitioner argues that Hart-787 discloses a voice-controlled device with a microphone that detects ambient audio for the environment, including user commands, and that an audio modification engine in the voice-controlled device can reduce audio output of another device based on the ambient audio. *Id.* at 34–35 (citing Ex. 1004, 1:30–39, 2:7–13, 4:15–17, 5:34–43, 5:47–51, 8:39–42, Fig. 1; Ex. 1003 ¶ 98). Petitioner contends that Hart-787 teaches certain actions, including the attenuation of audio, being performed to increase the accuracy of speech recognition. *Id.* at 35–36 (citing Ex. 1004, 5:52, 8:54–63; Ex. 1003 ¶ 99). Petitioner argues that while Hart-787 does not specify how to determine when to attenuate the audio, one of ordinary skill would have applied Fu's teachings regarding comparing current levels of ambient noise to a predetermined threshold to evaluate the volume of ambient noise. *Id.* at 36–39 (citing *inter alia* Ex. 1005 ¶¶ 26, 37, 40–42, 45–47, 53, 54, Figs. 2–4, 6; Ex. 1003 ¶¶ 101–105).

Petitioner cites Rosenberg's teaching of a volume threshold determined based on the volume of the ambient audio signal in which it appears, taught in Rosenberg's system where reducing an output of a media player occurs when a "characteristic form" (such as a detected trigger sound) exceeds a volume threshold determined based on the volume of ambient

audio. Pet. 40–41 (citing Ex. 1006, 6:1–13, 7:62–8:6, 8:32–37, 10:62–67, claim 5 (13:66–14:21, 14:28–30); Ex. 1003 ¶¶ 107–108).

Petitioner contends that one of ordinary skill would have been motivated to modify the Hart-787 device to supply details regarding when to attenuate audio. *Id.* at 26–31, 40–41. Petitioner contends that one of ordinary skill would have included an adjustment to the audio output of a wirelessly linked device when the voice-controlled device determined that the ambient noise level at the time of a wake word is greater than a threshold as in Fu, and, for the determination of that threshold given variable ambient noise, would have been motivated to further modify that combination to use a dynamic threshold that advantageously adjusts to the environment as in Rosenberg. *Id.* (citing Ex. 1005, code (57), ¶¶ 3, 24, 32, 54; Ex. 1006, 10:42–67; Ex. 1003 ¶¶ 87–93, 108–109). Petitioner further argues that one of ordinary skill would have had a reasonable expectation of success in doing this. *Id.* (citing Ex. 1003 ¶ 93).

(3) Limitation 1.b

Petitioner contends that limitation 1.b is taught by Hart-787, which teaches a microphone detecting audio at the device. Pet. 41–42 (citing Ex. 1004, 4:15–18, Fig. 1; Ex. 1003 ¶¶ 110–111).

(4) Limitation 1.c

Petitioner contends that Hart-787, in combination with Fu and Rosenberg, teaches using a second sound data captured from the environment in which the device is operating at the time the speech input is received to determine a noise level, as recited in limitation 1.c. Pet. 42. Petitioner notes that when the device in Hart-787 receives a speech input (such as "wake up"), it receives that input along with other environmental

ambient noise and uses the received audio signal to determine a noise level. *Id.* (citing Ex. 1004, 5:58–59, 8:39–42, 9:18–21; Ex. 1003 ¶¶ 57, 112–114).

(5) Limitations 1.d and 1.e

Petitioner contends that the combination of Hart-787, Fu, and Rosenberg meets limitations 1.d and 1.e. Pet. 43–45. Petitioner argues limitation 1.d, "determining if the determined noise level is greater than the established noise threshold," by referring back to its arguments with respect to claim 1.a, relating to Rosenberg's threshold being used in Hart-787's device modified to apply Fu's method of determining whether to adjust the volume of audio output by comparing ambient noise volume to a predetermined threshold. Pet. 43 (citing Ex. 1003 ¶¶ 115–116). Limitation 1.e recites that, "in direct response" to a determination (in 1.d) that the determined noise level is greater than the established noise threshold, "one or more commands" are caused "to be automatically issued to the controllable appliance" to cause it to transition from a first state with a first volume level to a second state with a second volume level less than the first volume level. Ex. 1001, 22:49–56. Petitioner argues that this is taught or suggested by Hart-787's audio modification engine, which may attenuate the audio if a speech input is being received. Pet. 43–44 (citing Ex. 1004, code (57), 1:64–2:7, 2:24–27, 5:34–51, 8:56–59; Ex. 1003 ¶¶ 44–45, 118).

Petitioner additionally argues that Fu's teachings in the proposed combination teach that the audio modification would be in direct response to a determination that an environmental noise level is greater than an established noise threshold. *Id.* at 44 (citing Ex. 1003 ¶ 119). While Petitioner acknowledges that certain examples in Fu disclose increasing volume output (rather than decreasing it) in response to a determination that the volume of ambient noise exceeds a predetermined threshold, Petitioner

contends that Fu does not require such an increase, and Petitioner cites Rosenberg's teachings regarding volume reduction in playing volume of media content when a determination has been made that the ambient noise includes certain triggers that indicate possibly relevant information in ambient noise for the user. *Id.* at 44–45 (citing Ex. 1006, 9:15–10:20, 12:42–67; Ex. 1003 ¶ 120).

b) Patent Owner's Contentions

(1) "first sound data" and "second sound data"

Patent Owner argues that Petitioner's showing is deficient because it uses the same sound data for both the "first sound data" of limitation 1.a and the "second sound data" of limitation 1.c. PO Resp. 17–21; PO Sur-reply 5–9. Patent Owner argues that "[c]rucially, the Petition fails to explain how the proposed combination of Hart-787 with F[u] and Rosenberg would result in a method that: (i) establishes a 'noise threshold' and determines a separate 'noise level' using separate first and second sound data; and (ii) determines that the 'noise level' is greater than the 'noise threshold.'" PO Resp. 22.

Patent Owner asserts that Hart-787 determines a noise level using the ambient audio level captured at the time the user's speech is detected. *Id.* at 19. Patent Owner further argues that Rosenberg's volume threshold is determined using the ambient audio signal captured at the time the user's speech is detected. *Id.* at 20–21 (citing Ex. 1003 ¶¶ 87, 91, 108, 109, 116; Ex. 2005 ¶ 73; Ex. 2006, 56:2–57:3, 57:8–13, claims 1, 2, 5; Pet. 29–30, 40–41), 24–25 (citing Ex. 2006, 57:8–17; Pet. 40–41); PO Sur-reply 5–7 (citing Ex. 2006, 56:9–57:20). According to Patent Owner, "Rosenberg's 'volume threshold' of claim 5 is not based on previously captured environmental noise—it is indisputably based on the ***current*** environmental noise level at the time of the user's speech." PO Sur-reply 5. Patent Owner argues that it

is the threshold in Rosenberg, captured at the same time as the user's speech—rather than Fu's pre-set threshold—that Petitioner must be relying on for the determination of a volume threshold. PO Resp. 25 (citing Ex. 2006, 57:8–13, 57:18–20; Ex. 1003 ¶¶ 91–92, 106). Petitioner asserts that the proposed combination "replaces F[u]'s pre-set threshold . . . with the alleged 'dynamic threshold' of claim 5 of Rosenberg" and therefore the combination does not teach or suggest a previously captured and established threshold as per the claim. *Id.* at 21, 25. Without a showing of a threshold based on prior sound data, Patent Owner concludes, the Petition's proposed combination relies on the same sound data (at the time of the speech input) as the claimed "first sound data" and "second sound data." *Id.* at 21.

Several additional contentions stem from this main argument. First, Patent Owner contends that, because of the asserted equivalence of the noise level and the noise threshold, the requirement in limitation 1.e that commands are automatically issued to the controllable appliance "in direct response to it being determined that the determined noise level is greater than the established noise threshold" is not met. PO Resp. 22. Relying on its argument that the method steps must be performed in the sequential order described in the claim (*see supra* Section II.C), Patent Owner contends that the noise threshold is not established (as required in limitation 1.a) before the speech input is received (in limitation 1.b). *Id.* at 23.

(2) Limitation 1.e – "transition from a first state having a first volume level to a second state having a second volume level that is less than the first volume level"

Patent Owner additionally argues that Fu does not teach "decreasing volume when a volume threshold may be exceeded" but teaches only (a) increasing the volume if ambient noise exceeds a volume threshold, or

(b) decreasing the volume if ambient noise is less than a predetermined threshold. PO Resp. 27–29 (citing Ex. 1005 ¶¶ 29, 36, 41, 42, 46, 47, 57, 59, 60, 62, Claims 3, 4, 10, 11, 17, Figs. 2–4; Ex. 2005 ¶ 87). Patent Owner contends that Petitioner has not proposed a modification to Fu to decrease the volume when a volume threshold was exceeded or shown how Rosenberg teaches or suggests a modification to Fu's teachings. *Id.* at 29–30; PO Sur-reply 10 ("Petitioner has no evidence regarding the 'greater than' requirement of Limitation [1.e]").

(3) Motivation to Combine

Patent Owner argues that Petitioner does not properly show a motivation to select and combine the teachings of the references in its showing regarding the unpatentability of claim 1 over Hart-787, Fu, and Rosenberg. PO Resp. 31–34; PO Sur-reply 11–22. Patent Owner argues that "Petitioner has failed to show that a [person of ordinary skill in the art] would have been motivated to modify Hart-787 to transmit volume down 'control signals' to decrease the audio output of a controllable appliance because Petitioner has failed to identify any reason ***why*** a [person of ordinary skill in the art] would have done so." PO Resp. 32–33 (citing Pet. 44). Patent Owner argues that the only motivation provided by Petitioner is that control signals were "well-known in the art," and Patent Owner argues that this is legally insufficient to establish a motivation to combine. *Id.*; PO Sur-reply 11–12.

Patent Owner additionally argues that Petitioner has not adequately shown that one of ordinary skill in the art would have modified Hart-787 in view of Fu, (1) because Hart-787 already addresses the problem Petitioner argues one of ordinary skill in the art would have looked to Fu for, (2) because no adequate motivation to combine has been shown, and

(3) because the combination would have changed Hart-787's basic principle of operation and rendered Hart-787 inoperable. PO Resp. 35–45; PO Sur-reply 13–18.

Patent Owner asserts that Hart-787 teaches four methods for determining whether and how much to decrease output audio, and that Petitioner does not show why Fu's method would have been considered an improvement over these four methods or why one of ordinary skill in the art would have sought another method. PO Resp. 37–42; PO Sur-reply 13–14. With respect to modifying Hart-787, Patent Owner argues that "Hart-787's basic principle of operation and its express intended purpose is to decrease the audio output of a speaker to increase SNR, and thus increase the accuracy of speech recognition in a voice-controlled device." PO Resp. 44 (citing Ex. 1004, 1:64–2:13; Ex. 2005 ¶ 115; Dec. on Inst. 11). Patent Owner contrasts this with Fu, which it describes as teaching a method for increasing audio output of a media player when the ambient noise is louder. *Id.* (citing Ex. 1005 ¶¶ 29, 36, 41, 42, 46, 47, 57, 59, 60, 62, Claims 3, 4, 10, 11, 17, Figs. 2–4; Ex. 2005 ¶¶ 115–117). Patent Owner concludes that these are "fundamentally different than, and incompatible with" each other. *Id.* Patent Owner argues that the combination would have resulted in an increase in the audio output of the media player when ambient noise is high, and thus a decrease in SNR. *Id.* at 44–45.

Patent Owner additionally argues that Petitioner has not shown proper motivation for the combination of Hart-787 with Fu and Rosenberg. *Id.* at 45–53; PO Sur-reply 19–22. Patent Owner contends that Rosenberg's volume threshold does not change during the performance of Rosenberg's claim 5, and thus that it is not a dynamic threshold as Petitioner contends. *Id.* at 47–48. Patent Owner contends Petitioner has not shown any benefits

to using a dynamic threshold. *Id.* at 48–49. Patent Owner argues that the method of Hart-787 and Fu already provides the same advantage of adjusting to changing environmental noise levels, according to Petitioner's declarant, and thus the change is not motivated. *Id.* at 50–51; PO Sur-reply 21.

Lastly, Patent Owner argues that the combination would have been inoperable because it would have required using, for the threshold, the ambient noise at the time the user's speech is detected, rather than a predetermined threshold, which would cause no change to the output level. PO Resp. 51–52. Patent Owner argues that the combination is a result of improper hindsight reconstruction of the challenged claim. *Id.* at 53–55.

c) Analysis

We determine that Petitioner has shown that claim 1 is unpatentable over Hart-787, Fu, and Rosenberg, as described in the summary of the Petitioner's contentions above.

We do not agree with Patent Owner that Petitioner's showing uses the same sound data to teach the "first sound data" of limitation 1.a and the "second sound data" of limitation 1.c. Patent Owner is correct that Rosenberg's claim 5 describes the determination of a volume threshold based on the volume of the ambient audio signal in which characteristic form(s) (e.g., the name of the user of the media player) are present. Ex. 1006, 13:66–21, 14:28–30. However, the Petition describes using Fu's "predetermined threshold" in combination with Hart-787's device, which attenuates audio output of a device upon detecting a user's utterance intended to gain the attention of the device, in order to "include adjusting the audio output volume of a wirelessly-linked audio-producing device when the voice-controlled device determines that the ambient noise level at the time a

user provides a 'wake word' is greater than a threshold." Pet. 27–29 (citing Ex. 1004, 2:22–37, 5:61–6:10, 9:18–25; Ex. 1005 ¶¶ 24, 32, 54; Ex. 1003 ¶¶ 88–89). Petitioner further proposes including a threshold that is advantageously based on the environment in which the device is operating as described in Fu, for example to respond to differing levels of noise at different times of day. *Id.* at 26, 29–30, 40 (citing Ex. 1006, 10:42–67, 14:28–30; Ex. 1003 ¶¶ 48–53, 55, 58, 87, 91, 107–109).

We agree with Petitioner that Patent Owner's arguments address the references individually instead of addressing the combination of the teachings proposed in the Petition. *See* Pet. Reply 8, 13–14; *see also* Dec. on Inst. 21–22, 23–24, 25–26. The Petition relies upon a combination of elements of Hart-787 with the predetermined threshold as taught in Fu and with establishing such a threshold based on the operating environment of a device as in Rosenberg. Pet. 26–31, 34–41. Patent Owner is correct that Rosenberg's threshold is set at the time of the utterance in Rosenberg's claim 5 and cites Petitioner's declarant as "conceding" issues regarding how "Rosenberg's volume threshold is determined." PO Resp. 20–21. But this argument and the ostensible concession do not squarely address the proposed combination, which combines Fu's teaching of an adjustment unit that "compares the volume of the ambient noise received . . . to a predetermined threshold" with Rosenberg's teaching that such "a threshold may be 'determined based on the volume of [an] ambient audio signal.'" Pet. 39, 40 (emphasis omitted) (quoting Ex. 1006, 14:28–30). While Patent Owner argues that "Petitioner has ***not*** proposed using a predetermined/pre-set threshold or a previously established threshold based on environmental noise in the combination of Hart-787 with F[u] and Rosenberg" (PO Resp. 46), we find, on the contrary, that the Petition describes a combination based

on "[a]djusting output audio when ambient noise is greater (or less) than a predetermined threshold" and on a threshold "determined according to an environmental noise level." Pet. 29–30. Thus, we find Petitioner's unpatentability grounds do not suffer from the issues Patent Owner argues are a consequence of the purported use of the same sound data for the "first sound data" of claim limitation 1.a and for the "second sound data" of claim limitation 1.c.

We do not agree with Patent Owner's arguments regarding Fu's teachings with respect to limitation 1.e's "transition from a first state having a first volume level to a second state having a second volume level that is less than the first volume level" because these arguments similarly do not address the proposed combination. *See* PO Resp. 26–30. The Petition cites Hart-787 for attenuating the volume of an audio-producing device when a wake word is issued. Pet. 32–34, 43–44. The Petition cites Fu for adjusting volume of an audio-producing device if the level of ambient noise exceeds a predetermined threshold. *Id.* at 36–39, 44–45. Thus, even if Fu teaches only increasing the volume of an audio-producing device if the predetermined threshold is exceeded, the Petition relies on the combination of teachings of Hart-787 and Fu, and Patent Owner's argument that neither reference teaches "decreasing a controllable appliance's volume output when a previously established volume threshold is exceeded" (PO Resp. 30) does not address the combination proposed. Patent Owner's argument that "Petitioner has not proposed modifying Fu to decrease a controllable appliance's volume output when a volume threshold is exceeded" (PO Resp. 30) similarly does not address the combination proposed in the Petition.

We also find that the preponderance of the evidence supports Petitioner's showing regarding the motivation to combine the references.

First, with respect to the modification of Hart-787 to use wirelessly transmitted volume down control signals as the means for attenuating audio output, Petitioner contends that Hart-787 "broadly teaches" that a device transmits control command signals to the audio-producing device, relying on the testimony of its declarant. *See* Pet. 23 (citing Ex. 1004, 5:47–51; Ex. 1003 ¶ 82), 43–44 (citing Ex. 1004, 1:67–2:7, 2:26–27, 5:47–51; Ex. 1003 ¶ 118). In addition, Petitioner shows that these control signals were well-known in the art and would have been known to one of ordinary skill in the art at the time of the invention, supporting its showing with additional testimony from its declarant. *Id.* at 44 (citing Ex. 1018[3], 2:39–47, 5:35–38; Ex. 1019[4] ¶¶ 3, 13; Ex. 1003 ¶¶ 44–45, 118).

We conclude Petitioner's evidence regarding the showing in Hart-787 is sufficient with respect to this point. Hart-787 describes altering a signal sent to the speaker to attenuate the audio from that speaker. Ex. 1004, 1:67–2:1. Petitioner's declarant testifies that using transmitted control signals to do this would have been known to one of ordinary skill. Ex. 1003 ¶¶ 44–45, 82, 118. We consider Petitioner's evidence regarding what one of ordinary skill in the art would have understood from Hart-787's disclosure to be sufficient for the showing regarding the "causing one or more commands to be automatically issued to the controllable appliance to thereby cause" that appliance to transition to a lower volume level, as required in limitation 1.e. While Patent Owner argues that Petitioner's declarant "concede[s] that Hart-787 does not disclose ***or teach*** how its voice-controlled device decreases the audio output of the controllable appliance," the cited portion of the

[3] Brown, U.S. Patent No. 7,706,553 B2, issued Apr. 27, 2010 (Ex. 1018).
[4] Li, US 2006/0028337 A1, published Feb. 9, 2006 (Ex. 1019).

declaration and deposition each relate specifically to the explicit disclosure of Hart-787 and not to what the reference would have taught or suggested to one of ordinary skill in the art, which is covered in other parts of the declarant's testimony. PO Resp. 32 (emphasis added); Pet. 44 ("Hart-787 does not ***disclose*** how—or under which conditions—it may alter audio output." (emphasis added)); Ex. 1003 ¶ 119 ("Hart-787 does not ***explicitly disclose*** how—or under which conditions—it may alter audio output." (emphasis added)); Ex. 2006, 65:17–66:5 ("Q: It's fair to say that Hart '787 does not ***explicitly disclose*** how it alters the audio output of the controlled appliance, correct? A: That's correct." (emphasis added)).

To the extent the Petition can be read to concede that Hart-787 does not teach or suggest the automatic issuance of one or more commands to the controllable appliance to transition volume states, we determine that the preponderance of the evidence additionally shows the wireless transmission of control signals to be an "identified, predictable" solution that one of ordinary skill in the art would have had good reason to pursue. Pet. 44 (citing Ex. 1003 ¶¶ 44–45, 118; Ex. 1018; Ex. 1019); *KSR*, 550 U.S. at 421 ("When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp."); *Almirall, LLC v. Amneal Pharms. LLC*, 28 F.4th 265, 274 (Fed. Cir. 2022) (finding a design choice rationale for a combination sufficient where supported by references and expert testimony).

With respect to Patent Owner's argument that Hart-787 itself already addresses the problem that Petitioner asserts would have provided motivation for combining Fu with Hart-787, we note that the Federal Circuit has criticized such an argument as "reasoning [that] belies its conclusion":

"[t]hat [two prior art references] address the same problem and that [one of the references] was a known way to address that problem is precisely the reason that there's a motivation to combine under *KSR* and our precedent." *Intel Corp. v. PACT XPP Schweiz AG*, 61 F.4th 1373, 1380–81 (Fed. Cir. 2023) (finding it obvious to modify a first reference with an element from a second reference to address a specified issue if the element was a "suitable option," even where the first reference already addressed the issue in a different way). Patent Owner argues that the Federal Circuit's *Henny Penny* decision stands for the opposite proposition, that "there is no motivation to modify a prior art reference to address a given problem if the reference already addresses the problem." PO Resp. 35–36 (citing *Henny Penny Corp. v. Frymaster LLC*, 938 F.3d 1324, 1332 (Fed. Cir. 2019)). But in that case, a Board analysis discussed the evidence regarding the drawbacks of a proposed modification of one reference with the teachings of another before finding no motivation to combine, and the Federal Circuit noted testimony regarding the drawbacks and concluded that "a reasonable fact finder could have found [the] tradeoffs to yield an unappetizing combination, especially because [the unmodified reference] already teaches [a benefit]." *Henny Penny Corp.*, 938 F.3d at 1332. This case is not that situation; upon review of the record, we do not find that any asserted drawbacks to the proposed modification outweigh the benefit of using Fu's threshold teaching as a "suitable option." *See In re Fulton*, 391 F.3d 1195, 1201 (Fed. Cir. 2004) (prior art does not teach away from claimed subject matter merely by disclosing a different solution to a similar problem unless the prior art also criticizes, discredits, or otherwise discourages the solution claimed).

The Petition argues that "Hart-787 left it to a user to deploy known audio output volume adjustment techniques based upon ambient noise

volumes detected in real-time" (Pet. 27) and that one of ordinary skill would have used Fu in order to "achieve Hart-787's goal of improving the SNR, while not lowering the volume of the wirelessly-linked audio-producing device in a situation where it may be unnecessary to do so" (*id.* at 28). While Patent Owner and Petitioner dispute whether Hart-787 already describes techniques that achieve this advantage, even if Hart-787 describes such techniques, Fu describes a technique to improve the SNR by adjusting volume based on an environmental noise threshold, and Petitioner has shown by a preponderance of the evidence that this technique is a suitable option to replace the techniques in Hart-787. Pet. 28 (citing Ex. 1005 ¶¶ 3, 24, 32, 54; Ex. 1003 ¶ 89), *Id.* at 36–39 (citing *inter alia* Ex. 1003 ¶¶ 101–106).

We do not agree that the proposed modification of Hart-787 with Fu would render Hart-787 inoperable. Incorporating a modification of Hart-787 from Fu by increasing the audio output of a media player when the ambient noise is above a threshold might frustrate the aims and operation of Hart-787. *See* PO Resp. 44–55. But that is not what Petitioner proposes. Rather, Petitioner proposes incorporating "adjusting the volume of audio output based upon the volume level of environmental noise within thresholds." Pet. 40. Additionally, "[t]he test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference . . . . Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art." *In re Keller*, 642 F.2d 413, 425 (CCPA 1981); *see also MCM Portfolio LLC v. Hewlett-Packard Co.*, 812 F.3d 1284, 1294 (Fed. Cir. 2015).

For similar reasons, we do not agree with Patent Owner's arguments regarding the motivation to combine Rosenberg with Hart-787 and Fu. While Rosenberg's volume threshold in its claim 5 is calculated based on the

same ambient audio signal that contains the "characteristic forms" that might cause a volume adjustment, the combination proposed uses the teaching of Rosenberg that a threshold may be determined based on ambient audio, and not the entire technique of Rosenberg's claim 5. Pet. 29–30, 40. Thus the inoperability argument (PO Resp. 24–25, 47–48) is based on a combination not proposed in the Petition. Additionally, addressing the argument that the combination of Hart-787 and Fu already provides the advantage of adjusting to changing environmental noise levels, the record supports a determination that the Rosenberg technique is at least a suitable option for providing this advantage, and in fact, provides a threshold based on the dynamic operating environment, unlike the preset threshold of Hart-787 and Fu. *See* Pet. 29–30, 40; Ex. 1003 ¶¶ 91, 108.

Having considered the parties' arguments and evidence, we determine that Petitioner has shown by a preponderance of the evidence that the subject matter of independent claim 1 would have been obvious over Hart-787, Fu, and Rosenberg.

5. Claims 2–7, 9–11, 13, 15, and 16

Petitioner identifies teachings in the prior art references that teach or suggest the limitations of dependent claims 2–7, 9–11, 13, 15, and 16, and provides persuasive reasoning as to why the claimed subject matter would have been obvious to one of ordinary skill in the art. Pet. 45–50, 51–54, 56–58. Patent Owner presents arguments addressing these claims that rely on positions regarding Hart-787 and the claimed combination that we have addressed above. PO Resp. 57–58.

We have considered the evidence and arguments of record and determine that Petitioner has demonstrated by a preponderance of the evidence that the subject matter of dependent claims 2–7, 9–11, 13, 15, and

16 would have been obvious based on the relied-on prior art for the reasons discussed in the Petition.

6. Claim 8

Claim 8 depends from claim 1 and further requires "determining, based on the speech input received at the device, that no further speech input is expected to be received by the device within a predetermined period of time subsequent to the speech input being received and, in response, causing one or more commands to be automatically issued to the controllable appliance to thereby cause the controllable appliance to transition from the second state back to the first state." Ex. 1001, 23:16–24.

For this claim, Petitioner refers to its argument with respect to claim 6, which is similar in some respects. But rather than a determination "that no further speech input is expected to be received by the device within a predetermined period of time subsequent to the speech input being received," as in claim 8, claim 6 involves a determination "that further speech input has not been received" within such a predetermined period of time. *Id.* at 23:1–7.

The Petition addresses claim 8 only with reference to the arguments for claim 6 and to Petitioner's declarant's testimony. Pet. 50 (citing Ex. 1003 ¶¶ 135–136). In the Petition's discussion of claim 6, Petitioner asserts that a time delay allowing lower volume during a time where an additional command might be issued, and returning the volume to the original level if no subsequent command was received is taught or suggested by the combination of Hart-787 and Rosenberg. Pet. 49 (citing Ex. 1004, 2:19–21; Ex. 1006, 9:15–30, 9:34–63; Ex. 1003 ¶¶ 130–132).

Patent Owner argues that Petitioner fails to make a sufficient showing for claim 8. Petitioner's argument in its Reply makes reference to the

showing of claim 6, but does not make a clear showing regarding the recitation of claim 8. Petitioner argues in the Reply that "when a media user's name is recognized . . . there is a determination . . . that no further speech input is expected, as the purpose of the delay is to allow the media user to hear a verbal communication (not for the device) that is provided in the delay period." Pet. Reply 19 (citing Ex. 1006, 9:53–60). As Patent Owner argues, this argument appears for the first time in Petitioner's Reply and is therefore untimely and inappropriate. *See* PO Sur-reply 23–24. "Petitioner may not submit new evidence or argument in reply that it could have presented earlier, e.g., to make out a prima facie case of unpatentability." PTAB Consolidated Trial Practice Guide November 2019,[5] 73–74. Although a reply may respond to arguments, "'[r]espond,' in the context of 37 C.F.R. § 42.23(b), does not mean proceed in a new direction with a new approach as compared to the positions taken in a prior filing." *Id.* at 74. While relying on a previously cited portion of Rosenberg, Petitioner has made a new assertion regarding how this portion teaches or suggests a determination that no further speech input is expected to be received by the device within a predetermined period of time; in doing so, Petitioner has proceeded in an impermissible new direction.

In addition, the cited portions of Rosenberg do not support Petitioner's Reply arguments. While Rosenberg, in the cited portion, teaches lowering the volume after detecting a verbal communication to a user (*see* Ex. 1006, 9:53–60), the cited portion does not support Petitioner's assertion of a teaching or suggestion that no further speech input to the

[5] Available at https://www.uspto.gov/sites/default/files/documents/tpgnovpdf.

device is expected during this time. In fact, the verbal communication is an input to the device, as it is described in the cited embodiment of Rosenberg as being identified by the device to enable setting a delay for as long as the communication continues. Pet. Reply 19; Ex. 1006, 9:50–60 (maintaining volume reduction "for at least as long as the first user's voice continues to be identified"). Additionally, the determination in claim 8 that no further speech input is expected results in a responsive transition back to the original volume, while Petitioner's arguments relate to a determination which results in continued attenuation of the volume of audio output. Pet. Reply 19 (citing Ex. 1003 ¶ 131). Thus, even were we to consider this belated argument, we still do not find Petitioner has made a persuasive showing with respect to claim 8.

7. Claim 14

Claim 14 depends from claim 1, and further recites that "the voice control application is provisioned with at least one protocol for use in transmitting voice commands to at least one further device adapted to receive speech input, and wherein the device uses the provisioned protocol to cause one or more voice commands to be automatically issued to the at least one further device via use of a transmitter associated with the device to cause the controllable appliance to transition from a first state having a first volume level to a second state having a second volume level that is less than the first volume level." Ex. 1001, 24:21–32.

Petitioner argues that this is taught because Hart-787 discloses a user providing voice commands to the Hart-787 voice-controlled device and that voice-controlled device may transmit volume level attenuation commands to a wirelessly-linked audio-producing device. Pet. 55–56 (citing Ex. 1003 ¶¶ 147–149); PO Resp. 22–23. Petitioner's declarant's testimony is that the

device "is ready to receive subsequent well-known voice commands . . . and exert control over the wirelessly-linked audio-producing device in accordance with these commands" and that "some smart wirelessly-linked audio-producing devices at the time of the filing were 'adapted to receive speech input.'" Ex. 1003 ¶¶ 148–149.

Patent Owner contends that there is no reason provided why one of ordinary skill in the art would have made a modification to Hart-787 to provide the voice-controlled device with a protocol for use in transmitting voice commands to wirelessly-linked audio-producing devices. PO Resp. 59–60. We agree. While Petitioner's declarant asserts that "[i]t would have been obvious to a person of ordinary skill in the art" that the Hart-787 voice-controlled device "could wirelessly link to, and issue commands to" a device adapted to receive speech input (Ex. 1003 ¶ 149), there is no assertion by Petitioner's declarant, and no supporting evidence, that it was known in the art for one device to produce voice commands for a second device or of a teaching or suggestion for Hart-787's voice-controlled device to provide such commands by producing voice commands for the wirelessly-linked audio-producing device.

Thus, we do not determine that Petitioner has shown by a preponderance of the evidence that claim 14 is unpatentable.

E. Asserted Obviousness Over Hart-787, Fu, Rosenberg, and Hart-286

Claim 12 depends from claim 1 and further recites "associating a time of day with the established noise threshold and comparing the determined noise level to the established noise threshold only when the received speech input is received during the time of day." Ex. 1001, 24:4–8.

Petitioner challenges claim 12 as obvious over a combination of Hart-787, Fu, Rosenberg, and Hart-286. Pet. 58–63. In addition to

repeating its arguments with respect to claim 1, which we address above, Patent Owner argues that the proposed combination does not teach or suggest the recited "comparing" limitation of claim 12. PO Resp. 61; PO Sur-reply 25.

1. Hart-286 (Ex. 1007)

Hart-286 is titled "Transitioning an Electronic Device Between Device States" and relates to "transitioning a device from a low power state to an interactive state in response to a user speaking a defined utterance." Ex. 1007, codes (54), (57). Hart-286 describes transitioning between device states based on a similarity score between utterances identified in captured audio signals and a defined word or phrase. *Id.* at 6:40–7:2. The similarity score is compared to a transition threshold to determine whether the similarity score is greater than that threshold, and if it is, a determination is made that the defined word or phrase has been uttered. *Id.* at 6:62–67.

Hart-286 describes that the value of the transition threshold may change, for example if an utterance with a similarity score close to the threshold is detected, the threshold may be altered to make it more or less likely that subsequent speech will meet the threshold. *Id.* at 7:6–15. Other defined events may also change the threshold. *Id.* at 7:15–22. The value of the transition threshold may also be changed "based on a time of day, day of the week, season, etc. (e.g., with the values being determined based on usage patterns of the voice controlled device . . .)." *Id.* at 7:22–27. Instead of altering the transition threshold, a temporary transition threshold may be established and used. *Id.* at 7:28–32. This temporary transition threshold also may be established and used "based on a time of day, day of the week, season, . . . etc." *Id.* at 7:47–52.

2. The Parties' Contentions and Our Analysis

Petitioner argues that Hart-286 "broadly teaches applying various thresholds during particular times of day in accordance with the possibility that a user will utter a command," to allow for more accurate speech recognition throughout the course of a day. Pet. 60 (citing Ex. 1003 ¶ 157). Petitioner argues that, "[f]or example, during a time of day when there is usually background noise . . . , a [person of ordinary skill in the art] would have understood that it would be advantageous to reduce the threshold." *Id.* (citing Ex. 1007, 3:18–4:22, 7:22–27; Ex. 1003 ¶ 157).

Petitioner contends that implementing modifying noise thresholds based on time of day would have been obvious to allow the device to be more attuned to usage patterns throughout the day to better detect voice commands. Pet. 61 (citing Ex. 1007, 7:22–27; Ex. 1003 ¶ 158). Petitioner argues that one of ordinary skill in the art would have modified the thresholds established using ambient noise according to the combination of Hart-787, Fu, and Rosenberg with respect to claim 1 by applying Hart-286's teachings of using different thresholds during different times of day. *Id.* (citing Ex. 1003 ¶ 158).

Patent Owner argues that Petitioner "fails to address the limitation 'comparing the determined noise level to the established noise threshold ***only when the received speech input is received during the time of day***.'" PO Resp. 61; PO Sur-reply 25. However, we agree that Petitioner's argument "explains that different thresholds applied at different times of day would apply only to the speech input received during those times." Pet. Reply 23–24 (citing Pet. 60–61). The Petition describes Hart-286 as teaching or suggesting that "during a time of day when there is usually background noise that may interfere with [a Hart-286 device]'s ability to

properly understand a user's voice command, a [person of ordinary skill in the art] would have understood that it would be advantageous to reduce the threshold such that [the Hart-286 device] may better recognize the user's speech." Pet. 60 (citing Ex. 1007, 3:18–4:22, 7:22–27; Ex. 1003 ¶ 157). The Petition adequately describes the modification as providing "improv[ed] desirable user speech recognition by setting a threshold that is accurate according to normal environmental conditions for a particular time of day" and provide a device that provides better detection throughout a day. *Id.* at 61 (citing Ex. 1007, 7:22–27; Ex. 1003 ¶ 158). The Petition therefore fairly addresses the use of the noise thresholds associated with a time of day with received speech input during that time of day.

Having considered the parties' arguments and evidence, we determine that Petitioner has shown by a preponderance of the evidence that the subject matter of dependent claim 12 would have been obvious over Hart-787, Fu, Rosenberg, and Hart-286.

III. CONCLUSION[6]

In summary:

[6] Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding. See* 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. *See* 37 C.F.R. § 42.8(a)(3), (b)(2).

Claim(s)	35 U.S.C. §	Reference(s)/Basis	Claim(s) Shown Unpatentable	Claim(s) Not shown Unpatentable
1–11, 13–16	103	Hart-787, Fu, Rosenberg	1–7, 9–11, 13, 15, 16	8, 14
12	103	Hart-787, Fu, Rosenberg, Hart-286	12	
Overall Outcome			1–7, 9–13, 15, 16	8, 14

IV. ORDER

For the reasons given, it is:

ORDERED that claims 1–7, 9–13, 15, and 16 of U.S. Patent No. 10,930,276 B2 have been proven to be unpatentable;

FURTHER ORDERED that claims 8 and 14 of U.S. Patent No. 10,930,276 B2 have not been proven to be unpatentable; and

FURTHER ORDERED that because this is a Final Written Decision, parties to this proceeding seeking judicial review of the Decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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