

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Samsung Electronics Co., LTD and Samsung Electronics America, Inc.,
Petitioners

v.

SpeakWare, Inc.,
Patent Owner

Case IPR2019-01146

U.S. Patent No. 6,397,186

**Petition for Inter Partes Review of
U.S. Patent No. 6,397,186**

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1002	U.S. Patent No. 5,802,467 to Salazar et al. (“Salazar”)
1003	U.S. Patent No. 5,983,186 to Miyazawa et al. (“Miyazawa”)
1004	U.S. Patent No. 6,012,027 to Bossemeyer, Jr. (“Bossemeyer”)
1005	U.S. Patent No. 5,008,954 to Oppendahl (“Oppendahl”)
1006	U.S. Patent No. 5,459,792 to Reichel (“Reichel”)
1007	U.S. Patent No. 6,425,086 to Clark et al. (“Clark”)
1008	U.S. Patent No. 5,583,965 to Douma et al. (“Douma”)
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1010	Prosecution History of U.S. Patent Application No. 09/469,707
1011	Prosecution History of U.S. Patent Application No. 10/168,935
1012	U.S. Patent No. 5,268,965 to Badie et al. (“Badie”)
1013	WO 94/03020 to Bissonnette (“Bissonnette”)
1014	U.S. Patent No. 5,566,271 to Tomitsuka (“Tomitsuka”)
1015	U.S. Patent No. 6,112,103 to Puthuff (“Puthuff”)
1016	U.S. Patent No. 6,188,986 to Matulich (“Matulich”)
1017	U.S. Patent No. 6,606,280 to Knittel (“Knittel”)
1018	U.S. Patent 5,668,929 to Foster (“Foster”)
1019	U.S. Patent No. 6,584,439 to Geilhufe (“Geilhufe”)
1020	Excerpts from Newton’s Telecom Dictionary (15th ed. Feb. 1999)

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1021	U.S. Patent No. 4,484,344 to Mai (“Mai”)
1022	U.S. Patent No. 5,276,765 to Freeman (“Freeman”)

TABLE OF AUTHORITIES

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I. INTRODUCTION

Petitioners Samsung Electronics Co., LTD and Samsung Electronics America, Inc. (“Samsung”) request inter partes review of claims 1-20 of U.S. Patent No. 6,397,186. The ’186 patent is directed to a sound-activated and voice-operated remote control for controlling appliances. ’186 patent, Abstract. Independent claim 1 requires three elements: a microphone for converting audio signals to electrical signals, a speech recognition system for receiving the electrical signals and generating signals for controlling an appliance, and an appliance control circuit for transmitting an appliance control signal to an appliance. ’186 patent, claim 1. But the patent admits, and the prior art in the Petition confirms, that these features were all well known. *See* Section III.A. And despite the ’186 patent and its applicant distinguishing the claims from the prior art by arguing that they provide hands-free control of appliances using a system that switches between a low-power mode and an active speech recognition mode based solely on voice input, these features were also not new. As this Petition demonstrates, the prior art disclosed these features and rendered obvious each of claims 1-20 before the ’186 patent.

II. STATEMENT OF PRECISE RELIEF REQUESTED FOR EACH CLAIM CHALLENGED

A. Claims and Statutory Grounds

Samsung requests review and cancellation under 35 U.S.C. § 311 of claims 1-

20 in view of:

Prior Art
<i>Salazar</i> , U.S. Patent No. 5,802,467 (Ex. 1002); issued Sept. 1, 1998; prior art under pre-AIA 35 U.S.C. § 102(b).
<i>Miyazawa</i> , U.S. Patent No. 5,983,186 (Ex. 1003); filed Aug. 20, 1996, issued on November 9, 1999; prior art under 35 U.S.C. §§ 102(a), (e).
<i>Bossemeyer</i> , U.S. Patent No. 6,012,027 (Ex. 1004); filed Sept. 17, 1997; prior art under § 102(e).
<i>Oppendahl</i> , U.S. Patent No. 5,008,954 (Ex. 1005); issued Sept. 24, 1990; prior art under § 102(b).
<i>Reichel</i> , U.S. Patent No. 5,459,792 (Ex. 1006); issued Oct. 17, 1995; prior art under § 102(b).
<i>Clark</i> , U.S. Patent No. 6,425,086 (Ex. 1007); filed Apr. 30, 1999; prior art under § 102(e).
<i>Douma</i> , U.S. Patent No. 5,583,965 (Ex. 1008); issued Dec. 10, 1996; prior art under § 102(b).

Grounds of Unpatentability	
1A/1B	<i>Salazar</i> in view of <i>Miyazawa</i> (1A), and <i>Salazar</i> and <i>Miyazawa</i> in view of <i>Bossemeyer</i> (1B) renders obvious claims 1-4, 7-16, and 19-20 under 35 U.S.C. § 103.
2A/2B	<i>Salazar</i> and <i>Miyazawa</i> in view of <i>Oppendahl</i> (2A), and <i>Salazar</i> , <i>Miyazawa</i> and <i>Bossemeyer</i> in view of <i>Oppendahl</i> (2B) renders obvious claim 5 under 35 U.S.C. § 103.
3A/3B	<i>Salazar</i> and <i>Miyazawa</i> in view of <i>Reichel</i> (3A), and <i>Salazar</i> , <i>Miyazawa</i> , and <i>Bossemeyer</i> in view of <i>Reichel</i> (3B) renders obvious claim 6 under 35 U.S.C. § 103.
4A/4B	<i>Salazar</i> and <i>Miyazawa</i> in view of <i>Clark</i> (4A), and <i>Salazar</i> , <i>Miyazawa</i> , and <i>Bossemeyer</i> in view of <i>Clark</i> (4B) renders obvious claim 8 under 35 U.S.C. § 103.
5A/5B	<i>Salazar</i> and <i>Miyazawa</i> in view of <i>Douma</i> (5A), and <i>Salazar</i> , <i>Miyazawa</i> , and <i>Bossemeyer</i> in view of <i>Douma</i> (5B) renders obvious claims 17 and 18 under 35 U.S.C. § 103.

III. OVERVIEW OF THE '186 PATENT

A. Summary

The '186 patent discloses a sound-activated, universal remote system for controlling appliances using voice input. Abstract, 4:33-51; Polish, ¶ 33. A microphone captures voice input, and one or more circuits convert and apply speech

recognition methods to the captured voice signals. '186 patent, 7:22–32, 10:5-46. Using the voice input, the system generates control signals that are wirelessly transmitted to an appliance. *Id.*, 8:17-38. The '186 patent admits, however, that all these elements were known, including:

- commercially available microphone, *id.*, 7:33-43;
- processing and recognizing speech in signals received from the microphone, *id.*, 10:20-21, 10:40-11:7, 23:16-28;
- using speech recognition to control appliances, *id.*, 2:43-62;
- controlling multiple appliances with a universal remote, *id.*, 1:11-67;
- “continuous listening software routines” of its speech recognition mode, *id.*, 21:39-49 (citing Fig. 5, S508 through S517), 23:16-28; and
- “signal amplification and triggering circuits,” *id.*, 19:57-20:19. Polish, ¶ 34.

The sole improvement over the admitted prior art is purportedly providing “truly hands-free” voice input for interacting with appliances. *Id.*, 2:7-42, 6:66-7:4, 8:36-38; Polish, ¶ 35. This can be accomplished using two operating modes: a speech recognition mode and a sound activation mode. '186 patent, 4:27-33, 7:4–15, 7:54-8:16. The speech recognition mode recognizes speech in a captured voice signal to determine commands. *Id.*, 11:34-67. The sound activation mode is a low-power mode. *Id.*, 7:54-8:16. The system remains in the low-power sound activation mode

until a voice signal is received that exceeds a threshold, triggering the speech recognition mode. *Id.* If a command is recognized from the captured voice signal, the system generates a corresponding control signal that is sent to an appliance. *Id.*, 8:1-16. The '186 patent contends that these features improved the prior art by eliminating the need for a “talk switch” found in earlier systems. *Id.*, 2:1-42. As this Petition and cited evidence demonstrate, these features were well known in the art, as were the challenged claims as a whole. *See generally* Polish; *id.* ¶¶ 23-32.

B. Prosecution History

The '186 patent was filed on December 22, 1999, as U.S. Patent Application No. 09/469,707. '186 patent, cover. The application includes no priority claims.

In response to two office actions citing prior art different than presented in this Petition, the applicant distinguished its claims based solely on a hands-free switching feature:

[I]n accordance with an important aspect of the invention, the push to talk switch is eliminated, . . . , while at the same time preventing false operations of the controlled device due to background noise by detecting the amplitude of an input signal and switching to a speech recognition mode if the input signal amplitude exceeds a certain threshold.

Ex. 1010, 192; *see also id.*, 161-64, 190-93.

C. The Level of Ordinary Skill in the Art

Factors defining the level of ordinary skill in the art include: (1) the types of problems encountered in the art; (2) the prior art solutions to those problems; (3) the rapidity with which innovations are made; (4) the sophistication of technology; and (5) the educational level of active workers in the field. *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995).

Based on these factors, a person of ordinary skill in the art at the time of the alleged invention of the '186 patent ("POSITA") would have held at least a bachelor's degree in electrical engineering or an equivalent field, and approximately two years of industrial or academic experiences working with voice-operated systems for remotely controlling appliances. Polish ¶¶ 39-41 (citing '186 patent, 1:5-9). This person would have been familiar with technologies for remotely controlling electronic equipment, including voice-operated systems for remotely controlling appliances. *Id.*

D. Claim Construction

In this proceeding, the claim terms of the '186 patent should be given their plain and ordinary meaning as understood by one of ordinary skill in the art, consistent with the disclosure and the prosecution history. 83 Fed. Reg. 51, 340-59 (Oct. 11, 2018).

E. The Board Should Institute Review

The Board should institute review and, pursuant to the motion for joinder filed with this petition, join the resulting proceeding to previously instituted IPR2019-00340 filed by Google. As stated in Samsung's motion for joinder, there are no substantive differences between Google's and Samsung's Petitions, and the evidence relied on is substantially the same.

In addition to there being no substantive differences between this Petition and Google's, Samsung notes that no reference in this Petition was relied on by the Office during prosecution of the '186 patent. Salazar and Bossemeyer were not cited, and Miyazawa was only cited in an IDS among numerous other references. Ex. 1010, 172-77. Miyazawa was never analyzed during prosecution of the '186 patent, *id.*, 153-59, 172-85, and its identification in an IDS is not a sufficient reason to deny institution. *E.g., Intex Recreation Corp. v. Team Worldwide Corp.*, Case IPR2018-00871, Paper 14 at 13 (PTAB Sept. 14, 2018).

This Petition also presents different grounds of unpatentability than those considered by the Office prior to institution of trial in Google's petition. The present petition, like Google's, identifies new references (e.g., Salazar), different combinations of prior art elements, and different rationales for why a POSITA would have considered the combinations to have been obvious. Samsung does not suggest modifying a trigger-activated system to remove its trigger for voice input, as was

suggested during prosecution. *See* Ex. 1010, 156-59, 181-85. Samsung instead submits that it would have been obvious to combine Salazar's voice-controlled appliance remote system with the voice-activated processor of Miyazawa. *See Praxair Distribution, Inc. v. Ino Therapeutics, LLC*, IPR2015-00893, paper 14 at 8-9 (PTAB Sept. 22, 2015).

Finally, while the Office relied on Miyazawa to reject claims presented in a child application claiming priority to the '186 patent, Ex. 1011, 56-79, the circumstances demonstrate Miyazawa was not considered with regard to the '186 patent. After the '186 patent issued, a different examiner rejected continuation claims in view of a prior art combination including Miyazawa. *See* Ex. 1011, 56-80; *compare id.* at 56 (examiner Harper) *with* Ex. 1010 at 207 (examiner Dorvil). Instead of distinguishing Miyazawa, the applicant canceled its broadest claims and converted into independent form narrower dependent claims having limitations not considered in the '186 patent. Ex. 1011, 33-39. Specifically, the applicant narrowed the claims to require a "MUTE mode," *id.*, 36-37 (original claim 17), "recognition error muting mode" and "volume control mode," *id.* (original claim 23). The applicant also avoided a double patenting rejection of claims reciting substantially the same limitations as originally-presented in the '186 patent (original claims 1-8) by canceling those claims. *See id.* 33-39, 189-90. Thus, the Office did not consider Miyazawa while the application for the '186 patent was pending and similarly

claimed subject matter was canceled in the child when it was considered. That a different examiner relied on Miyazawa in the continuation application suggests that the original examiner misapprehended or overlooked Miyazawa, and that the applicant canceled similar claims when faced with Miyazawa indicates its relevance to patentability. These circumstances weigh in favor of institution.

F. The *General Plastic* Factors are Inapplicable

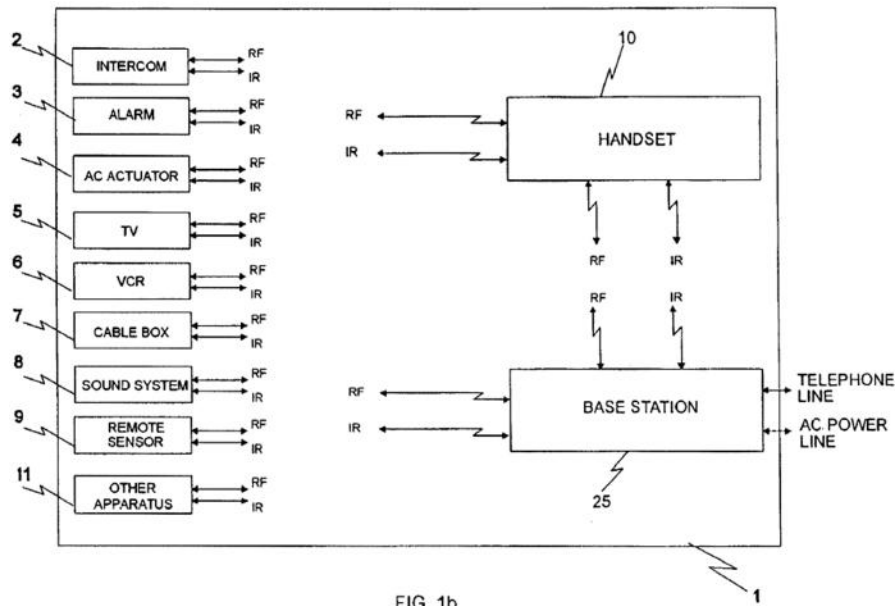
The Board has held that the factors outlined in *General Plastic Industrial Co., Ltd. v. Canon Kabushiki Kaisha*, IPR2016-01357, Paper 19 (P.T.A.B. Sept. 6, 2017), regarding whether to institute subsequent petitions challenging the same patent are inapplicable to the situation here. For example, in *Apple Inc. v. Uniloc 2017 LLC*, IPR2018-00580, at 9-10 (PTAB Aug. 21, 2018) (Paper 13), the Board held that when a copycat petition is accompanied by a timely motion for joinder in which the petitioner has agreed to both a passive understudy role and the existing schedule, the *General Plastic* factors are “effectively neutraliz[ed].”

IV. GROUND 1A/1B: SALAZAR IN VIEW OF MIYAZAWA (1A), AND SALAZAR AND MIYAZAWA IN VIEW OF BOSSEMEYER (1B) RENDER OBVIOUS CLAIMS 1-4, 7-16, AND 19-20

A. Salazar Overview

Salazar discloses a universal remote system (including a handset and base station) that receives voice inputs to control appliances. *Salazar*, Abstract, 1:8-14, 2:11-26, Fig. 1b; Polish, ¶¶ 44-46. The handset and base station each have a

microprocessor, a wireless transceiver for sending RF or infrared signals to appliances, a microphone, and circuits for recognizing speech in an input signal and generating corresponding command and control signals to control appliances. *Salazar*, 3:2-4, 15-40, 6:31-51, 22:35-37, Figs. 1b, 2-5. Salazar's speech recognition occurs in a "voice activated mode" that "may be selected with voice command input via [the] microphone," i.e., without the need for a physical switch. *Id.*, 21:44-55.



Salazar discloses that its methods may be carried out by either the handset or the base station alone, or together, as each component includes the same functionality. *Id.*, 2:66-3:4. Figure 5 (below), shows Salazar's base station with a **microphone** that sends voice signals to a **voice activated device IC**. *Id.*, 24:36-45. The voice activated device IC performs speech recognition and transmits recognized signals to the **microprocessor**. *Id.* The microprocessor generates command and

control signals and transmits commands to the appliances via **IR/RF transceiver circuitry**. *Id.* Fig. 3 shows identical functionality for the handset. *Id.*, 21:43-55.

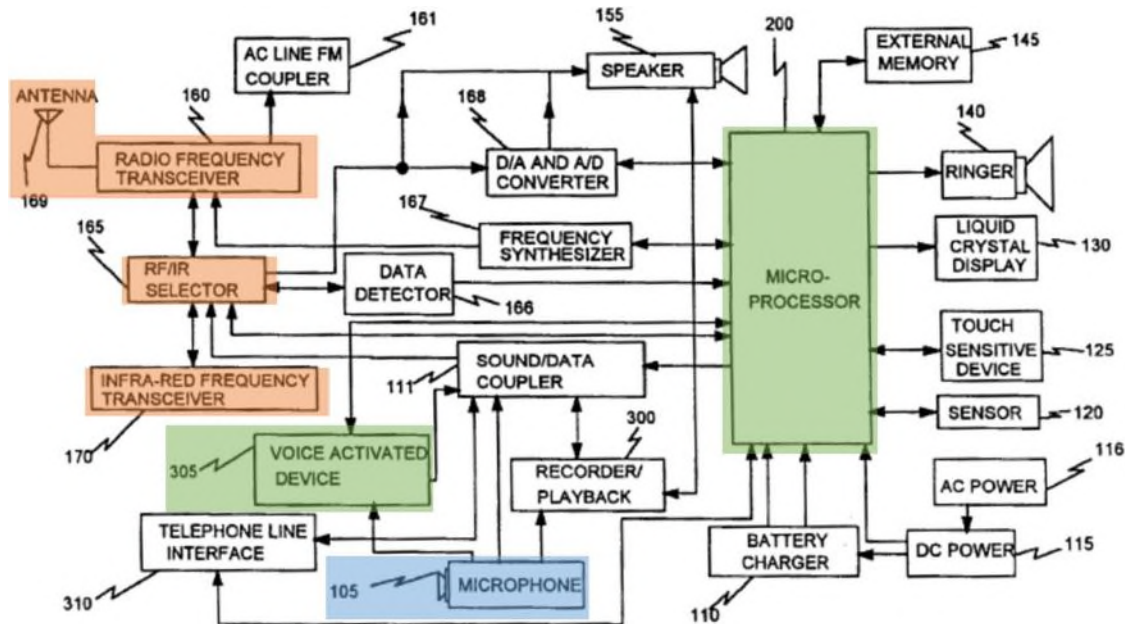


FIG. 5

Polish, ¶ 45-46.

To conserve power, Salazar discloses a “stop mode” and a “battery save circuit 208” that activates and deactivates its microprocessor for periods of time to reduce battery drain. *Salazar*, 18:30-41, 19:1-51. Salazar discloses that its microprocessor may be commanded to exit the stop mode using hardware interrupts. *Id.*, 18:30-36.

B. Miyazawa Overview

Miyazawa discloses a voice-activated speech recognition system for interacting with various devices, including toys, game machines, and electronic

appliances. *Miyazawa*, Abstract, 1:30-34, 2:46-53, 14:4-27; Polish, ¶ 47. Like Salazar, Miyazawa discloses a sound signal input unit 1 that includes a **microphone** (along with an amplifier, low-pass filter, and A/D converter, as discussed below), a **CPU 10** that performs speech recognition to enable voice interaction, and an **input sound signal power detector 9**. *Miyazawa*, 6:38-56.

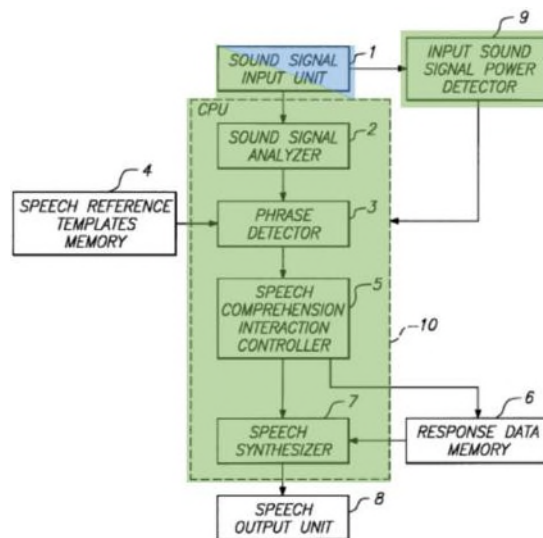
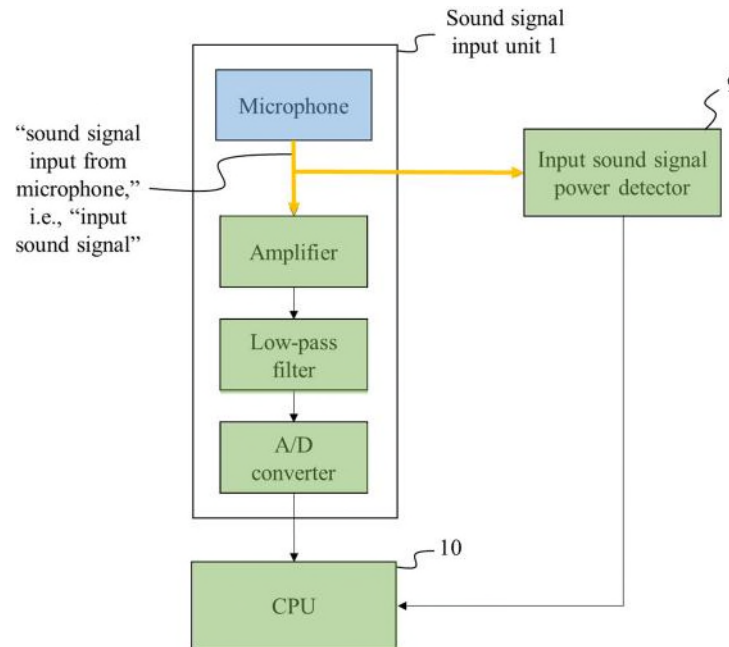


FIG. -1

Polish, ¶ 47.

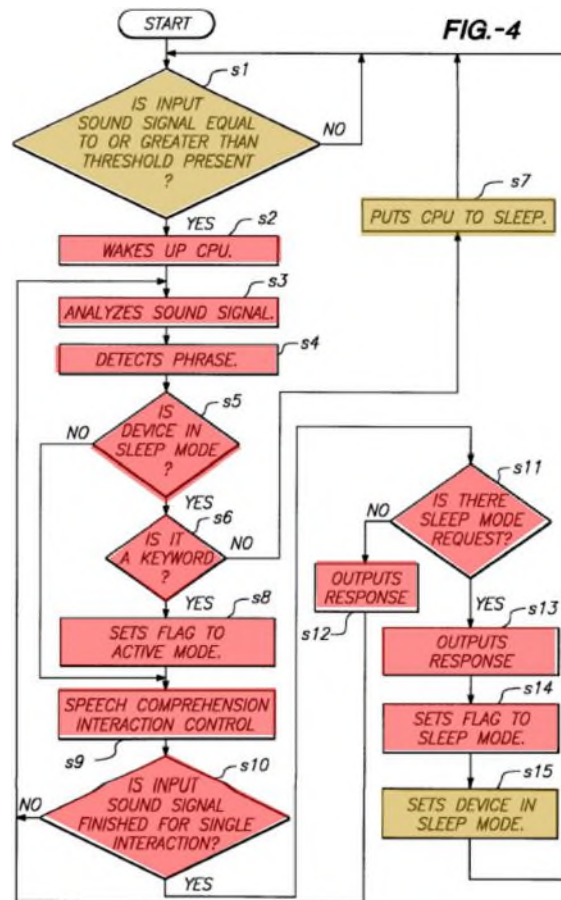
Miyazawa's Figure 1 does not show the elements of sound signal input unit 1 because, as Miyazawa explains, these elements are conventional. But Miyazawa discloses that "the sound signal input from the microphone is first passed through the amplifier and the lowpass filter" and then through an A/D converter. *Id.*, 6:38-56. Miyazawa also discloses that the input sound signal power detector 9 receives

the same “input sound signal fetched by sound signal input unit 1.” *Id.*, 9:33-40 , 9:64-67; *see also id.*, 3:13-17, 4:9-12. This is shown in the diagram below:



Polish, ¶ 48.

Miyazawa also discloses switching between multiple modes to conserve power. The input sound signal detector 9 enables CPU 10 to switch between a **low-power sleep mode** and an **active speech recognition mode** based on the volume, magnitude, or amplitude of input signals collected at the microphone, to conserve power. *Miyazawa*, 2:56-3:28, 4:13-22, 10:2-29, Fig 4 (below). This switching occurs without requiring a physical switch. *Id.*, 2:8-19.

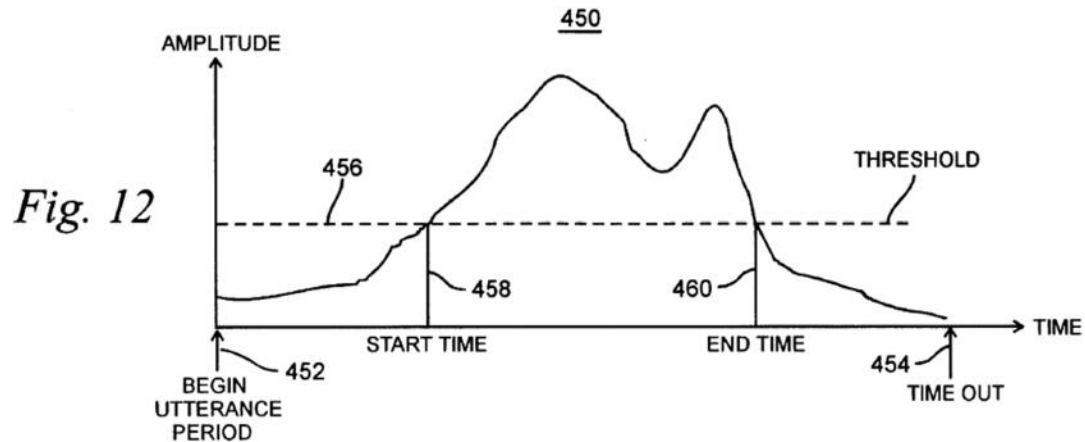


Polish, ¶¶ 49-50.

C. Bossemeyer Overview

Bossemeyer discloses an enrollment process for a speech recognition system. *Bossemeyer*, 1:17-39, 2:24-32; Polish, ¶ 51. The system includes a microphone and hardware and software for receiving, converting, and analyzing voice signals received by the microphone. *Bossemeyer*, 2:33-58. During enrollment, Bossemeyer's system monitors signals from the microphone to determine if an utterance is received. *Id.*, 8:51-62. The start of an utterance is determined if the

amplitude of a received voice input crosses an amplitude threshold, as shown below in Figure 12. *Id.*, 8:51-62, Fig. 12.



D. Combining Salazar, Miyazawa, and Bossemeyer

A POSITA would have found it obvious to combine Salazar and Miyazawa. Polish, ¶¶ 52-62. Both disclose: speech recognition systems that use voice to interact with electronic devices, mode-switching processors to reduce power consumption, and entering voice recognition modes without a user activating a physical switch. *Id.*, ¶ 52.

Salazar discloses a universal remote system with a voice-activated mode for recognizing voice inputs and creating commands for controlling external appliances. *Salazar*, 21:43-59, 24:37-51. Salazar discloses that its voice-activated mode may be selected by a voice command input via its microphone. *Id.*, 21:53-55. Salazar also discloses reducing power consumption in its system via a “stop mode” and a “battery save circuit 208” that activates and deactivates its processor for periods of time. *Id.*,

18:30-41, 19:1-51. Salazar further discloses that the microprocessor is activated and exits the stop mode in response to a hardware interrupt. *Id.* Salazar does not expressly disclose switching from its stop mode to its voice-activated mode as a function of the amplitude of a received signal from its microphone. However, a POSITA would have recognized this feature was well-known in the art and disclosed by Miyazawa. Polish, ¶¶ 53-54.

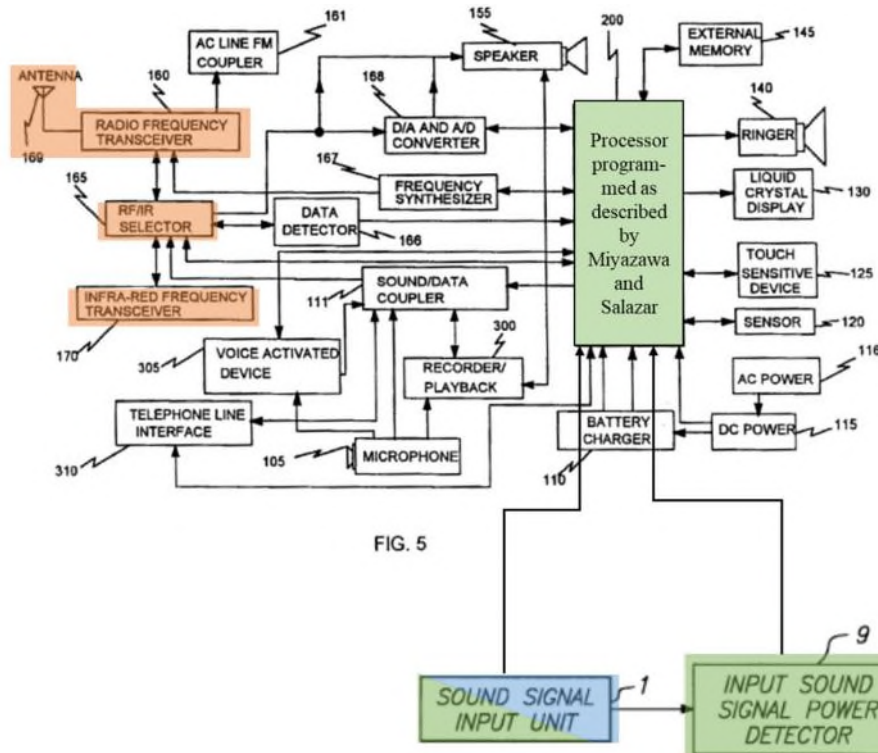
Miyazawa discloses a voice-activated, speech recognition system for interacting with appliances that switches between processor modes as a function of amplitude of a received electrical signal from a microphone. Polish, ¶ 54. Specifically, Miyazawa's speech recognition system switches from a low-power sleep mode to an active speech recognition mode based on the volume, magnitude, or amplitude of input signals collected at the microphone. *Miyazawa*, Abstract, 2:56-3:28. Miyazawa therefore discloses receiving voice inputs and switching modes without a physical switch to activate the system.

A POSITA would have found it obvious to incorporate Miyazawa's voice-triggered switching into Salazar's voice-activated appliance control system to further reduce power consumption in Salazar. Polish, ¶¶ 55-56; *DyStar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co.*, 464 F.3d 1356, 1368 (Fed. Cir. 2006) (finding motivation to combine exists "[when] the combination of references . . . is more desirable, for example because it is . . . cheaper . . . or more efficient.>").

A POSITA would have recognized that the combined Salazar-Miyazawa system would provide a universal remote system with a lower power mode that does not process voice commands until one is detected using Miyazawa's thresholding techniques. Polish, ¶ 56. Combining Miyazawa with Salazar would have been simply combining known techniques of voice control with known battery-saving processor modes to yield the predictable result of a system employing voice inputs to switch between processor modes that maintains a low power mode until a voice command is received. *Id.*; *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 416-17 (2007). This achieves the express goals of Miyazawa and Salazar by reducing system power requirements, where Miyazawa discloses reducing power consumption specifically when no voice inputs are provided and Salazar discloses a more generalized power-saving mode. Polish, ¶ 56. The Salazar-Miyazawa system also would have been straightforward to implement because both receive voice inputs without a physical trigger and both utilize mode-switching processors, microphones, and speech recognition hardware and software. *Id.*, ¶ 57.

While not required to demonstrate obviousness, it also would have been obvious to physically incorporate Miyazawa into Salazar. *Allied Erecting & Dismantling Co. v. Genesis Attachments, LLC*, 825 F.3d 1373, 1381 (Fed. Cir. 2016); *In re Sneed*, 710 F.2d 1544, 1550 (Fed. Cir. 1983). For example, a POSITA would have found it obvious to include the components and functionality from

Miyazawa's sound signal input unit 1 and input sound signal power detector 9 into Salazar here:



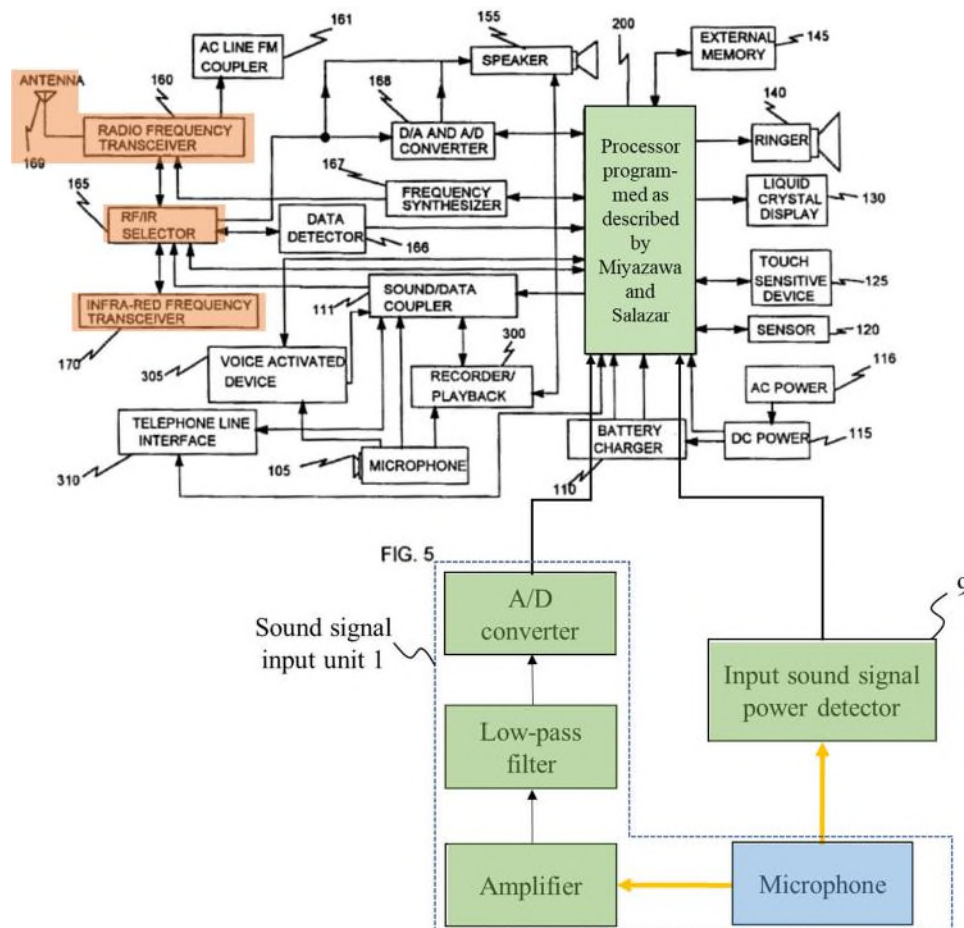
Polish, ¶ 58-62. Here, a POSITA would have included or replaced Salazar's microphone 105 with Miyazawa's sound signal input unit 1, which includes its own microphone. Polish, ¶ 59. The correspondence between sound signal input unit 1, input sound signal power detector 9, and the processor/CPU are exactly as disclosed in Miyazawa Figure 1. *Id.* In this manner, Miyazawa's input sound signal power detector 9 would be connected to the processor/CPU to incorporate the power-saving mode switching disclosed in Miyazawa. *Id.* As discussed, a POSITA would have been motivated to make that combination because it would conserve power. *Id.*

Moreover, this would have been straightforward to implement because sound signal power detector 9 would instruct the processor (which would include the functionality of Salazar and Miyazawa, as discussed below) to switch between sleep and active modes using, e.g., hardware interrupts, as expressly contemplated by Salazar. *Id.* Moreover, this combination would have been simply combining two known elements (Salazar's voice control system and Miyazawa's voice-activated power mode switching) in a known manner (using hardware interrupts) to achieve a predictable result (reducing overall power consumption). *Id.*; *KSR*, 550 U.S. at 416-17.

While Salazar's, voice activated device IC performs speech recognition and A/D conversion, *Salazar*, 17:56-61, it would have been obvious to replace this functionality with Miyazawa's sound signal input unit 1 (which performs A/D conversion) and the functionality disclosed in Miyazawa's CPU (which performs speech recognition). Polish, ¶ 60. It would have been obvious to program the Salazar-Miyazawa processor to perform speech recognition in addition to the other command generation and control functions taught by Salazar because Miyazawa teaches that multiple CPU functionalities can be consolidated into a single processor or distributed among several. *Id.* A POSITA would have been motivated to implement the speech recognition in the CPU by the cost-savings of removing voice activated device IC. *Id.*, ¶ 61; *DyStar*, 464 F.3d at 1368. Moreover, Miyazawa

discloses that processor-based speech recognition was known. *Miyazawa*, 6:49-57, 7:7-26.

Miyazawa's sound signal input unit 1 also includes multiple components that are illustrated in the drawing below. The two drawings are color-coded to respond to the elements of claim 1: a **microphone**, a **speech recognition system**, and an **appliance control circuit**. Polish, ¶ 62.



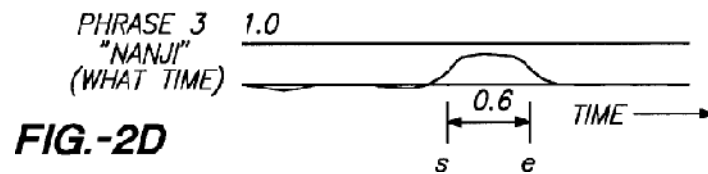
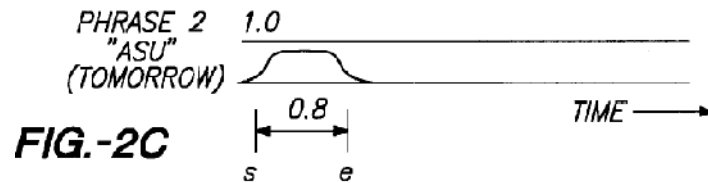
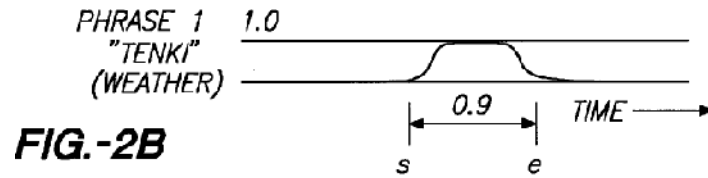
If SpeakWare argues Salazar and Miyazawa do not disclose switching between modes based on an amplitude of a microphone electrical signal, it would

have been obvious to combine Salazar-Miyazawa with Bossemeyer to provide such a system. Polish, ¶¶ 63-65. Like Salazar-Miyazawa, Bossemeyer discloses a speech recognition system that detects an utterance received from a user. Polish, ¶ 63. Bossemeyer discloses monitoring microphone signals and detecting utterance start and end times when the amplitude of the signal exceeds a threshold. *Bossemeyer*, 2:33-58, 8:51-62, Fig. 12.

A POSITA would have combined Bossemeyer with Salazar-Miyazawa because each relates to a speech recognition system that detects an utterance from a user. Polish, ¶ 64. A POSITA would have found it obvious to combine Bossemeyer's utterance amplitude threshold with Miyazawa's threshold mode switching because doing so would have been nothing more than combining known techniques of setting an utterance threshold in a speech recognition system. *Id.* The predictable result would have been a system that switches from a low-power state to a speech recognition state upon detection of an utterance using an amplitude of a signal. *Id.*; *KSR*, 550 U.S. at 416-17.

A POSITA also would have combined Bossemeyer's amplitude thresholding with Miyazawa's thresholding techniques because Miyazawa discloses utilizing "the volume, magnitude or amplitude of input sound signals" to trigger its system to determine whether a keyword has been uttered, and Bossemeyer discloses using an amplitude to detect an utterance from background noise. Polish, ¶ 64. A POSITA

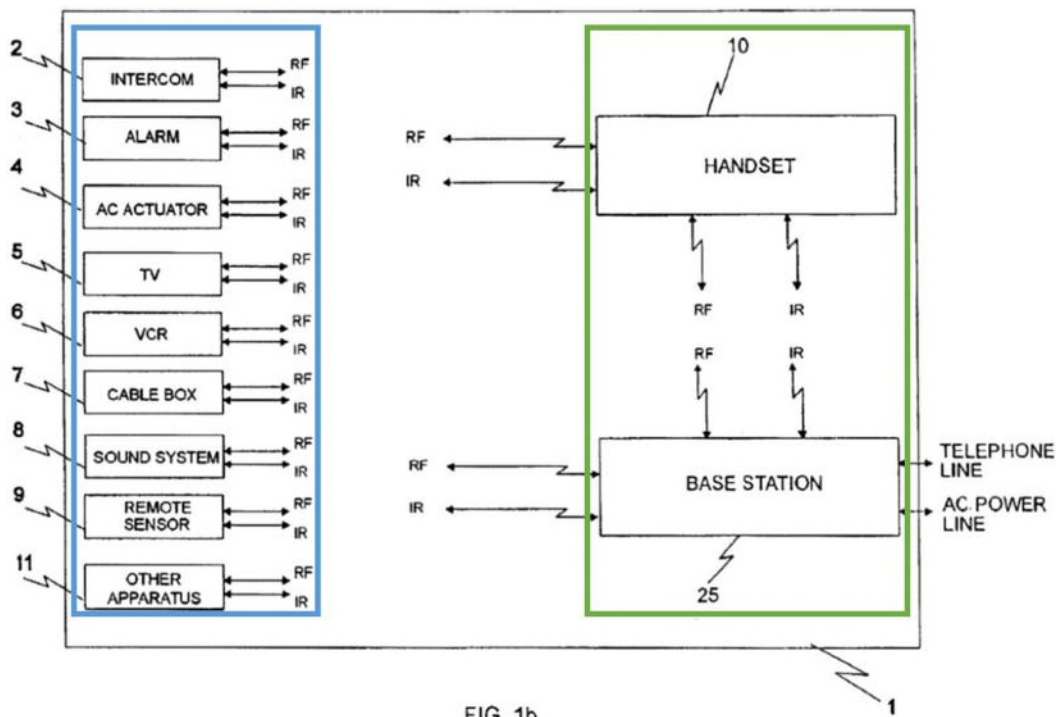
would have recognized that Bossemeyer would have improved Miyazawa's speech recognition techniques by setting the start and end points of an utterance and only processing voice signals that could be voice commands. *Id.* In particular, Bossemeyer's thresholding determines the start and end of an utterance based on a voice signal exceeding a threshold. *Id.* ¶¶ 51, 65. Combined with Miyazawa, Bossemeyer's techniques identify the useful parts of a voice sample before applying Miyazawa's speech recognition techniques (e.g., applying speech recognition to only those portions that exceed the threshold). *Id.*, ¶ 65. This reduces power consumption by applying speech recognition only to registered utterances and not background noise adjacent to the utterance. *Id.*; *Bossemeyer*, Fig. 12; *DyStar*, 464 F.3d at 1368. A POSITA would have recognized Bossemeyer's boundary-setting technique as aligning with Miyazawa's disclosure of analyzing the duration of a voice sample to determine a confidence level that a voice sample matches a stored word in its vocabulary. *See Miyazawa*, 7:27-37, 8:28-37, Figs. 2B-2D; *Polish*, ¶ 65.



E. Claim 1

[1p] “An audio signal activated control system for controlling appliances comprising:”

To the extent the preamble is limiting, Salazar discloses an **audio signal-activated control system** for controlling **appliances**. *Salazar*, Fig. 1b (below); Polish, ¶¶ 66-68, 70. Salazar discloses a system that responds to voice commands and generates command or control signals for transmission to devices, including home appliances. *Salazar*, Abstract, 1:8-14, 1:50-55, 2:11-26, 3:15-40, 3:53-4:17, 4:44-5:15, 5:39-46, 5:62-67, 6:31-51, 7:14-8:30, 17:57-61, 21:43-58, 24:37-51, 25:39-50, Fig. 1b.



Salazar discloses that its system may include a mobile handset 10 and a stationary base station 25 that each have a processor (microprocessors 30/200), a wireless transceiver for sending RF or infrared signals to appliances, a microphone, and one or more circuits for applying speech recognition to voice inputs and for generating corresponding command and control signals to appliances. *Id.*, 3:15-40, 6:31-51, 22:35-37, Figs. 1b, 2-5. Salazar discloses that its handset and base station carry out substantially the same functions and control appliances alone or in combination. *See id.*

Miyazawa also discloses an audio signal activated system for controlling appliances. Polish, ¶¶ 66, 69, 70. Miyazawa's processor-based "voice-activated interactive speech recognition device" monitors voice inputs exceeding a defined

volume threshold, analyzes the voice input, and generates an output based on the voice input. *See, e.g., Miyazawa*, Title, Abstract, 1:8-14, 2:8-27, 2:46-54, Figs. 1, 4. Miyazawa discloses that its output may be used for various purposes, including with “electronic appliances that are used in everyday life,” including “home electronics, computer subsystems, electronic appliances or similar devices.” Miyazawa, 14:4-31.

In addition to the '186 patent conceding that voice-activated systems for controlling appliances were known, *see supra* Section III.A, it would have been obvious to combine Salazar with Miyazawa (Ground 1A) and Salazar, Miyazawa, and Bossemeyer (Ground 1B) to arrive at the audio signal activated control system recited in claim 1, *see supra* Section IV.D; Polish, ¶ 70.

[1a] “a microphone for receiving audio signals and converting said audio signals to electrical signals”

Salazar and Miyazawa disclose this element. Polish, ¶¶ 71-76. Salazar’s handset (Fig. 3) and base station (Fig. 5) have **microphones** for receiving audio signals and for converting the audio signals into electrical signals. *Salazar*, Abstract, 1:8-14, 3:32-60, 17:37-65, 21:43-58, 24:37-51, Figs. 1-5.

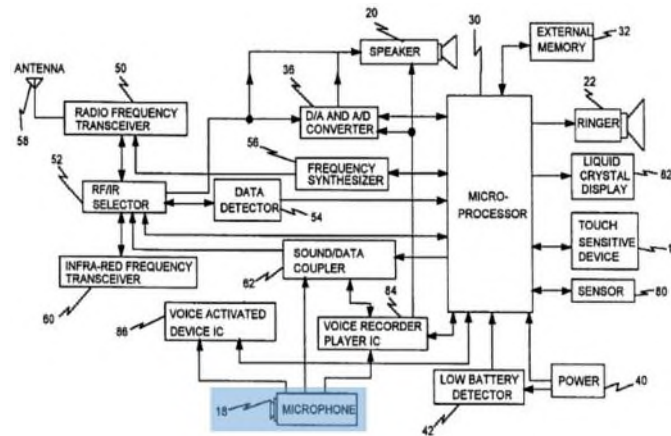


FIG. 3

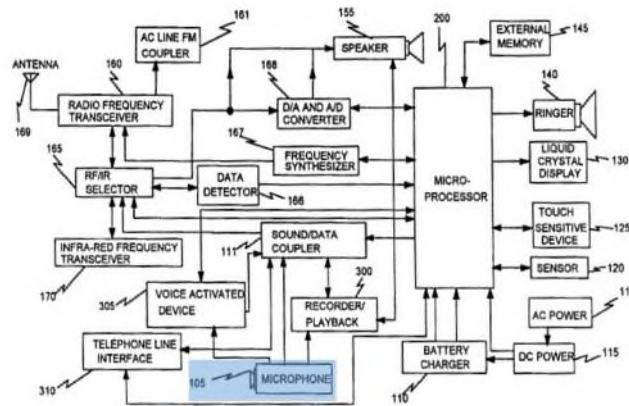


FIG. 5

Polish, ¶ 71.

Miyazawa's sound signal input 1 also includes a **microphone** for receiving audio signals and for converting the audio signals into electrical signals. *Miyazawa*, 6:20-57, Fig. 1.

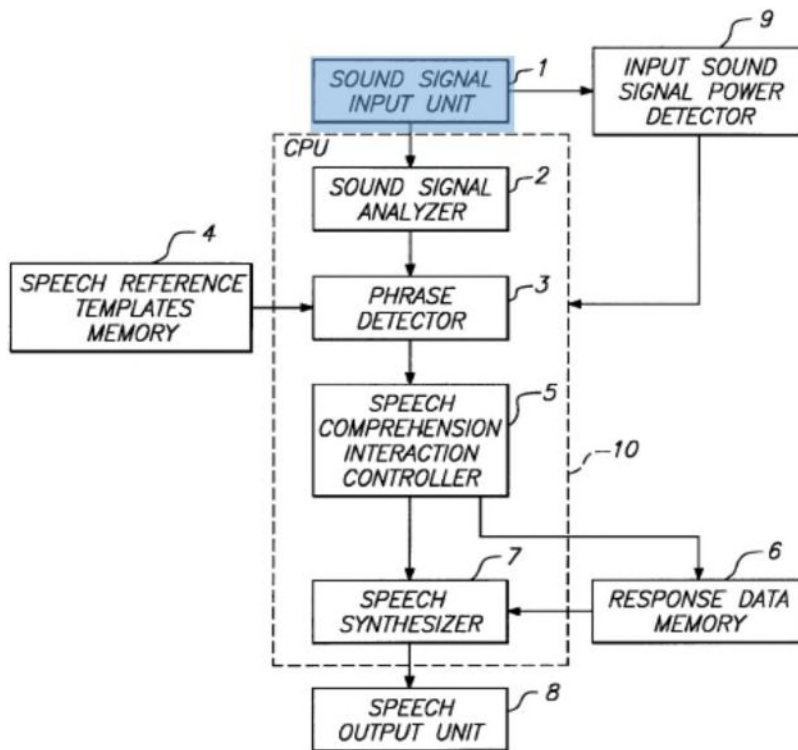


FIG.-1

Polish, ¶ 73.

A POSITA would have known that microphones are conventional transducers that convert received audio signals into electrical signals. Polish, ¶¶ 74-75; *Badie*, 2:22-25. The '186 patent additionally discloses that its system uses a commercially available microphone. '186 patent, 7:33-43. A POSITA would have found it obvious to implement an audio signal activated control system with Salazar's or Miyazawa's microphone. Polish, ¶¶ 74-75.

**[1b] “a speech recognition system for receiving said electrical signals,
said speech recognition system including a processor”**

Salazar and Miyazawa disclose this element. Polish, ¶ 77-82. Salazar discloses a **speech recognition system** that includes a voice activated device IC 86/305 and microprocessor 30/200 in its handset (Fig. 3)/base station (Fig. 5). *Salazar*, Figs. 2-5, 17:57-61, 21:42-56, 24:37-51, 3:32-60. These components perform speech recognition on the input voice signals. *See, e.g., Salazar*, 17:57-61, 21:42-56, 24:37-51, 3:32-41, 53-60, Fig. 2-5. Microprocessors 30/200 “control all their internal operations.” *Salazar*, 3:15-31, 3:42-60. The voice activated device ICs 86/305 that are a part of Salazar’s speech recognition system receive the **electrical signals** from the **microphone**. *Salazar*, Figs. 3, 5, 3:32-41, 3:53-60, 17:57-61, 21:42-56, 24:37-40.

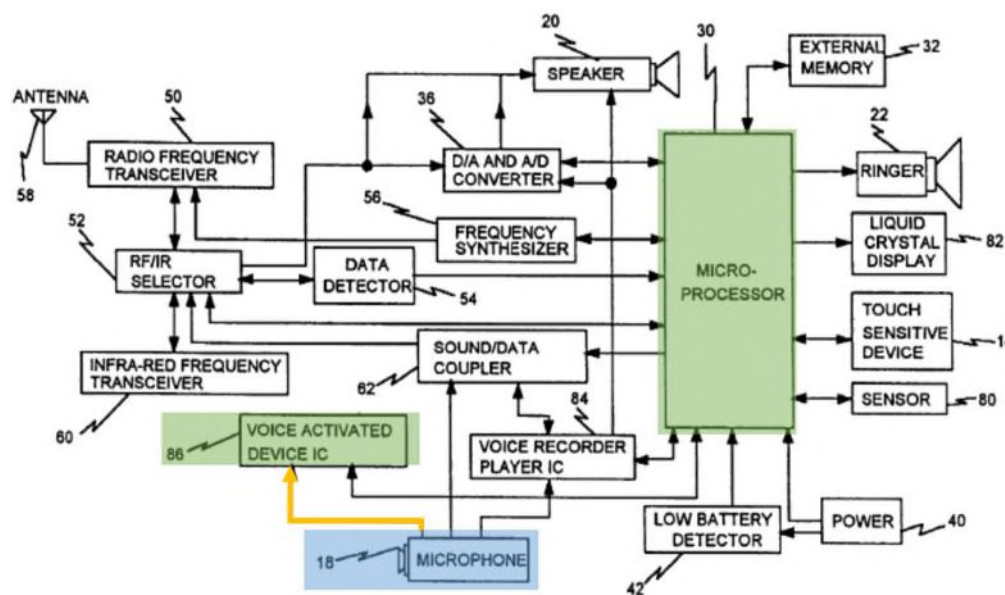


FIG. 3

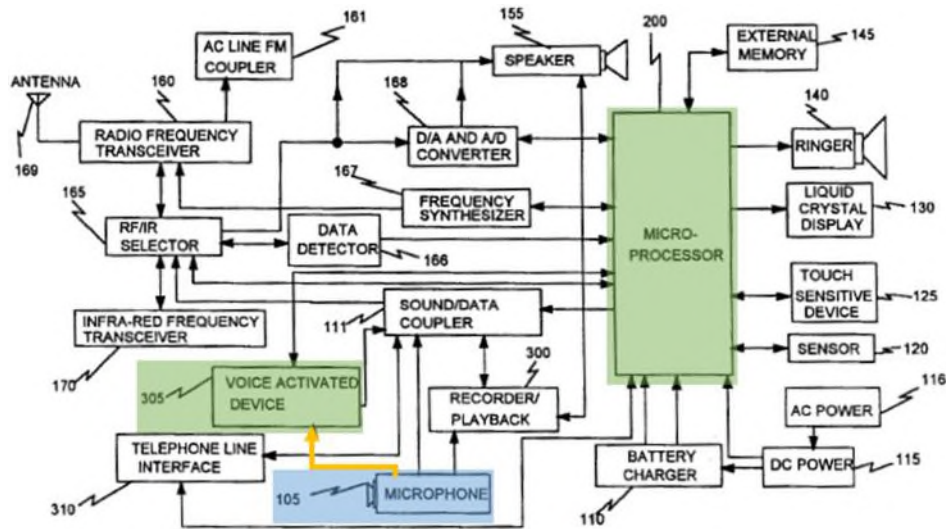


FIG. 5

Polish, ¶ 78.

Miyazawa also discloses a **speech recognition system** for receiving **electrical signals** from the **microphone**. Miyazawa's **speech recognition system** includes the **amplifier, low-pass filter, and A/D converter** in "sound signal capture unit 1", "input sound signal power detector 9," and "CPU 10." Polish, ¶ 79; *Miyazawa*, 6:20-57, Fig. 1 (annotated below). Miyazawa discloses that its "CPU 10" may include multiple CPUs, *Miyazawa*, 9:17-24, and that input sound signal power detector 9 receives the "input sound signal (including noise) output by sound signal input unit 1." *Id.*, 9:32-41. The amplifier also receives the input sound signal from the microphone, as discussed above in the Overview of Miyazawa.

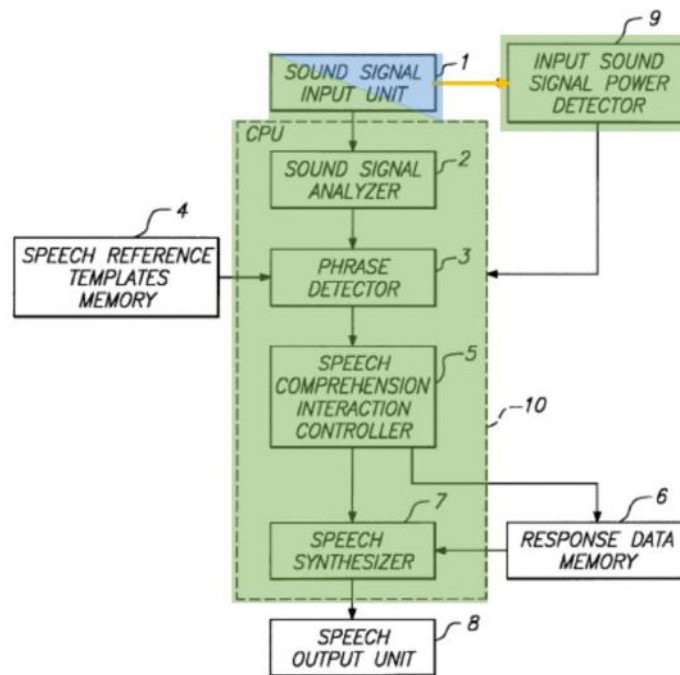


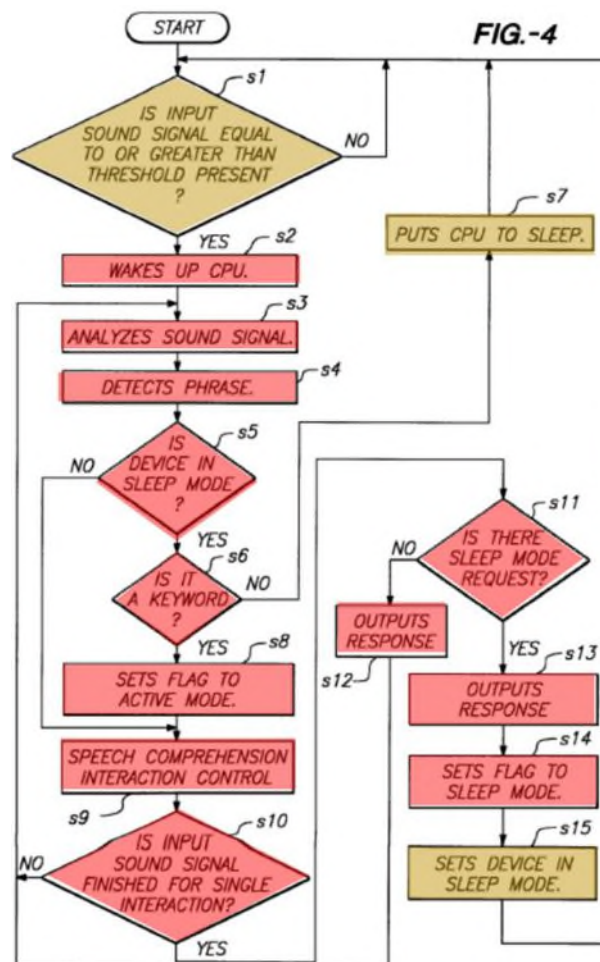
FIG.-1

Polish, ¶¶ 79-80.

A POSITA would have found it obvious to implement an audio signal activated control system with Salazar's and/or Miyazawa's processor-based speech recognition systems because both references relate to speech recognition systems for using voice inputs, both disclose conserving power via mode-switching processors that have low power modes, and both receive voice inputs without first requiring a user to activate a physical switch. Polish, ¶ 81; *see also supra* Section IV.D. Moreover, a POSITA would have recognized the '186 patent admits that processor-based speech recognition systems are well known. Polish, ¶ 82; Ex. '186 patent, 10:20-21, 10:40-44.

[1c] “and having a low power sound activation mode for detecting the presence of said electrical signals”

Miyazawa discloses that its speech recognition system, including CPU 10, includes a **low power sound activation mode** for detecting the presence of the electrical signals from the microphone by disclosing a “sleep” mode that can be switched to an active mode based on detected electrical sound signals received from its microphone. *See Miyazawa*, 2:8-18, 2:29-36, 2:46-53, 4:13-19, 4:61-5:7, 9:25-10:15, 11:33-65, 12:1-61, 13:37-51, Fig. 4, s1 (below).



Polish, ¶¶ 83-85.

Miyazawa explains that its speech recognition system “enable[s] the device to remain in a sleep mode and perform recognition operations only when a recognizable speech input is detected.” *Miyazawa*, 2:46-53; *see also id.*, 2:8-18. In addition, Miyazawa discloses that the input sound signal power detector 9, which is a part of the speech recognition system, is “in communication with at least the sound signal input unit” (which includes the microphone), “for detecting the volume, magnitude or amplitude of input sound signals” in a “low-power sleep mode.” *Id.*, 3:13-27, 4:10-22; *see also id.*, 4:61-5:7. Miyazawa further explains that the “[i]nput sound signal power detector 9 . . . detects the power of the input sound signal (including noise) output by the sound signal input unit 1.” *Id.*, 9:25-40.

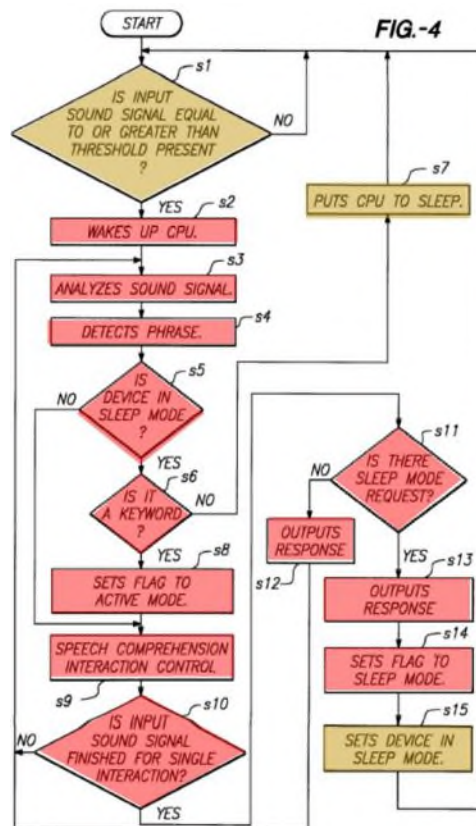
In Fig. 4 (above), Miyazawa explains that the speech recognition system may initially be set in a **sleep mode**. *Id.*, 9:59-64. During this sleep mode, “the CPU 10 is placed in a non-active state or sleep mode, as is well known in the computing arts.” *Id.*, 9:64-10:2. Miyazawa also describes the sleep mode as an “inactive, power-saving state.” *Id.*, 11:50-67. In this non-active state, the sound signal power detector detects the presence of the microphone’s electrical signals by “determin[ing] whether or not the power of the input sound signal is greater than a preset threshold.” *Id.*, 10:3-15; *see also id.*, 12:1-61, 13:37-51, Fig. 4.

A POSITA would have found it obvious to incorporate Miyazawa’s voice-activated processor mode switching into Salazar’s voice-activated appliance control

system to reduce power consumption—an express goal of both references. Polish, ¶ 86; *see also supra* Section IV.D.

[1d] “and a speech recognition mode for converting said electrical signals to electrical representative signals, decoding said electrical representative signals”

Salazar and Miyazawa disclose this element. Polish, ¶¶ 87-93. Miyazawa discloses the recited **speech recognition mode** starting at s2 of Miyazawa Fig. 4:



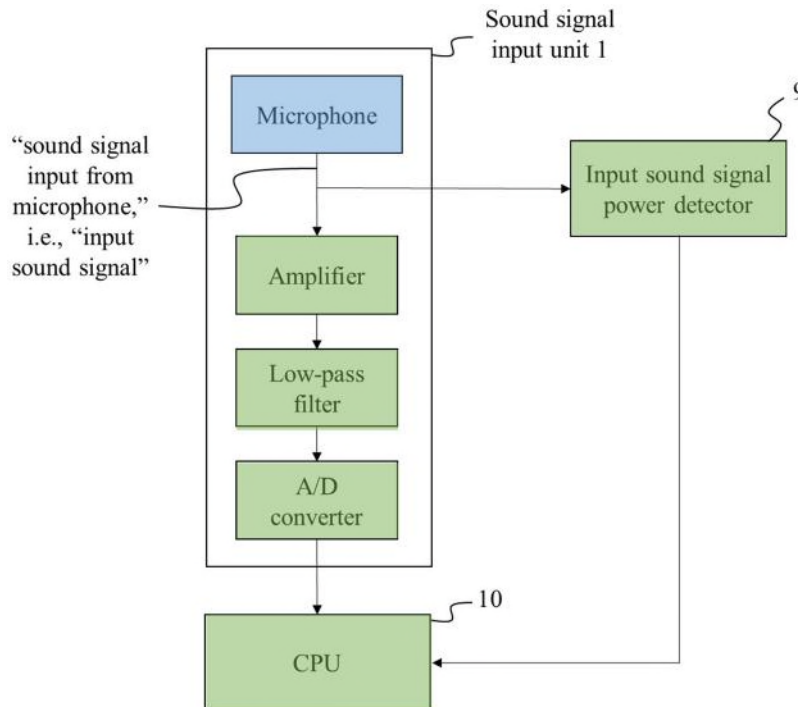
Polish, ¶ 87.

Miyazawa teaches that its speech recognition system “recognizes speech,” and that it includes a “sound signal analyzer 2, phrase detector 3, and speech reference templates memory 4,” among other components, for performing speech

recognition. *Miyazawa*, 1:30-35, 6:20-37, Fig. 1. These components are a part of CPU 10, which is a part of Miyazawa's speech recognition system. Polish, ¶ 88. Miyazawa's Figure 4 and its accompanying description explains the process by which its system performs speech recognition upon being activated by voice input. *Id.*, 6:1-2, 9:59-11:42.

Specifically, Miyazawa discloses that the speech recognition mode is for (a) "converting said electrical signals [received from the microphone] to electrical representative signals" and (b) "decoding said electrical representative signals," as recited in claim 1. Miyazawa discloses converting the received electrical signal from the microphone into a representative signal by disclosing "[t]he sound signal input from the microphone is first passed through the amplifier and lowpass filter and converted into an appropriate sound waveform. This waveform is converted into a digital signal . . . by the A/D converter, which is then sent to sound signal analyzer 2." *Id.*, 6:38-49. Miyazawa also explains that sound signal analyzer 2 (and more generally, CPU 10) decodes the electrical representative signal it received by extracting a "multi-dimensional speech feature vector" and performing "matching and recognition operations." *Id.*, 6:49-9:24, Figs. 1, 4 (s2-s6) (describing decoding embodiments). A POSITA would have understood that the "decoding" of claim 1 includes applying speech recognition algorithms to a voice signal (e.g., performing

“matching and recognition operations”) to determine if a word or phrase has been uttered. Polish, ¶ 89.



Id.

Miyazawa’s converting and decoding is indistinguishable from the converting and decoding steps described in the ’186 patent. Polish, ¶ 90. The ’186 patent discloses “[an] analog to digital converter (A/D) 57, preferably having an accuracy of at least 12 bits, is coupled to the output of the preamplifier 56 and **converts** the incoming audio waveform into **digital representations** of the incoming signal. The digital output of the analog to digital converter 57 is directed to the speech processing unit 58.” ’186 patent, 11:39-45 (emphases added). This is the patent’s only discussion of “convert[ing]” electrical signals from a microphone into a

“representation” of those signals. The ’186 patent also discloses that, after the audio waveform has been converted from an analog signal to a digital representation, controller 60 “executes recognition algorithm software to determine which voice command in the active recognition vocabulary set is the best match and was most likely spoken by the user.” *Id.*, 11:43-67, 12:64-13:30. A POSITA would have understood this process of determining which voice command corresponds to the representative signal to be within the plain meaning of the term “decoding.” Polish, ¶ 90. In addition, while the ’186 patent does not use the word “decoding” to describe this process, the patent does not elsewhere describe any operation performed on a representation of an electrical signal received from a microphone as “decoding.” Therefore, a POSITA would have recognized that, based on these disclosures, “converting” the electrical signals from the microphone includes at least converting the microphone’s electrical signals into digital representations using an A/D converter. *Id.* A POSITA would further have understood that “decoding” the electrical representative signals includes at least determining if the converted digital representations match a stored voice command. *Id.*

This understanding is consistent with dependent claim 20, which requires “decoding said electrical representative signals to determine if said signals represent predetermined audible commands.” ’186 patent, claim 20. This element explicitly claims the process disclosed in the above-cited sections of the ’186 patent. Because

claim 20 narrows the “decoding” step of claim 1 to include determining if a predetermined audible command is present, claim 1’s “decoding” is presumed to include at least this embodiment. *See, e.g., Laitram Corp. v. NEC Corp.*, 62 F.3d 1388, 1392 (Fed. Cir. 1995) (“Although each claim is an independent invention, dependent claims can aid in interpreting the scope of claims from which they depend.”)

Salazar also discloses a speech recognition mode for performing these converting and decoding steps by disclosing “voice commands are input via microphone 18 to the voice activated IC 86, which scans the voice signal with a pattern recognition algorithm [(e.g., “decoding”)]. Recognized commands are converted into digital signals that then go to microprocessor 30 [(e.g., “converting”)].” *Salazar*, 21:43-58; *see also id.*, 17:66-18:4 (handset), 24:37-51 (base station); Polish, ¶ 92.

As discussed above, a POSITA would have combined Salazar and Miyazawa to achieve Miyazawa’s stated goal of hands-free switching from a low-power mode to a speech recognition mode within Salazar’s universal remote control system. *See supra* Section IV.D; Polish, ¶ 93. Doing so would have simply combined known techniques of voice-activated control with known battery-saving processor modes to yield the predictable result of a system that uses voice inputs to switch between processor modes and maintains a low power mode until a voice command is

received. Polish, ¶ 93. Moreover, a POSITA would have modified Salazar's processor to include functionality of Miyazawa's CPU, including decoding the electrical representative signals. *Id.* A POSITA would have been motivated by the potential cost-savings in eliminating the need for voice activated device IC and instead providing the functionality on the existing processor. *Id.*

[1e] “and generating control signals for controlling one or more appliances,”

Salazar discloses that its speech recognition system generates control signals for controlling one or more appliances by disclosing that signals input to its microprocessor are “converted into command and control signals for transmission via an RF and/or infra-red transceiver to external appliances or apparatus.” *Salazar*, 3:53-60; *see also id.*, 6:31-51 (describing “remote command and control of appliances and/or apparatuses”); Polish, ¶ 94. Salazar discloses that the “command and control signals” are sent to and used to control various appliances. *Salazar*, 4:49-54, 4:65-5:9, 5:39-46, 25:39-50. Salazar further discloses that the microprocessors on each of the handset and base station (and thus its “speech recognition system”) generate the control signals. *Id.*, 21:43-58 (explaining that “[m]icroprocessor 30 [in the handset] processes the commands and generates the appropriate command and control signal for internal processing or for

transmission.”), 24:37-51 (describing identical functionality for the microprocessor of the base station).

[1f] “wherein in said speech recognition mode said processor decodes said electrical representative signals”

The analysis for elements [1c] (“speech recognition system . . . including a processor”) and [1d] (speech recognition system “having . . . a speech recognition mode for . . . decoding said electrical representative signals”) fully encompasses this claim element. Polish, ¶ 95. Claim element [1f] adds that “said processor” decodes the electrical representative signals, but as described above regarding elements [1c] and [1d], Miyazawa discloses a CPU that decodes the electrical representative signals (e.g., the digital representations of the received audio signals). *Miyazawa*, 6:38-9:24, Figs. 1, 4 (s2-s12). Salazar also discloses that its microprocessor-based system performs the decoding, *see, e.g., Salazar*, 3:53-60, 17:57-61, 21:43-58 (handset), 24:37-51 (base station), and that the microprocessors of the handset and the base station “control all their internal operations,” *id.*, 3:15–31, 3:42-60.

[1g] “and wherein in said sound activation mode said processor is in a low power state,”

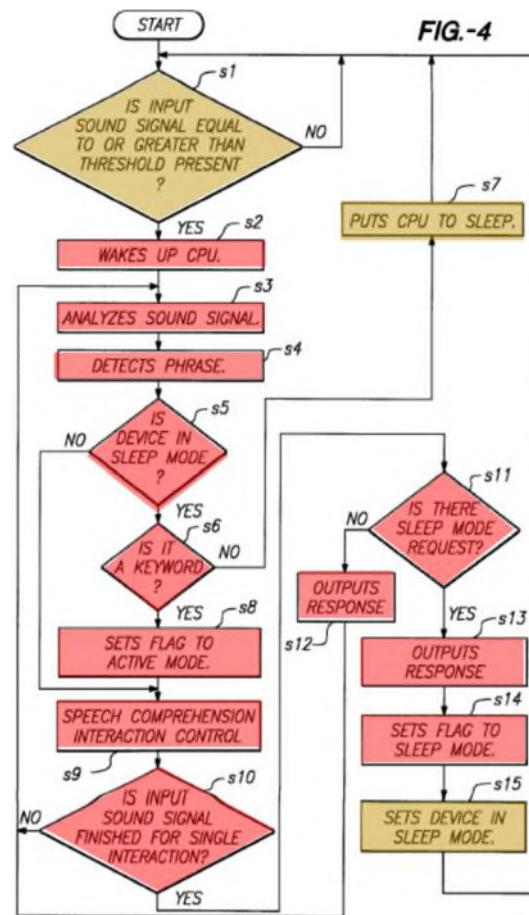
For the reasons provided for element [1c], Miyazawa discloses a sleep mode that corresponds to the recited low-power sound activation mode in the ’186 patent. Polish, ¶ 96. Claim element [1g] adds that “said processor is in a low power state” during the sound activation mode. Miyazawa discloses this feature by disclosing

that CPU 10 is in a low power state during sleep mode. *See supra* Section IV.E.[1c]. Miyazawa discloses in reference to Figure 4 that when the process begins at step s1 the device is in the sleep mode and, while the “input sound signal power detector 9 remains active and ready to detect the power of the input sound signal fetched by sound signal input unit 1,” “CPU 10 is placed in a non-active state or sleep mode, as is well known in the computing arts.” *Miyazawa*, 9:62-10:15; *see also id.*, 11:50-67, 12:1-61. Miyazawa discloses that this sleep mode “minimize[s] power consumption,” because only the portions of the device that “consume small amounts of power” need to be active. *Id.*, 2:46-53, 4:61-5:7.

[1h] “said speech recognition system configured to automatically switch from said sound activation mode to said speech recognition mode as a function of the amplitude of said electrical signals, and”

Miyazawa’s speech recognition system is configured to automatically switch from the **sound activation mode** to the **speech recognition mode** as a function of the amplitude of the electrical signals received from the microphone. Polish, ¶¶ 97-106. Miyazawa’s system automatically switches its CPU from the **sleep mode** to a **speech recognition mode**, where the CPU becomes active based on whether the “input sound signal [received from its microphone] is equal to or greater than [a] threshold.” *Miyazawa*, Fig. 4, s1-s2 (below). As Figure 4 below shows, if the input sound signal is equal to or greater than a threshold, then the system wakes up the CPU (s2) and performs speech recognition (e.g., s3-s6, s9-s14). A POSITA would

have understood that by waking up a CPU to analyze a sound signal at s2, Miyazawa's system transitions from a low power sound activation mode to a speech recognition mode because CPU 10 is activated from an inactive state to perform speech recognition. Polish, ¶ 98. Miyazawa's speech recognition mode continues if a keyword is detected (s6) by CPU 10 performing speech recognition on incoming sound signals (s9 through s11 and back to s3). *Id.* The system exits the speech recognition mode if no keyword is detected in the initial sound signal (s6), or when a sleep mode request is determined (s11) and the system causes CPU 10 to return to sleep. *Id.* This is consistent with claim 1, which recites "wherein in said sound activation mode said processor is in a low power state." A POSITA would have understood that, to process a sound signal to determine if a keyword is present as provided in Miyazawa, CPU 10 is not in a "low power state." *Id.*



To the extent SpeakWare argues Miyazawa’s mode switching occurs only after a keyword is determined, this still discloses switching based on the sound signals exceeding a predetermined threshold. In particular, a POSITA would have understood that activating CPU 10 and determining a keyword before switching to be “automatically switch[ing] . . . as a function of the amplitude of said electrical signals” because the mode is switched without manual operation after the sound signals are equal to or greater than a threshold. Polish, ¶ 99. Claim 1 is also an open-form claim that does not exclude the additional step of identifying a keyword in the threshold-exceeding signal before switching.

Miyazawa is also consistent with the '186 patent, which describes the same keyword search operation after a threshold is exceeded. Polish, ¶ 100. With reference to Figures 5 and 6, the '186 patent discloses that its system, in a sound activation mode (S501, YES), may detect a sound exceeding a threshold (S502). '186 patent, 18:51-54, 20:6-11. Upon detecting the sound (S502), the system may enter the speech recognition mode (S505) and determine if a match can be found in the sound signal (S514). *Id.*, 20:52-56, 22:42-53. If no match is identified (S514, NO), the system returns to the sound activation mode (S517 (YES), S622). *Id.*, 23:51-64.

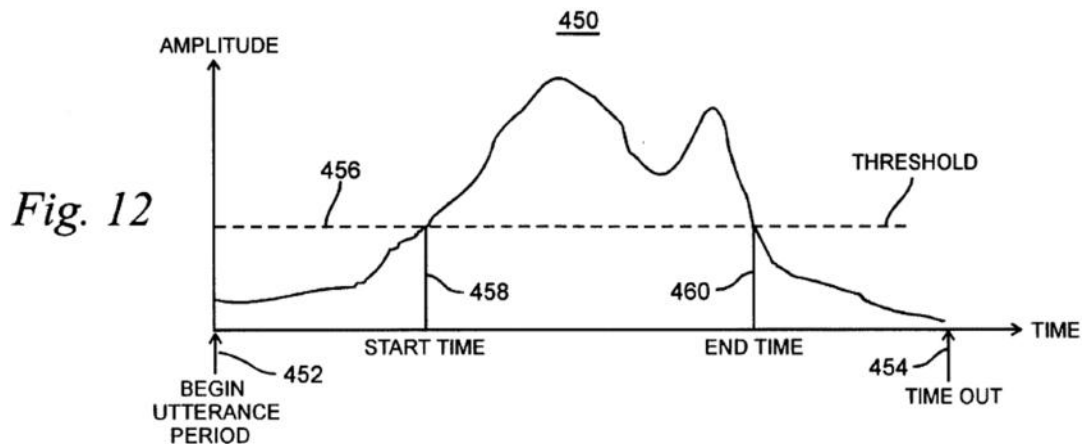
Moreover, a POSITA would have found it obvious to implement Miyazawa's system to switch based on a threshold alone. Polish, ¶ 101. Doing so would have been nothing more than applying known techniques of triggering in Miyazawa without the additional step of checking for a keyword. *Id.* Such a modification would have been well within the capabilities of a POSITA and required simply foregoing one step in Miyazawa's process in favor of switching based on a threshold alone. *Id.*

Miyazawa also discloses that the threshold detection that results in the switching is performed "as a function" of the amplitude of the signal in two ways. Polish, ¶ 102. First, Miyazawa discloses comparing amplitude to a threshold to determine whether to exit the sleep mode. Miyazawa discloses the "input sound

signal power detection for detecting the power, magnitude, or *amplitude of input sound signals*.” Miyazawa, 4:9-15 (emphasis added); *see also id.*, 3:12-17. It next discloses that “during [the] sleep mode, a determination is made *whether input sound signals*, as detected during input sound signal capture, *are at least at a predetermined threshold signal level* above the background noise.” *Id.*, 4:15-19 (emphasis added); *see also id.*, 3:18-25. A POSITA would have understood Miyazawa’s detecting the “amplitude of input sound signals” and then determining whether the “input sound signals” meet a predetermined threshold signal level as disclosing comparing the amplitude to the threshold signal level. Polish, ¶ 102. Moreover, a POSITA would have understood that the comparison to a threshold corresponds to s1 in Figure 4, which causes Miyazawa’s system to wake up CPU 10 (s2) if the sound signal is equal to or greater than the threshold, as discussed above. *Id.* This understanding would have been confirmed by Miyazawa’s Abstract, which discloses “bringing the CPU out of an initial sleep state upon detection of perceived voice exceeding a predetermined threshold volume level.” A POSITA would have understood that the “predetermined threshold volume” of a perceived voice corresponds to the amplitude of the electrical signal from the microphone. *Id.* Similarly, Miyazawa discloses that “CPU 10 momentarily wakes up when a sound signal of at least a certain level is input.” *Miyazawa*, 11:58-60.

Second, in the sections described above, Miyazawa also discloses detecting the “power” of the input sound signals and determining whether the input sound signals are at a predetermined threshold. *Miyazawa*, 3:12-25, 4:9-19. A POSITA would have understood these portions as disclosing comparing the power of the input sound signals to a given threshold. Polish, ¶ 103. A POSITA would have further understood that power of an input sound signal to be a “function of an amplitude” of an electrical signal from a microphone. *Id.* Miyazawa describes this process in additional detail in relation to Figure 4. For example, Miyazawa discloses that at s1, “the input sound signal power detector 9 determines whether or not the power of the input sound signal is greater than a preset threshold th1,” and if it is, “CPU 10 wakes up (step s2),” i.e., enters the active speech recognition mode. *Miyazawa*, 9:62-10:29; *see also id.*, 12:1-15, 50-61. Therefore, Miyazawa discloses switching modes as a function of amplitude for this second reason.

Bossemeyer also teaches switching “as a function of the amplitude of said electrical signals.” Polish, ¶ 105-106. Bossemeyer discloses determining the beginning and end points of an utterance based on the amplitude of signals received from its microphone against a threshold. *Bossemeyer*, 8:51-62, Fig. 12.



Bossemeyer explains that “[t]he amplitude [of a signal from the microphone] is monitored and when it crosses above an amplitude threshold 456 it is assumed that the utterance has started (start time) 458. When the amplitude of the utterance falls below the threshold, it is marked as the end time 460.” *Id.* A POSITA would have understood Bossemeyer as determining when an utterance occurs “as a function of the amplitude of said electrical signals.” Polish, ¶ 106. Moreover, a POSITA would have incorporated Bossemeyer’s amplitude thresholding because, as explained above, both relate to detecting an utterance and because Miyazawa at least suggests this approach. *Id.* The result would have been nothing more than the combination of known techniques to yield the predictable result of switching processor modes based on a voice signal amplitude threshold. *Id.*; *see also supra* Section IV.D.

[1i] “an appliance control circuit which includes a transmitter, said appliance control circuit configured to receive said control signals from

said speech recognition system and generate and automatically transmit one or more appliance control signals to said one or more appliances.”

Salazar discloses the recited **appliance control circuit**, including RF transceiver 50 and IR transceiver 60 that receive the **command and control signals** from microprocessor 30 (part of the **speech recognition system**) for “internal processing *or for transmission*.” *Salazar*, 21:8-46 (emphasis added); *see also id.*, 24:37-51 (RF transceiver 160 and IR transceiver 170 in base station). Salazar further discloses that the RF and IR transceivers are connected to the microprocessors via RF/IR selectors 52/165. *Id.*, Figs. 3, 5. Salazar also discloses that its handset (and/or base station) transmits infrared and IR control signals based on voice inputs to one or more appliances. *See id.*, 1:50-2:25, 3:15-40, 3:53-60, 4:49-64, 5:39-46. A POSITA would have understood that Salazar’s transceivers and selectors therefore receive the control signals from the speech recognition system (microprocessor 30 or 200) and generate and automatically transmit an appliance control signal to one or more appliances (by generating and transmitting appropriate IR or RF signals associated with the received control signals/voice inputs to communicate with a particular appliance). Polish, ¶ 107.

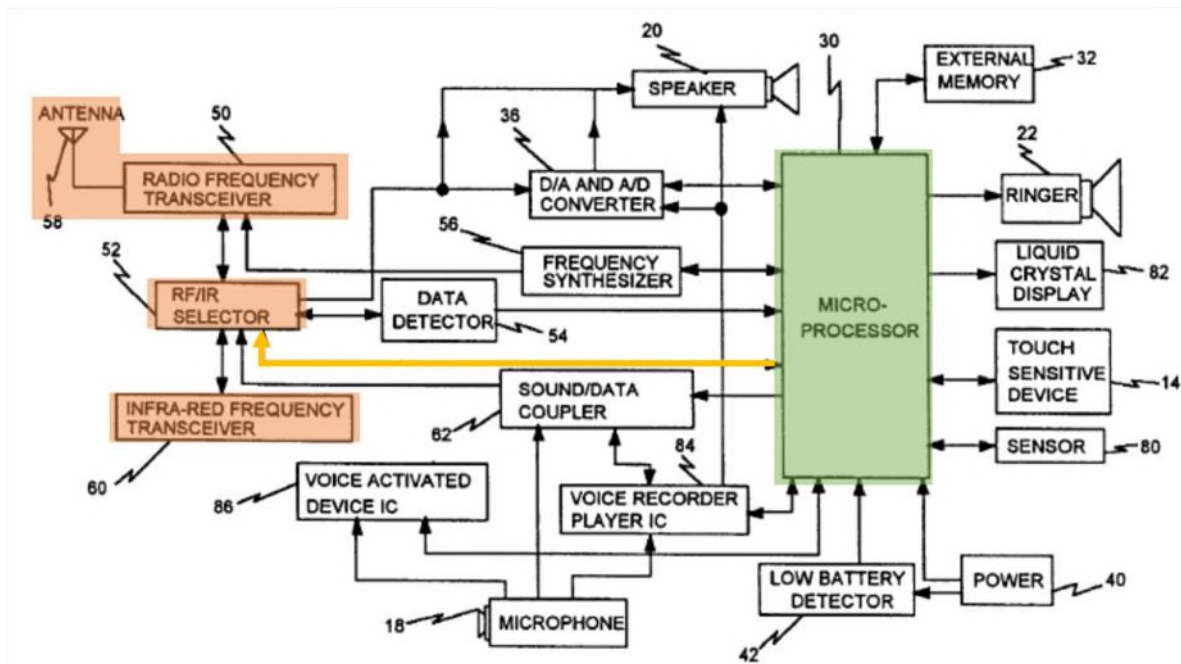


FIG. 3

This is consistent with the '186 patent specification, which discloses an “infrared signal controlling circuit 70” that receives “signals for controlling the appliance” from speech recognition circuit 50 and is part of a “wireless transmitter.” '186 patent, 8:9-38. This is indistinguishable from Salazar’s infrared and RF transceivers. Polish, ¶ 108. In fact, the '186 patent admits it “utilizes conventional infrared remote control microcontroller-based technologies, including the conventional universal appliance code libraries that are familiar to those skilled in the art.” '186 patent, 8:24-28, 32:30-40. These code libraries are used to generate appropriate IR or RF signals for transmission. *Id.*, 32:30-40. Salazar also discloses using such libraries because Salazar discloses using command control sets to send

commands to various different devices. *See Salazar*, 7:34-8:34; *see also id.*, 7:34-17:36 (describing the use and storage of code sets in detail).

F. Claim 2 — “The audio signal activated control system as recited in claim 1, wherein said transmitter is configured to wirelessly transmit said one or more appliance control signals to said one or more appliances.”

Salazar discloses this element by disclosing that the IR and RF transmitters “wireless[ly]” transmit control signals to appliances. *Salazar*, Abstract, 1:50-2:17, 2:27-46, 3:53-4:18, 4:49-64, 5:10-15, 7:34-8:16, 17:37-45, 21:43-58, 24:37-51, 25:39-50, Fig. 3, 5; *see also supra* Section IV.E.[1i]; Polish, ¶ 109.

G. Claim 3 — “The audio signal activated control system as recited in claim 2, wherein said transmitter is an infrared transmitter.”

Salazar discloses this feature. *See supra* Sections IV.E.[1i], IV.F; Polish, ¶ 110.

H. Claim 4 — “The audio signal activated control system as recited in claim 2, wherein said transmitter is an RF transmitter.”

Salazar discloses this feature. *See supra* Sections IV.E.[1i], IV.F; Polish, ¶ 111.

I. Claim 7 — “The audio signal activated control system as recited in claim 1, wherein said low power state of said processor is a sleep state.”

Miyazawa discloses this feature by disclosing that CPU 10 is in a sleep mode until a sound signal from the microphone registers above a threshold level. *See supra* Sections IV.E.[1c], IV.E.[1g]; Polish, ¶ 112. Miyazawa describes “bringing the CPU

out of an initial sleep state upon detection of [a] perceived voice exceeding a predetermined threshold volume level.” Miyazawa, Abstract. Regarding Figure 4, Miyazawa discloses that “CPU 10 is placed in a non-active state or sleep mode, as is well known in the computing arts.” *Id.*, 9:67-10:2; *see also id.*, 11:27-28, 11:50-67.

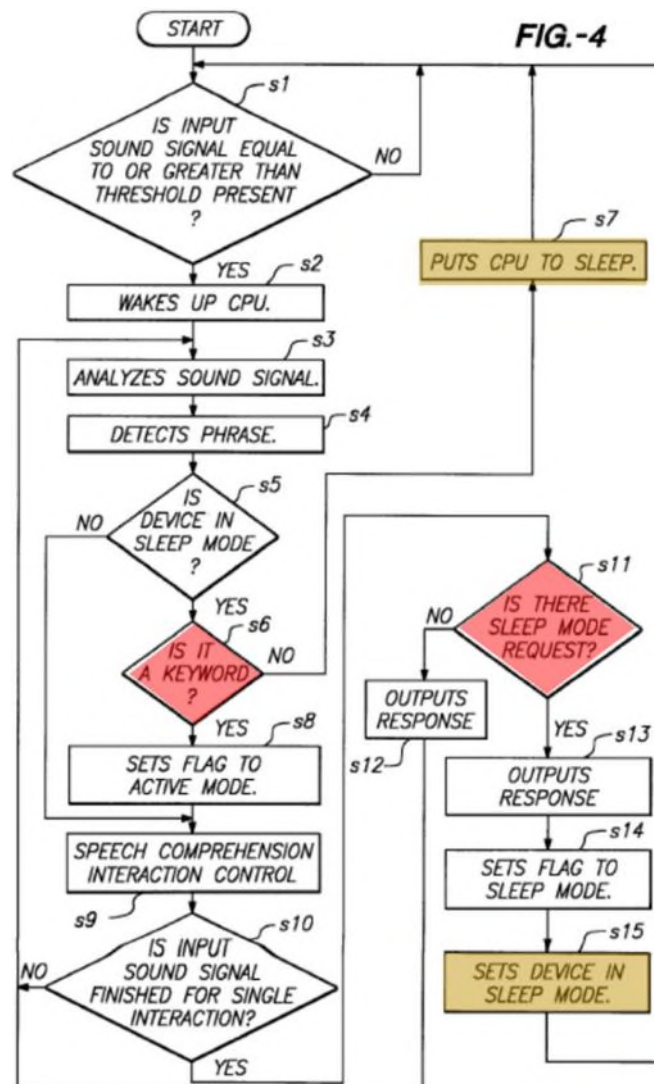
J. Claim 8 — “The audio signal activated control system as recited in claim 1, wherein in said speech recognition mode said processor operates at a higher operating frequency than in said low power state.”

Miyazawa discloses the additional feature in claim 8 by disclosing that its CPU is inactive when in sleep mode and wakes up in its active mode. *Miyazawa*, 11:43-67 (“CPU 10 is in an inactive, power-saving state during the sleep mode, and only sound signal capture unit 1 and input sound signal power detector 9 are in the active state. In conventional speech recognition devices, power consumption by an active mode CPU 10 is substantial in order to handle complex speech recognition tasks.”); *see also id.*, Abstract, 2:30-53, 3:13-28, 4:10-22, 4:55-5:7, 9:25-10:2, 10:41-47, Fig. 4. A POSITA would have understood that an “active” processor operates at a higher operating frequency than in an “inactive,” low power state processor, particularly if in the inactive state the processor is not operating at all. Polish, ¶ 113. For example, a POSITA would have understood Miyazawa’s disclosure of an “inactive power-saving state” as requiring the processor to either be

operating at a frequency of zero or at a lower frequency than when the processor is in its active state. Polish, ¶ 113.

K. Claim 9 — “The audio signal activated control system as recited in claim 1, wherein said speech recognition system is further configured to automatically terminate said speech recognition mode and automatically switch to said low power sound activation mode.”

Miyazawa discloses this feature in two ways. Polish, ¶¶ 114-116. First, Miyazawa discloses that its CPU is reset to a sleep state once it is determined the voice signal does not contain a “keyword,” as shown in s6 and s7 of Figure 4, below.



Polish, ¶ 114.

As discussed above regarding claim 1, at s6, Miyazawa's system is in an active speech recognition mode. *See supra* Sections IV.E.[1d], IV.E.[1f], IV.E.[1h]. Immediately upon determining that the input speech does not contain a keyword, (s6, NO), the CPU is put into a sleep mode (s7). *Miyazawa*, 10:30-47; *see also id.*, 11:43-67 ("In the present invention, CPU 10 momentarily wakes up when a sound signal of at least a certain level is input. However, even when the input sound signal

turns out to be a speech signal, CPU 10 immediately goes inactive if that speech signal is determined not to be one of the recognizable phrases.”). Putting the CPU to sleep immediately upon detecting the absence of a key word, without human intervention, discloses “automatically” terminating the speech recognition mode and automatically switching to the low power sound activation mode. Polish, ¶ 115.

Second, Miyazawa discloses putting the CPU (and the device, generally) to sleep upon receiving a “sleep mode request.” *Miyazawa*, 11:14-32, Fig. 4, s11-15. Miyazawa explains that one way the system interprets a “sleep mode request” is if the “speaker is *quiet for a specified duration*,” i.e., if no voice input is detected, or if the speaker says a particular keyword such as “Be quiet” or “Good night.” *Id.*, 9:51-58 (emphasis added), 11:14-20. If one of these events occurs, Miyazawa discloses the “device and CPU 10 go into the sleep mode (step s15).” *Id.*, 11:14-29. Based on this, a POSITA would have understood that switching to the sleep mode based on lack of an input for a specified duration or based on receipt of an audible input discloses “automatically” terminating the speech recognition mode and “automatically” switching to the low power sound activation mode because it involves limited or no human interaction. Polish, ¶ 116. This understanding is confirmed by claim 12, which requires “automatically” terminating the speech recognition modes based upon the results of decoding the electrical representative signals (i.e., based on words determined from the voice input).

- L. Claim 10 — “The audio signal activated control system as recited in claim 9, wherein said speech recognition system is configured for automatically terminating said speech recognition mode after a predetermined period of time.”**

Miyazawa discloses this feature for the reasons discussed above regarding claim 9 because Miyazawa discloses that the CPU is reset to a sleep state if it is determined that the “speaker is *quiet for a specified duration*,” i.e., after a predetermined period of time where no voice input is detected. *See supra* Section IV.K; Miyazawa, 9:51-58 (emphasis added), 11:14-20; Polish, ¶ 117.

- M. Claim 11 — “The audio signal activated control system as recited in claim 9, wherein said speech recognition system is configured for automatically terminating said speech recognition mode after a period of time that is based upon the results of said decoding of said electrical representative signals.”**

Miyazawa discloses this feature for the reasons discussed above regarding claim 9, because Miyazawa discloses that the CPU is reset to a sleep state if it is determined that the “speaker is *quiet for a specified duration*,” i.e., after a period of time where no voice input is detected. *See supra* Section IV.K; Miyazawa, 9:51–58 (emphasis added), 11:14-20. In this case, Miyazawa discloses terminating said speech recognition mode after a “period of time that is based upon the results of said decoding of said electrical representative signals” because the specified duration must be while the “speaker is quiet,” i.e., when the decoding determines no voice input is detected in the electrical representative signals for a period of time. In other

words, the period of time to terminate Miyazawa's speech recognition mode is dependent on whether voice is detected in the decoded electrical representative signals. If the decoded signals from the microphone detect silence for a specified duration (s11, Figure 4), then the device is reset to a sleep mode (s13-s15, Figure 4). A POSITA would have understood that determining silence for a specified period of time discloses a period of time that is based upon the results of said decoding of said electrical representative signals. Polish, ¶ 118. That is, Miyazawa discloses returning to a sleep mode based on decoding silence for a specified time. Therefore reaching the specified time is dependent on the voice signal being decoded as silence. *Id.* This is consistent with the '186 patent specification which explains that "[t]he sound activation time-out counter tracks elapsed time between attempts made by the speech recognition circuit 50 to recognize sounds and if a predetermined time value TMAX elapses between recognition attempts, the speech recognition circuit software initiates a routine to enter sound activation mode and changes the logic states of the previously described control register bits." '186 patent, 20:52-21:5.

A POSITA would also have understood Miyazawa as disclosing this feature for a second reason when a voice signal is detected before Miyazawa's specified duration runs out at s11 of Figure 4. If a voice signal is received that, when decoded, is not a sleep mode request or silence, then the total period of time before the speech recognition mode is terminated will be longer because the specified duration before

terminating the speech recognition mode will reset. Polish, ¶ 119. For example, Miyazawa explains with reference to Figure 4 that if a sleep mode request is not received in step 11 in the form of a specific command or silence, the process returns to step 3 to analyze a sound signal. *Miyazawa*, 10:58-11:32 (performing steps s11, s12, s3, s4, s8, s9, and s10 in order if no sleep mode request is determined). Miyazawa therefore discloses basing the “period of time” before terminating the speech recognition mode on the decoding of electrical representative signals.

N. Claim 12 — “The audio signal activated control system as recited in claim 9, wherein said speech recognition system is configured for automatically terminating said speech recognition mode based upon the results of said decoding of said electrical representative signals.”

For the reasons discussed above regarding claim 9, Miyazawa discloses this feature by disclosing that its CPU is reset to a sleep state once it is determined the voice signal does not contain a “keyword,” that a speaker has not input speech for a specified duration, or that an audible sleep mode request was uttered. *See supra* Section IV.K; *see also Miyazawa*, 11:43-67 (“In the present invention, CPU 10 momentarily wakes up when a sound signal of at least a certain level is input. However, even when the input sound signal turns out to be a speech signal, CPU 10 immediately goes inactive if that speech signal is determined not to be one of the recognizable phrases.”); *see also id.*, Abstract, 2:30-53, 3:13-28, 4:10-22, 4:55–5:7,

9:25-10:2, Fig. 4. Each of these determinations are based on the results of decoding the electrical representative signals. Polish, ¶ 120.

O. Claim 13 — “The audio signal activated control system as recited in claim 12, wherein said results include one or more predetermined errors detected during said speech recognition mode.”

For the reasons discussed above regarding claims 9 and 12, Miyazawa discloses this feature because it discloses that its CPU is reset to a sleep mode if a keyword is not recognized from a voice input. As shown in s6 and s7 of Fig. 4, Miyazawa analyzes an incoming sound signal above a given threshold to determine if a keyword has been uttered, and returns its CPU to sleep mode if no keyword is registered. *See Miyazawa*, 10:30-47, 7:59-8:38.

A POSITA would have recognized that “one or more predetermined errors detected” in claim 13 includes a failure to recognize a keyword in an incoming sound signal. Polish, ¶¶ 121-122. This is consistent with the ’186 patent’s disclosure of counting a number of recognition errors and using this counter to switch from the speech recognition mode to the sound activation mode. *See* ’186 patent, 20:52–22:53. The ’186 patent states that “[t]he recognition error counter tracks the number of attempts made by the speech recognition circuit 50 to recognize sounds for which no match is identified.” *Id.*, 20:65-21:1. It further explains a “match” in the context of matching a voice signal to a known reference command. *See id.*,

22:31-41. If a match is not identified, then the recognition error counter is incremented by 1, and if the value of the recognition counter exceeds a threshold TMAX, then the speech recognition circuit 50 switches to the sound activation mode. *Id.*, 22:42-53. Miyazawa discloses this by attempting to match a “keyword” and resetting the CPU to a sleep mode after one failed attempt at step s6 (e.g., determining no keyword is present in the voice input). Polish, ¶ 122.

P. Claim 14 — “The audio signal activated control system as recited in claim 1, wherein said control system further comprises a memory for storage of data associated with said appliance control signals.”

Salazar discloses that its system includes a memory, including memories both internal to and external to Salazar’s microprocessors 30/200. *E.g.*, *Salazar*, 7:4-7, 8:12-34, 22:36-60, Fig. 3 (microprocessor 30, external memory 32), Fig. 5 (microprocessor 200, external memory 145). Salazar also discloses that these memories store data associated with the appliance control signals, including the control signals to control appliances such as televisions, VCRs, and cable boxes. *See generally Salazar*, 7:34-17:36 (describing the use and storage of code sets in detail); *see also id.*, 8:22-34; Polish, ¶ 123.

Q. Claim 15 — “The audio signal activated control system as recited in claim 1, wherein said control system further comprises a memory for storage of data associated with a plurality of said appliance control signals for controlling an appliance.”

Salazar discloses the additional features of claim 15 for the reasons discussed above regarding claim 14. *See supra* Section IV.P. Moreover, Salazar expressly discloses that “[e]ach command code set comprises a set of signals, wherein each signal is utilized to perform an available function.” *Salazar*, 7:34-54. For televisions, Salazar discloses available functions may include “channel up, channel down, volume up, volume down, mute, and power ‘on’ and ‘off.’” *Id.* Based on this, a POSITA would have understood that Salazar expressly this element. Polish, ¶ 124.

R. Claim 16 — “The audio signal activated control system as recited in claim 1, wherein said control system further comprises a memory for storage of data associated with a plurality of said appliance control signals for controlling a plurality of said appliances.”

Salazar discloses the additional features of claim 16 for the reasons discussed above regarding claims 14 and 15. *See supra* Section IV.P, IV.Q; Polish, ¶ 125. Moreover, Salazar discloses storing data associated with a plurality of signals for controlling a plurality of appliances. For example, Salazar discloses that the code set stored for the functions on a television from manufacturer A will be different than the code set stored for the functions on a television from manufacturer B. *Salazar*, 7:46-52. Moreover, Salazar discloses that manufacturer A may make

multiple models of TV sets, each having unique command code sets. *Id.*, 7:52-54. Salazar also describes memory requirements for storing code sets for “substantially all major brands of various devices,” and discloses methods for reducing the memory requirements of the system. *Id.*, 7:55-8:30.

- S. Claim 19 — “The audio signal activated control system as recited in claim 1, wherein said speech recognition system wherein in said speech recognition mode is further configured for decoding said electrical representative signals to define an appliance type, said appliance type defining said appliance to which said appliance control signals are transmitted by said appliance control circuit.”**

The additional features recited in claim 19 would have been obvious to a POSITA based on the teachings of Salazar. Polish, ¶ 126-127. Salazar discloses that its handset is configured to communicate using command and control signals with various devices and is configured to communicate using different protocols to control their operations. *Salazar*, 7:34-54. To do so, Salazar discloses using a “command code set [that] includes a set of signals that may be employed to transmit a specific command to an infra-red receiver located in the appliance being controlled.” *Id.*, 8:31-34. Each command code set is different for each device because, as Salazar explains, similar commands for different appliances may require different signals based on their manufacturer or other differences. *Id.*, 7:46-54. Salazar further discloses that its handset receives voice inputs, analyzes those inputs, and recognizes commands to generate command and control signals that can be

transmitted wirelessly to an appliance via IR or RF. *Id.*, 21:43-58, 24:36-51. Thus, a POSITA would have understood and would have recognized that, to control the correct appliance (and apply the correct code set) in Salazar’s speech recognition mode, Salazar’s system would decode the received signals to define an appliance type. Polish, ¶ 126.

Moreover, even if Salazar were not required to decode the received signals, it would have been obvious to modify Salazar to do so. *Id.*, ¶ 127. In particular, Salazar discloses a “home entertainment embodiment” in which a “touch sensitive device 14 . . . to generate the appropriate command and control signals for the appliance.” *Salazar*, 21:7-26. Salazar further contemplates providing a display in order to select “pre-programmed icons representing other external apparatus” to switch modes and designate a particular appliance to control. *Id.*, 20:22-40. It would have been obvious to a POSITA to use voice commands to switch between different appliance types. Polish, ¶ 127. Salazar provides express motivation for doing so because Salazar discloses using voice control in lieu of pressing buttons for various functions. Given Salazar’s express disclosure of selecting a “voice activated device mode” through voice only, it would have been a natural extension to switch between appliance types using voice only, in addition to, or as an alternative to, providing buttons or touchscreen displays to accomplish this task. *Id.* Doing so would have been nothing more than substituting known touch inputs for known voice inputs to

yield the predictable result of switching modes by voice only, as expressly contemplated by Salazar and expressly disclosed by Miyazawa. *Id.* This straightforward substitution of known elements would have been well within the grasp of a POSITA. *Id.*

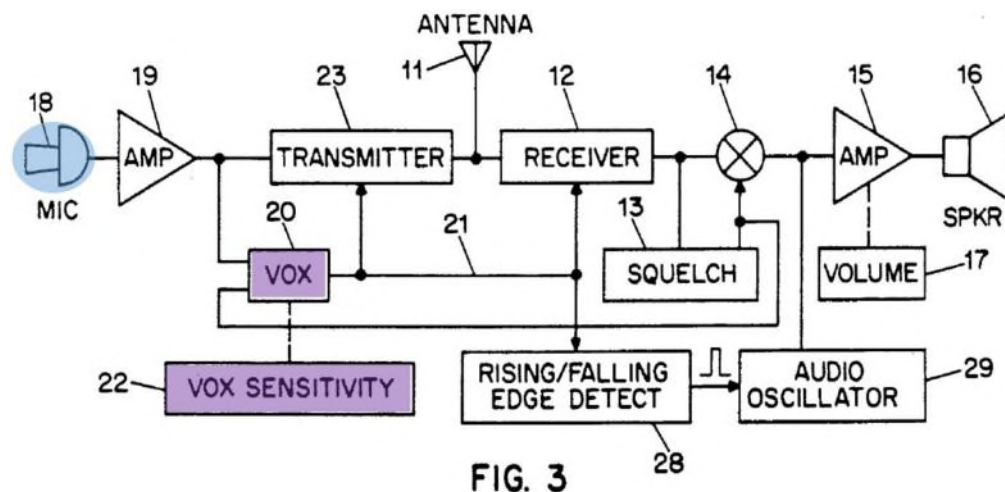
T. Claim 20 — “The audio signal activated control system as recited in claim 19, wherein said speech recognition system in said speech recognition mode is further configured for decoding said electrical representative signals to determine if said signals represent predetermined audible commands corresponding to control functions associated with said defined appliance type.”

The additional features of claim 20 would have been obvious to a POSITA for the reasons discussed above regarding claim 19. Salazar discloses this element by disclosing that its handset is configured to generate command and control signals to communicate with various devices. This command code set may have a different set of signals for different appliance manufacturers. *Salazar*, 7:34-54. Salazar further discloses that command and control signals may be generated by voice input. *Id.*, 21:43-58. Salazar thus discloses decoding electrical representative signals to determine if the signals represent predetermined audible commands corresponding to control functions associated with a defined appliance type. Polish, ¶ 128.

V. **GROUND 2A/2B: SALAZAR AND MIYAZAWA IN VIEW OF
OPPENDAHL (2A), AND SALAZAR, MIYAZAWA, AND
BOSSEMEYER IN VIEW OF OPPENDAHL (2B) RENDERS
OBVIOUS CLAIM 5**

A. **Oppendahl Overview**

Oppendahl discloses a voice operated switch, or VOX, that switches from a voice receive mode to a voice transmit mode based on voice inputs received by a **microphone**. *Oppendahl*, Abstract, 1:22-41, Fig. 3 (below); Oppendahl's system provides notifications to a user in transmit mode and enables the user to adjust the **"VOX threshold"** for switching between the voice receive and voice transmit modes using a **"VOX sensitivity control 22."** *Id.*, 4:4-24, 4:38-48. Oppendahl discloses that these features reduce instances of false triggers and open-mike events. *Id.*, 1:42-53, 2:10-14, 3:20-29. This reduces unnecessary battery drain in its system. *Id.*, 3:20-28.



Polish, ¶ 130.

B. Rationale and Motivation to Combine Salazar, Miyazawa, and Bossemeyer with Oppendahl

A POSITA would have combined the teachings of Oppendahl with those of Salazar, Miyazawa, and Bossemeyer. Each relates to voice-activated systems, and Oppendahl and Miyazawa both recognize the same problem-solution in these systems—reducing battery drain by ameliorating false-positive voice triggers using an adjustable detection threshold before registering an utterance. Polish, ¶ 132.

VOX systems are well-known speech recognition systems for triggering an operation based solely on voice input. Polish, ¶ 133. A POSITA would have found it obvious to incorporate the features of a VOX system in Oppendahl into the voice-activated appliance control system in Salazar and Miyazawa (and Salazar, Miyazawa, and Bossemeyer), because doing so would have been nothing more than combining known elements of similar systems according to known methods to yield predictable results. *Id.* A POSITA would have found it obvious to incorporate Oppendahl’s adjustable trigger threshold into Salazar-Miyazawa or Salazar-Miyazawa-Bossemeyer because it would allow a user to manually set the threshold for switching modes. *Id.* This would predictably allow a user to manually adjust a threshold up or down to prevent false triggers if the threshold is set too low in a high noise environment, or false negatives if the threshold is set too high in low noise environment. *Id.* While Oppendahl considers this feature in the context of an “open-

mike” event, applying the same manual threshold adjustment to Salazar-Miyazawa or Salazar-Miyazawa-Bossemeyer would prevent false mode switching. *Id.* This fulfills the goals of Oppendahl as well as Salazar, Miyazawa, and Bossemeyer by employing techniques to reduce power consumption in a speech recognition system. *Id.* Incorporating Oppendahl’s manual adjustment would have been simply combining known elements in the speech recognition arts to yield the predictable result of having an adjustable trigger in Salazar-Miyazawa or Salazar-Miyazawa-Bossemeyer. *Id.*, ¶ 134

A POSITA would have also understood that a manual adjustment would complement Miyazawa’s automatic threshold adjusting methods. *Id.*, ¶ 135; see *Miyazawa*, Figs. 5A, B and accompanying text. In particular, Miyazawa discloses increasing a threshold based on an initial trigger that fails to return a recognized keyword in a received voice sample. *Id.*, 12:24-37. However, Miyazawa does not disclose how this method would reduce the threshold after subsequent false triggers and threshold increases. A manual adjustment would compensate for a threshold being automatically set too high and, in an environment with varying noise levels, would allow for manually lowering the threshold when the noise level is low and voice inputs are not being registered by the system. Polish, ¶ 135. Incorporating this manual control would add redundancy to the automatic process of Miyazawa and enable a user to compensate for triggering errors in a variable noise environment.

Id. This system would also enable a user to anticipate in advance a high or low noise period and preemptively set the threshold to an appropriate level. *Id.*

C. Claim 5 — “The audio signal activated control system as recited in claim 1, wherein said speech recognition system further includes a user-adjustable sound activation sensitivity control configured to enable a user to adjust the signal amplitude threshold level that must be exceeded by said amplitude of said electrical signals for automatically switching from said sound activation mode to said speech recognition mode.”

Claim 5 would have been obvious based on Salazar and Miyazawa in combination with Oppendahl (Ground 2A) or based on Salazar, Miyazawa, and Bossemeyer in combination with Oppendahl (Ground 2B). Polish, ¶¶ 129-135. Miyazawa discloses switching between a speech recognition mode and a low power sound activation mode based on voice signals exceeding a threshold. See [1h]. Bossemeyer similarly discloses setting a threshold for registering a spoken utterance based on an amplitude of a sound signal. See [1h]. Oppendahl discloses a user-adjustable threshold for recognizing an utterance in a hands-free VOX transceiver. See *Oppendahl*, Abstract, Fig. 3, 1:22-53, 4:17-24 (“The **VOX threshold** may be adjusted by the user by **VOX sensitivity control 22**”). A POSITA would have understood that a sensitivity control for manually setting the sensitivity of a VOX transceiver would be a user-adjustable sound activation sensitivity control that enables a user to adjust the threshold at which an utterance will be detected. Polish, ¶ 131.

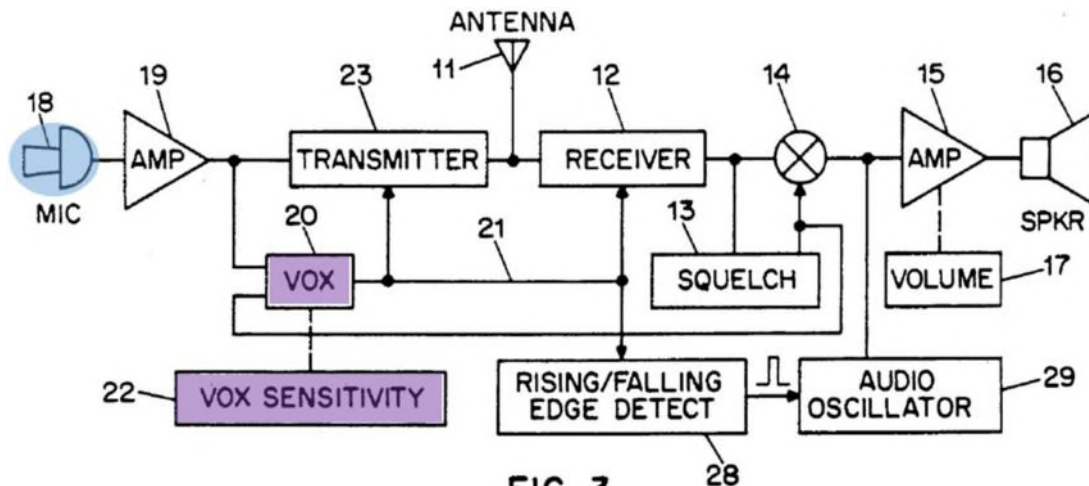


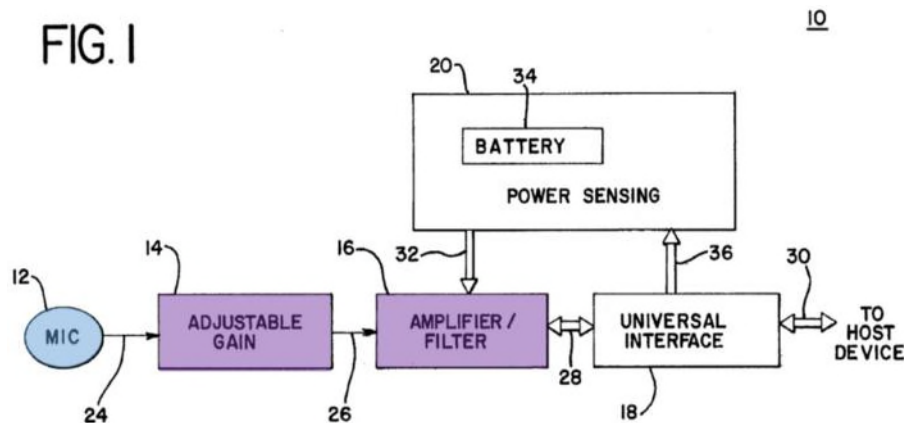
FIG. 3

VI. GROUNDS 3A/3B: SALAZAR AND MIYAZAWA IN VIEW OF REICHEL (3A), AND SALAZAR, MIYAZAWA AND BOSSEMEYER IN VIEW OF REICHEL (3B) RENDERS OBVIOUS CLAIM 6

A. Reichel Overview

Reichel discloses an adjustable audio input circuit for use with a voice recognition system. *Reichel*, 1:7-16. Reichel discloses that its system can compensate for inexpensive microphones by improving the input signal. *Id.*, 1:37-2:8, 2:38-52. Reichel's system includes a **microphone** and a **user-adjustable amplification circuit** that includes an adjustable gain control circuit 14 and an amplifier/filter circuit 16. *Id.*, 3:57-67, Fig. 1 (below).

FIG. 1



Polish, ¶ 137.

The gain control circuit includes a potentiometer whose resistance can be “manually adjust[ed]” to allow the amplifier/filter circuit 16 to provide between approximately 6 DB and 20 DB of gain. *Reichel*, 4:36-53. *Reichel*’s disclosure of a manually adjustable potentiometer is indistinguishable from the ’186 patent’s teaching of a “thumbwheel potentiometer” for performing an identical amplification function. *See* ’186 patent, 17:19-27, 20:20-26; Polish, ¶ 138. The adjustable gain (e.g., the potentiometer) serves as an input to the amplifier/filter circuit to control the level of amplification (or gain) applied to the microphone signal being sent to the host (e.g., a voice recognition system). *Reichel*, 4:36-53.

B. Rationale and Motivation to Combine Salazar, Miyazawa, and Bossemeyer with Reichel

A POSITA would have recognized that one way to adjust the sensitivity of a speech recognition system would be to, instead of (or in conjunction with) adjusting a triggering threshold for a speech recognition, adjusting the gain/amplification of

incoming signals relative to a threshold. Polish, ¶ 141. A POSITA would have recognized that it is known that speech and voice recognition systems would benefit from an amplified and filtered microphone signal, such as one that is “essentially linear or has a uniform energy spectrum throughout the [useful] frequency range.” *See Reichel*, 1:54-2:8; Polish, ¶ 141. Reichel provides this capability by disclosing adjustable amplification of a microphone signal used in a voice recognition system. From Reichel’s disclosure, a POSITA would have understood that amplifier-adjustable audio input circuits were well known at the time of the ’186 patent. Polish, ¶ 141.

Based on a POSITA’s understanding of the art, it would have been obvious to combine Reichel’s manual amplification adjustment with Salazar-Miyazawa or Salazar-Miyazawa-Bossemeyer to adjust the microphone gain relative to Miyazawa’s and Bossemeyer’s triggering threshold. Polish, ¶ 142. Doing so would have been nothing more than applying known techniques of microphone amplification to known systems of speech recognition. Polish, ¶ 142. Reichel’s disclosure would also have suggested incorporation of its techniques into a speech recognition system by Reichel disclosing its system being used in conjunction with a “voice recognition host.” *Reichel*, 1:7-16; Polish, ¶ 142. While “voice recognition” in Reichel and “speech recognition” in Salazar and Miyazawa have their differences, a POSITA would have understood systems supporting these two

recognition methods enjoy substantial overlap and similar hardware configurations. Polish, ¶ 142. Incorporating Reichel’s adjustable gain would have been simply combining known elements in the speech recognition arts to yield the predictable result of having an adjustable amplification in Salazar-Miyazawa or Salazar-Miyazawa-Bossemeyer and would have provided cost savings in the form of cheaper microphones. Polish, ¶¶ 143-144.

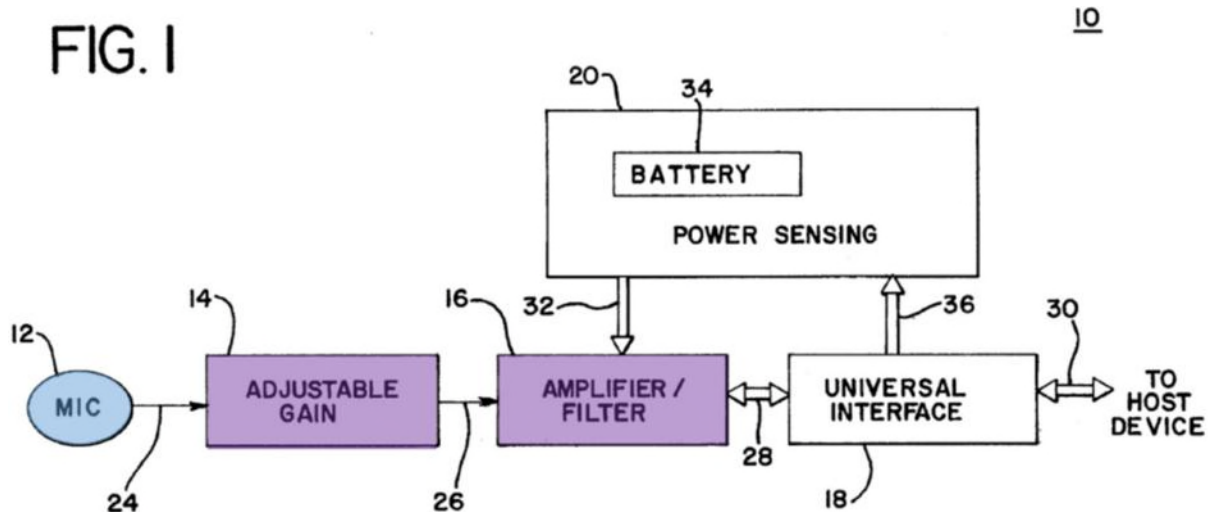
Finally, a POSITA would not have been discouraged from a combination with Reichel based on Miyazawa’s adjustable threshold because a POSITA would have recognized that a microphone input and a trigger threshold are not mutually exclusive—both may be adjusted to fine-tune the system to a trigger when an appropriate command is uttered. Polish, ¶ 142. Electing to include one or the other, or both, is a system design choice that would have been obvious to implement to a POSITA. Polish, ¶ 142.

C. Claim 6 — “The audio signal activated control system as recited in claim 1, wherein said speech recognition system further includes a user-adjustable amplification circuit configured to enable the degree of amplification of said amplitude of said electrical signals to be varied.”

Reichel discloses the additional features of claim 6. As discussed, Figure 1 of Reichel discloses a voice recognition system with a **user-adjustable amplification circuit (adjustable gain 14 and amplifier/filter 16)** configured to

enable the degree of amplification of said amplitude of said electrical signals (received from the **microphone (mic 12)**) to be varied.

FIG. I



Reichel discloses that the adjustable gain control circuit 14 includes a potentiometer whose resistance can be “manually adjust[ed]” to allow the amplifier/filter circuit 16 to provide between approximately 6 DB and 20 DB of gain. Reichel, 4:36-53. This disclosure of a manually adjustable potentiometer is indistinguishable from the ’186 patent’s teaching of a “thumbwheel potentiometer” for performing an identical amplification function. Polish, ¶¶ 139-140.

VII. GROUNDS 4A/4B: SALAZAR AND MIYAZAWA IN VIEW OF CLARK (4A), AND SALAZAR, MIYAZAWA AND BOSSEMEYER IN VIEW OF CLARK (4B) RENDERS OBVIOUS CLAIM 8

A. Clark Overview

Clark discloses a system for dynamically controlling the frequency of a processor by adjusting its operating voltage. *Clark*, Abstract. Clark discloses that its system may include a processor and voltage regulator for reducing processor

voltage in an “idle” or “sleep” mode, and then increasing the processor voltage to perform computationally-expensive tasks. *Id.*, 4:50-64, 5:40-6:2, 6:65-7:14, 7:26-56. Clark further discloses that its system may be utilized in voice recognition systems where the processor frequency may be lowered when the system is not in use and interrupted to raise the frequency when processing voice samples. *Id.*; *see also id.*, 1:18-24; Polish, ¶ 146.

B. Rationale and Motivation to Combine Salazar, Miyazawa, and Bossemeyer with Clark

As discussed above in Grounds 1A/1B, Salazar-Miyazawa and Salazar-Miyazawa-Bossemeyer disclose the additional features of claim 8. If SpeakWare argues otherwise, it would have been obvious to combine Clark with Salazar-Miyazawa and Salazar-Miyazawa-Bossemeyer to provide a lower frequency sleep mode and a higher frequency speech recognition mode. Polish, ¶¶ 145-148. Such a combination would have been nothing more than applying known techniques of processor control using input voltage to yield the predictable result of a processor that operates at a higher frequency when processing speech and at a lower frequency in a sleep mode. Polish, ¶ 148. Moreover, a POSITA would have understood that Clark’s intended use in battery-operated devices, which generally employ voltage regulators, suggests that its methods of varying voltage to a processor to achieve a frequency change would have been straightforward to implement into the battery-

powered systems of Salazar, Miyazawa, and Bossemeyer. *See Clark*, 1:14-47, 2:65-3:52; Polish, ¶ 148.

C. Claim 8 — “The audio signal activated control system as recited in claim 1, wherein in said speech recognition mode said processor operates at a higher operating frequency than in said low power state.”

As explained above regarding claim 8 in Grounds 1A/1B, Miyazawa discloses the additional features recited in claim 8. To the extent PO or its expert disagrees, Clark discloses this feature by disclosing “idle” or “sleep” modes (a low power state) in which a processor is operational but at a lower frequency than in an active state. *See, e.g., Clark*, Abstract, 4:50-64, 5:40-6:59, 6:65-7:14, 7:26-56; Polish, ¶ 147. Clark further discloses that its frequency methods may be used in microprocessor-based voice recognition systems to conserve power. *Clark*, 1:12-24, 5:40-45.

VIII. GROUNDS 5A/5B: SALAZAR AND MIYAZAWA IN VIEW OF DOUMA (5A), AND SALAZAR, MIYAZAWA, AND BOSSEMEYER IN VIEW OF DOUMA (5B) RENDERS OBVIOUS CLAIMS 17-18

A. Douma Overview

Douma discloses a system and method for training a voice recognition system where the system receives a first voice signal and an instruction signal representing an instruction, and processes the first voice signal to identify the instruction based on a second voice signal representing the same instruction. *Douma*, Abstract, 1:51-2:42, 4:17-5:16, 6:28-7:14, Figs. 2, 4; Polish, ¶ 150. In particular, Douma discloses a training mode that listens to voice inputs, generates voice recognition data for the

voice input, and stores it for future use. *Douma*, 4:29-54. The stored input is associated with instruction data, also entered by the user, for carrying out an action. *Id.*, 3:18-4:54. *Douma* also discloses a separate mode where a subsequent voice input is received, compared to the voice recognition data, and, if there is a match, the computer 10 carries out the action corresponding to the instruction. *Id.*, 3:49-4:16, 4:49-5:32. *Douma* explains that its system may be used to control various functions for a wide variety of appliances such as printers, TVs, VCRs, consumer and office electronic devices, and home appliances. *Id.*, 3:49-4:16, 4:49-54, Fig. 1.

B. Rationale and Motivation to Combine Salazar, Miyazawa, and Bossemeyer with Douma

A POSITA would have found it obvious to incorporate *Douma*'s programming mode into *Salazar-Miyazawa* or *Salazar-Miyazawa-Bossemeyer* in part because of the similarities between *Douma* and *Salazar*. Polish, ¶ 153. As discussed, both references relate to controlling a plurality of functions in multiple appliances using voice commands. Polish, ¶ 153. Moreover, *Salazar* discloses a programming mode for a universal remote using a touch-sensitive device. *Salazar*, 20:22-40, 23:6-22 (describing a program function). *Salazar* furthermore discloses interacting with its device via voice input instead of touch. *E.g., id.*, 21:43-58, 24:37-51. A POSITA would have recognized, based on *Salazar*'s disclosure, that it would have been obvious to use *Salazar*'s voice input feature to conduct the same

operations it discloses via touch input, and Douma explicitly discloses this feature. Polish, ¶ 153. As discussed above, Douma teaches a user-defined voice input is associated with a various instructions for controlling multiple devices. Incorporating this feature into Salazar-Miyazawa or Salazar-Miyazawa-Bossemeyer would have been nothing more than incorporating Douma's known voice input training technique into Salazar's appliance control system for the purpose of allowing a user to program user-specific commands into a speech recognition system for controlling appliances. Polish, ¶ 154. This would have had recognizable benefits including increasing user control and customization of the system, and would have substituted physical inputs with voice inputs when programming Salazar's device. Polish, ¶ 154.

- C. Claim 17 — “The audio signal activated control system as recited in claim 1, wherein said speech recognition system further includes a programming mode to enable a user to define a control signal to be associated with a defined audible command, wherein in said speech recognition mode said speech recognition system generates said defined control signal for controlling one or more appliances if said electrical signals represent said defined audible command.”**

Douma discloses the additional features of claim 17. Polish, ¶¶ 151-152. In particular, Douma discloses the recited programming mode. In Douma's programming mode, Douma “enable[s] a user to define a control signal” because Douma discloses enabling a user to input instructions in the form of “instruction

data” or an “instruction signal” (the instruction data/signal corresponds to the “control signal”) to the system. *Douma*, 1:55-56, 2:4-10, 3:18-36. Douma also discloses that the control signal is “associated with a defined audible command,” because Douma discloses that the voice recognition data, which is generated in response to a user’s entry of an audible command, is associated with the instruction data. *Id.*, 4:24-54, 5:38-43; *see also id.*, 1:53-59, 2:2:8-9.

Douma also discloses, in a speech recognition mode, generating the defined control signal if the electrical signals represent the defined audible command because Douma discloses generating and carrying out the instruction from the instruction data/signal if a second received voice input matches the voice recognition data that was associated with the instruction data/signal. *Id.*, 4:55-5:32. Moreover, Douma discloses that the instruction data/signals (the control signals), are for controlling appliances because Douma discloses that “[t]he computer 10 responds to received instruction data by carrying out an action,” and that the instruction data can be used to control “various function[s]” of a variety of other appliances including TVs and VCRs. *Id.*, 3:49-4:16, 4:49-54, Fig. 1.

- D. Claim 18 — “The audio signal activated control system as recited in claim 1, wherein said speech recognition system further includes a programming mode to enable a user to define a plurality of control signals to be associated with a defined audible command, wherein in said speech recognition mode said speech recognition system generates said defined plurality of control signals for controlling said one or more appliances if said electrical signals represent said defined audible command.”**

Claim 18 would have been obvious for the reasons discussed above regarding claim 17. The only difference between the two claims is that claim 18 requires “a plurality of control signals” associated with the defined audible command and generating the “defined plurality of control signals.” The above-cited portions of Douma disclose these features: Douma discloses that the received inputs can be “instruction *data*” which is plural and thus discloses multiple control signals, as well as performing multiple actions in response to that data. Douma, 3:18-26, 3:50-59. Douma also explains that “*various functions* of a TV40, a VCR 42, a high fidelity sound reproduction system 44 *and/or* a CD player are controlled by the computer 10 *in response to a voice command input* via the microphone.” *Id.*, 4:9-16 (emphasis added). A POSITA would have appreciated that to control various functions of multiple appliances with “a voice command input,” a plurality of control signals would need to be associated with a defined audible command and subsequently generated in response to a match in Douma’s system. Polish, ¶ 155.

IX. MANDATORY NOTICES UNDER 37 C.F.R. § 42.8

A. Real Party-in-Interest

Samsung Electronics Co., LTD and Samsung Electronics America, Inc. are the real parties in interest for this petition.

B. Related Matters

Samsung is concurrently requesting inter partes review of claims 21-55 in IPR2019-01147, which Samsung will seek to join to IPR2019-00342, filed by Google.

To the best knowledge of Samsung, the '186 patent is or has been involved in the following district court litigations:

Name	No.	Court	Filed
<i>SpeakWare, Inc. v. Microsoft Corp.</i>	8-18-cv-01293	C.D. Cal.	Jul. 26, 2018
<i>SpeakWare, Inc. v. Google LLC</i>	8-18-cv-01299	C.D. Cal.	Jul. 26, 2018
<i>SpeakWare, Inc. v. Samsung Elecs. Co., Ltd.</i>	8-18-cv-01300	C.D. Cal.	Jul. 26, 2018
<i>SpeakWare, Inc. v. Apple Inc.</i>	8-18-cv-01302	C.D. Cal.	Jul. 26, 2018
<i>SpeakWare, Inc. v. Amazon.com, Inc.</i>	8-18-cv-01303	C.D. Cal.	Jul. 26, 2018

To the best knowledge of Samsung, the '186 patent is or has been involved in the following petitions for inter partes review:

Name	No.	Filed
<i>Google LLC v. SpeakWare, Inc.</i>	IPR2019-00340	November 30, 2018
<i>Google LLC v. SpeakWare, Inc.</i>	IPR2019-00342	November 30, 2018
<i>Unified Patents Inc. v. SpeakWare, Inc.</i>	IPR2019-00495	December 27, 2018
<i>Microsoft Corp. v. SpeakWare, Inc.</i>	IPR2019-00758	March 11, 2019
<i>Microsoft Corp. v. SpeakWare, Inc.</i>	IPR2019-00792	March 11, 2019
<i>Apple Inc. v. SpeakWare, Inc.</i>	IPR2019-00874	April 3, 2019
<i>Apple Inc. v. SpeakWare, Inc.</i>	IPR2019-00875	April 3, 2019
<i>Amazon.com, Inc. v. SpeakWare, Inc.</i>	IPR2019-00999	April 9, 2019

The Board has instituted trial in the two challenges filed by Google. In the remaining proceedings, no institution decisions have been made.

U.S. Patent No. 7,080,014, issued on July 18, 2006, claims priority to the '186 patent.

C. Lead and Backup Counsel

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D. Service Information

Please address all correspondence to lead and back-up counsel at the addresses shown above. Samsung consents to electronic service by e-mail.

X. GROUND FOR STANDING

Samsung certifies that the '186 patent is available for inter partes review, and that Samsung is not barred or estopped from requesting inter partes review to challenge the claims on the grounds herein. Samsung filed this Petition within one year of service of the original complaint against Samsung in the district court.

Date: May 31, 2019

Respectfully submitted,

/Jeffrey A. Miller/
Jeffrey A. Miller, Lead Counsel
Reg. No. 35,287

CERTIFICATE OF COMPLIANCE

The undersigned hereby certifies that the foregoing Petition for Inter Partes Review contains 13,999 words, excluding those portions identified in 37 C.F.R. § 42.24(a), as measured by the word-processing system used to prepare this paper.

/Jeffrey A. Miller/
Jeffrey A. Miller

CERTIFICATE OF SERVICE

The undersigned certifies that the foregoing Petition for *Inter Partes* Review, the associated Power of Attorney, and Exhibits 1001-1022 are being served on May 31, 2019, by Express Mail at the following address of record for the subject patent:

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