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# UTILITY PATENT APPLICATION TRANSMITTAL

*(Only for new nonprovisional applications under 37 CFR 1.53(b))*

| | |
|---|---|
| *Attorney Docket No.* | ALI-050CCON1 |
| *First Named Inventor* | Gregory C. Burnett |
| *Title* | DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA) |
| *Express Mail Label No.* | N/A |

## APPLICATION ELEMENTS

*See MPEP chapter 600 concerning utility patent application contents.*

1. ☐ **Fee Transmittal Form** (PTO/SB/17 or equivalent)
2. ☑ **Applicant asserts small entity status.** See 37 CFR 1.27
3. ☐ **Applicant certifies micro entity status.** See 37 CFR 1.29. Applicant must attach form PTO/SB/15A or B or equivalent.
4. ☑ **Specification** [*Total Pages* 54] Both the claims and abstract must start on a new page. *(See MPEP § 608.01(a) for information on the preferred arrangement)*
5. ☑ **Drawing(s)** (35 U.S.C. 113) [*Total Sheets* 17]
6. **Inventor's Oath or Declaration** [*Total Pages* ____] *(including substitute statements under 37 CFR 1.64 and assignments serving as an oath or declaration under 37 CFR 1.63(e))*
   a. ☐ Newly executed (original or copy)
   b. ☐ A copy from a prior application (37 CFR 1.63(d))
7. ☑ **Application Data Sheet** ** See note below.* See 37 CFR 1.76 (PTO/AIA/14 or equivalent)
8. **CD-ROM or CD-R** in duplicate, large table, or Computer Program (*Appendix*)
   ☐ Landscape Table on CD
9. **Nucleotide and/or Amino Acid Sequence Submission** (*if applicable, items a. – c. are required*)
   a. ☐ Computer Readable Form (CRF)
   b. ☐ Specification Sequence Listing on:
      i. ☐ CD-ROM or CD-R (2 copies); or
      ii. ☐ Paper
   c. ☐ Statements verifying identity of above copies

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**Commissioner for Patents**
**P.O. Box 1450**
**Alexandria, VA 22313-1450**

## ACCOMPANYING APPLICATION PAPERS

10. ☐ **Assignment Papers** (cover sheet & document(s))
    Name of Assignee _____
11. ☐ **37 CFR 3.73(c) Statement** (*when there is an assignee*) ☐ **Power of Attorney**
12. ☐ **English Translation Document** (*if applicable*)
13. ☐ **Information Disclosure Statement** (PTO/SB/08 or PTO-1449)
    ☐ Copies of citations attached
14. ☐ **Preliminary Amendment**
15. ☐ **Return Receipt Postcard** (*MPEP § 503*) (*Should be specifically itemized*)
16. ☐ **Certified Copy of Priority Document(s)** (*if foreign priority is claimed*)
17. ☐ **Nonpublication Request** Under 35 U.S.C. 122(b)(2)(B)(i). Applicant must attach form PTO/SB/35 or equivalent.
18. ☐ **Other:** _____

**Note*: (1) Benefit claims under 37 CFR 1.78 and foreign priority claims under 1.55 **must** be included in an Application Data Sheet (ADS).
(2) For applications filed under 35 U.S.C. 111, the application must contain an ADS specifying the applicant if the applicant is an assignee, person to whom the inventor is under an obligation to assign, or person who otherwise shows sufficient proprietary interest in the matter. See 37 CFR 1.46(b).

## 19. CORRESPONDENCE ADDRESS

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This collection of information is required by 37 CFR 1.53(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

*If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*

# Application Data Sheet

## Cross-Reference to Related Applications

This application is continuation of U.S. Nonprovisional Patent Application No. 12/139,355, filed June 13, 2008, entitled "Dual Omnidirectional Microphone Array (DOMA)," which claims the benefit of U.S. Provisional Patent Application No. 60/934,551, filed June 13, 2007, U.S. Provisional Patent Application No. 60/953,444, filed August 1, 2007, U.S. Provisional Patent Application No.60/954,712, filed August 8, 2007, and U.S. Provisional Patent Application No. 61/045,377, filed April 16, 2008, all of which are incorporated by reference herein in their entirety for all purposes.

## Application Information

| | |
|---|---|
| **Filing Date::** | July 22, 2013 |
| **Application Type::** | Continuation |
| **Subject Matter::** | Utility |
| **Suggested Group Art Unit::** | None |
| **CD-ROM or CD-R?::** | None |
| **Title::** | DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA) |
| **Attorney Docket Number::** | ALI-050CCON1 |
| **Request for Early Publication?::** | No |
| **Request for Non-Publication?::** | No |
| **Suggested Drawing Figure::** | FIG. 1 |
| **Total Drawing Sheets::** | 17 |
| **Small Entity::** | Yes |
| **Petition included?::** | No |
| **Secrecy Order in Parent Appl.?::** | No |



Meta Platforms, Inc. - Exhibit 1002
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## Applicant Information

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3 of 450

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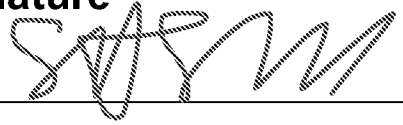
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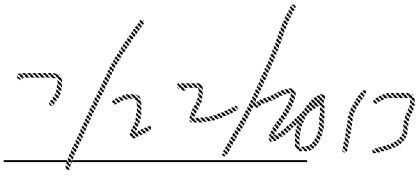
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Date



Meta Platforms, Inc. - Exhibit 1002
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# APPLICATION FOR UNITED STATES PATENT

## DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)

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# DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)

## CROSS-REFERENCE TO RELATED APPLICATIONS

**[0001]** This application is continuation of U.S. Nonprovisional Patent Application No. 12/139,355, filed June 13, 2008, entitled "Dual Omnidirectional Microphone Array (DOMA)," which claims the benefit of U.S. Provisional Patent Application No. 60/934,551, filed June 13, 2007, U.S. Provisional Patent Application No. 60/953,444, filed August 1, 2007, U.S. Provisional Patent Application No.60/954,712, filed August 8, 2007, and U.S. Provisional Patent Application No. 61/045,377, filed April 16, 2008, all of which are incorporated by reference herein in their entirety for all purposes.

## TECHNICAL FIELD

**[0002]** The disclosure herein relates generally to noise suppression. In particular, this disclosure relates to noise suppression systems, devices, and methods for use in acoustic applications.

## BACKGROUND

**[0003]** Conventional adaptive noise suppression algorithms have been around for some time. These conventional algorithms have used two or more microphones to sample both an (unwanted) acoustic noise field and the (desired) speech of a user. The noise relationship between the microphones is then determined using an adaptive filter (such as Least-Mean-Squares as described in Haykin & Widrow, ISBN# 0471215708, Wiley, 2002, but any adaptive or stationary system identification algorithm may be used) and that relationship used to filter the noise from the desired signal.

**[0004]** Most conventional noise suppression systems currently in use for speech communication systems are based on a single-microphone spectral subtraction technique first develop in the 1970's and described, for example, by S. F. Boll in "Suppression of Acoustic Noise in Speech using Spectral Subtraction," IEEE Trans. on ASSP, pp. 113-120, 1979. These techniques have been refined over the years,but the basic principles of operation have remained the same. See, for example,US Patent Number 5,687,243 of McLaughlin, et aI., and US Patent Number 4,811,404 of Vilmur, et al. There have also been several attempts at multimicrophone

noise suppression systems, such as those outlined in US Patent Number 5,406,622 of Silverberg et al. and US Patent Number 5,463,694 of Bradley et al. Multi-microphone systems have not been very successful for a variety of reasons, the most compelling being poor noise cancellation performance and/or significant speech distortion. Primarily, conventional multi-microphone systems attempt to increase the SNR of the user's speech by "steering" the nulls of the system to the strongest noise sources. This approach is limited in the number of noise sources removed by the number of available nulls.

**[0005]** The Jawbone earpiece (referred to as the "Jawbone), introduced in December 2006 by AliphCom of San Francisco, California, was the first known commercial product to use a pair of physical directional microphones (instead of omnidirectional microphones) to reduce environmental acoustic noise. The technology supporting the Jawbone is currently described under one or more of US Patent Number 7,246,058 by Burnett and/or US Patent Application Numbers 10/400,282,10/667,207, and/or 10/769,302. Generally, multi-microphone techniques make use of an acoustic-based Voice Activity Detector (VAD) to determine the background noise characteristics, where "voice" is generally understood to include human voiced speech, unvoiced speech, or a combination of voiced and unvoiced speech. The Jawbone improved on this by using a microphone-based sensor to construct a VAD signal using directly detected speech vibrations in the user's cheek. This allowed the Jawbone to aggressively remove noise when the user was not producing speech. However, the Jawbone uses a directional microphone array.

## INCORPORATION BY REFERENCE

**[0006]** Each patent, patent application, and/or publication mentioned in this specification is herein incorporated by reference in its entirety to the same extent as if each individual patent, patent application, and/or publication was specifically and individually indicated to be incorporated by reference.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0007] Figure 1** is a two-microphone adaptive noise suppression system, under an embodiment.

**[0008] Figure 2** is an array and speech source (S) configuration, under an embodiment. The microphones are separated by a distance approximately equal to $2d_0$, and the speech source is located a distance ds away from the midpoint of the array at an angle $\theta$. The system is axially symmetric so only $d_s$ and $\theta$ need be specified.

**[0009] Figure 3** is a block diagram for a first order gradient microphone using two omnidirectional elements $O_1$ and $O_2$ , under an embodiment.

**[0010] Figure 4** is a block diagram for a DOMA including two physical microphones configured to form two virtual microphones $V_1$ and $V_2$, under an embodiment.

**[0011] Figure 5** is a block diagram for a DOMA including two physical microphones configured to form N virtual microphones $V_1$ through $V_N$, where N is any number greater than one, under an embodiment.

**[0012] Figure 6** is an example of a headset or head-worn device that includes the DOMA, as described herein, under an embodiment.

**[0013] Figure 7** is a flow diagram for denoising acoustic signals using the DOMA, under an embodiment.

**[0014] Figure 8** is a flow diagram for forming the DOMA, under an embodiment.

**[0015] Figure 9** is a plot of linear response of virtual microphone $V_2$ to a 1 kHz speech source at a distance of 0.1 m, under an embodiment. The null is at 0 degrees, where the speech is normally located.

**[0016] Figure 10** is a plot of linear response of virtual microphone $V_2$ to a 1 kHz noise source at a distance of 1.0 m, under an embodiment. There is no null and all noise sources are detected.

**[0017] Figure 11** is a plot of linear response of virtual microphone $V_1$ to a 1 kHz speech source at a distance of 0.1 m, under an embodiment. There is no null and the response for speech is greater than that shown in Figure 9.

**[0018] Figure 12** is a plot of linear response of virtual microphone $V_1$ to a 1 kHz noise source at a distance of 1.0 m, under an embodiment. There is no null and

the response is very similar to $V_2$ shown in Figure 10.

**[0019] Figure 13** is a plot of linear response of virtual microphone $V_1$ to a speech source at a distance of 0.1 m for frequencies of 100, 500, 1000, 2000, 3000, and 4000 Hz, under an embodiment.

**[0020] Figure 14** is a plot showing comparison of frequency responses for speech for the array of an embodiment and for a conventional cardioid microphone.

**[0021] Figure 15** is a plot showing speech response for $V_1$ (top, dashed) and V2 (bottom, solid) versus B with ds assumed to be 0.1 m, under an embodiment. The spatial null in V2 is relatively broad.

**[0022] Figure 16** is a plot showing a ratio of $V_1/V_2$ speech responses shown in Figure 10 versus B, under an embodiment. The ratio is above 10 dB for all $0.8 < B < 1.1$. This means that the physical $\beta$ of the system need not be exactly modeled for good performance.

**[0023] Figure 17** is a plot of B versus actual ds assuming that ds = 10 cm and theta = 0, under an embodiment.

**[0024] Figure 18** is a plot of B versus theta with ds = 10 cm and assuming ds = 10 cm, under an embodiment.

**[0025] Figure 19** is a plot of amplitude (top) and phase (bottom) response of N(s) with B = 1 and D = -7.2 μsec, under an embodiment. The resulting phase difference clearly affects high frequencies more than low.

**[0026] Figure 20** is a plot of amplitude (top) and phase (bottom) response of N(s) with B = 1.2 and D = -7.2 μsec, under an embodiment. Non-unity B affects the entire frequency range.

**[0027] Figure 21** is a plot of amplitude (top) and phase (bottom) response of the effect on the speech cancellation in $V_2$ due to a mistake in the location of the speech source with q1 = 0 degrees and q2 = 30 degrees, under an embodiment. The cancellation remains below -10 dB for frequencies below 6 kHz.

**[0028] Figure 22** is a plot of amplitude (top) and phase (bottom) response of the effect on the speech cancellation in V2 due to a mistake in the location of the speech source with q1 = 0 degrees and q2 = 45 degrees, under an embodiment. The cancellation is below -10 dB only for frequencies below about 2.8 kHz and a

reduction in performance is expected.

**[0029] Figure 23** shows experimental results for a 2do = 19 mm array using a linear $\beta$ of 0.83 on a Bruel and Kjaer Head and Torso Simulator (HATS) in very loud (~85 dBA) music/speech noise environment, under an embodiment. The noise has been reduced by about 25 dB and the speech hardly affected, with no noticeable distortion.

## DETAILED DESCRIPTION

**[0030]** A dual omnidirectional microphone array (DOMA) that provides improved noise suppression is described herein. Compared to conventional arrays and algorithms, which seek to reduce noise by nulling out noise sources, the array of an embodiment is used to form two distinct virtual directional microphones which are configured to have very similar noise responses and very dissimilar speech responses. The only null formed by the DOMA is one used to remove the speech of the user from V2 • The two virtual microphones of an embodiment can be paired with an adaptive filter algorithm and/or VAD algorithm to significantly reduce the noise without distorting the speech, significantly improving the SNR of the desired speech over conventional noise suppression systems. The embodiments described herein are stable in operation, flexible with respect to virtual microphone pattern choice, and have proven to be robust with respect to speech source-to-array distance and orientation as well as temperature and calibration techniques.

**[0031]** In the following description, numerous specific details are introduced to provide a thorough understanding of, and enabling description for, embodiments of the DOMA. One skilled in the relevant art, however, will recognize that these embodiments can be practiced without one or more of the specific details, or with other components, systems, etc. In other instances, well-known structures or operations are not shown, or are not described in detail, to avoid obscuring aspects of the disclosed embodiments.

**[0032]** Unless otherwise specified, the following terms have the corresponding meanings in addition to any meaning or understanding they may convey to one skilled in the art.

**[0033]** The term "bleedthrough" means the undesired presence of noise during speech.

**[0034]** The term "denoising" means removing unwanted noise from Mic1, and also refers to the amount of reduction of noise energy in a signal in decibels (dB).

**[0035]** The term "devoicing" means removing/distorting the desired speech from Mic1.

**[0036]** The term "directional microphone (DM)" means a physical directional microphone that is vented on both sides of the sensing diaphragm.

**[0037]** The term "Mic1 (M1)" means a general designation for an adaptive noise suppression system microphone that usually contains more speech than noise.

**[0038]** The term "Mic2 (M2)" means a general designation for an adaptive noise suppression system microphone that usually contains more noise than speech.

**[0039]** The term "noise" means unwanted environmental acoustic noise.

**[0040]** The term "null" means a zero or minima in the spatial response of a physical or virtual directional microphone.

**[0041]** The term "$0_1$" means a first physical omnidirectional microphone used to form a microphone array.

**[0042]** The term "$0_2$" means a second physical omnidirectional microphone used to form a microphone array.

**[0043]** The term "speech" means desired speech of the user.

**[0044]** The term "Skin Surface Microphone (SSM)" is a microphone used in an earpiece (e.g., the Jawbone earpiece available from Aliph of San Francisco, California) to detect speech vibrations on the user's skin.

**[0045]** The term "$V_1$" means the virtual directional "speech" microphone, which has no nulls.

**[0046]** The term "$V_2$' means the virtual directional "noise" microphone, which has a null for the user's speech.

**[0047]** The term "Voice Activity Detection (VAD) signal" means a signal indicating when user speech is detected.

**[0048]** The term "virtual microphones (VM)" or "virtual directional microphones" means a microphone constructed using two or more omnidirectional microphones and associated signal processing.

**[0049]** **Figure 1** is a two-microphone adaptive noise suppression system 100, under an embodiment. The two-microphone system 100 including the combination of physical microphones MIC 1 and MIC 2 along with the processing or circuitry components to which the microphones couple (described in detail below, but not shown in this figure) is referred to herein as the dual omnidirectional microphone

array (DOMA) 110, but the embodiment is not so limited. Referring to Figure 1, in analyzing the single noise source 101 and the direct path to the microphones, the total acoustic information coming into MIC 1 (102, which can be an physical or virtual microphone) is denoted by $m_1(n)$. The total acoustic information coming into MIC 2 (103, which can also be an physical or virtual microphone) is similarly labeled m2(n). In the z (digital frequency) domain, these are represented as $M_1(z)$ and $M_2(Z)$. Then,

$$\boldsymbol{M_1(z) = S(z) + N_2(z)}$$
$$\boldsymbol{M_2(z) = N(z) + S_2(z)}$$

with

$$\boldsymbol{N_2(z) = N(z)H_1(z)}$$
$$\boldsymbol{S_2(z) = S(z)H_2(z)}$$

so that

$$\boldsymbol{M_1(z) = S(z) + N(z)H_1(z)} \qquad \text{Eq. 1}$$
$$\boldsymbol{M_2(z) = N(z) + S(z)H_2(z)}$$

This is the general case for all two microphone systems. Equation 1 has four unknowns and only two known relationships and therefore cannot be solved explicitly.

**[0050]** However, there is another way to solve for some of the unknowns in Equation 1. The analysis starts with an examination of the case where the speech is not being generated, that is, where a signal from the VAD subsystem 104 (optional) equals zero. In this case, s(n) = S(z) = 0, and Equation 1 reduces to

$$\boldsymbol{M_{1N}(z) = N(z)H_1(z)}$$
$$\boldsymbol{M_{2N}(z) = N(z)}$$

where the N subscript on the M variables indicate that only noise is being received.

This leads to

$$M_{1N}(z) = M_{2N}(z)H_1(z)$$
$$H_1(z) = \frac{M_{1N}(z)}{M_{2N}(z)} \ . \qquad \text{Eq. 2}$$

The function $H_1(z)$ can be calculated using any of the available system identification algorithms and the microphone outputs when the system is certain that only noise is being received. The calculation can be done adaptively, so that the system can react to changes in the noise.

**[0051]** A solution is now available for $H_1(z)$, one of the unknowns in Equation 1. The final unknown, $H_2(z)$, can be determined by using the instances where speech is being produced and the VAD equals one. When this is occurring, but the recent (perhaps less than 1 second) history of the microphones indicate low levels of noise, it can be assumed that n(s) = N(z) ~ O. Then Equation 1 reduces to

$$M_{1s}(z) = S(z)$$
$$M_{2s}(z) = S(z)H_2(z),$$

which in turn leads to

$$M_{2S}(z) = M_{1S}(z)H_2(z)$$
$$H_2(z) = \frac{M_{2S}(z)}{M_{1S}(z)}$$

which is the inverse of the $H_1(z)$ calculation. However, it is noted that different inputs are being used (now only the speech is occurring whereas before only the noise was occurring). While calculating $H_2(z)$, the values calculated for $H_1(z)$ are held constant (and vice versa) and it is assumed that the noise level is not high enough to cause errors in the $H_2(z)$calculation.

**[0052]** After calculating H1(z) and $H_2(z)$, they are used to remove the noise from the signal. If Equation 1 is rewritten as

$$S(z) = M_1(z) - N(z)H_1(z)$$
$$N(z) = M_2(z) - S(z)H_2(z)$$
$$S(z) = M_1(z) - [M_2(z) - S(z)H_2(z)]H_1(z) \ ,$$
$$S(z)[1 - H_2(z)H_1(z)] = M_1(z) - M_2(z)H_1(z)$$

then N(z) may be substituted as shown to solve for S(z) as

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

**[0053]** If the transfer functions $H_1(z)$ and $H_2(z)$ can be described with sufficient accuracy, then the noise can be completely removed and the original signal recovered. This remains true without respect to the amplitude or spectral characteristics of the noise. If there is very little or no leakage from the speech source into $M_2$, then $H_2(z) \approx 0$ and Equation 3 reduces to

$$\boldsymbol{S(z) \approx M_1(z) - M_2(z)H_1(z)}\,. \qquad \text{Eq. 4}$$

**[0054]** Equation 4 is much simpler to implement and is very stable, assuming $H_1(z)$ is stable. However, if significant speech energy is in $M_2(Z)$, devoicing can occur. In order to construct a well-performing system and use Equation 4, consideration is given to the following conditions:

R1. Availability of a perfect (or at least very good) VAD in noisy conditions
R2. Sufficiently accurate $H_1(z)$
R3. Very small (ideally zero) $H_2(z)$
R4. During speech production, $H_1(z)$cannot change substantially.
R5. During noise, $H_2(z)$cannot change substantially.

**[0055]** Condition R1 is easy to satisfy if the SNR of the desired speech to the unwanted noise is high enough. "Enough" means different things depending on the method of VAD generation. If a VAD vibration sensor is used, as in Burnett 7,256,048, accurate VAD in very low SNRs (-10 dB or less) is possible. Acoustic-only methods using information from $O_1$ and $O_2$ can also return accurate VADs, but are limited to SNRs of ~3 dB or greater for adequate performance.

**[0056]** Condition R5 is normally simple to satisfy because for most applications the microphones will not change position with respect to the user's mouth very often or rapidly. In those applications where it may happen (such as hands-free conferencing systems) it can be satisfied by configuring Mic2 so that $H_2(z) \approx 0$ .

**[0057]** Satisfying conditions R2, R3, and R4 are more difficult but are possible given the right combination of $V_1$ and $V_2$ • Methods are examined below that have proven to be effective in satisfying the above, resulting in excellent noise suppression performance and minimal speech removal and distortion in an embodiment.

**[0058]** The DOMA, in various embodiments, can be used with the Pathfinder system as the adaptive filter system or noise removal. The Pathfinder system, available from AliphCom, San Francisco, CA, is described in detail in other patents and patent applications referenced herein. Alternatively, any adaptive filter or noise removal algorithm can be used with the DOMA in one or more various alternative embodiments or configurations.

**[0059]** When the DOMA is used with the Pathfinder system, the Pathfinder system generally provides adaptive noise cancellation by combining the two microphone signals (e.g., Mic1, Mic2) by filtering and summing in the time domain. The adaptive filter generally uses the signal received from a first microphone of the DOMA to remove noise from the speech received from at least one other microphone of the DOMA, which relies on a slowly varying linear transfer function between the two microphones for sources of noise. Following processing of the two channels of the DOMA, an output signal is generated in which the noise content is attenuated with respect to the speech content, as described in detail below.

**[0060]** **Figure 2** is a generalized two-microphone array (DOMA) including an array 201/202 and speech source S configuration, under an embodiment. **Figure 3** is a system 300 for generating or producing a first order gradient microphone V using two omnidirectional elements $O_1$ and $O_2$, under an embodiment. The array of an embodiment includes two physical microphones 201 and 202 (e.g., omnidirectional microphones) placed a distance $2d_0$ apart and a speech source 200 is located a distance $d_S$ away at an angle of $\theta$. This array is axially symmetric (at least in free space), so no other angle is needed. The output from each microphone 201 and 202 can be delayed ($z_1$ and $z_2$), multiplied by a gain ($A_1$ and $A_2$), and then summed with the other as demonstrated in **Figure 3.** The output of the array is or forms at

least one virtual microphone, as described in detail below. This operation can be over any frequency range desired. By varying the magnitude and sign of the delays and gains, a wide variety of virtual microphones (VMs), also referred to herein as virtual directional microphones, can be realized. There are other methods known to those skilled in the art for constructing VMs but this is a common one and will be used in the enablement below.

**[0061]** As an example, **Figure 4** is a block diagram for a DOMA 400 including two physical microphones configured to form two virtual microphones $V_1$ and $V_2$, under an embodiment. The DOMA includes two first order gradient microphones $V_1$ and $V_2$ formed using the outputs of two microphones or elements $O_1$ and $O_2$ (201 and 202), under an embodiment. The DOMA of an embodiment includes two physical microphones 201 and 202 that are omnidirectional microphones, as described above with reference to Figures 2 and 3. The output from each microphone is coupled to a processing component 402, or circuitry, and the processing component outputs signals representing or corresponding to the virtual microphones $V_1$ and $V_2$.

**[0062]** In this example system 400, the output of physical microphone 201 is coupled to processing component 402 that includes a first processing path that includes application of a first delay $Z_{11}$ and a first gain $A_{11}$ and a second processing path that includes application of a second delay $Z_{12}$ and a second gain $A_{12}$• The output of physical microphone 202 is coupled to a third processing path of the processing component 402 that includes application of a third delay $Z_{21}$ and a third gain $A_{21}$ and a fourth processing path that includes application of a fourth delay $Z_{22}$ and a fourth gain $A_{22}$. The output of the first and third processing paths is summed to form virtual microphone $V_1$, and the output of the second and fourth processing paths is summed to form virtual microphone $V_2$.

**[0063]** As described in detail below, varying the magnitude and sign of the delays and gains of the processing paths leads to a wide variety of virtual microphones (VMs), also referred to herein as virtual directional microphones, can be realized. While the processing component 402 described in this example includes four processing paths generating two virtual microphones or microphone signals, the embodiment is not so limited. For example, **Figure 5** is a block diagram for a DOMA 500 including two physical microphones configured to form N virtual microphones $V_1$ through $V_N$, where N is any number greater than one, under an embodiment. Thus, the

DOMA can include a processing component 502 having any number of processing paths as appropriate to form a number N of virtual
microphones.

**[0064]** The DOMA of an embodiment can be coupled or connected to one or more remote devices. In a system configuration, the DOMA outputs signals to the remote devices. The remote devices include, but are not limited to, at least one of cellular telephones, satellite telephones, portable telephones, wireline telephones, Internet telephones, wireless transceivers, wireless communication radios, personal digital assistants (PDAs), personal computers (PCs), headset devices, head-worn devices, and earpieces.

**[0065]** Furthermore, the DOMA of an embodiment can be a component or subsystem integrated with a host device. In this system configuration, the DOMA outputs signals to components or subsystems of the host device. The host device includes, but is not limited to, at least one of cellular telephones, satellite telephones, portable telephones, wireline telephones, Internet telephones, wireless transceivers, wireless communication radios, personal digital assistants (PDAs), personal computers (PCs), headset devices, head-worn devices, and earpieces.

**[0066]** As an example, **Figure 6** is an example of a headset or head-worn device 600 that includes the DOMA, as described herein, under an embodiment. The headset 600 of an embodiment includes a housing having two areas or receptacles (not shown) that receive and hold two microphones (e.g., $O_1$ and $O_2$), The headset 600 is generally a device that can be worn by a speaker 602, for example, a headset or earpiece that positions or holds the microphones in the vicinity of the speaker's mouth. The headset 600 of an embodiment places a first physical microphone (e.g., physical microphone $O_1$) in a vicinity of a speaker's lips. A second physical microphone (e.g., physical microphone $O_2$) is placed a distance behind the first physical microphone. The distance of an embodiment is in a range of a few centimeters behind the first physical microphone or as described herein (e.g., described with reference to Figures 1-5). The DOMA is symmetric and is used in the same configuration or manner as a single close-talk microphone, but is not so limited.

**[0067]** **Figure 7** is a flow diagram for denoising 700 acoustic signals using the DOMA, under an embodiment. The denoising 700 begins by receiving 702 acoustic signals at a first

physical microphone and a second physical microphone. In response to the acoustic signals, a first microphone signal is output from the first physical microphone and a second microphone signal is output from the second physical microphone 704. A first virtual microphone is formed 706 by generating a first combination of the first microphone signal and the second microphone signal. A second virtual microphone is formed 708 by generating a second combination of the first microphone signal and the second microphone signal, and the second combination is different from the first combination. The first virtual microphone and the second virtual microphone are distinct virtual directional microphones with substantially similar responses to noise and substantially dissimilar responses to speech. The denoising 700 generates 710 output signals by combining signals from the first virtual microphone and the second virtual microphone, and the output signals include less acoustic noise than the acoustic signals.

**[0068]** **Figure 8** is a flow diagram for forming 800 the DOMA, under an embodiment. Formation 800 of the DOMA includes forming 802 a physical microphone array including a first physical microphone and a second physical microphone. The first physical microphone outputs a first microphone signal and the second physical microphone outputs a second microphone signal. A virtual microphone array is formed 804 comprising a first virtual microphone and a second virtual microphone. The first virtual microphone comprises a first combination of the first microphone signal and the second microphone signal. The second virtual microphone comprises a second combination of the first microphone signal and the second microphone signal, and the second combination is different from the first combination. The virtual microphone array including a single null oriented in a direction toward a source of speech of a human speaker.

**[0069]** The construction of VMs for the adaptive noise suppression system of an embodiment includes substantially similar noise response in $V_1$ and $V_2$. Substantially similar noise response as used herein means that $H_1(z)$ is simple to model and will not change much during speech, satisfying conditions R2 and R4 described above and allowing strong denoising and minimized bleedthrough.

**[0070]** The construction of VMs for the adaptive noise suppression system of an embodiment includes relatively small speech response for $V_2$. The relatively small speech response for $V_2$ means that $H_2(z) \approx 0$, which will satisfy conditions R3 and R5 described above.

**[0071]** The construction of VMs for the adaptive noise suppression system of an embodiment further includes sufficient speech response for $V_1$ so that the cleaned speech will have significantly higher SNR than the original speech captured by $O_1$.

**[0072]** The description that follows assumes that the responses of the omnidirectional microphones $O_1$ and $O_2$ to an identical acoustic source have been normalized so that they have exactly the same response (amplitude and phase) to that source. This can be accomplished using standard microphone array methods (such as frequency-based calibration) well known to those versed in the art.

**[0073]** Referring to the condition that construction of VMs for the adaptive noise suppression system of an embodiment includes relatively small speech response for $V_2$, it is seen that for discrete systems $V_2(z)$ can be represented as:

$$\boldsymbol{V_2(z) = O_2(z) - z^{-\gamma}\beta O_1(z)}$$

where

$$\boldsymbol{\beta = \frac{d_1}{d_2}}$$

$$\boldsymbol{\gamma} = \frac{\boldsymbol{d_2 - d_1}}{\boldsymbol{c}} \cdot \boldsymbol{f_s} \text{ (samples)}$$

$$\boldsymbol{d_1 = \sqrt{d_S^2 - 2d_{S1}d_0\,cos(\theta) + d_0^2}}$$

$$\boldsymbol{d_2 = \sqrt{d_S^2 + 2d_S d_0\,cos(\theta) + d_0^2}}$$

The distances $d_1$ and $d_2$ are the distance from $O_1$and $O_2$ to the speech source (see **Figure 2**), respectively, and $\gamma$ is their difference divided by c, the speed of sound, and multiplied by the sampling frequency $f_s$. Thus y is in samples, but need not be an integer. For non-integer $\gamma$, fractional-delay filters (well known to those versed in the art) may be used.

**[0074]** It is important to note that the $\beta$ above is not the conventional $\beta$ used to denote the mixing of VMs in adaptive beamforming; it is a physical variable of the system that depends on

the intra-microphone distance $d_o$ (which is fixed) and the distance $d_s$ and angle β, which can vary. As shown below, for properly calibrated microphones, it is not necessary for the system to be programmed with the exact β of the array. Errors of approximately 10-15% in the actual β (i.e. the β used by the algorithm is not the β of the physical array) have been used with very little degradation in quality. The algorithmic value of β may be calculated and set for a particular user or may be calculated adaptively during speech production when little or no noise is present. However, adaptation during use is not required for nominal performance.

**[0075]** **Figure 9** is a plot of linear response of virtual microphone $V_2$ with β = 0.8 to a 1 kHz speech source at a distance of 0.1 m, under an embodiment. The null in the linear response of virtual microphone $V_2$ to speech is located at 0 degrees, where the speech is typically expected to be located. **Figure 10** is a plot of linear response of virtual microphone $V_2$ with β = 0.8 to a 1 kHz noise source at a distance of 1.0 m, under an embodiment. The linear response of $V_2$ to noise is devoid of or includes no null, meaning all noise sources are detected.

**[0076]** The above formulation for $V_2(z)$ has a null at the speech location and will therefore exhibit minimal response to the speech. This is shown in **Figure 9** for an array with $d_o$ = 10.7 mm and a speech source on the axis of the array (θ = 0) at 10 cm β = 0.8). Note that the speech null at zero degrees is not present for noise in the far field for the same microphone, as shown in **Figure 10** with a noise source distance of approximately 1 meter. This insures that noise in front of the user will be detected so that it can be removed. This differs from conventional systems that can have difficulty removing noise in the direction of the mouth of the user.

**[0077]** The $V_1(z)$ can be formulated using the general form for $V_1(z)$

$$\boldsymbol{V_1(z) = \alpha_A O_1(z) \cdot z^{-d_A} - \alpha_B O_2(z) \cdot z^{-d_B}}$$

Since

$$\boldsymbol{V_2(z) = O_2(z) - z^{-\gamma} \beta O_1(z)}$$

and, since for noise in the forward direction

$$\boldsymbol{O_{2N}(z) = O_{1N}(z) \cdot z^{-\gamma}},$$

then

$$\boldsymbol{V_{2N}(z) = O_{1N}(z) \cdot z^{-\gamma} - z^{-\gamma}\beta O_{1N}(z)}$$

$$\boldsymbol{V_{2N}(z) = (1-\beta)(O_{1N}(z) \cdot z^{-\gamma})}$$

If this is then set equal to V1(z) above, the result is

$$\boldsymbol{V_{IN}(z) = \alpha_A O_{1N}(z) \cdot z^{-d_A} - \alpha_B O_{1N}(z) \cdot z^{-\gamma} \cdot z^{-d_B} = (1-\beta)(O_{1N}(z) \cdot z^{-\gamma})}$$

thus we may set

$$\boldsymbol{d_A = \gamma}$$

$$\boldsymbol{d_B = 0}$$

$$\boldsymbol{\alpha_A = 1}$$

$$\boldsymbol{\alpha_B = \beta}$$

to get

$$\boldsymbol{V_1(z) = O_1(z) \cdot z^{-\gamma} - \beta O_2(z)}$$

The definitions for $V_1$ and $V_2$ above mean that for noise $H_1(z)$ is:

$$\boldsymbol{H_I(z) = \frac{V_1(z)}{V_2(z)} = \frac{\beta O_2(z) + O_1(z) \cdot z^{-\gamma}}{O_1(z) \cdot z^{-\gamma} \beta O_2(z)}}$$

which, if the amplitude noise responses are about the same, has the form of an all pass filter. This has the advantage of being easily and accurately modeled, especially in magnitude response, satisfying R2.

**[0078]** This formulation assures that the noise response will be as similar as possible and that the speech response will be proportional to $(1-\beta^2)$. Since $\beta$ is the ratio of the distances from $O_1$ and $O_2$ to the speech source, it is affected by the size of the array and the distance from the array to the speech source.

**[0079]** **Figure 11** is a plot of linear response of virtual microphone $V_1$ with $\beta = 0.8$ to a 1 kHz speech source at a distance of 0.1 m, under an embodiment. The linear

response of virtual microphone $V_1$ to speech is devoid of or includes no null and the response for speech is greater than that shown in Figure 4.

**[0080]** **Figure 12** is a plot of linear response of virtual microphone $V_1$ with $\beta = 0.8$ to a 1 kHz noise source at a distance of 1.0 m, under an embodiment. The linear response of virtual microphone $V_1$to noise is devoid of or includes no null and the response is very similar to $V_2$ shown in Figure 5.

**[0081]** **Figure 13** is a plot of linear response of virtual microphone $V_1$ with $\beta = 0.8$ to a speech source at a distance of 0.1 m for frequencies of 100, 500, 1000, 2000, 3000, and 4000 Hz, under an embodiment. **Figure 14** is a plot showing comparison of frequency responses for speech for the array of an embodiment and for a conventional cardioid microphone.

**[0082]** The response of $V_1$ to speech is shown in **Figure 11,** and the response to noise in **Figure 12.** Note the difference in speech response compared to $V_2$ shown in **Figure 9** and the similarity of noise response shown in **Figure 10.** Also note that the orientation of the speech response for Vl shown in **Figure 11** is completely opposite the orientation of conventional systems, where the main lobe of response is normally oriented toward the speech source. The orientation of an embodiment, in which the main lobe of the speech response of VI is oriented away from the speech source, means that the speech sensitivity of $V_1$is lower than a normal directional microphone but is flat for all frequencies within approximately +-30 degrees of the axis of the array, as shown in **Figure 13.** This flatness of response for speech means that no shaping postfilter is needed to restore omnidirectional frequency response. This does come at a price - as shown in **Figure 14,** which shows the speech response of $V_1$ with $\beta = 0.8$ and the speech response of a cardioid microphone. The speech response of $V_1$ is approximately 0 to ~ 13 dB less than a normal directional microphone between approximately 500 and 7500 Hz and approximately 0 to 10+ dB greater than a directional microphone below approximately 500 Hz and above 7500 Hz for a sampling frequency of approximately 16000 Hz. However, the superior noise suppression made possible using this system more than compensates for the initially poorer SNR.

**[0083]** It should be noted that **Figures 9-12** assume the speech is located at approximately 0 degrees and approximately 10 cm, $\beta = 0.8$, and the noise at all angles is located approximately 1.0 meter away from the midpoint of the array. Generally, the noise distance is not required to be

1 m or more, but the denoising is the best for those distances. For distances less than approximately 1 m, denoising will not be as effective due to the greater dissimilarity in the noise responses of $V_1$ and $V_2$• This has not proven to be an impediment in practical use - in fact, it can be seen as a feature. Any "noise" source that is ~10 cm away from the earpiece is likely to be desired to be captured and transmitted.

**[0084]** The speech null of $V_2$ means that the VAD signal is no longer a critical component. The VAD's purpose was to ensure that the system would not train on speech and then subsequently remove it, resulting in speech distortion. If, however, $V_2$ contains no speech, the adaptive system cannot train on the speech and cannot remove it. As a result, the system can denoise all the time without fear of devoicing, and the resulting clean audio can then be used to generate a VAD signal for use in subsequent single-channel noise suppression algorithms such as spectral subtraction. In addition, constraints on the absolute value of $H_1(z)$ (i.e. restricting it to absolute values less than two) can keep the system from fully training on speech even if it is detected. In reality, though, speech can be present
due to a mis-located $V_2$ null and/or echoes or other phenomena, and a VAD sensor
or other acoustic-only VAD is recommended to minimize speech distortion.

**[0085]** Depending on the application, $\beta$ and y may be fixed in the noise suppression algorithm or they can be estimated when the algorithm indicates that speech production is taking place in the presence of little or no noise. In either case, there may be an error in the estimate of the actual $\beta$ and $\gamma$ of the system. The following description examines these errors and their effect on the performance of the system. As above, "good performance" of the system indicates that there is sufficient de noising and minimal devoicing.

**[0086]** The effect of an incorrect $\beta$ and $\gamma$ on the response of $V_1$ and $V_2$ can be seen by examining the definitions above:

$$\boldsymbol{V_1(z) = O_1(z) \cdot z^{-\gamma_T} - \beta_T O_2(z)}$$
$$\boldsymbol{V_2(z) = O_2(z) \cdot z^{-\gamma_T} \beta_T O_1(z)}$$

where $\beta_T$ and $\gamma_T$ denote the theoretical estimates of $\beta$ and $\gamma$ used in the noise suppression algorithm. In reality, the speech response of $O_2$ is

$$\boldsymbol{O_{1S}(z) = \beta_R O_{1S}(z) \cdot z^{-\gamma_T}}$$

where $\beta_R$ and $\gamma_R$ denote the real $\beta$ and $\gamma$ of the physical system. The differences between the theoretical and actual values of $\beta$ and $\gamma$ can be due to mis-location of the speech source (it is not where it is assumed to be) and/or a change in air temperature (which changes the speed of sound). Inserting the actual response of $O_2$ for speech into the above equations for $V_1$ and $V_2$ yields

$$\boldsymbol{V_{1S}(z) = O_{1S}(z)[z^{-\gamma_T} - \beta_T \beta_R z^{-\gamma_R}]}$$
$$\boldsymbol{V_{2S}(z) = O_{1S}(z)[\beta_R z^{-\gamma_R} - \beta_T z^{-\gamma_T}]}$$

If the difference in phase is represented by

$$\boldsymbol{\gamma_R = \gamma_T + \gamma_D}$$

And the difference in amplitude as

$$\boldsymbol{\beta_R = \mathrm{B}\beta_T}$$

then

$$\boldsymbol{V_{1S}(z) = O_{1S}(z) z^{-\gamma_T}\left[1 - \mathrm{B}\beta_T^2 z^{-\gamma_D}\right]}$$
$$\boldsymbol{V_{2S}(z) = \beta_T O_{1S}(z) z^{-\gamma_T}[\mathrm{B}z^{-\gamma_D} - 1]}$$

**[0087]** The speech cancellation in $V_2$ (which directly affects the degree of devoicing) and the speech response of $V_1$ will be dependent on both B and D. An examination of the case where D = 0 follows. **Figure l5** is a plot showing speech response for $V_1$ (top, dashed) and $V_1$ (bottom, solid) versus B with $d_s$ assumed to be 0.1 m, under an embodiment. This plot shows the spatial null in $V_2$ to be relatively broad. **Figure 16** is a plot showing a ratio of $V_{1/} V_2$ speech responses shown in **Figure 10** versus B, under an embodiment. The ratio of $V_{1/} V_2$ is above 10 dB for all $0.8 < B < 1.1$, and this means that the physical $\beta$ of the system need not be exactly modeled for good performance. **Figure 17** is a plot of B versus actual $d_s$ assuming that $d_s$ =

10 cm and theta = 0, under an embodiment. **Figure 18** is a plot of B versus theta with $d_s$ = 10 cm and assuming $d_s$ = 10 cm, under an embodiment.

**[0088]** In **Figure 15,** the speech response for $V_1$ (upper, dashed) and $V_2$ (lower, solid) compared to $O_1$ is shown versus B when $d_s$ is thought to be approximately 10 cm and θ = 0. When B = 1, the speech is absent from $V_2$• In **Figure 16,** the ratio of the speech responses in **Figure 10** is shown. When 0.8 < B < 1.1, the $V_{1/} V_2$ ratio is above approximately 10 dB - enough for good performance. Clearly, if D = 0, B can vary significantly without adversely affecting the performance of the system. Again, this assumes that calibration of the microphones so that both their amplitude and phase response is the same for an identical source has been performed.

**[0089]** The B factor can be non-unity for a variety of reasons. Either the distance to the speech source or the relative orientation of the array axis and the speech source or both can be different than expected. If both distance and angle mismatches are included for B, then

$$\boldsymbol{B = \frac{\beta_R}{\beta_T} \frac{\sqrt{d_{SR}^2 - 2d_{SR}d_0\cos(\theta_R) + d_0^2}}{\sqrt{d_{SR}^2 + 2d_{SR}d_0\cos(\theta_R) + d_0^2}} \cdot \frac{\sqrt{d_{ST}^2 + 2d_{ST}d_0\cos(\theta_T) + d_0^2}}{\sqrt{d_{ST}^2 - 2d_{ST}d_0\cos(\theta_T) + d_0^2}}}$$

where again the T subscripts indicate the theorized values and R the actual values.

**[0090]** In **Figure 17,** the factor B is plotted with respect to the actual $d_s$ with the assumption that $d_s$ = 10 cm and θ = o. So, if the speech source in on-axis of the array, the actual distance can vary from approximately 5 cm to 18 cm without significantly affecting performance - a significant amount. Similarly, **Figure 18** shows what happens if the speech source is located at a distance of approximately 10 cm but not on the axis of the array. In this case, the angle can vary up to approximately +-55 degrees and still result in a B less than 1.1, assuring good performance. This is a significant amount of allowable angular deviation. If there is both angular and distance errors, the equation above may be used to determine if the deviations will result in adequate performance. Of course,

if the value for $\beta_T$ is allowed to update during speech, essentially tracking the speech source, then B can be kept near unity for almost all configurations.

**[0091]** An examination follows of the case where B is unity but D is nonzero. This can happen if the speech source is not where it is thought to be or if the speed of sound is different from what it is believed to be. From Equation 5 above, it can be sees that the factor that weakens the speech null in $V_2$ for speech is

$$N(z) = \mathbf{B}z^{-\gamma_D} - \mathbf{1}$$

or in the continuous s domain

$$N(s) = \mathbf{B}e^{-Ds} - \mathbf{1}.$$

Since $\gamma$_ is the time difference between arrival of speech at $V_1$ compared to $V_2$, it can be errors in estimation of the angular location of the speech source with respect to the axis of the array and/or by temperature changes. Examining the temperature sensitivity, the speed of sound varies with temperature as

$$c = 331.3 + (0.606T)\ m/s$$

where T is degrees Celsius. As the temperature decreases, the speed of sound also decreases. Setting 20 C as a design temperature and a maximum expected temperature range to -40 C to +60 C (-40 F to 140 F). The design speed of sound at 20 C is 343 m/s and the slowest speed of sound will be 307 m/s at -40 C with 25 the fastest speed of sound 362 m/s at 60 C. Set the array length ($2d_o$) to be 21 mm. For speech sources on the axis of the array, the difference in travel time for the largest change in the speed of sound is

$$\nabla t_{MAX} = \frac{d}{c_1} - \frac{d}{c_2} = 0.021m\left(\frac{1}{343\ m/s} - \frac{1}{307\ m/s}\right) = -7.2x10^{-6}sec$$

or approximately 7 microseconds. The response for N(s) given B = 1 and D = 7.2 μsec is shown in **Figure 19. Figure 19** is a plot of amplitude (top) and phase (bottom) response of N(s) with B = 1 and D = -7.2 μsec, under an embodiment. The resulting phase difference clearly affects high frequencies more than low. The amplitude response is less than approximately -10 dB for all frequencies less than 7 kHz and is only about -9 dB at 8 kHz. Therefore, assuming B = 1, this system would likely perform well at frequencies up to approximately 8 kHz. This means that a properly compensated system would work well even up to 8 kHz in an exceptionally wide (e.g., -40 C to 80 C) temperature range. Note that the phase mismatch due to the delay estimation error causes N(s) to be much larger at high frequencies compared to low.

**[0092]** If B is not unity, the robustness of the system is reduced since the effect from non-unity B is cumulative with that of non-zero D. **Figure 20** shows the amplitude and phase response for B = 1.2 and D = 7.2 μsec. **Figure 20** is a plot of amplitude (top) and phase (bottom) response of N(s) with B = 1.2 and D = -7.2 μsec, under an embodiment. Non-unity B affects the entire frequency range. Now N(s) is below approximately -10 dB only for frequencies less than approximately 5 kHz and the response at low frequencies is much larger. Such a system would still perform well below 5 kHz and would only suffer from slightly elevated devoicing for frequencies above 5 kHz. For ultimate performance, a temperature sensor may be integrated into the system to allow the algorithm to adjust $\gamma_T$ as the temperature varies.

**[0093]** Another way in which D can be non-zero is when the speech source is not where it is believed to be - specifically, the angle from the axis of the array to the speech source is incorrect. The distance to the source may be incorrect as well, but that introduces an error in B, not D.

**[0094]** Referring to **Figure 2,** it can be seen that for two speech sources (each with their own $d_s$ and θ) that the time difference between the arrival of the speech at $O_1$ and the arrival at $O_2$ is

$$\Delta t = \frac{1}{c}(d_{12} - d_{11} - d_{22} + d_{21})$$

where

$$d_{11} = \sqrt{d_{S1}^2 - 2d_{S1}d_0\cos(\theta_1) + d_0^2}$$

$$d_{12} = \sqrt{d_{S1}^2 + 2d_{S1}d_0\cos(\theta_1) + d_0^2}$$

$$d_{21} = \sqrt{d_{S2}^2 - 2d_{S2}d_0\cos(\theta_2) + d_0^2}$$

$$d_{22} = \sqrt{d_{S2}^2 + 2d_{S2}d_0\cos(\theta_2) + d_0^2}$$

**[0095]** The $V_2$ speech cancellation response for $\theta_1 = 0$ degrees and $\theta_2 = 30$ degrees and assuming that B = 1 is shown in **Figure 21. Figure 21** is a plot of amplitude (top) and phase (bottom) response of the effect on the speech cancellation in $V_1$ due to a mistake in the location of the speech source with q1 = 0 degrees and q2 = 30 degrees, under an embodiment. Note that the cancellation is still below -10 dB for frequencies below 6 kHz. The cancellation is still below approximately -10 dB for frequencies below approximately 6 kHz, so an error of this type will not significantly affect the performance of the system. However, if $\theta_2$ is increased to approximately 45 degrees, as shown in **Figure 22,** the cancellation is below approximately -10 dB only for frequencies below approximately 2.8 kHz. **Figure 22** is a plot of amplitude (top) and phase (bottom) response of the effect on the speech cancellation in $V_2$ due to a mistake in the location of the speech source with q1 = 0 degrees and q2 = 45 degrees, under an embodiment. Now the cancellation is below -10 dB only for frequencies below about 2.8 kHz and a reduction in performance is expected. The poor $V_2$ speech cancellation above approximately 4 kHz may result in significant devoicing for those frequencies.

**[0096]** The description above has assumed that the microphones $O_1$and $O_2$ were calibrated so that their response to a source located the same distance away was identical for both amplitude and phase. This is not always feasible, so a more practical calibration procedure is presented below. It is not as accurate, but is

much simpler to implement. Begin by defining a filter α(z)such that:

$$\boldsymbol{O_{1C}(z) = \alpha(z) O_{2C}(z)}$$

where the "C" subscript indicates the use of a known calibration source. The simplest one to use is the speech of the user. Then

$$\boldsymbol{O_{1S}(z) = \alpha(z) O_{2C}(z)}$$

The microphone definitions are now:

$$\boldsymbol{V_1(z) = O_1(z) \cdot z^{-\gamma} - \beta(z)\alpha(z)O_2(z)}$$
$$\boldsymbol{V_2(z) = \alpha(z)O_2(z) - z^{-\gamma}\beta(z)O_1(z)}$$

The $\beta$ of the system should be fixed and as close to the real value as possible. In practice, the system is not sensitive to changes in $\beta$ and errors of approximately +-5% are easily tolerated. During times when the user is producing speech but there is little or no noise, the system can train α(z) to remove as much speech as possible. This is accomplished by:

1. Construct an adaptive system as shown in **Figure 1** with $\boldsymbol{\beta O_{1S}(z)z^{-\gamma}}$ in the "MIC1" position, $O_{2S}(Z)$ in the "MIC2" position, and α(z) in the $H_1(z)$ position.
2. During speech, adapt α(z) to minimize the residual of the system.
3. Construct $V_1(z)$ and $V_2(z)$ as above.

**[0097]** A simple adaptive filter can be used for α(z) so that only the relationship between the microphones is well modeled. The system of an embodiment trains only when speech is being produced by the user. A sensor like the SSM is invaluable in determining when speech is being produced in the absence of noise. If the speech source is fixed in position and will not vary significantly during use (such as when the array is on an earpiece), the adaptation should be infrequent and slow to update in order to minimize any errors introduced by noise present during training.

**[0098]** The above formulation works very well because the noise (far-field)

responses of $V_1$ and $V_2$ are very similar while the speech (near-field) responses are very different. However, the formulations for $V_1$ and $V_2$ can be varied and still result in good performance of the system as a whole. If the definitions for $V_1$ and $V_2$ are taken from above and new variables B1 and B2 are inserted, the result is:

$$\boldsymbol{V_1(z) = O_1(z) \cdot z^{-\gamma_T} - B_1 \beta_T O_2(z)}$$
$$\boldsymbol{V_2(z) = O_2(z) - z^{-\gamma_T} B_2 \beta_T O_1(z)}$$

where B1 and B2 are both positive numbers or zero. If B1 and B2 are set equal to unity, the optimal system results as described above. If B1 is allowed to vary from unity, the response of $V_1$ is affected. An examination of the case where B2 is left at 1 and B1 is decreased follows. As B1 drops to approximately zero, $V_1$ becomes less and less directional, until it becomes a simple omnidirectional microphone when B1 = O. Since B2 = 1, a speech null remains in $V_2$, so very different speech responses 10 remain for $V_1$ and $V_2$ • However, the noise responses are much less similar, so denoising will not be as effective. Practically, though, the system still performs well. B1 can also be increased from unity and once again the system will still denoise well, just not as well as with B1 = 1.

**[0099]** If B2 is allowed to vary, the speech null in $V_2$ is affected. As long as the speech null is still sufficiently deep, the system will still perform well. Practically values down to approximately B2 = 0.6 have shown sufficient performance, but it is recommended to set B2 close to unity for optimal performance.

**[00100]** Similarly, variables $\varepsilon$ and $\Delta$ may be introduced so that:

$$\boldsymbol{V_1(z) = (\varepsilon - \beta) O_{2N}(z) + (1 + \Delta) O_{1N}(z) z^{-\gamma}}$$
$$\boldsymbol{V_2(z) = (1 + \Delta) O_{2N}(z) + (\varepsilon - \beta) O_{1N}(z) z^{-\gamma}}$$

This formulation also allows the virtual microphone responses to be varied but retains the all-pass characteristic of $H_1(z)$.

**[00101]** In conclusion, the system is flexible enough to operate well at a variety of B1 values, but B2 values should be close to unity to limit devoicing for best performance.

**[00102]** Experimental results for a $2d_o$ = 19 mm array using a linear $\beta$ of 0.83 and B1 = B2 = 1 on a Bruel and Kjaer Head and Torso Simulator (HATS) in very loud (~85 dBA) music/speech noise environment are shown in **Figure 23.** The alternate microphone calibration technique discussed above was used to calibrate the microphones. The noise has been reduced by about 25 dB and the speech hardly affected, with no noticeable distortion. Clearly the technique significantly increases the SNR of the original speech, far outperforming conventional noise suppression techniques.

**[00103]** The DOMA can be a component of a single system, multiple systems, and/or geographically separate systems. The DOMA can also be a subcomponent or subsystem of a single system, multiple systems, and/or geographically separate systems. The DOMA can be coupled to one or more other components (not shown) of a host system or a system coupled to the host system.

**[00104]** One or more components of the DOMA and/or a corresponding system or application to which the DOMA is coupled or connected includes and/or runs under and/or in association with a processing system. The processing system includes any collection of processor-based devices or computing devices operating together, or components of processing systems or devices, as is known in the art. For example, the processing system can include one or more of a portable computer, portable communication device operating in a communication network, and/or a network server. The portable computer can be any of a number and/or combination of devices selected from among personal computers, cellular telephones, personal digital assistants, portable computing devices, and portable communication devices, but is not so limited. The processing system can include components within a larger computer system.

**[00105]** The processing system of an embodiment includes at least one processor and at least one memory device or subsystem. The processing system can also include or be coupled to at least one database. The term "processor" as generally used herein refers to any logic processing unit, such as one or more central processing units (CPUs), digital signal processors (DSPs), application-specific integrated circuits (ASIC), etc. The processor and memory can be monolithically integrated onto a single chip, distributed among a number of chips or components, and/or provided by some combination of algorithms. The methods

described herein can be implemented in one or more of software algorithm(s), programs, firmware, hardware, components, circuitry, in any combination.

**[00106]** The components of any system that includes the DOMA can be located together or in separate locations. Communication paths couple the components and include any medium for communicating or transferring files among the components. The communication paths include wireless connections, wired connections, and hybrid wireless/wired connections. The communication paths also include couplings or connections to networks including local area networks (LANs), metropolitan area networks (MANs), wide area networks (WANs), proprietary networks, interoffice or backend networks, and the Internet. Furthermore, the communication paths include removable fixed mediums like floppy disks, hard disk drives, and CD-ROM disks, as well as flash RAM, Universal Serial Bus (USB) connections, RS-232 connections, telephone lines, buses, and electronic mail messages.

**[00107]** Embodiments of the DOMA described herein include a microphone array comprising: a first virtual microphone comprising a first combination of a first microphone signal and a second microphone signal, wherein the first microphone signal is generated by a first physical microphone and the second microphone signal is generated by a second physical microphone; and a second virtual microphone comprising a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone and the second virtual microphone are distinct virtual directional microphones with substantially similar responses to noise and substantially dissimilar responses to speech.

**[00108]** The first and second physical microphones of an embodiment are omnidirectional.

The first virtual microphone of an embodiment has a first linear response to speech that is devoid of a null, wherein the speech is human speech. The second virtual microphone of an embodiment has a second linear response to speech that includes a single null oriented in a direction toward a source of the speech.

**[00109]** The single null of an embodiment is a region of the second linear response having a measured response level that is lower than the measured response level of any other region of the second linear response.

**[00110]** The second linear response of an embodiment includes a primary lobe oriented in a direction away from the source of the speech.

**[00111]** The primary lobe of an embodiment is a region of the second linear response having a measured response level that is greater than the measured response level of any other region of the second linear response.

**[00112]** The first physical microphone and the second physical microphone of an embodiment are positioned along an axis and separated by a first distance.

**[00113]** A midpoint of the axis of an embodiment is a second distance from a speech source that generates the speech, wherein the speech source is located in a direction defined by an angle relative to the midpoint.

**[00114]** The first virtual microphone of an embodiment comprises the second microphone signal subtracted from the first microphone signal.

**[00115]** The first microphone signal of an embodiment is delayed.

**[00116]** The delay of an embodiment is raised to a power that is proportional to a time difference between arrival of the speech at the first virtual microphone and arrival of the speech at the second virtual microphone.

**[00117]** The delay of an embodiment is raised to a power that is proportional to a sampling frequency multiplied by a quantity equal to a third distance subtracted from a fourth distance, the third distance being between the first physical microphone and the speech source and the fourth distance being between the second physical microphone and the speech source.

**[00118]** The second microphone signal of an embodiment is multiplied by a ratio, wherein the ratio is a ratio of a third distance to a fourth distance, the third distance being between the first physical microphone and the speech source and the fourth distance being between the second physical microphone and the speech source.

**[00119]** The second virtual microphone of an embodiment comprises the first microphone signal subtracted from the second microphone signal.

**[00120]** The first microphone signal of an embodiment is delayed.

**[00121]** The delay of an embodiment is raised to a power that is proportional to a time difference between arrival of the speech at the first virtual microphone and arrival of the speech at the second virtual microphone.

**[00122]** The power of an embodiment is proportional to a sampling frequency multiplied by a quantity equal to a third distance subtracted from a fourth distance, the third distance being between the first physical microphone and the speech source and the fourth distance being between the second physical microphone and the speech source.

**[00123]** The first microphone signal of an embodiment is multiplied by a ratio, wherein the ratio is a ratio of the third distance to the fourth distance.

**[00124]** The single null of an embodiment is located at a distance from at least one of the first physical microphone and the second physical microphone where the source of the speech is expected to be.

**[00125]** The first virtual microphone of an embodiment comprises the second microphone signal subtracted from a delayed version of the first microphone signal.

**[00126]** The second virtual microphone of an embodiment comprises a delayed version of the first microphone signal subtracted from the second microphone signal.

**[00127]** Embodiments of the DOMA described herein include a microphone array comprising: a first virtual microphone formed from a first combination of a first microphone signal and a second microphone signal, wherein the first microphone signal is generated by a first omnidirectional microphone and the second microphone signal is generated by a second omnidirectional microphone; and a second virtual microphone formed from a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination; wherein the first virtual microphone has a first linear response to speech that is devoid of a null, wherein
the second virtual microphone has a second linear response to speech that has a single null oriented in a direction toward a source of the speech, wherein the speech is human speech.

**[00128]** The first virtual microphone and the second virtual microphone of an embodiment have a linear response to noise that is substantially similar.

**[00129]** The single null of an embodiment is a region of the second linear response having a measured response level that is lower than the measured response level of any other region of the second linear response.

**[00130]** The second linear response of an embodiment includes a primary lobe oriented in a direction away from the source of the speech.

**[00131]** The primary lobe of an embodiment is a region of the second linear response having a measured response level that is greater than the measured response level of any other region of the second linear response.

**[00132]** Embodiments of the DOMA described herein include a device comprising: a first microphone outputting a first microphone signal and a second microphone outputting a second microphone signal; and a processing component coupled to the first microphone signal and the second microphone signal, the processing component generating a virtual microphone array comprising a first virtual microphone and a second virtual microphone, wherein the first virtual microphone comprises a first combination of the first microphone signal and the second microphone signal, wherein the second virtual microphone comprises a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone and the second virtual microphone have substantially similar responses to noise and substantially dissimilar responses to speech.

**[00133]** Embodiments of the DOMA described herein include a device comprising: a first microphone outputting a first microphone signal and a second microphone outputting a second microphone signal, wherein the first microphone and the second microphone are omnidirectional microphones; and a virtual microphone array comprising a first virtual microphone and a second virtual microphone, wherein the first virtual microphone comprises a first combination of the first microphone signal and the second microphone signal, wherein the second virtual microphone comprises a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone and the second virtual microphone are distinct virtual directional microphones.

**[00134]** Embodiments of the DOMA described herein include a device comprising: a first physical microphone generating a first microphone signal; a second physical microphone generating a second microphone signal; and a processing component coupled to the first microphone signal and the second microphone signal, the processing component generating a virtual microphone array comprising a first virtual microphone and a second virtual microphone; wherein the first virtual microphone comprises the second microphone signal subtracted from a

delayed version of the first microphone signal; wherein the second virtual microphone comprises a delayed version of the first microphone signal subtracted from the second microphone signal.

**[00135]** The first virtual microphone of an embodiment has a first linear response to speech that is devoid of a null, wherein the speech is human speech.

**[00136]** The second virtual microphone of an embodiment has a second linear response to speech that includes a single null oriented in a direction toward a source of the speech.

**[00137]** The single null of an embodiment is a region of the second linear response having a measured response level that is lower than the measured response level of any other region of the second linear response.

**[00138]** The second linear response of an embodiment includes a primary lobe oriented in a direction away from the source of the speech.

**[00139]** The primary lobe of an embodiment is a region of the second linear response having a measured response level that is greater than the measured response level of any other region of the second linear response.

**[00140]** The first physical microphone and the second physical microphone of an embodiment are positioned along an axis and separated by a first distance.

**[00141]** A midpoint of the axis of an embodiment is a second distance from a speech source that generates the speech, wherein the speech source is located in a direction defined by an angle relative to the midpoint.

**[00142]** One or more of the first microphone signal and the second microphone signal of an embodiment is delayed.

**[00143]** The delay of an embodiment is raised to a power that is proportional to a time difference between arrival of the speech at the first virtual microphone and arrival of the speech at the second virtual microphone.

**[00144]** The power of an embodiment is proportional to a sampling frequency multiplied by a quantity equal to a third distance subtracted from a fourth distance, the third distance being between the first physical microphone and the speech source and the fourth distance being between the second physical microphone and the speech source.

**[00145]** One or more of the first microphone signal and the second microphone signal of an embodiment is multiplied by a gain factor.

**[00146]** Embodiments of the DOMA described herein include a sensor comprising: a physical microphone array including a first physical microphone and a second physical microphone, the first physical microphone outputting a first microphone signal and the second physical microphone outputting a second microphone signal; a virtual microphone array comprising a first virtual microphone and a second virtual microphone, the first virtual microphone comprising a first combination of the first microphone signal and the second microphone signal, the second virtual microphone comprising a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination; the virtual microphone array including a single null oriented in a direction toward a source of speech of a human speaker.

**[00147]** The first virtual microphone of an embodiment has a first linear response to speech that is devoid of a null, wherein the second virtual microphone has a second linear response to speech that includes the single null.

**[00148]** The first virtual microphone and the second virtual microphone of an embodiment have a linear response to noise that is substantially similar.

**[00149]** The single null of an embodiment is a region of the second linear response to speech having a measured response level that is lower than the measured response level of any other region of the second linear response.

**[00150]** The second linear response to speech of an embodiment includes a primary lobe oriented in a direction away from the source of the speech.

**[00151]** The primary lobe of an embodiment is a region of the second linear response having a measured response level that is greater than the measured response level of any other region of the second linear response.

**[00152]** The single null of an embodiment is located at a distance from the physical microphone array where the source of the speech is expected to be.

**[00153]** Embodiments of the DOMA described herein include a device comprising: a headset including at least one loudspeaker, wherein the headset attaches to a region of a human head; a microphone array connected to the headset, the microphone array including a first physical microphone outputting a first microphone signal and a second physical microphone outputting a second microphone signal; and a processing component coupled to the microphone array and generating a virtual microphone array comprising a first virtual microphone and a second virtual

microphone, the first virtual microphone comprising a first combination of the first microphone signal and the second microphone signal, the second virtual microphone comprising a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone and the second virtual microphone have substantially similar responses to noise and substantially dissimilar responses to speech.

**[00154]** The first and second physical microphones of an embodiment are omnidirectional.

**[00155]** The first virtual microphone of an embodiment has a first linear response to speech that is devoid of a null, wherein the speech is human speech.

**[00156]** The second virtual microphone of an embodiment has a second linear response to speech that includes a single null oriented in a direction toward a source of the speech.

**[00157]** The single null of an embodiment is a region of the second linear response having a measured response level that is lower than the measured response level of any other region of the second linear response.

**[00158]** The second linear response of an embodiment includes a primary lobe oriented in a direction away from the source of the speech.

**[00159]** The primary lobe of an embodiment is a region of the second linear response having a measured response level that is greater than the measured response level of any other region of the second linear response.

**[00160]** The first physical microphone and the second physical microphone of an embodiment are positioned along an axis and separated by a first distance.

**[00161]** A midpoint of the axis of an embodiment is a second distance from a speech source that generates the speech, wherein the speech source is located in a direction defined by an angle relative to the midpoint.

**[00162]** The first virtual microphone of an embodiment comprises the second microphone signal subtracted from the first microphone signal.

**[00163]** The first microphone signal of an embodiment is delayed.

**[00164]** The delay of an embodiment is raised to a power that is proportional to a time difference between arrival of the speech at the first virtual microphone and arrival of the speech at the second virtual microphone.

**[00165]** The delay of an embodiment is raised to a power that is proportional to a sampling frequency multiplied by a quantity equal to a third distance subtracted from a fourth distance, the third distance being between the first physical microphone and the speech source and the fourth distance being between the second physical microphone and the speech source.

**[00166]** The second microphone signal of an embodiment is multiplied by a ratio, wherein the ratio is a ratio of a third distance to a fourth distance, the third distance being between the first physical microphone and the speech source and the fourth distance being between the second physical microphone and the speech source.

**[00167]** The second virtual microphone of an embodiment comprises the first microphone signal subtracted from the second microphone signal.

**[00168]** The first microphone signal of an embodiment is delayed.

**[00169]** The delay of an embodiment is raised to a power that is proportional to a time difference between arrival of the speech at the first virtual microphone and arrival of the speech at the second virtual microphone.

**[00170]** The power of an embodiment is proportional to a sampling frequency multiplied by a quantity equal to a third distance subtracted from a fourth distance, the third distance being between the first physical microphone and the speech source and the fourth distance being between the second physical microphone and the speech source.

**[00171]** The first microphone signal of an embodiment is multiplied by a ratio, wherein the ratio is a ratio of the third distance to the fourth distance.

**[00172]** The first virtual microphone of an embodiment comprises the second microphone signal subtracted from a delayed version of the first microphone signal.

**[00173]** The second virtual microphone of an embodiment comprises a delayed version of the first microphone signal subtracted from the second microphone signal.

**[00174]** A speech source that generates the speech of an embodiment is a mouth of a human wearing the headset.

**[00175]** The device of an embodiment comprises a voice activity detector (VAD) coupled to the processing component, the VAD generating voice activity signals.

**[00176]** The device of an embodiment comprises an adaptive noise removal application coupled to the processing component, the adaptive noise removal application receiving signals from the

first and second virtual microphones and generating an output signal, wherein the output signal is a denoised acoustic signal.

**[00177]** The microphone array of an embodiment receives acoustic signals including acoustic speech and acoustic noise.

**[00178]** The device of an embodiment comprises a communication channel coupled to the processing component, the communication channel comprising at least one of a wireless channel, a wired channel, and a hybrid wireless/wired channel.

**[00179]** The device of an embodiment comprises a communication device coupled to the headset via the communication channel, the communication device comprising one or more of cellular telephones, satellite telephones, portable telephones, wireline telephones, Internet telephones, wireless transceivers, wireless communication radios, personal digital assistants (PDAs), and personal computers (PCs).

**[00180]** Embodiments of the DOMA described herein include a device comprising: a housing; a loudspeaker connected to the housing; a first physical microphone and a second physical microphone connected to the housing, the first physical microphone outputting a first microphone signal and the second physical microphone outputting a second microphone signal, wherein the first and second physical microphones are omnidirectional; a first virtual microphone comprising a first combination of the first microphone signal and the second microphone signal; and a second virtual microphone comprising a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone and the second virtual microphone are distinct virtual directional microphones with substantially similar responses to noise and substantially dissimilar responses to speech.

**[00181]** Embodiments of the DOMA described herein include a device comprising: a housing including a loudspeaker, wherein the housing is portable and configured for attaching to a mobile object; and a physical microphone array connected to the headset, the physical microphone array including a first physical microphone and a second physical microphone that form a virtual microphone array comprising a first virtual microphone and a second virtual microphone; the first virtual microphone comprising a first combination of a first microphone signal and a second microphone signal, wherein the first microphone signal is generated by the first physical microphone and the second microphone signal is generated by the second physical microphone;

and the second virtual microphone comprising a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination; wherein the first virtual microphone has a first linear response to speech that is devoid of a null, wherein the second virtual microphone has a second linear response to speech that has a single null oriented in a direction toward a source of the speech, wherein the speech is human speech.

**[00182]** The first virtual microphone and the second virtual microphone of an embodiment have a linear response to noise that is substantially similar.

**[00183]** The single null of an embodiment is a region of the second linear response having a measured response level that is lower than the measured response level of any other region of the second linear response.

**[00184]** The second linear response of an embodiment includes a primary lobe oriented in a direction away from the source of the speech.

**[00185]** The primary lobe of an embodiment is a region of the second linear response having a measured response level that is greater than the measured response level of any other region of the second linear response.

**[00186]** Embodiments of the DOMA described herein include a device comprising: a housing that is attached to a region of a human speaker; a loudspeaker connected to the housing; and a physical microphone array including a first physical microphone and a second physical microphone connected to the housing, the first physical microphone outputting a first microphone signal and the second physical microphone outputting a second microphone signal that in combination form a virtual microphone array; the virtual microphone array comprising a first virtual microphone and a second virtual microphone, the first virtual microphone comprising a first combination of the first microphone signal and the second microphone signal, the second virtual microphone comprising a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination; the virtual microphone array including a single null oriented in a direction toward a source of speech of the human speaker.

**[00187]** The first virtual microphone of an embodiment has a first linear response to speech that is devoid of a null, wherein the second virtual microphone has a second linear response to speech that includes the single null.

**[00188]** The first virtual microphone and the second virtual microphone of an embodiment have a linear response to noise that is substantially similar.

**[00189]** The single null of an embodiment is a region of the second linear response to speech having a measured response level that is lower than the measured response level of any other region of the second linear response.

**[00190]** The second linear response to speech of an embodiment includes a primary lobe oriented in a direction away from the source of the speech.

**[00191]** The primary lobe of an embodiment is a region of the second linear response having a measured response level that is greater than the measured response level of any other region of the second linear response.

**[00192]** The single null of an embodiment is located at a distance from the physical microphone array where the source of the speech is expected to be.

**[00193]** Embodiments of the DOMA described herein include a system comprising: a microphone array including a first physical microphone outputting a first microphone signal and a second physical microphone outputting a second microphone signal; a processing component coupled to the microphone array and generating a virtual microphone array comprising a first virtual microphone and a second virtual microphone, the first virtual microphone comprising a first combination of the first microphone signal and the second microphone signal, the second virtual microphone comprising a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone and the second virtual microphone have substantially similar responses to noise and substantially dissimilar responses to speech; and an adaptive noise removal application coupled to the processing component and generating de noised output signals by forming a plurality of combinations of signals output from the first virtual microphone and the second virtual microphone, wherein the denoised output signals include less acoustic noise than acoustic signals received at the microphone array.

**[00194]** The first and second physical microphones of an embodiment are omnidirectional.

**[00195]** The first virtual microphone of an embodiment has a first linear response to speech that is devoid of a null, wherein the speech is human speech.

**[00196]** The second virtual microphone of an embodiment has a second linear response to speech that includes a single null oriented in a direction toward a source of the speech.

**[00197]** The single null of an embodiment is a region of the second linear response having a measured response level that is lower than the measured response level of any other region of the second linear response.

**[00198]** The second linear response of an embodiment includes a primary lobe oriented in a direction away from the source of the speech.

**[00199]** The primary lobe of an embodiment is a region of the second linear response having a measured response level that is greater than the measured response level of any other region of the second linear response.

**[00200]** The first physical microphone and the second physical microphone of an embodiment are positioned along an axis and separated by a first distance.

**[00201]** A midpoint of the axis of an embodiment is a second distance from a speech source that generates the speech, wherein the speech source is located in a direction defined by an angle relative to the midpoint.

**[00202]** The first virtual microphone of an embodiment comprises the second microphone signal subtracted from the first microphone signal.

**[00203]** The first microphone signal of an embodiment is delayed.

**[00204]** The delay of an embodiment is raised to a power that is proportional to a time difference between arrival of the speech at the first virtual microphone and arrival of the speech at the second virtual microphone.

**[00205]** The delay of an embodiment is raised to a power that is proportional to a sampling frequency multiplied by a quantity equal to a third distance subtracted from a fourth distance, the third distance being between the first physical microphone and the speech source and the fourth distance being between the second physical microphone and the speech source.

**[00206]** The second microphone signal of an embodiment is multiplied by a ratio, wherein the ratio is a ratio of a third distance to a fourth distance, the third distance being between the first physical microphone and the speech source and the fourth distance being between the second physical microphone and the speech source.

**[00207]** The second virtual microphone of an embodiment comprises the first microphone signal subtracted from the second microphone signal.

**[00208]** The first microphone signal of an embodiment is delayed.

**[00209]** The delay of an embodiment is raised to a power that is proportional to a time difference between arrival of the speech at the first virtual microphone and arrival of the speech at the second virtual microphone.

**[00210]** The power of an embodiment is proportional to a sampling frequency multiplied by a quantity equal to a third distance subtracted from a fourth distance, the third distance being between the first physical microphone and the speech source and the fourth distance being between the second physical microphone and the speech source.

**[00211]** The first microphone signal of an embodiment is multiplied by a ratio, wherein the ratio is a ratio of the third distance to the fourth distance.

**[00212]** The first virtual microphone of an embodiment comprises the second microphone signal subtracted from a delayed version of the first microphone signal.

**[00213]** The second virtual microphone of an embodiment comprises a delayed version of the first microphone signal subtracted from the second microphone signal.

**[00214]** The system of an embodiment comprises a voice activity detector (VAD) coupled to the processing component, the VAD generating voice activity signals.

**[00215]** The system of an embodiment comprises a communication channel coupled to the processing component, the communication channel comprising at least one of a wireless channel, a wired channel, and a hybrid wireless/wired channel.

**[00216]** The system of an embodiment comprises a communication device coupled to the processing component via the communication channel, the communication device comprising one or more of cellular telephones, satellite telephones, portable telephones, wireline telephones, Internet telephones, wireless transceivers, wireless communication radios, personal digital assistants (PDAs), and personal computers (PCs).

**[00217]** Embodiments of the DOMA described herein include a system comprising: a first virtual microphone formed from a first combination of a first microphone signal and a second microphone signal, wherein the first microphone signal is generated by a first physical microphone and the second microphone signal is generated by a second physical microphone; a second virtual microphone formed from a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination; wherein the first virtual microphone has a first linear response to speech that is devoid of a null, wherein the second virtual microphone has a second linear response to speech

that has a single null oriented in a direction toward a source of the speech, wherein the speech is human speech; an adaptive noise removal application coupled to the first and second virtual microphones and generating denoised output signals by forming a plurality of combinations of signals output from the first virtual microphone and the second virtual microphone, wherein the denoised output signals include less acoustic noise than acoustic signals received at the first and second physical microphones.

**[00218]** The first virtual microphone and the second virtual microphone of an embodiment have a linear response to noise that is substantially similar.

**[00219]** The single null of an embodiment is a region of the second linear response having a measured response level that is lower than the measured response level of any other region of the second linear response.

**[00220]** The second linear response of an embodiment includes a primary lobe oriented in a direction away from the source of the speech.

**[00221]** The primary lobe of an embodiment is a region of the second linear response having a measured response level that is greater than the measured response level of any other region of the second linear response.

**[00222]** Embodiments of the DOMA described herein include a system comprising: a first microphone outputting a first microphone signal and a second microphone outputting a second microphone signal, wherein the first microphone and the second microphone are omnidirectional microphones; a virtual microphone array comprising a first virtual microphone and a second virtual microphone, wherein the first virtual microphone comprises a first combination of the first microphone signal and the second microphone signal, wherein the second virtual microphone comprises a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone and the second virtual microphone are distinct virtual directional microphones; and an adaptive noise removal application coupled to the virtual microphone array and generating denoised output signals by forming a plurality of combinations of signals output from the first virtual microphone and the second virtual microphone, wherein the denoised output signals include less acoustic noise than acoustic signals received at the first microphone and the second microphone.

**[00223]** Embodiments of the DOMA described herein include a system comprising: a first physical microphone generating a first microphone signal; a second physical microphone generating a second microphone signal; a processing component coupled to the first microphone signal and the second microphone signal, the processing component generating a virtual microphone array comprising a first virtual microphone and a second virtual microphone; and wherein the first virtual microphone comprises the second microphone signal subtracted from a delayed version of the first microphone signal; wherein the second virtual microphone comprises a delayed version of the first microphone signal subtracted from the second microphone signal; an adaptive noise removal application coupled to the processing component and generating denoised output signals, wherein the denoised output signals include less acoustic noise than acoustic signals received at the first physical microphone and the second physical microphone.

**[00224]** The first virtual microphone of an embodiment has a first linear response to speech that is devoid of a null, wherein the speech is human speech.

**[00225]** The second virtual microphone of an embodiment has a second linear response to speech that includes a single null oriented in a direction toward a source of the speech.

**[00226]** The single null of an embodiment is a region of the second linear response having a measured response level that is lower than the measured response level of any other region of the second linear response.

**[00227]** The second linear response of an embodiment includes a primary lobe oriented in a direction away from the source of the speech.

**[00228]** The primary lobe of an embodiment is a region of the second linear response having a measured response level that is greater than the measured response level of any other region of the second linear response.

**[00229]** The first physical microphone and the second physical microphone of an embodiment are positioned along an axis and separated by a first distance.

**[00230]** A midpoint of the axis of an embodiment is a second distance from a speech source that generates the speech, wherein the speech source is located in a direction defined by an angle relative to the midpoint.

**[00231]** One or more of the first microphone signal and the second microphone signal of an embodiment is delayed.

**[00232]** The delay of an embodiment is raised to a power that is proportional to a time difference between arrival of the speech at the first virtual microphone and arrival of the speech at the second virtual microphone.

**[00233]** The power of an embodiment is proportional to a sampling frequency multiplied by a quantity equal to a third distance subtracted from a fourth distance, the third distance being between the first physical microphone and the speech source and the fourth distance being between the second physical microphone and the speech source.

**[00234]** One or more of the first microphone signal and the second microphone signal of an embodiment is multiplied by a gain factor.

**[00235]** The system of an embodiment comprises a voice activity detector (VAD) coupled to the processing component, the VAD generating voice activity signals.

**[00236]** The system of an embodiment comprises a communication channel coupled to the processing component, the communication channel comprising at least one of a wireless channel, a wired channel, and a hybrid wireless/wired channel.

**[00237]** The system of an embodiment comprises a communication device coupled to the processing component via the communication channel, the communication device comprising one or more of cellular telephones, satellite telephones, portable telephones, wireline telephones, Internet telephones, wireless transceivers, wireless communication radios, personal digital assistants (PDAs), and personal computers (PCs).

**[00238]** Embodiments of the DOMA described herein include a system comprising: a physical microphone array including a first physical microphone and a second physical microphone, the first physical microphone outputting a first microphone signal and the second physical microphone outputting a second microphone signal; a virtual microphone array comprising a first virtual microphone and a second virtual microphone, the first virtual microphone comprising a first combination of the first microphone signal and the second microphone signal, the second virtual microphone comprising a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination; the virtual microphone array including a single null oriented in a direction toward a source of speech of a human speaker; and an adaptive noise removal application coupled to the virtual microphone array and generating denoised output signals by forming a plurality of combinations of signals output from the virtual microphone array, wherein the denoised output

signals include less acoustic noise than acoustic signals received at the physical microphone array.

**[00239]** The first virtual microphone of an embodiment has a first linear response to speech that is devoid of a null, wherein the second virtual microphone of an embodiment has a second linear response to speech that includes the single null.

**[00240]** The first virtual microphone and the second virtual microphone of an embodiment have a linear response to noise that is substantially similar.

**[00241]** The single null of an embodiment is a region of the second linear response to speech having a measured response level that is lower than the measured response level of any other region of the second linear response.

**[00242]** The second linear response to speech of an embodiment includes a primary lobe oriented in a direction away from the source of the speech.

**[00243]** The primary lobe of an embodiment is a region of the second linear response having a measured response level that is greater than the measured response level of any other region of the second linear response.

**[00244]** The single null of an embodiment is located at a distance from the physical microphone array where the source of the speech is expected to be.

**[00245]** Embodiments of the DOMA described herein include a system comprising: a first virtual microphone comprising a first combination of a first microphone signal and a second microphone signal, wherein the first microphone signal is output from a first physical microphone and the second microphone signal is output from a second physical microphone; a second virtual microphone comprising a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone and the second virtual microphone are distinct virtual directional microphones with substantially similar responses to noise and substantially dissimilar responses to speech; and a processing component coupled to the first and second virtual microphones, the processing component including an adaptive noise removal application receiving acoustic signals from the first virtual microphone and the second virtual microphone and generating an output signal wherein the output signal is a denoised acoustic signal.

**[00246]** Embodiments of the DOMA described herein include a method comprising: forming a first virtual microphone by generating a first combination of a first microphone signal and a

second microphone signal, wherein the first microphone signal is generated by a first physical microphone and the second microphone signal is generated by a second physical microphone; and forming a second virtual microphone by generating a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone and the second virtual microphone are distinct virtual directional microphones with substantially similar responses to noise and substantially dissimilar responses to speech.

**[00247]** Forming the first virtual microphone of an embodiment includes forming the first virtual microphone to have a first linear response to speech that is devoid of a null, wherein the speech is human speech.

**[00248]** Forming the second virtual microphone of an embodiment includes forming the second virtual microphone to have a second linear response to speech that includes a single null oriented in a direction toward a source of the speech.

**[00249]** The single null of an embodiment is a region of the second linear response having a measured response level that is lower than the measured response level of any other region of the second linear response.

**[00250]** The second linear response of an embodiment includes a primary lobe oriented in a direction away from the source of the speech.

**[00251]** The primary lobe of an embodiment is a region of the second linear response having a measured response level that is greater than the measured response level of any other region of the second linear response.

**[00252]** The method of an embodiment comprises positioning the first physical microphone and the second physical microphone along an axis and separating the first and second physical microphones by a first distance.

**[00253]** A midpoint of the axis of an embodiment is a second distance from a speech source that generates the speech, wherein the speech source is located in a direction defined by an angle relative to the midpoint.

**[00254]** Forming the first virtual microphone of an embodiment comprises subtracting the second microphone signal subtracted from the first microphone signal.

**[00255]** The method of an embodiment comprises delaying the first microphone signal.

**[00256]** The method of an embodiment comprises raising the delay to a power that is proportional to a time difference between arrival of the speech at the first virtual microphone and arrival of the speech at the second virtual microphone.

**[00257]** The method of an embodiment comprises raising the delay to a power that is proportional to a sampling frequency multiplied by a quantity equal to a third distance subtracted from a fourth distance, the third distance being between the first physical microphone and the speech source and the fourth distance being between the second physical microphone and the speech source.

**[00258]** The method of an embodiment comprises multiplying the second microphone signal by a ratio, wherein the ratio is a ratio of a third distance to a fourth distance, the third distance being between the first physical microphone and the speech source and the fourth distance being between the second physical microphone and the speech source.

**[00259]** Forming the second virtual microphone of an embodiment comprises subtracting the first microphone signal from the second microphone signal.

**[00260]** The method of an embodiment comprises delaying the first microphone signal.

**[00261]** The method of an embodiment comprises raising the delay to a power that is proportional to a time difference between arrival of the speech at the first virtual microphone and arrival of the speech at the second virtual microphone.

**[00262]** The method of an embodiment comprises raising the delay to a power that is proportional to a sampling frequency multiplied by a quantity equal to a third distance subtracted from a fourth distance, the third distance being between the first physical microphone and the speech source and the fourth distance being between the second physical microphone and the speech source.

**[00263]** The method of an embodiment comprises multiplying the first microphone signal by a ratio, wherein the ratio is a ratio of the third distance to the fourth distance.

**[00264]** Forming the first virtual microphone of an embodiment comprises subtracting the second microphone signal from a delayed version of the first microphone signal.

**[00265]** Forming the second virtual microphone of an embodiment comprises: forming a quantity by delaying the first microphone signal; and subtracting the quantity from the second microphone signal.

**[00266]** The first and second physical microphones of an embodiment are omnidirectional.



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**[00267]** Embodiments of the DOMA described herein include a method comprising: receiving a first microphone signal from a first omnidirectional microphone and receiving a second microphone signal from a second omnidirectional microphone; generating a first virtual directional microphone by generating a first combination of the first microphone signal and the second microphone signal; generating a second virtual directional microphone by generating a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone and the second virtual microphone are distinct virtual directional microphones with substantially similar responses to noise and substantially dissimilar responses to speech.

**[00268]** Embodiments of the DOMA described herein include a method of forming a microphone array comprising: forming a first virtual microphone by generating a first combination of a first microphone signal and a second microphone signal, wherein the first microphone signal is generated by a first omnidirectional microphone and the second microphone signal is generated by a second omnidirectional microphone; and forming a second virtual microphone by generating a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination; wherein the first virtual microphone has a first linear response to speech that is devoid of a null, wherein the second virtual microphone has a second linear response to speech that has a single null oriented in a direction toward a source of the speech, wherein the speech is human speech.

**[00269]** Forming the first and second virtual microphones of an embodiment comprises forming the first virtual microphone and the second virtual microphone to have a linear response to noise that is substantially similar.

**[00270]** The single null of an embodiment is a region of the second linear response having a measured response level that is lower than the measured response level of any other region of the second linear response.

**[00271]** The second linear response of an embodiment includes a primary lobe oriented in a direction away from the source of the speech.

**[00272]** The primary lobe of an embodiment is a region of the second linear response having a measured response level that is greater than the measured response level of any other region of the second linear response.

**[00273]** Embodiments of the DOMA described herein include a method comprising: receiving acoustic signals at a first physical microphone and a second physical microphone; outputting in response to the acoustic signals a first microphone signal from the first physical microphone and outputting a second microphone signal from the second physical microphone; forming a first virtual microphone by generating a first combination of the first microphone signal and the second microphone signal; forming a second virtual microphone by generating a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone and the second virtual microphone are distinct virtual directional microphones with substantially similar responses to noise and substantially dissimilar responses to speech; generating output signals by combining signals from the first virtual microphone and the second virtual microphone, wherein the output signals include less acoustic noise than the acoustic signals.

**[00274]** The first and second physical microphones of an embodiment are omnidirectional microphones.

**[00275]** Forming the first virtual microphone of an embodiment includes forming the first virtual microphone to have a first linear response to speech that is devoid of a null, wherein the speech is human speech.

**[00276]** Forming the second virtual microphone of an embodiment includes forming the second virtual microphone to have a second linear response to speech that includes a single null oriented in a direction toward a source of the speech.

**[00277]** The single null of an embodiment is a region of the second linear response having a measured response level that is lower than the measured response level of any other region of the second linear response.

**[00278]** The second linear response of an embodiment includes a primary lobe oriented in a direction away from the source of the speech.

**[00279]** The primary lobe of an embodiment is a region of the second linear response having a measured response level that is greater than the measured response level of any other region of the second linear response.

**[00280]** Forming the first virtual microphone of an embodiment comprises subtracting the second microphone signal from a delayed version of the first microphone signal.

**[00281]** Forming the second virtual microphone of an embodiment comprises: forming a quantity by delaying the first microphone signal; and subtracting the quantity from the second microphone signal.

**[00282]** Embodiments of the DOMA described herein include a method comprising: forming a physical microphone array including a first physical microphone and a second physical microphone, the first physical microphone outputting a first microphone signal and the second physical microphone outputting a second microphone signal; and forming a virtual microphone array comprising a first virtual microphone and a second virtual microphone, the first virtual microphone comprising a first combination of the first microphone signal and the second microphone signal, the second virtual microphone comprising a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination; the virtual microphone array including a single null oriented in a direction toward a source of speech of a human speaker.

**[00283]** Forming the first and second virtual microphones of an embodiment comprises forming the first virtual microphone and the second virtual microphone to have a linear response to noise that is substantially similar.

**[00284]** The single null of an embodiment is a region of the second linear response having a measured response level that is lower than the measured response level of any other region of the second linear response.

**[00285]** The second linear response of an embodiment includes a primary lobe oriented in a direction away from the source of the speech.

**[00286]** The primary lobe of an embodiment is a region of the second linear response having a measured response level that is greater than the measured response level of any other region of the second linear response.

**[00287]** The single null of an embodiment is located at a distance from the physical microphone array where the source of the speech is expected to be.

**[00288]** Aspects of the DOMA and corresponding systems and methods described herein may be implemented as functionality programmed into any of a variety of circuitry, including programmable logic devices (PLDs), such as field programmable gate arrays (FPGAs), programmable array logic (PAL) devices, electrically programmable logic and memory devices and standard cell-based devices, as well as application specific integrated circuits (ASICs). Some

other possibilities for implementing aspects of the DOMA and corresponding systems and methods include: microcontrollers with memory (such as electronically erasable programmable read only memory (EEPROM)), embedded microprocessors, firmware, software, etc. Furthermore, aspects of the DOMA and corresponding systems and methods may be embodied in microprocessors having software-based circuit emulation, discrete logic (sequential and combinatorial), custom devices, fuzzy (neural) logic, quantum devices, and hybrids of any of the above device types. Of course the underlying device technologies may be provided in a variety of component types, e.g., metal-oxide semiconductor field-effect transistor (MOSFET) technologies like complementary metal-oxide semiconductor (CMOS), bipolar technologies like emitter-coupled logic (ECl), polymer technologies (e.g., silicon-conjugated polymer and metal-conjugated polymer-metal structures), mixed analog and digital, etc.

**[00289]** It should be noted that any system, method, and/or other components disclosed herein may be described using computer aided design tools and expressed (or represented), as data and/or instructions embodied in various computer-readable media, in terms of their behavioral, register transfer, logic component, transistor, layout geometries, and/or other characteristics. Computer-readable media in which such formatted data and/or instructions may be embodied include, but are not limited to, non-volatile storage media in various forms (e.g., optical, magnetic or semiconductor storage media) and carrier waves that may be used to transfer such formatted data and/or instructions through wireless, optical, or wired signaling media or any combination thereof. Examples of transfers of such formatted data and/or instructions by carrier waves include, but are not limited to, transfers (uploads, downloads, e-mail, etc.) over the Internet and/or other computer networks via one or more data transfer protocols (e.g., HTTP, FTP, SMTP, etc.). When received within a computer system via one or more computer-readable media, such data and/or instruction-based expressions of the above described components may be processed by a processing entity (e.g., one or more processors) within the computer system in conjunction with execution of one or more other computer programs.

**[00290]** Unless the context clearly requires otherwise, throughout the description and the claims, the words "comprise," "comprising," and the like are to be construed in an inclusive sense as opposed to an exclusive or exhaustive sense; that is to say, in a sense of "including, but not limited to." Words using the singular or plural number also include the plural or singular number respectively. Additionally, the words "herein," "hereunder," "above," "below," and

words of similar import, when used in this application, refer to this application as a whole and not to any particular portions of this application. When the word "or" is used in reference to a list of two or more items, that word covers all of the following interpretations of the word: any of the items in the list, all of the items in the list and any combination of the items in the list.

**[00291]** The above description of embodiments of the DOMA and corresponding systems and methods is not intended to be exhaustive or to limit the systems and methods to the precise forms disclosed. While specific embodiments of, and examples for, the DOMA and corresponding systems and methods are described herein for illustrative purposes, various equivalent modifications are possible within the scope of the systems and methods, as those skilled in the relevant art will recognize. The teachings of the DOMA and corresponding systems and methods provided herein can be applied to other systems and methods, not only for the systems and methods described above.

**[00292]** The elements and acts of the various embodiments described above can be combined to provide further embodiments. These and other changes can be made to the DOMA and corresponding systems and methods in light of the above detailed description.

**[00293]** In general, in the following claims, the terms used should not be construed to limit the DOMA and corresponding systems and methods to the specific embodiments disclosed in the specification and the claims, but should be construed to include all systems that operate under the claims. Accordingly, the DOMA and corresponding systems and methods is not limited by the disclosure, but instead the scope is to be determined entirely by the claims.

**[00294]** While certain aspects of the DOMA and corresponding systems and methods are presented below in certain claim forms, the inventors contemplate the various aspects of the DOMA and corresponding systems and methods in any number of claim forms. Accordingly, the inventors reserve the right to add additional claims after filing the application to pursue such additional claim forms for other aspects of the DOMA and corresponding systems and methods.

**What is claimed is:**

1. A system comprising:

a microphone array including a first physical microphone outputting a first microphone signal and a second physical microphone outputting a second microphone signal;

a processing component coupled to the microphone array and generating a virtual microphone array comprising a first virtual microphone and a second virtual microphone, the first virtual microphone comprising a first combination of the first microphone signal and the second microphone signal, the second virtual microphone comprising a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone and the second virtual microphone have substantially similar responses to noise and substantially dissimilar responses to speech; and

an adaptive noise removal application coupled to the processing component and generating denoised output signals by forming a plurality of combinations of signals output from the first virtual microphone and the second virtual microphone, wherein the denoised output signals include less acoustic noise than acoustic signals received at the microphone array.

# DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)

## ABSTRACT

A dual omnidirectional microphone array noise suppression is described. Compared to conventional arrays and algorithms, which seek to reduce noise by nulling out noise sources, the array of an embodiment is used to form two distinct virtual directional microphones which are configured to have very similar noise responses and very dissimilar speech responses. The only null formed is one used to remove the speech of the user from $V_2$. The two virtual microphones may be paired with an adaptive filter algorithm and VAD algorithm to significantly reduce the noise without distorting the speech, significantly improving the SNR of the desired speech over conventional noise suppression systems.



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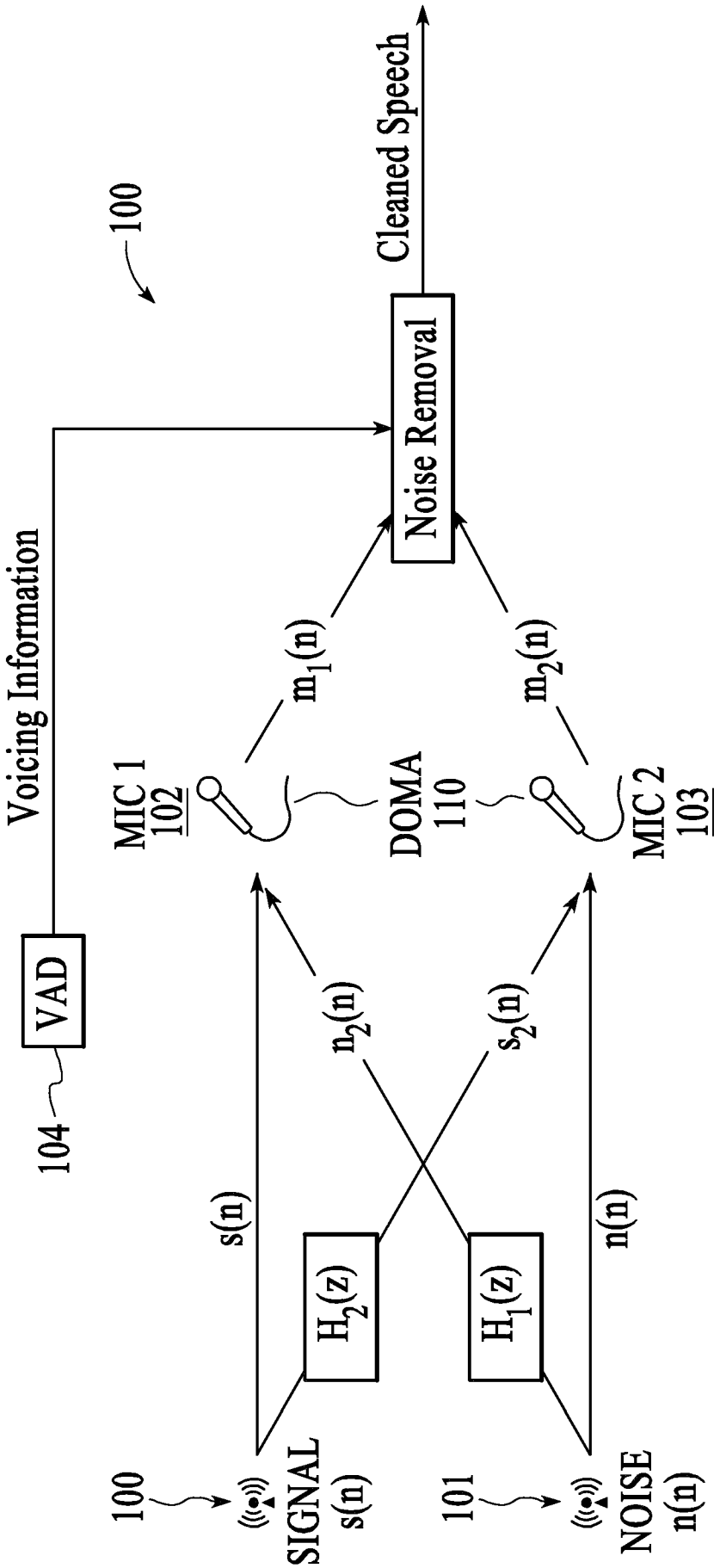

100
Cleaned Speech
Noise Removal
Voicing Information
VAD
104
MIC 1
102
DOMA
110
MIC 2
103
$m_1(n)$
$m_2(n)$
$n_2(n)$
$s_2(n)$
s(n)
n(n)
$H_2(z)$
$H_1(z)$
100
SIGNAL
s(n)
101
NOISE
n(n)

FIG.1

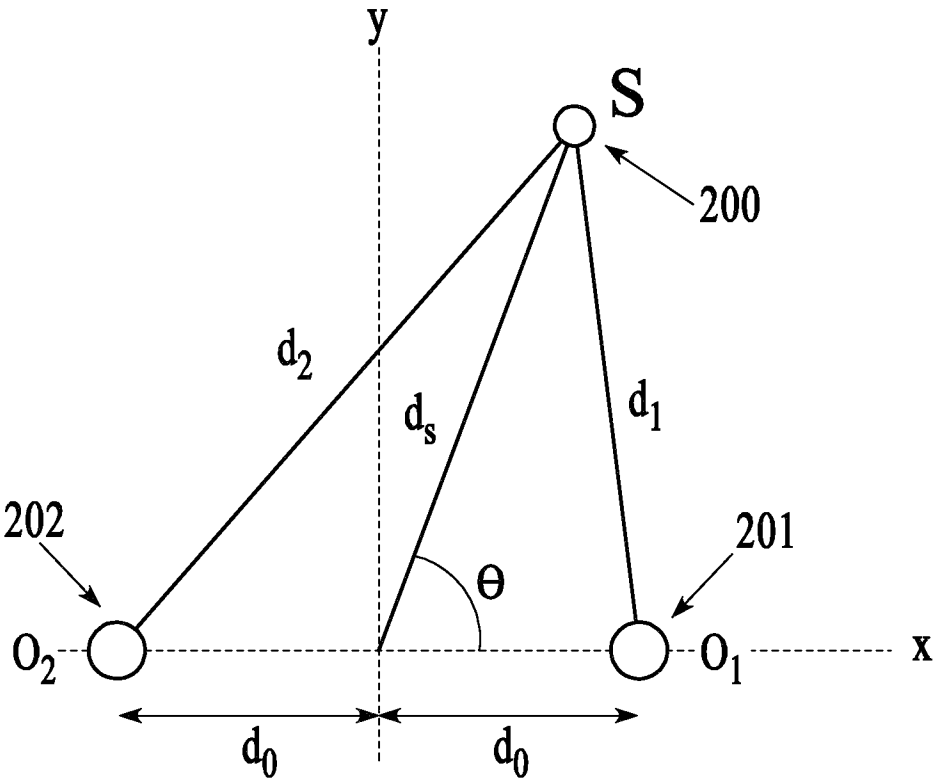

y
S
200
$d_2$
$d_s$
$d_1$
202
201
θ
$O_2$
$O_1$
x
$d_0$
$d_0$

FIG.2

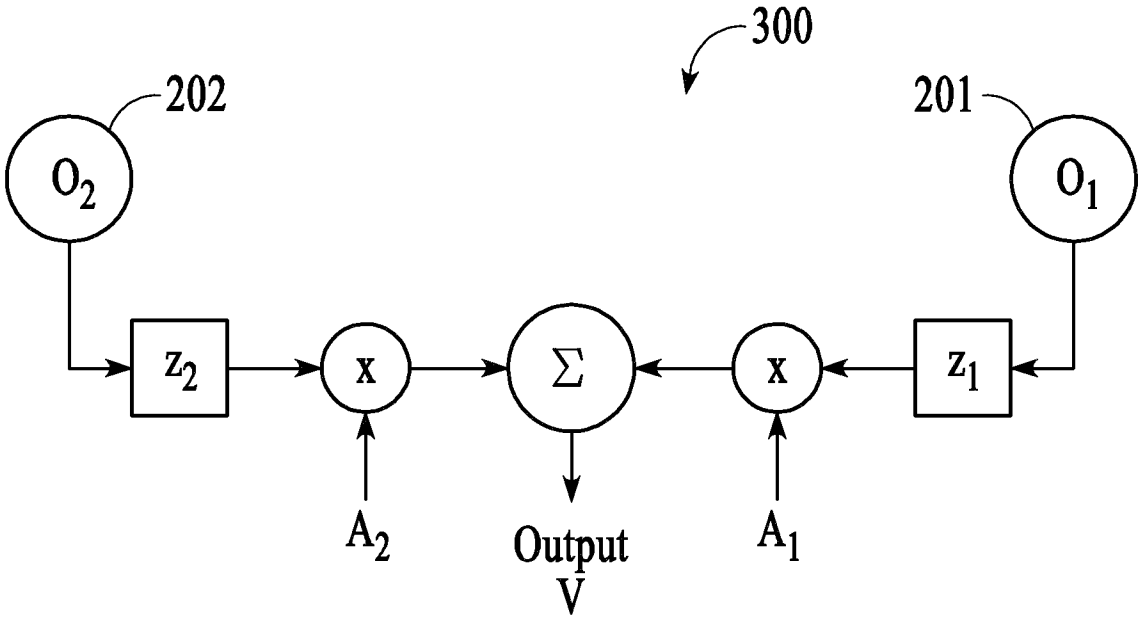

300
202
201
$O_2$
$O_1$
$z_2$
x
Σ
x
$z_1$
$A_2$
Output
V
$A_1$

FIG.3

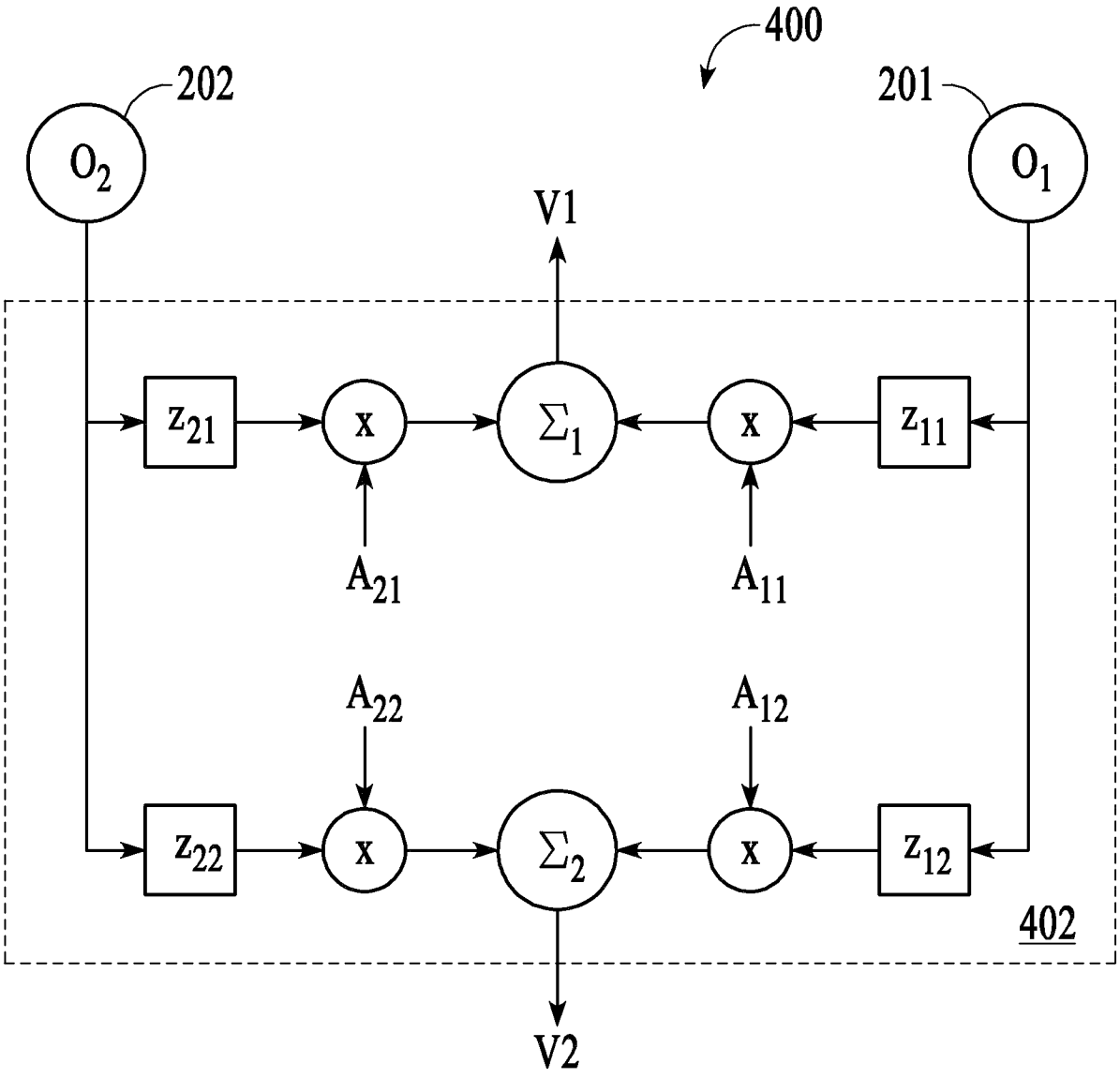

400
202
201
$O_2$
$O_1$
V1
$z_{21}$
x
$\Sigma_1$
x
$z_{11}$
$A_{21}$
$A_{11}$
$A_{22}$
$A_{12}$
$z_{22}$
x
$\Sigma_2$
x
$z_{12}$
402
V2

FIG.4

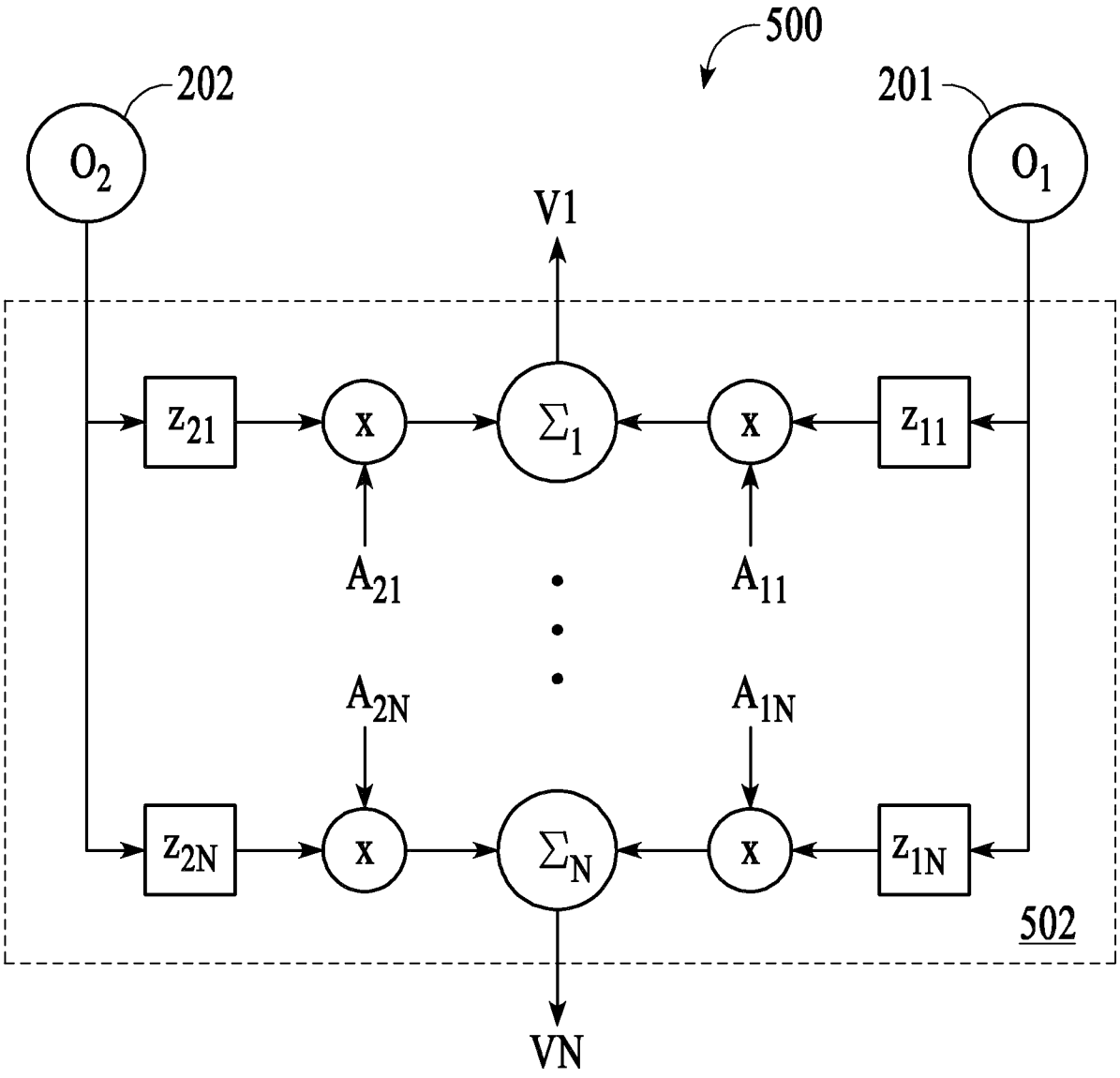

500
202
201
$O_2$
$O_1$
V1
$z_{21}$
x
$\Sigma_1$
x
$z_{11}$
$A_{21}$
$A_{11}$
$A_{2N}$
$A_{1N}$
$z_{2N}$
x
$\Sigma_N$
x
$z_{1N}$
502
VN

FIG.5

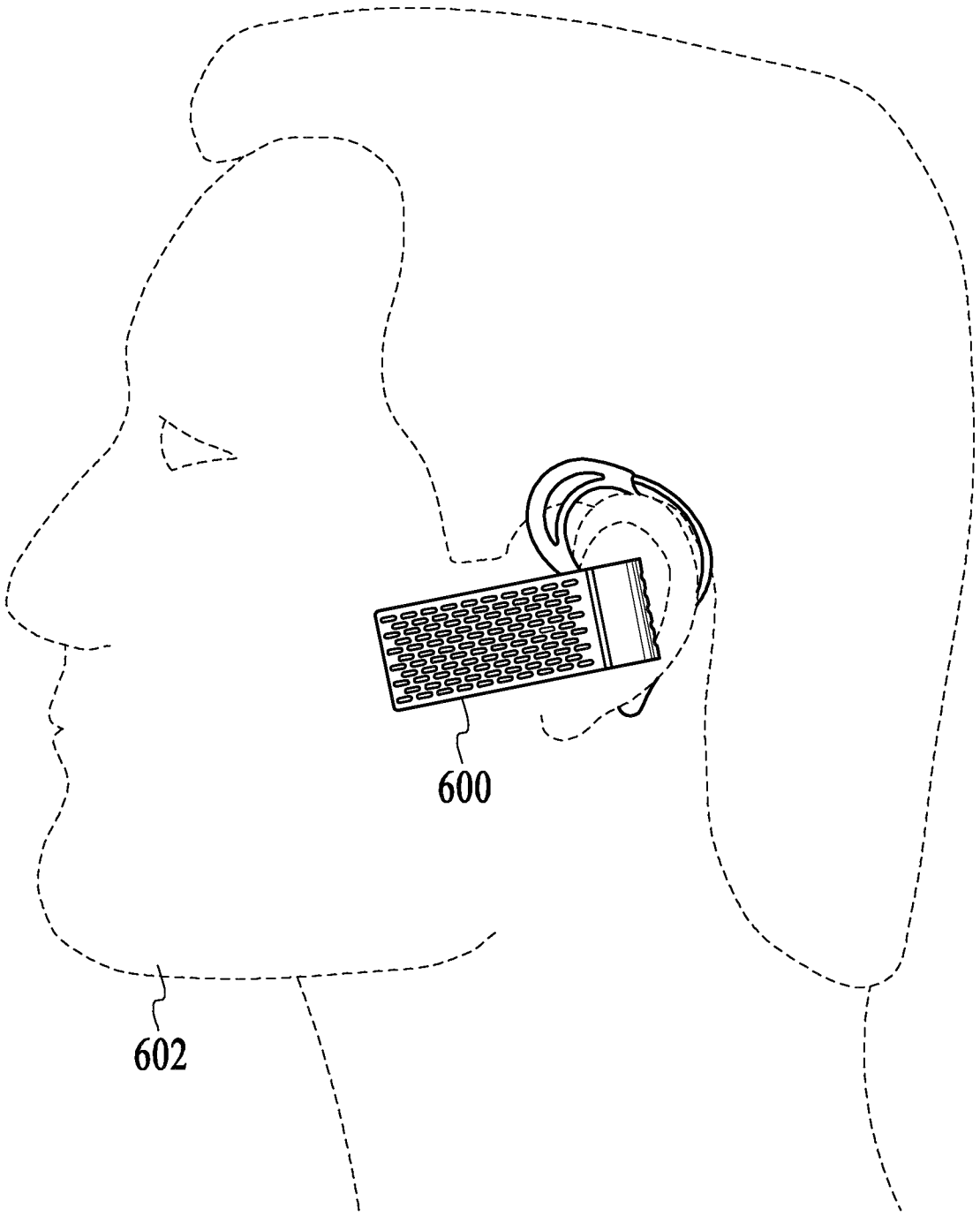



FIG.6

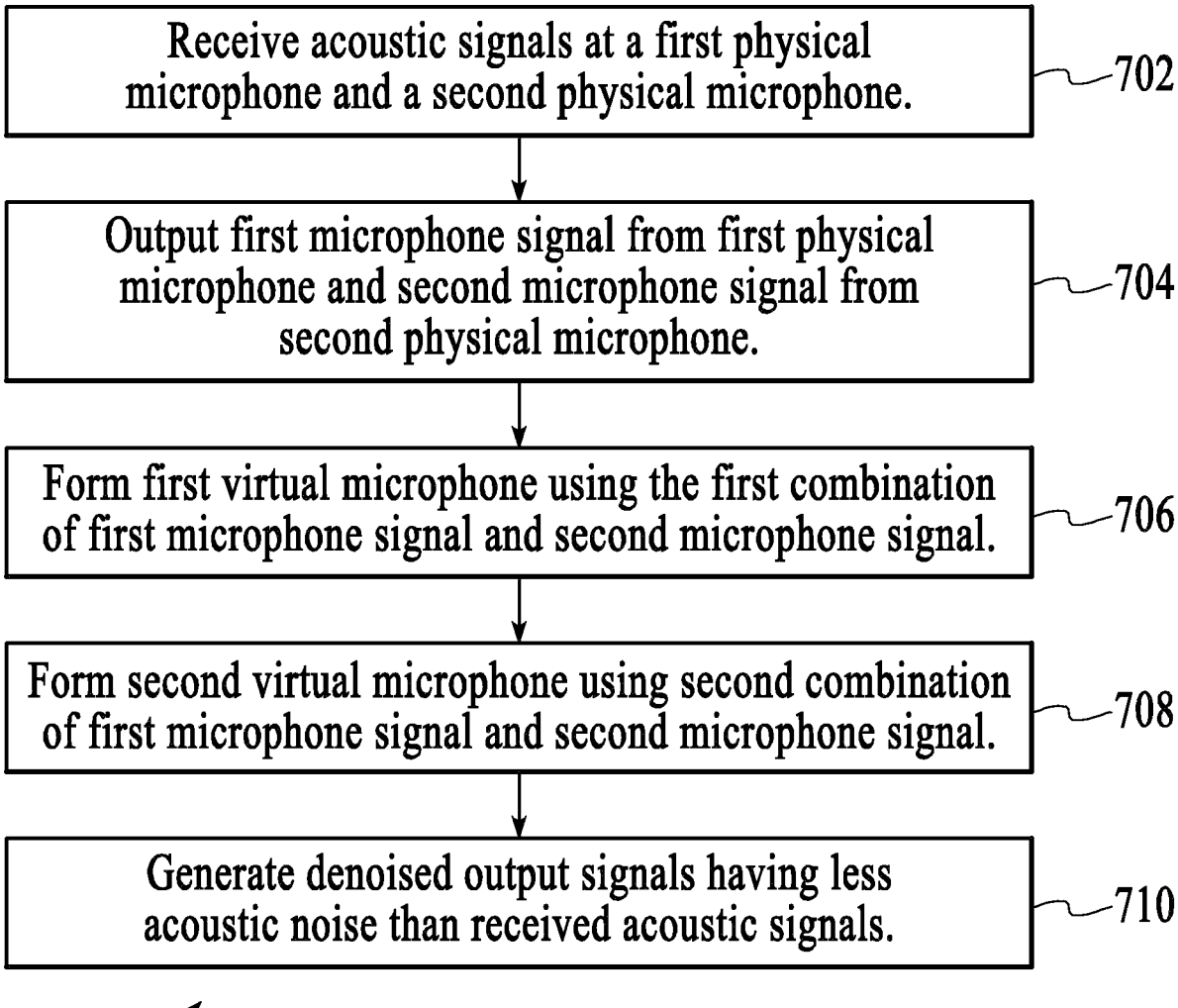

Receive acoustic signals at a first physical microphone and a second physical microphone.
702
Output first microphone signal from first physical microphone and second microphone signal from second physical microphone.
704
Form first virtual microphone using the first combination of first microphone signal and second microphone signal.
706
Form second virtual microphone using second combination of first microphone signal and second microphone signal.
708
Generate denoised output signals having less acoustic noise than received acoustic signals.
710
700

FIG.7

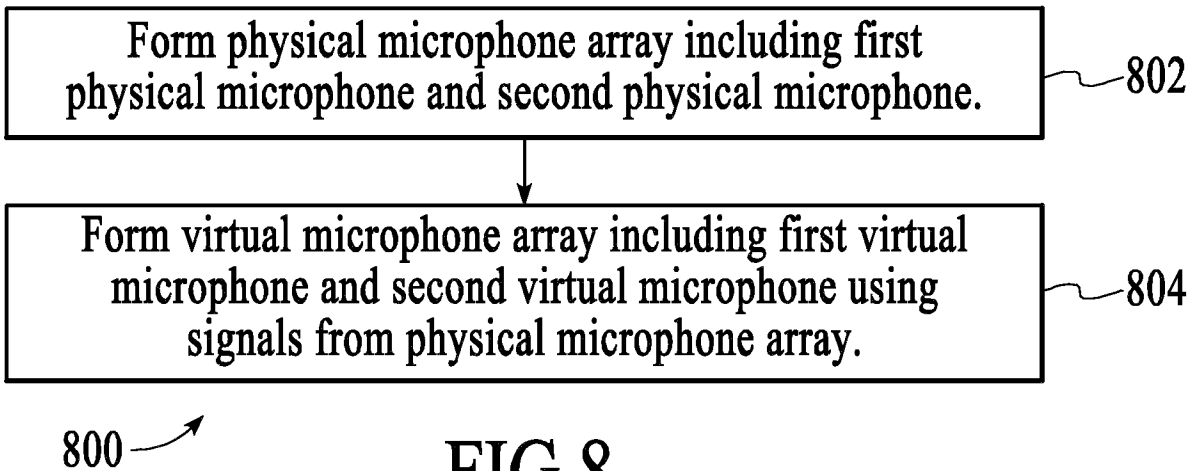

Form physical microphone array including first physical microphone and second physical microphone.
802
Form virtual microphone array including first virtual microphone and second virtual microphone using signals from physical microphone array.
804
800

FIG.8

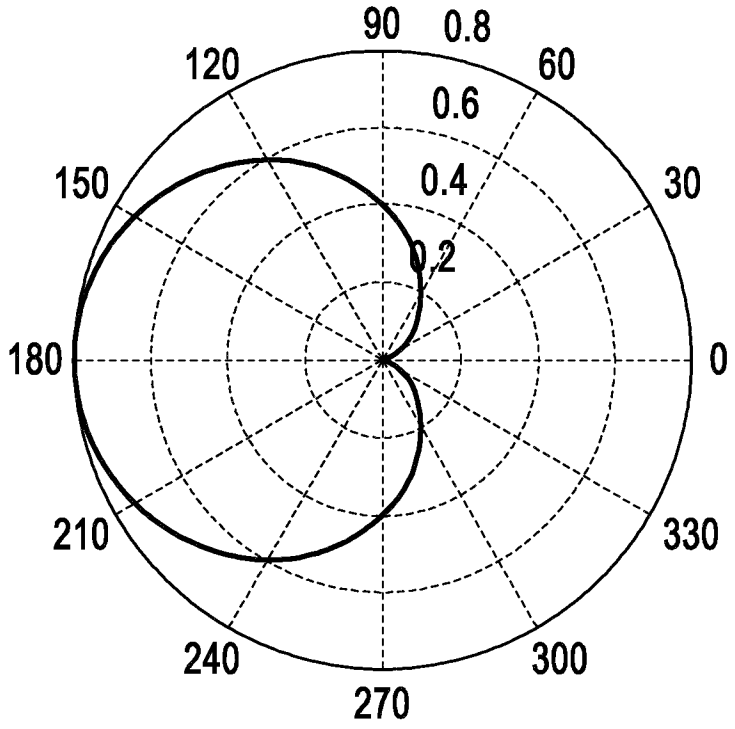

Linear response of V2 to a speech source at 0.10 meters
90
0.8
120
60
0.6
150
0.4
30
0.2
180
0
210
330
240
300
270

FIG.9

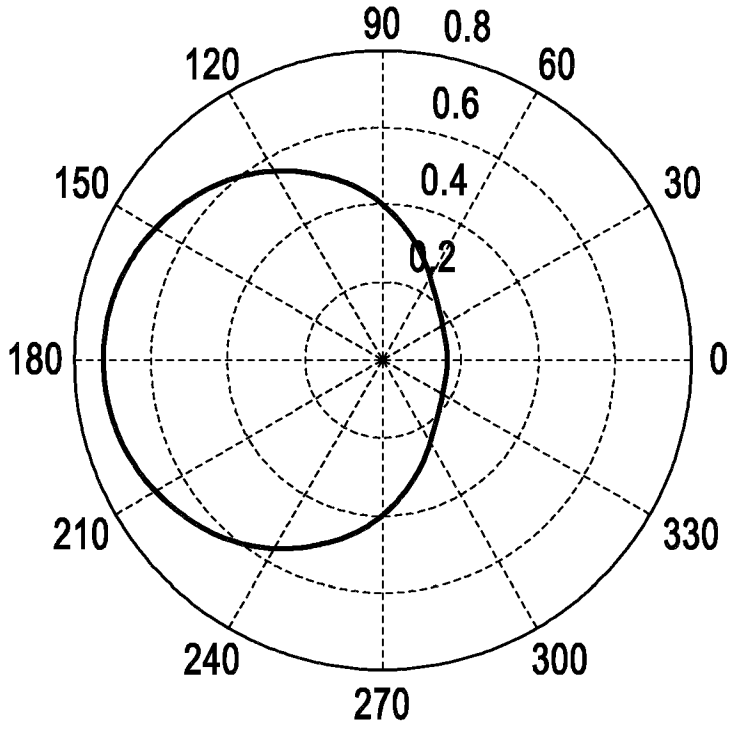

Linear response of V2 to a noise source at 1 meters
90
0.8
120
60
0.6
150
0.4
30
0.2
180
0
210
330
240
300
270

FIG.10

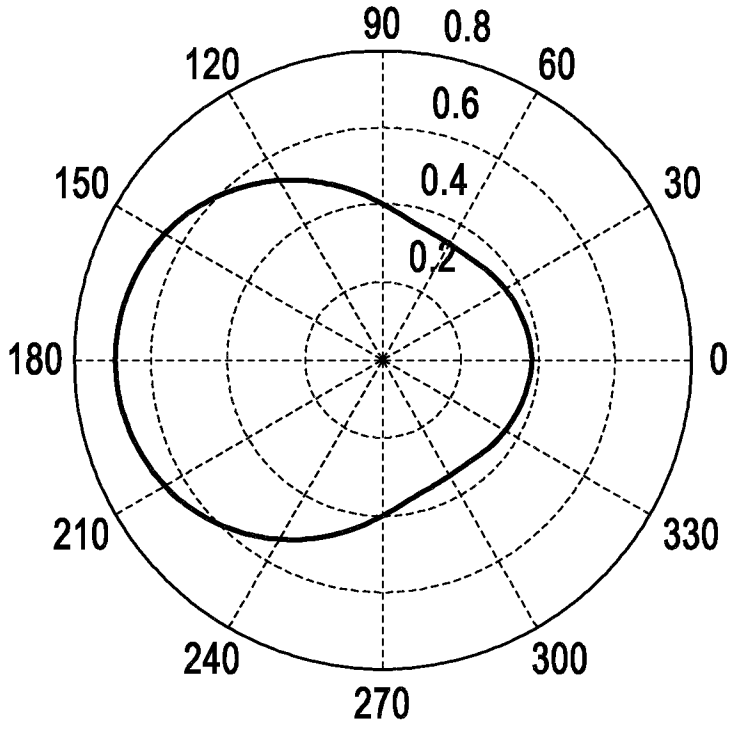

Linear response of V1 to a speech source at 0.10 meters
90
0.8
120
60
0.6
150
0.4
30
0.2
180
0
210
330
240
300
270

FIG.11

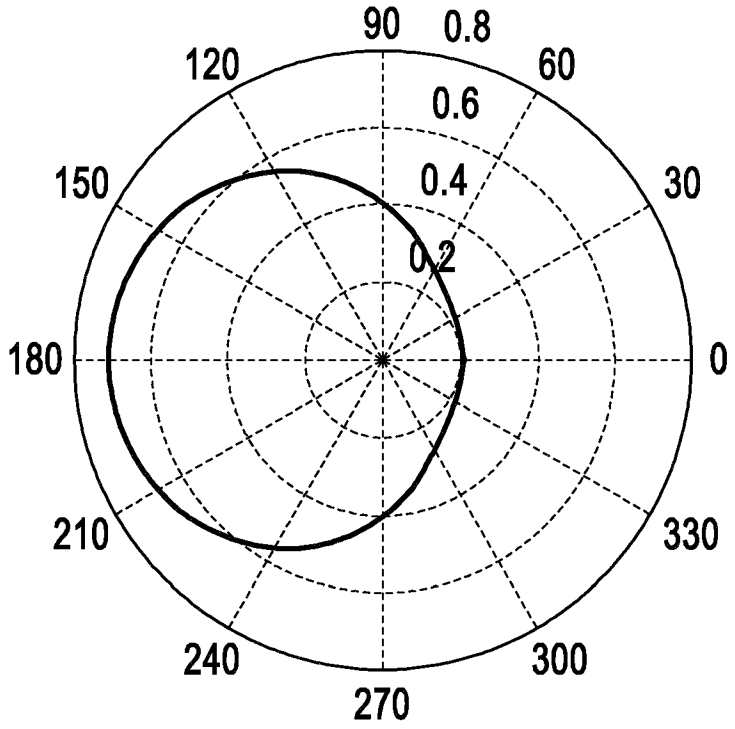

Linear response of V1 to a noise source at 1 meters
90
0.8
120
60
0.6
150
0.4
30
0.2
180
0
210
330
240
300
270

FIG.12

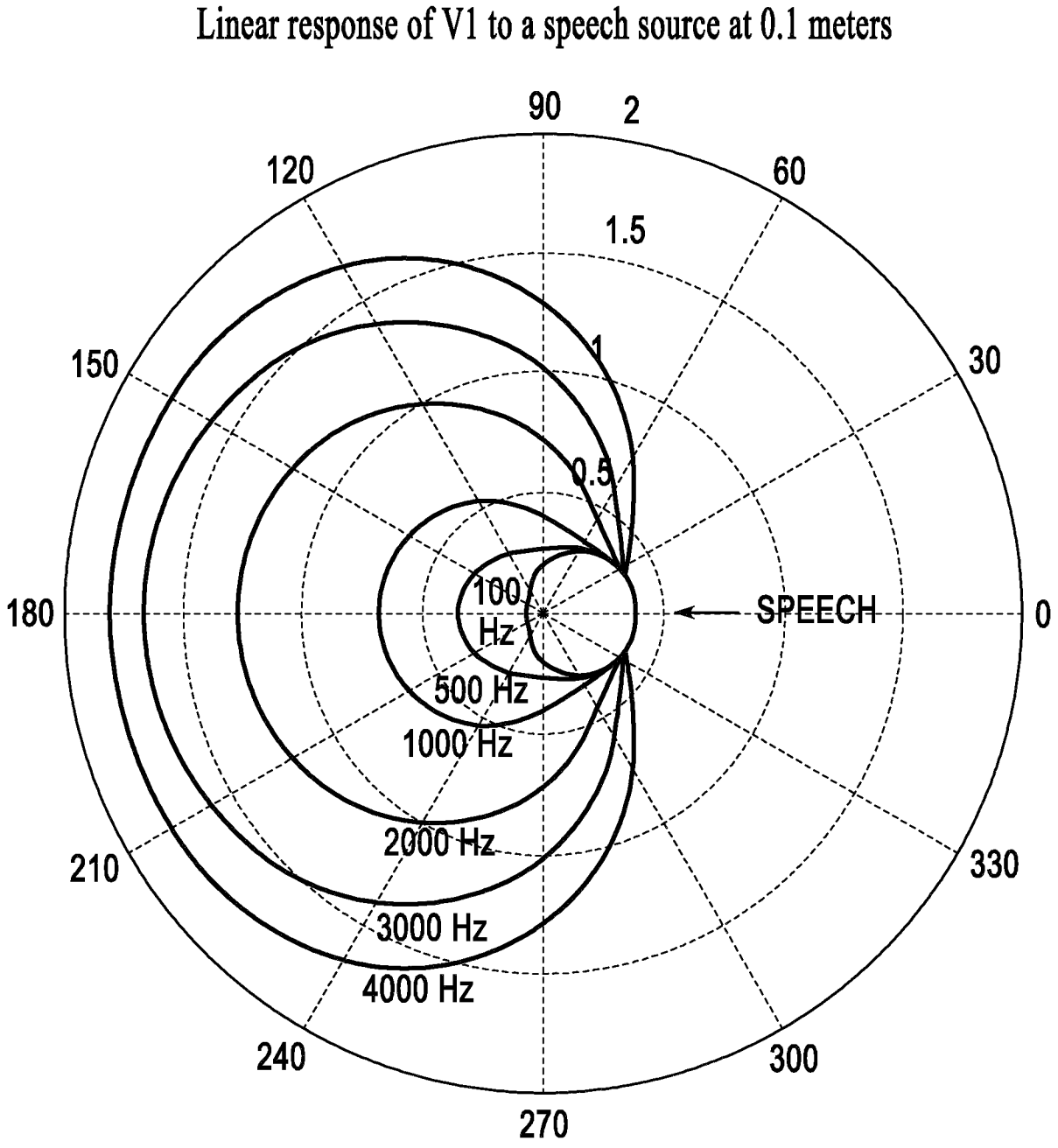

Linear response of V1 to a speech source at 0.1 meters
90
2
120
60
1.5
150
30
1
0.5
180
0
100 Hz
SPEECH
500 Hz
1000 Hz
2000 Hz
210
330
3000 Hz
4000 Hz
240
300
270

FIG.13

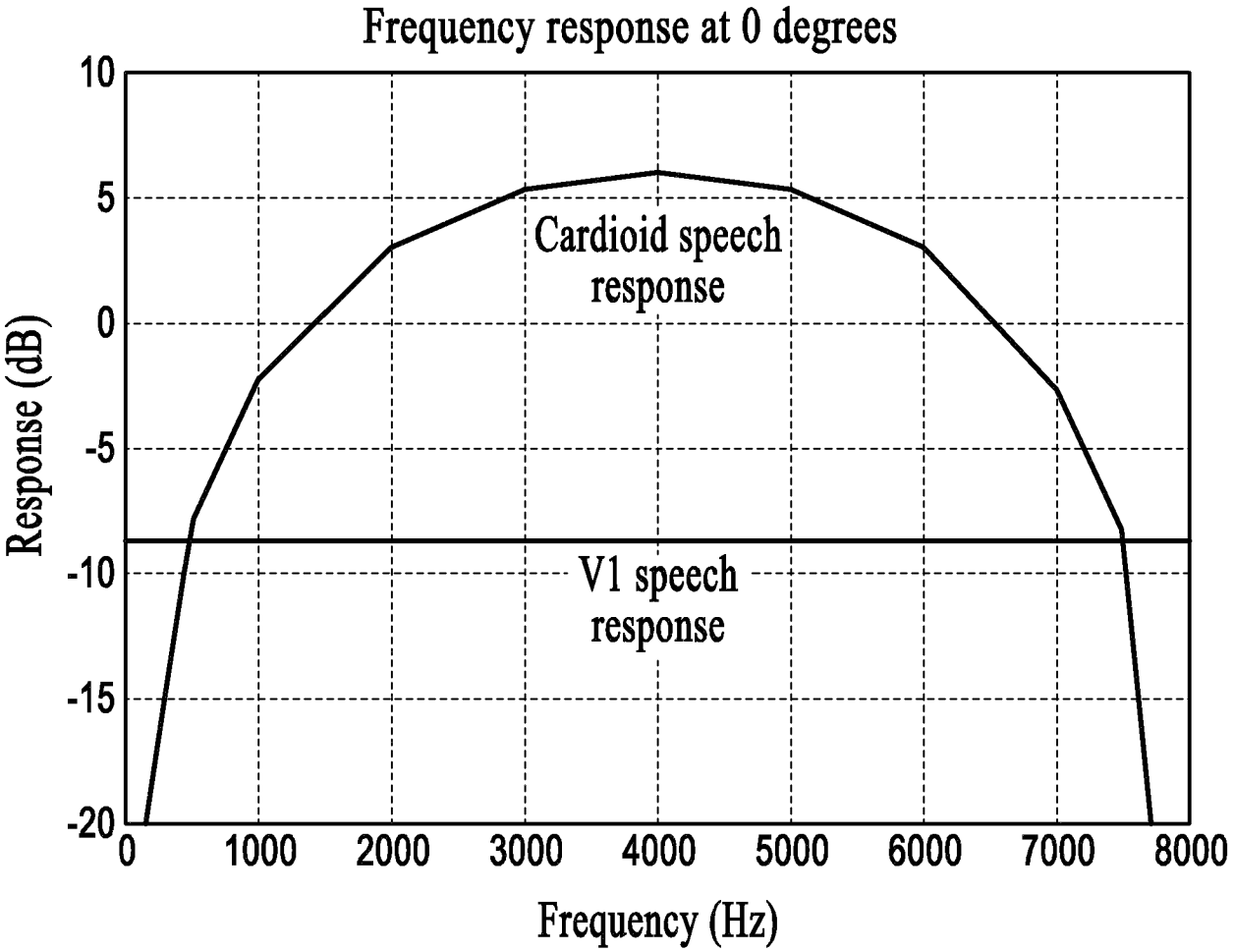

Frequency response at 0 degrees
10
5
0
-5
-10
-15
-20
Response (dB)
Cardioid speech response
V1 speech response
0
1000
2000
3000
4000
5000
6000
7000
8000
Frequency (Hz)

FIG.14

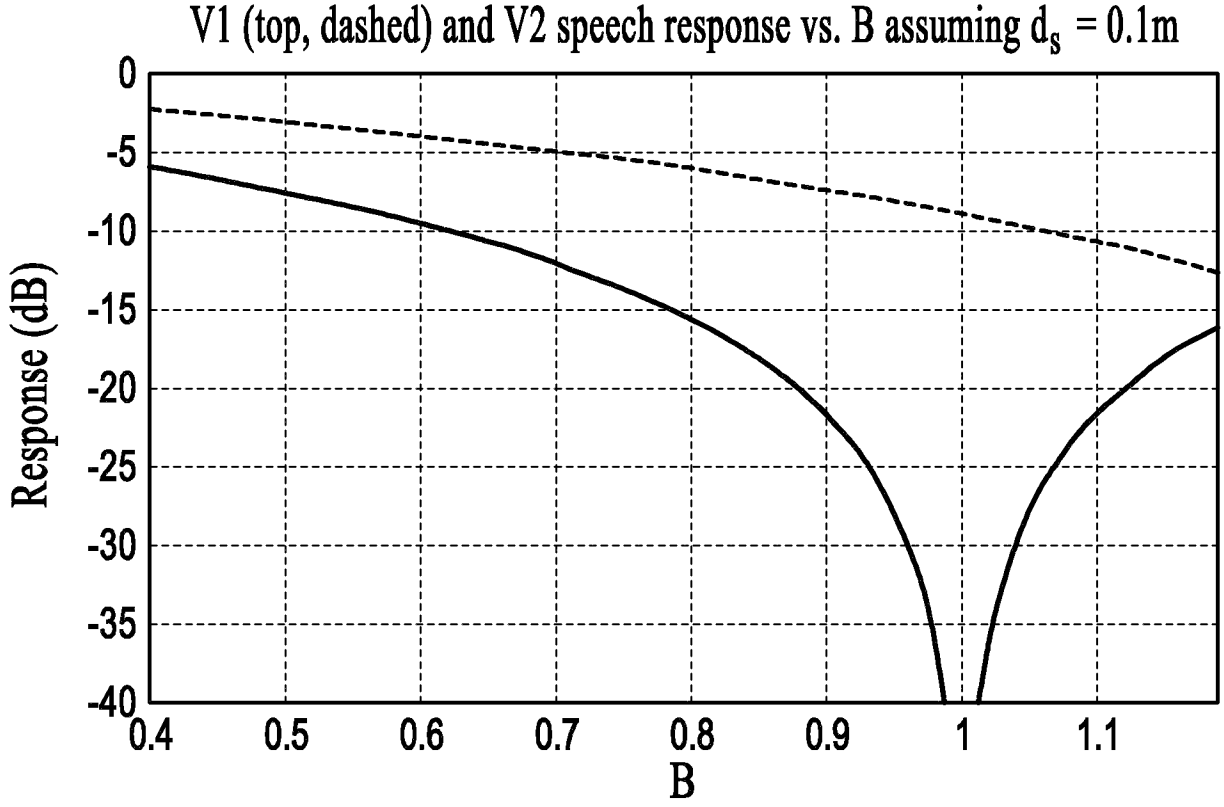

V1 (top, dashed) and V2 speech response vs. B assuming $d_s$ = 0.1m
Response (dB)
0
-5
-10
-15
-20
-25
-30
-35
-40
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
B

FIG.15

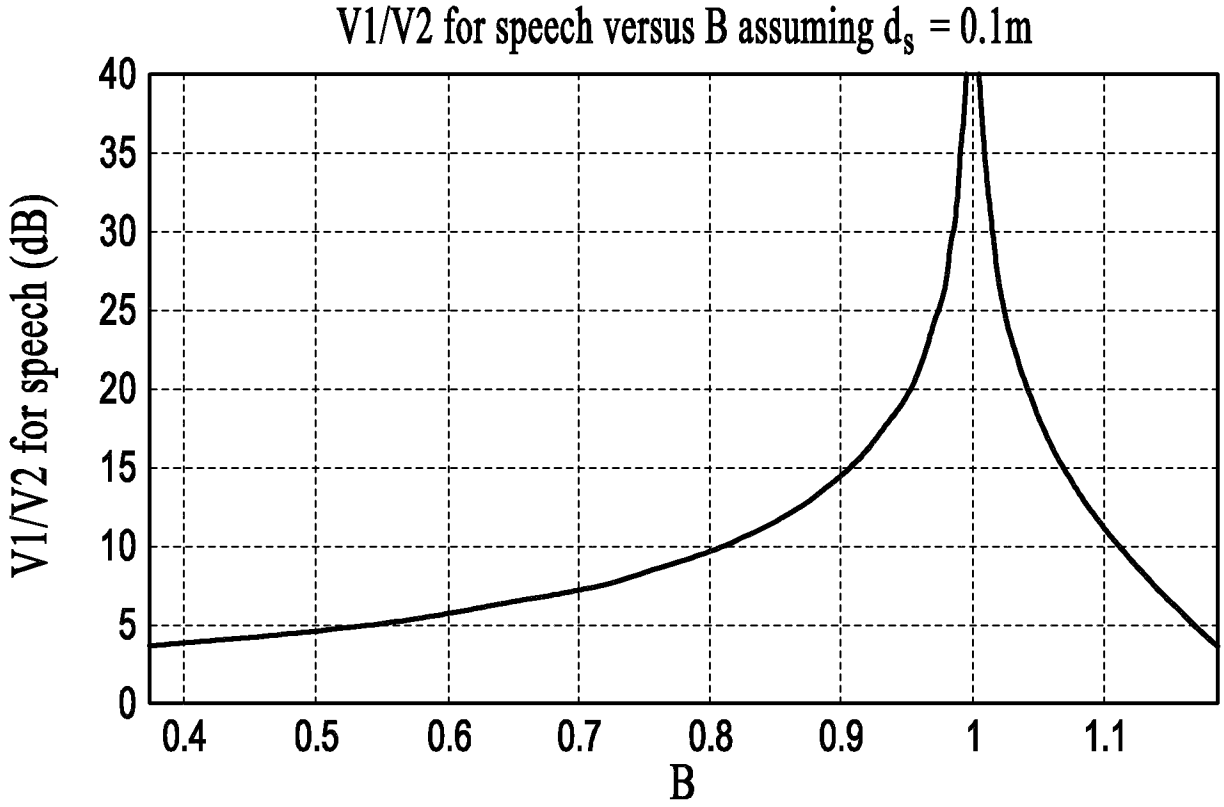

V1/V2 for speech versus B assuming $d_s$ = 0.1m
V1/V2 for speech (dB)
40
35
30
25
20
15
10
5
0
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
B

FIG.16

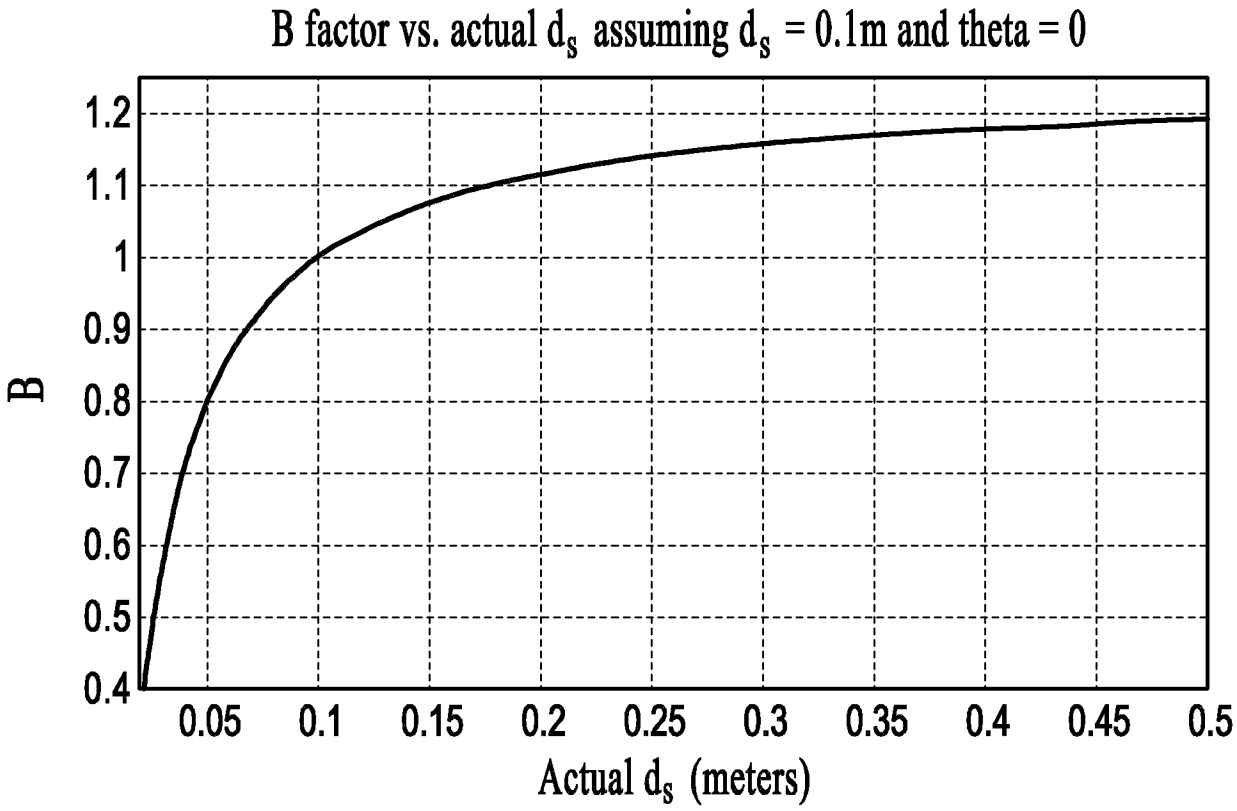

B factor vs. actual $d_s$ assuming $d_s$ = 0.1m and theta = 0
B
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
0.45
0.5
Actual $d_s$ (meters)

FIG.17

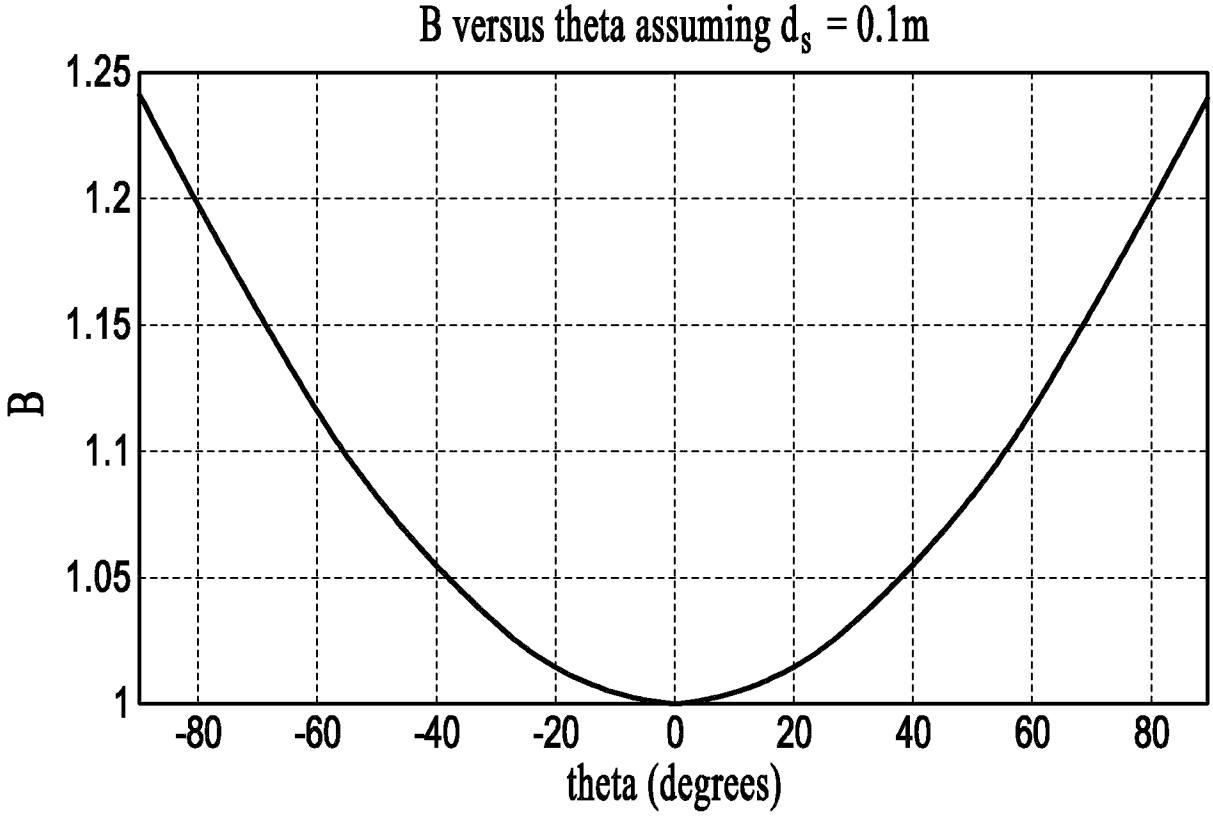

B versus theta assuming $d_s$ = 0.1m
B
1.25
1.2
1.15
1.1
1.05
1
-80
-60
-40
-20
0
20
40
60
80
theta (degrees)

FIG.18

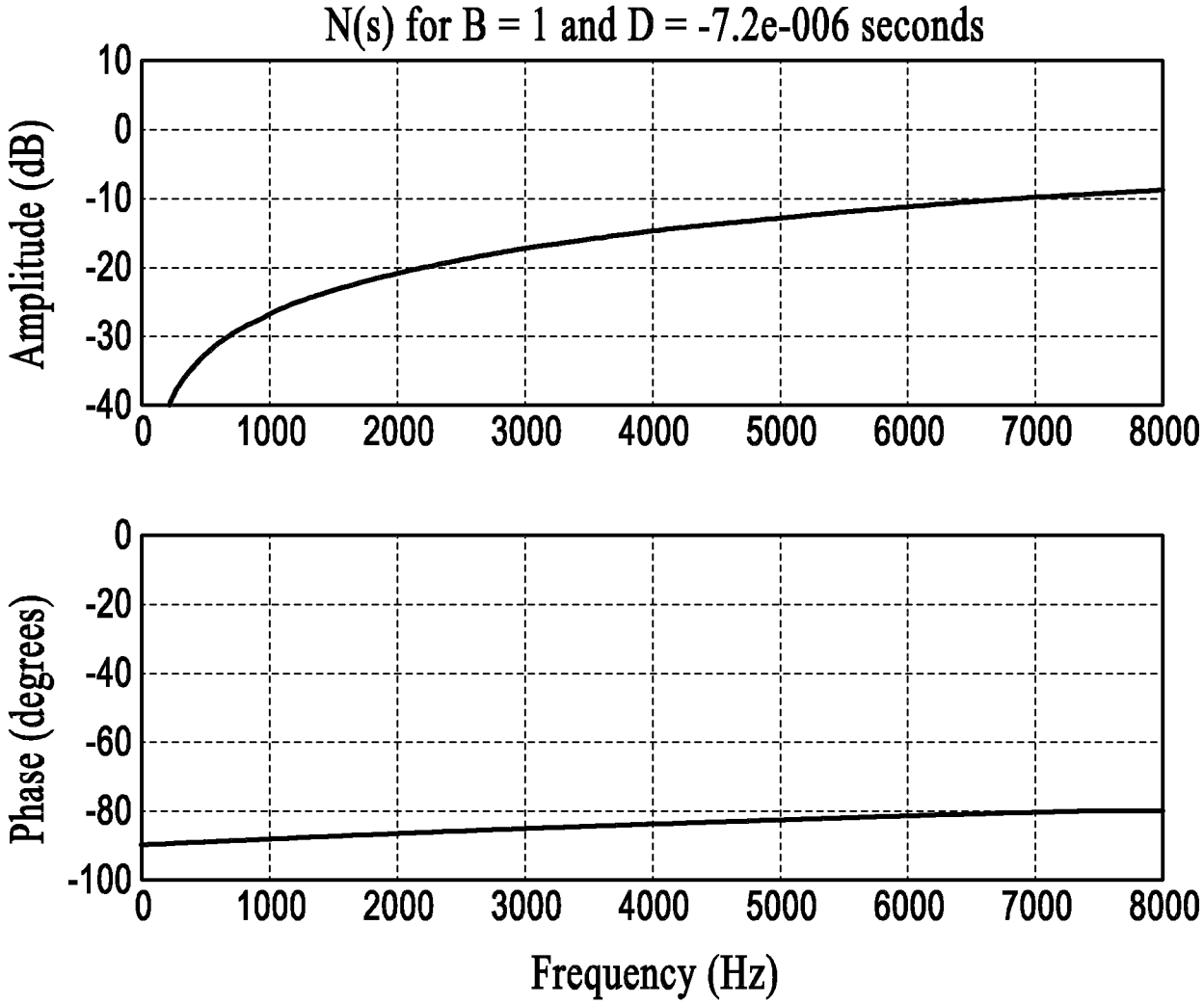

N(s) for B = 1 and D = -7.2e-006 seconds
Amplitude (dB)
10
0
-10
-20
-30
-40
0
1000
2000
3000
4000
5000
6000
7000
8000
Phase (degrees)
0
-20
-40
-60
-80
-100
0
1000
2000
3000
4000
5000
6000
7000
8000
Frequency (Hz)

FIG.19

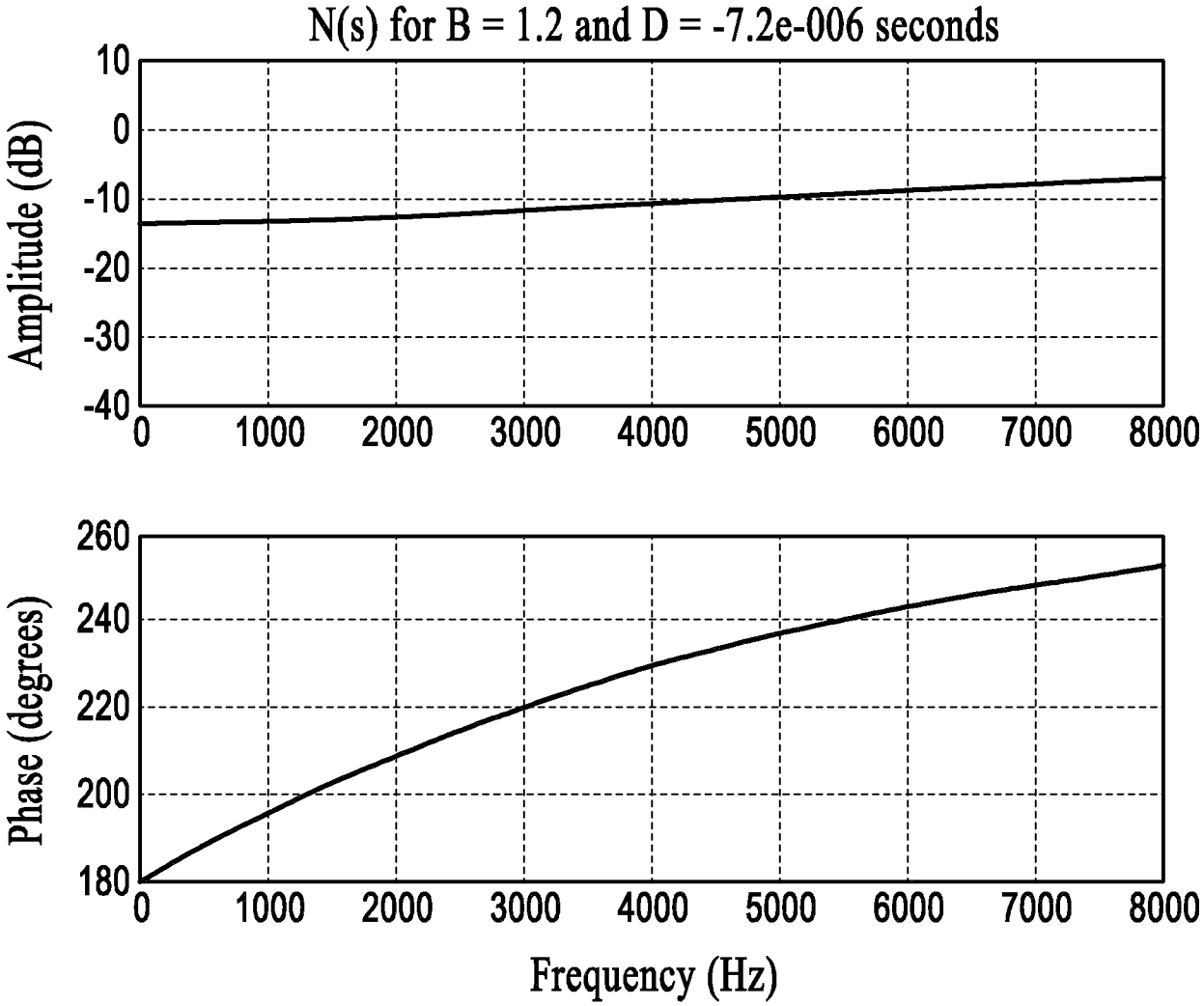

N(s) for B = 1.2 and D = -7.2e-006 seconds
Amplitude (dB)
10
0
-10
-20
-30
-40
0
1000
2000
3000
4000
5000
6000
7000
8000
Phase (degrees)
260
240
220
200
180
0
1000
2000
3000
4000
5000
6000
7000
8000
Frequency (Hz)

FIG.20

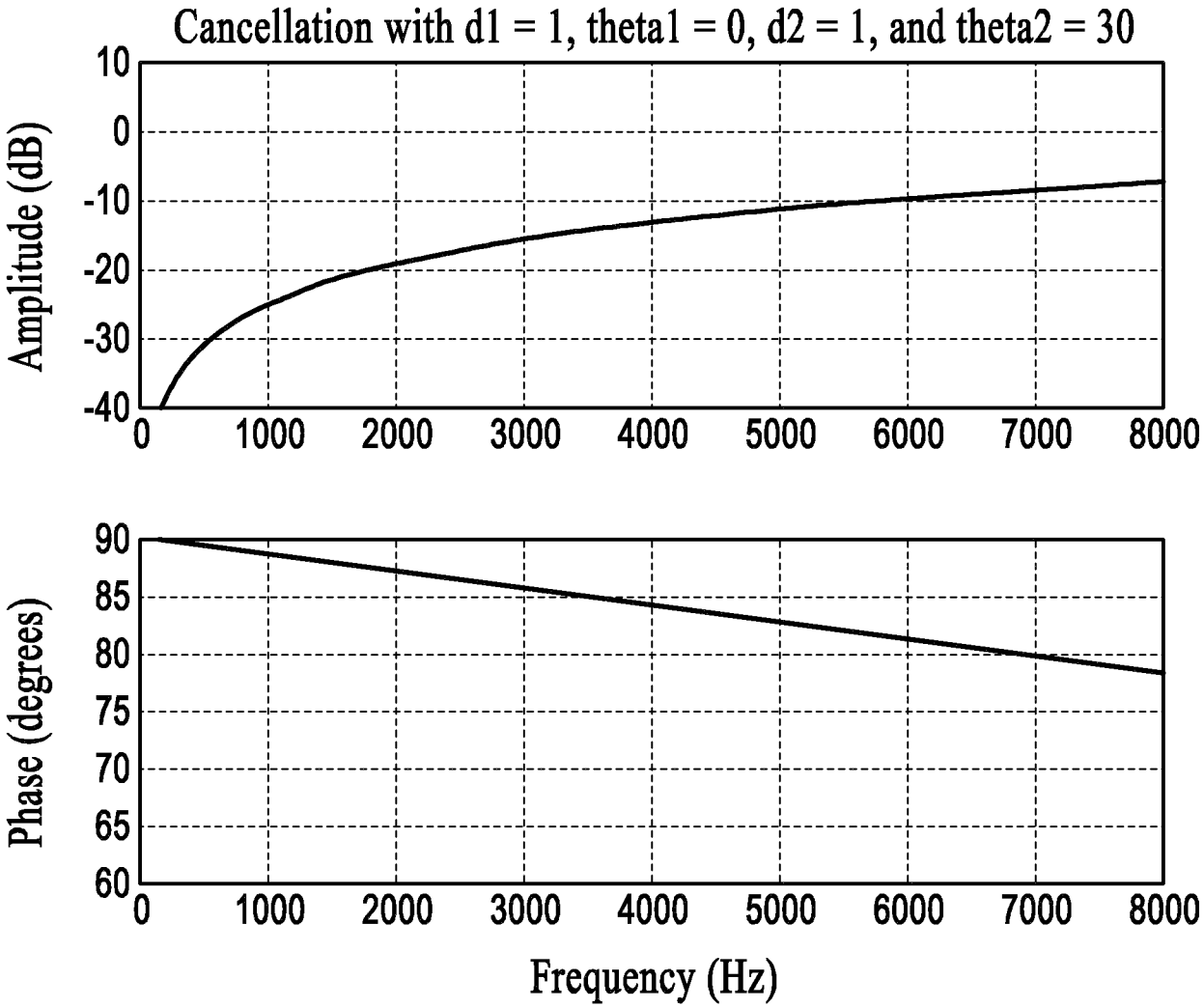

Cancellation with d1 = 1, theta1 = 0, d2 = 1, and theta2 = 30
Amplitude (dB)
10
0
-10
-20
-30
-40
0
1000
2000
3000
4000
5000
6000
7000
8000
Phase (degrees)
90
85
80
75
70
65
60
0
1000
2000
3000
4000
5000
6000
7000
8000
Frequency (Hz)

FIG.21

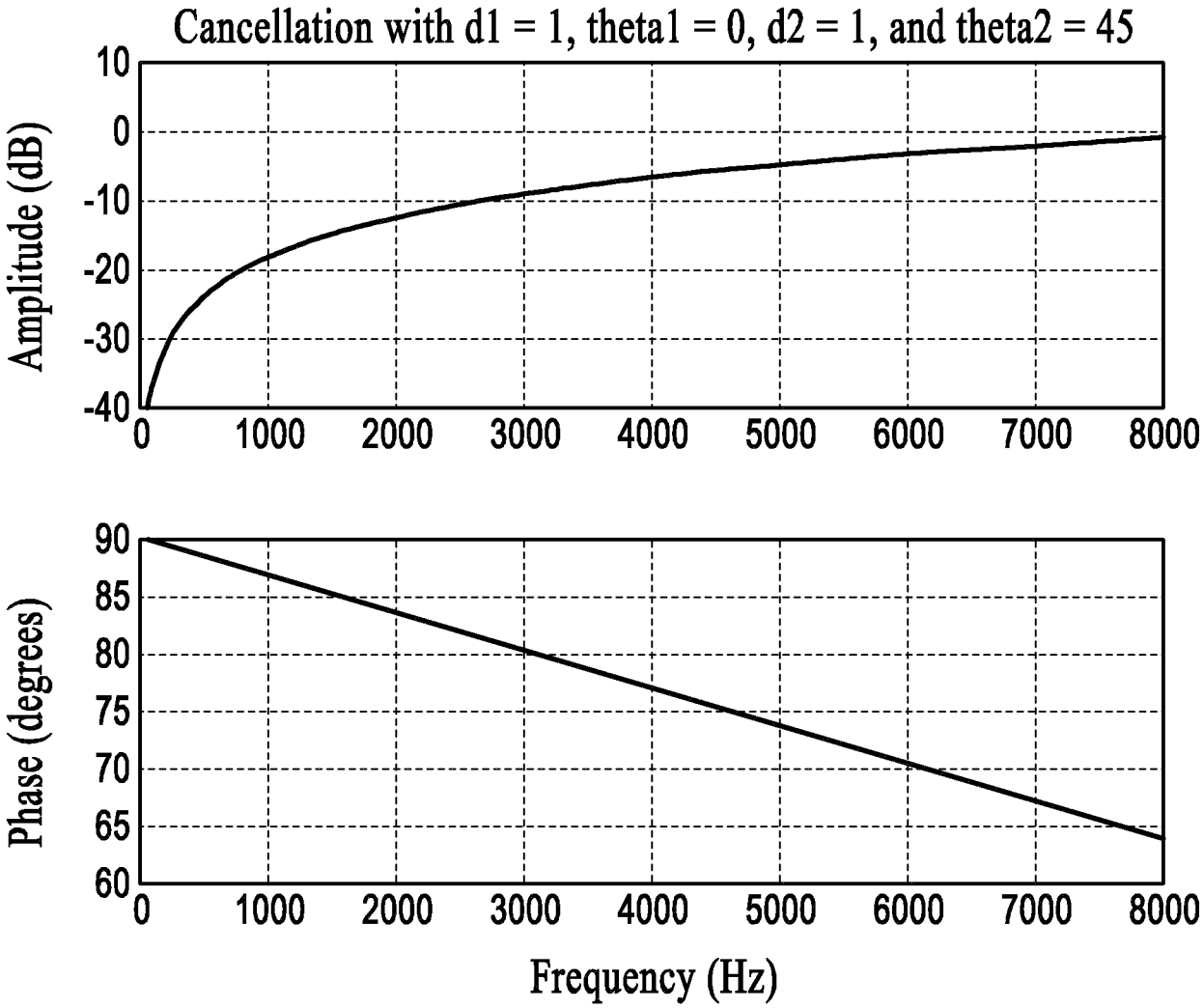

Cancellation with d1 = 1, theta1 = 0, d2 = 1, and theta2 = 45
Amplitude (dB)
10
0
-10
-20
-30
-40
0
1000
2000
3000
4000
5000
6000
7000
8000
Phase (degrees)
90
85
80
75
70
65
60
0
1000
2000
3000
4000
5000
6000
7000
8000
Frequency (Hz)

FIG.22

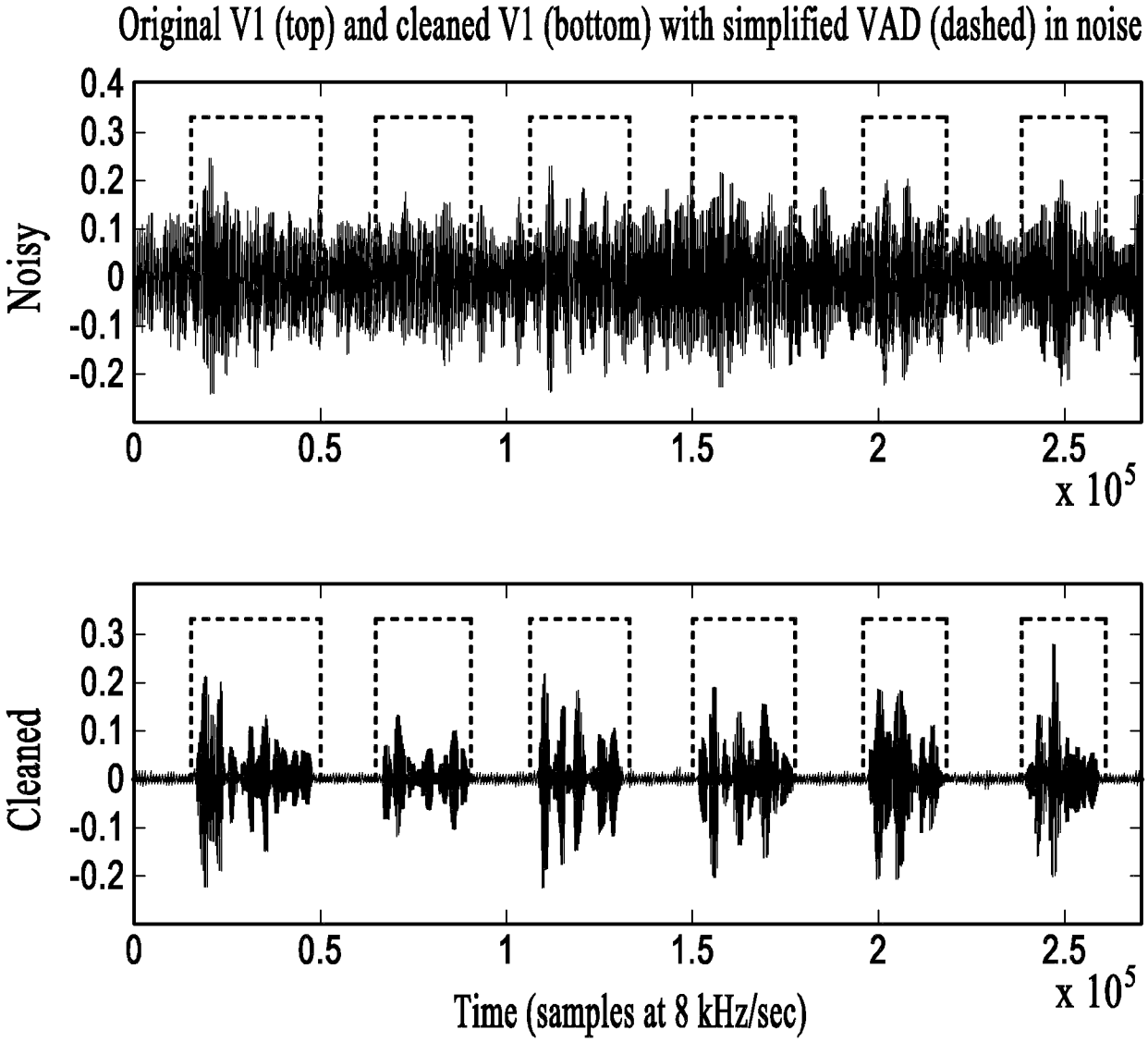

Original V1 (top) and cleaned V1 (bottom) with simplified VAD (dashed) in noise
Noisy
Cleaned
0.4
0.3
0.2
0.1
0
-0.1
-0.2
0
0.5
1
1.5
2
2.5
x 10^5
Time (samples at 8 kHz/sec)

FIG.23

# Electronic Acknowledgement Receipt

| | |
|---|---|
| **EFS ID:** | 16384183 |
| **Application Number:** | 13948160 |
| **International Application Number:** | |
| **Confirmation Number:** | 2184 |
| **Title of Invention:** | DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA) |
| **First Named Inventor/Applicant Name:** | Gregory C. Burnett |
| **Customer Number:** | 15516 |
| **Filer:** | Scott Susumu Kokka |
| **Filer Authorized By:** | |
| **Attorney Docket Number:** | ALI-050CCON1 |
| **Receipt Date:** | 22-JUL-2013 |
| **Filing Date:** | |
| **Time Stamp:** | 23:19:33 |
| **Application Type:** | Utility under 35 USC 111(a) |

## Payment information:

| | |
|---|---|
| Submitted with Payment | no |

## File Listing:

| Document Number | Document Description | File Name | File Size(Bytes)/ Message Digest | Multi Part /.zip | Pages (if appl.) |
|---|---|---|---|---|---|
| 1 | | ALI-050CCON1_Nonprovisional_Application_asfiled.pdf | 8954458<br>77126247b08d98bb59814cb108953098fe86acaa | yes | 75 |

| | Multipart Description/PDF files in .zip description | | |
|---|---|---|---|
| | **Document Description** | **Start** | **End** |
| | Transmittal of New Application | 1 | 1 |
| | Application Data Sheet | 2 | 4 |
| | Specification | 5 | 56 |
| | Claims | 57 | 57 |
| | Abstract | 58 | 58 |
| | Drawings-only black and white line drawings | 59 | 75 |
| **Warnings:** | | | |
| **Information:** | | | |
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**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

**National Stage of an International Application under 35 U.S.C. 371**
**If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.**

**New International Application Filed with the USPTO as a Receiving Office**
**If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.**

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| APPLICATION NUMBER | FILING or 371(c) DATE | GRP ART UNIT | FIL FEE REC'D | ATTY.DOCKET.NO | TOT CLAIMS | IND CLAIMS |
|---|---|---|---|---|---|---|
| 13/948,160 | 07/22/2013 | 2654 | 0.00 | ALI-050CCON1 | 1 | 1 |

**CONFIRMATION NO. 2184**

15516
Kokka & Backus, PC
703 High Street
Palo Alto, CA 94301

**FILING RECEIPT**

*OC000000063082166*

Date Mailed: 08/09/2013

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

**Inventor(s)**

Gregory C. Burnett, Dodge Center, MN;

**Applicant(s)**

Gregory C. Burnett, Dodge Center, MN;

**Power of Attorney:** None

**Domestic Priority data as claimed by applicant**

This application is a CON of 12/139,355 06/13/2008 PAT 8494177
which claims benefit of 60/934,551 06/13/2007
and claims benefit of 60/953,444 08/01/2007
and claims benefit of 60/954,712 08/08/2007
and claims benefit of 61/045,377 04/16/2008

**Foreign Applications** for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
*Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.*

**If Required, Foreign Filing License Granted:** 08/06/2013
The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 13/948,160**
**Projected Publication Date:** To Be Determined - pending completion of Missing Parts
**Non-Publication Request:** No
**Early Publication Request:** No
** **SMALL ENTITY** **

**Title**

DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)

**Preliminary Class**

381

**Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications:** No

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Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

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## Title 37, Code of Federal Regulations, 5.11 & 5.15

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| APPLICATION NUMBER | FILING OR 371(C) DATE | FIRST NAMED APPLICANT | ATTY. DOCKET NO./TITLE |
|---|---|---|---|
| 13/948,160 | 07/22/2013 | Gregory C. Burnett | ALI-050CCON1 |

**CONFIRMATION NO. 2184**

15516
Kokka & Backus, PC
703 High Street
Palo Alto, CA 94301

**FORMALITIES LETTER**

*OC00000063082167*

Date Mailed: 08/09/2013

# NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

**FILED UNDER 37 CFR 1.53(b)**

***Filing Date Granted***

**Items Required To Avoid Abandonment:**

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing. Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- The statutory basic filing fee is missing.
  *Applicant must submit $**70** to complete the basic filing fee for a small entity.*

The applicant needs to satisfy supplemental fees problems indicated below.

The required item(s) identified below must be timely submitted to avoid abandonment:

- A surcharge (for late submission of the basic filing fee, search fee, examination fee or inventor's oath or declaration) as set forth in 37 CFR 1.16(f) of $ **70** for a small entity in compliance with 37 CFR 1.27, must be submitted.

**SUMMARY OF FEES DUE:**

Total fee(s) required within **TWO MONTHS** from the date of this Notice is $ **800** for a small entity
- $ **70** Statutory basic filing fee.
- $ **70** Surcharge.
- The application search fee has not been paid. Applicant must submit $ **300** to complete the search fee.
- The application examination fee has not been paid. Applicant must submit $ **360** to complete the examination fee for a small entity in compliance with 37 CFR 1.27.

**Items Required To Avoid Processing Delays:**

Applicant is notified that the above-identified application contains the deficiencies noted below. No period for reply is set forth in this notice for correction of these deficiencies. However, if a deficiency relates to the inventor's oath or declaration, the applicant must file an oath or declaration in compliance with 37 CFR 1.63, or a substitute statement in compliance with 37 CFR 1.64, executed by or with respect to each actual inventor no later than the expiration of the time period set in the "Notice of Allowability" to avoid abandonment. See 37 CFR 1.53(f).

- A properly executed inventor's oath or declaration has not been received for the following inventor(s):

Gregory C. Burnett

Applicant may submit the inventor's oath or declaration at any time before the Notice of Allowance and Fee(s) Due, PTOL-85, is mailed.

Replies must be received in the USPTO within the set time period or must include a proper Certificate of Mailing or Transmission under 37 CFR 1.8 with a mailing or transmission date within the set time period. For more information and a suggested format, see Form PTO/SB/92 and MPEP 512.

Replies should be mailed to:

Mail Stop Missing Parts
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Alexandria VA 22313-1450

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/rnegga/

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Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

## PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 13/948,160

### APPLICATION AS FILED - PART I

| FOR | (Column 1) NUMBER FILED | (Column 2) NUMBER EXTRA | SMALL ENTITY RATE($) | SMALL ENTITY FEE($) | OR | OTHER THAN SMALL ENTITY RATE($) | OTHER THAN SMALL ENTITY FEE($) |
|---|---|---|---|---|---|---|---|
| BASIC FEE (37 CFR 1.16(a), (b), or (c)) | N/A | N/A | N/A | 70 | | N/A | |
| SEARCH FEE (37 CFR 1.16(k), (i), or (m)) | N/A | N/A | N/A | 300 | | N/A | |
| EXAMINATION FEE (37 CFR 1.16(o), (p), or (q)) | N/A | N/A | N/A | 360 | | N/A | |
| TOTAL CLAIMS (37 CFR 1.16(i)) | 1 minus 20 = | * | x 40 = | 0.00 | OR | | |
| INDEPENDENT CLAIMS (37 CFR 1.16(h)) | 1 minus 3 = | * | x 210 = | 0.00 | | | |
| APPLICATION SIZE FEE (37 CFR 1.16(s)) | If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s). | | | 0.00 | | | |
| MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j)) | | | | 0.00 | | | |
| * If the difference in column 1 is less than zero, enter "0" in column 2. | | | TOTAL | 730 | | TOTAL | |

### APPLICATION AS AMENDED - PART II

| | | (Column 1) CLAIMS REMAINING AFTER AMENDMENT | | (Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR | (Column 3) PRESENT EXTRA | SMALL ENTITY RATE($) | SMALL ENTITY ADDITIONAL FEE($) | OR | OTHER THAN SMALL ENTITY RATE($) | OTHER THAN SMALL ENTITY ADDITIONAL FEE($) |
|---|---|---|---|---|---|---|---|---|---|---|
| AMENDMENT A | Total (37 CFR 1.16(i)) | * | Minus | ** | = | x = | | OR | x = | |
| | Independent (37 CFR 1.16(h)) | * | Minus | *** | = | x = | | OR | x = | |
| | Application Size Fee (37 CFR 1.16(s)) | | | | | | | | | |
| | FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) | | | | | | | OR | | |
| | | | | | | TOTAL ADD'L FEE | | OR | TOTAL ADD'L FEE | |

| | | (Column 1) CLAIMS REMAINING AFTER AMENDMENT | | (Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR | (Column 3) PRESENT EXTRA | RATE($) | ADDITIONAL FEE($) | | RATE($) | ADDITIONAL FEE($) |
|---|---|---|---|---|---|---|---|---|---|---|
| AMENDMENT B | Total (37 CFR 1.16(i)) | * | Minus | ** | = | x = | | OR | x = | |
| | Independent (37 CFR 1.16(h)) | * | Minus | *** | = | x = | | OR | x = | |
| | Application Size Fee (37 CFR 1.16(s)) | | | | | | | | | |
| | FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) | | | | | | | OR | | |
| | | | | | | TOTAL ADD'L FEE | | OR | TOTAL ADD'L FEE | |

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

| | |
|---|---|
| In re Application for: | Confirmation No.: 2184 |
| Gregory C. Burnett | Examiner: Unassigned |
| Serial No.: 13/948,160 | Group Art Unit: 2654 |
| Filing Date: July 22, 2013 | Transmission Date: March 10, 2014 |
| For: DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA) | Attorney Docket No.: ALI-050CCON1 |

**Certificate of Transmission**
I hereby certify that this correspondence is being transmitted via the U.S. Patent and Trademark Office electronic filing system (EFS-Web) to the USPTO on **March 10, 2014**.

Signed: _____
Mark C. Cleland

## RESPONSE TO NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir or Madam:

In response to the *Notice to File Missing Parts of Nonprovisional Application*, mailed August 9, 2013, Applicant hereby provides the requisite surcharge of $140 for submission of this paper, as well as the required application filing, examination, search and additional claims fees of $1,600. Applicant also submits a five-month extension of time fee of $3000. A copy of the *Notice to File Missing Parts of Nonprovisional Application* is also submitted herewith. Applicant also submits a *Written Assertion for Notification of Loss of Entitlement to Small Entity Status Under 37 CFR § 1.27(g)(2).*

Please contact the undersigned representative below if you should have any further questions or require any additional information.

Respectfully submitted,



Scott S. Kokka
Reg. No. 51,893

KOKKA & BACKUS, PC
703 High Street
Palo Alto, CA 94301
Telephone: (650) 566-9921
Facsimile: (650) 566-9922

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| APPLICATION NUMBER | FILING OR 371(C) DATE | FIRST NAMED APPLICANT | ATTY. DOCKET NO./TITLE |
|---|---|---|---|
| 13/948,160 | 07/22/2013 | Gregory C. Burnett | ALI-050CCON1 |

**CONFIRMATION NO. 2184**

15516
Kokka & Backus, PC
703 High Street
Palo Alto, CA 94301

**FORMALITIES LETTER**

*OC00000063082167*

Date Mailed: 08/09/2013

# NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

**FILED UNDER 37 CFR 1.53(b)**

***Filing Date Granted***

**Items Required To Avoid Abandonment:**

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing. Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- The statutory basic filing fee is missing.
  *Applicant must submit $**70** to complete the basic filing fee for a small entity.*

The applicant needs to satisfy supplemental fees problems indicated below.

The required item(s) identified below must be timely submitted to avoid abandonment:

- A surcharge (for late submission of the basic filing fee, search fee, examination fee or inventor's oath or declaration) as set forth in 37 CFR 1.16(f) of $ **70** for a small entity in compliance with 37 CFR 1.27, must be submitted.

**SUMMARY OF FEES DUE:**

Total fee(s) required within **TWO MONTHS** from the date of this Notice is $ **800** for a small entity
- $ **70** Statutory basic filing fee.
- $ **70** Surcharge.
- The application search fee has not been paid. Applicant must submit $ **300** to complete the search fee.
- The application examination fee has not been paid. Applicant must submit $ **360** to complete the examination fee for a small entity in compliance with 37 CFR 1.27.

**Items Required To Avoid Processing Delays:**

Applicant is notified that the above-identified application contains the deficiencies noted below. No period for reply is set forth in this notice for correction of these deficiencies. However, if a deficiency relates to the inventor's oath or declaration, the applicant must file an oath or declaration in compliance with 37 CFR 1.63, or a substitute statement in compliance with 37 CFR 1.64, executed by or with respect to each actual inventor no later than the expiration of the time period set in the "Notice of Allowability" to avoid abandonment. See 37 CFR 1.53(f).

- A properly executed inventor's oath or declaration has not been received for the following inventor(s):

Gregory C. Burnett

Applicant may submit the inventor's oath or declaration at any time before the Notice of Allowance and Fee(s) Due, PTOL-85, is mailed.

Replies must be received in the USPTO within the set time period or must include a proper Certificate of Mailing or Transmission under 37 CFR 1.8 with a mailing or transmission date within the set time period. For more information and a suggested format, see Form PTO/SB/92 and MPEP 512.

Replies should be mailed to:

Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

Registered users of EFS-Web may alternatively submit their reply to this notice via EFS-Web.
https://sportal.uspto.gov/authenticate/AuthenticateUserLocalEPF.html

For more information about EFS-Web please call the USPTO Electronic Business Center at **1-866-217-9197** or visit our website at http://www.uspto.gov/ebc.

If you are not using EFS-Web to submit your reply, you must include a copy of this notice.

/rnegga/

---

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:
Gregory C. Burnett

Application Serial No.: 13/948,160

Filing Date: July 22, 2013

For: DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)

Examiner: Unassigned

Confirmation No.: 2184

Group Art Unit: 2654

Transmission Date: March 10, 2014

Atty. Docket No.: ALI-050CCON1

CERTIFICATE OF TRANSMISSION

I hereby certify that this correspondence is being transmitted via the U.S. Patent and Trademark Office electronic filing system (EFS-Web) to the USPTO on **March 10, 2014**.

Signed: _____
Mark C. Cleland

**WRITTEN ASSERTION FOR NOTIFICATION OF LOSS OF ENTITLEMENT TO SMALL ENTITY STATUS UNDER 37 CFR § 1.27(g)(2)**

Dear Sir or Madam:

In accordance with 37 CFR § 1.27(g)(2) and MPEP § 509.03, Applicant is submitting this *Written Assertion for Notification of Loss of Entitlement to Small Entity Status* in the above-referenced patent application. This written assertion is intended to notify the Office of the loss of entitlement to small entity status. Please contact the undersigned representative below if you have any questions or require any additional information.

Respectfully submitted,

Scott S. Kokka
Reg. No. 51,893

KOKKA & BACKUS, PC
703 High Street
Palo Alto, CA 94301-2447
Tel: (650) 566-9921
Fax: (650) 566-9922

# Electronic Patent Application Fee Transmittal

| | |
|---|---|
| **Application Number:** | 13948160 |
| **Filing Date:** | 22-Jul-2013 |
| **Title of Invention:** | DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA) |
| **First Named Inventor/Applicant Name:** | Gregory C. Burnett |
| **Filer:** | Scott Susumu Kokka/Mark Cleland |
| **Attorney Docket Number:** | ALI-050CCON1 |

Filed as Large Entity

## Utility under 35 USC 111(a) Filing Fees

| Description | Fee Code | Quantity | Amount | Sub-Total in USD($) |
|---|---|---|---|---|
| **Basic Filing:** | | | | |
| Utility application filing | 1011 | 1 | 280 | 280 |
| Utility Search Fee | 1111 | 1 | 600 | 600 |
| Utility Examination Fee | 1311 | 1 | 720 | 720 |
| **Pages:** | | | | |
| **Claims:** | | | | |
| **Miscellaneous-Filing:** | | | | |
| Late Filing Fee for Oath or Declaration | 1051 | 1 | 140 | 140 |
| **Petition:** | | | | |

| Description | Fee Code | Quantity | Amount | Sub-Total in USD($) |
|---|---|---|---|---|
| **Patent-Appeals-and-Interference:** | | | | |
| **Post-Allowance-and-Post-Issuance:** | | | | |
| **Extension-of-Time:** | | | | |
| Extension - 5 months with $0 paid | 1255 | 1 | 3000 | 3000 |
| **Miscellaneous:** | | | | |
| | | **Total in USD ($)** | | **4740** |

# Electronic Acknowledgement Receipt

| | |
|---|---|
| **EFS ID:** | 18417299 |
| **Application Number:** | 13948160 |
| **International Application Number:** | |
| **Confirmation Number:** | 2184 |
| **Title of Invention:** | DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA) |
| **First Named Inventor/Applicant Name:** | Gregory C. Burnett |
| **Customer Number:** | 15516 |
| **Filer:** | Scott Susumu Kokka |
| **Filer Authorized By:** | |
| **Attorney Docket Number:** | ALI-050CCON1 |
| **Receipt Date:** | 10-MAR-2014 |
| **Filing Date:** | 22-JUL-2013 |
| **Time Stamp:** | 23:28:27 |
| **Application Type:** | Utility under 35 USC 111(a) |

## Payment information:

| | |
|---|---|
| Submitted with Payment | yes |
| Payment Type | Credit Card |
| Payment was successfully received in RAM | $4740 |
| RAM confirmation Number | 8755 |
| Deposit Account | |
| Authorized User | |

## File Listing:

| Document Number | Document Description | File Name | File Size(Bytes)/ Message Digest | Multi Part /.zip | Pages (if appl.) |
|---|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| 1 | | ALI-050CCON1_Response_to_NOMP_asfiled.pdf | 265401<br>d1cefda4e9a66ad81e30de3d6075c15949f82477 | yes | 5 |

| Multipart Description/PDF files in .zip description | | |
|---|---|---|
| **Document Description** | **Start** | **End** |
| Applicant Response to Pre-Exam Formalities Notice | 1 | 4 |
| Notification of loss of entitlement to small entity status | 5 | 5 |

**Warnings:**

**Information:**

| | | | | | |
|---|---|---|---|---|---|
| 2 | Fee Worksheet (SB06) | fee-info.pdf | 38983<br>c265e927d58c60cc43d0b27be78fb1e130ffa188 | no | 2 |

**Warnings:**

**Information:**

| | |
|---|---|
| **Total Files Size (in bytes):** | 304384 |

**This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.**

**New Applications Under 35 U.S.C. 111**

**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

**National Stage of an International Application under 35 U.S.C. 371**

**If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.**

**New International Application Filed with the USPTO as a Receiving Office**

**If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.**

## PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 13/948,160

### APPLICATION AS FILED - PART I

| FOR | (Column 1) NUMBER FILED | (Column 2) NUMBER EXTRA | SMALL ENTITY RATE($) | SMALL ENTITY FEE($) | OR | OTHER THAN SMALL ENTITY RATE($) | OTHER THAN SMALL ENTITY FEE($) |
|---|---|---|---|---|---|---|---|
| BASIC FEE (37 CFR 1.16(a), (b), or (c)) | N/A | N/A | N/A | | | N/A | 280 |
| SEARCH FEE (37 CFR 1.16(k), (i), or (m)) | N/A | N/A | N/A | | | N/A | 600 |
| EXAMINATION FEE (37 CFR 1.16(o), (p), or (q)) | N/A | N/A | N/A | | | N/A | 720 |
| TOTAL CLAIMS (37 CFR 1.16(i)) | 1 minus 20 = | * | | | OR | x 80 = | 0.00 |
| INDEPENDENT CLAIMS (37 CFR 1.16(h)) | 1 minus 3 = | * | | | | x 420 = | 0.00 |
| APPLICATION SIZE FEE (37 CFR 1.16(s)) | If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s). | | | | | | 0.00 |
| MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j)) | | | | | | | 0.00 |
| * If the difference in column 1 is less than zero, enter "0" in column 2. | | | TOTAL | | | TOTAL | 1600 |

### APPLICATION AS AMENDED - PART II

AMENDMENT A

| | (Column 1) CLAIMS REMAINING AFTER AMENDMENT | | (Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR | (Column 3) PRESENT EXTRA | SMALL ENTITY RATE($) | SMALL ENTITY ADDITIONAL FEE($) | OR | OTHER THAN SMALL ENTITY RATE($) | OTHER THAN SMALL ENTITY ADDITIONAL FEE($) |
|---|---|---|---|---|---|---|---|---|---|
| Total (37 CFR 1.16(i)) | * | Minus | ** | = | x = | | OR | x = | |
| Independent (37 CFR 1.16(h)) | * | Minus | *** | = | x = | | OR | x = | |
| Application Size Fee (37 CFR 1.16(s)) | | | | | | | | | |
| FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) | | | | | | | OR | | |
| | | | | | TOTAL ADD'L FEE | | OR | TOTAL ADD'L FEE | |

AMENDMENT B

| | (Column 1) CLAIMS REMAINING AFTER AMENDMENT | | (Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR | (Column 3) PRESENT EXTRA | RATE($) | ADDITIONAL FEE($) | | RATE($) | ADDITIONAL FEE($) |
|---|---|---|---|---|---|---|---|---|---|
| Total (37 CFR 1.16(i)) | * | Minus | ** | = | x = | | OR | x = | |
| Independent (37 CFR 1.16(h)) | * | Minus | *** | = | x = | | OR | x = | |
| Application Size Fee (37 CFR 1.16(s)) | | | | | | | | | |
| FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) | | | | | | | OR | | |
| | | | | | TOTAL ADD'L FEE | | OR | TOTAL ADD'L FEE | |

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NUMBER | FILING or 371(c) DATE | GRP ART UNIT | FIL FEE REC'D | ATTY.DOCKET.NO | TOT CLAIMS | IND CLAIMS |
|---|---|---|---|---|---|---|
| 13/948,160 | 07/22/2013 | 2654 | 1740 | ALI-050CCON1 | 1 | 1 |

**CONFIRMATION NO. 2184**

**UPDATED FILING RECEIPT**

15516
Kokka & Backus, PC
703 High Street
Palo Alto, CA 94301




Date Mailed: 03/20/2014

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

**Inventor(s)**

Gregory C. Burnett, Dodge Center, MN;

**Applicant(s)**

Gregory C. Burnett, Dodge Center, MN;

**Power of Attorney:** None

**Domestic Priority data as claimed by applicant**

This application is a CON of 12/139,355 06/13/2008 PAT 8494177
which claims benefit of 60/934,551 06/13/2007
and claims benefit of 60/953,444 08/01/2007
and claims benefit of 60/954,712 08/08/2007
and claims benefit of 61/045,377 04/16/2008

**Foreign Applications** for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
*Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.*

**If Required, Foreign Filing License Granted:** 08/06/2013

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 13/948,160**

**Projected Publication Date:** 06/26/2014

**Non-Publication Request:** No

**Early Publication Request:** No

**Title**

DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)

**Preliminary Class**

381

**Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications:** No

## PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

## LICENSE FOR FOREIGN FILING UNDER

## Title 35, United States Code, Section 184

## Title 37, Code of Federal Regulations, 5.11 & 5.15

**GRANTED**

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

**NOT GRANTED**

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

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## *SelectUSA*

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NUMBER | FILING OR 371(C) DATE | FIRST NAMED APPLICANT | ATTY. DOCKET NO./TITLE |
|---|---|---|---|
| 13/948,160 | 07/22/2013 | Gregory C. Burnett | ALI-050CCON1 |

**CONFIRMATION NO. 2184**

15516
Kokka & Backus, PC
703 High Street
Palo Alto, CA 94301

**NOTICE**

*OC000000067185063*

Date Mailed: 03/20/2014

## INFORMATIONAL NOTICE TO APPLICANT

Applicant is notified that the above-identified application contains the deficiencies noted below. No period for reply is set forth in this notice for correction of these deficiencies. However, if a deficiency relates to the inventor's oath or declaration, the applicant must file an oath or declaration in compliance with 37 CFR 1.63, or a substitute statement in compliance with 37 CFR 1.64, executed by or with respect to each actual inventor no later than the expiration of the time period set in the "Notice of Allowability" to avoid abandonment. See 37 CFR 1.53(f).

The item(s) indicated below are also required and should be submitted with any reply to this notice to avoid further processing delays.

- A properly executed inventor's oath or declaration has not been received for the following inventor(s):
  Gregory C. Burnett

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 13/948,160 | 07/22/2013 | Gregory C. Burnett | ALI-050CCON1 | 2184 |

15516 7590 05/12/2014

Kokka & Backus, PC
703 High Street
Palo Alto, CA 94301

| EXAMINER | |
|---|---|
| WEISS, HOWARD | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2814 | |

| MAIL DATE | DELIVERY MODE |
|---|---|
| 05/12/2014 | PAPER |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. 13/948,160 | Applicant(s) BURNETT, GREGORY C. | |
|---|---|---|---|
| | Examiner HOWARD WEISS | Art Unit 2814 | AIA (First Inventor to File) Status No |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *7/22/2013*.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims***

5)☒ Claim(s) *1* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☐ Claim(s) _____ is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

**Application Papers**

10)☒ The specification is objected to by the Examiner.

11)☒ The drawing(s) filed on *7/22/2013* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

**Certified copies:**

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

Attorney's Docket Number: ALI-050CCON1

Filing Date: 7/22/2013

Continuing Data: a continuation of 12/139,355 (06/13/2008 now U. S. Patent No. 8,494,177) which claims benefit of 60/934,551 (06/13/2007) and claims benefit of 60/953,444 (08/01/2007) and claims benefit of 60/954,712 (08/08/2007) and claims benefit of 61/045,377 (04/16/2008)

Claimed Foreign Priority Date: none

Applicant(s): Burnett

Examiner: Howard Weiss

### *Notice of Pre-AIA or AIA Status*

1. The present application is being examined under the pre-AIA first to invent provisions.

2. In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

### *Specification*

3. The disclosure is objected to because of the following informalities: --now U. S. Patent No. 8,494,177—should be inserted after “2008” in Line 2 of Paragraph **[0001]**. Appropriate correction is required.

### *Claim Rejections - 35 USC § 102*

4. The following is a quotation of the appropriate paragraphs of pre-AIA 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section

351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claim 1 is rejected under pre-AIA 35 U.S.C. 102(e) as being anticipated by Zhang et al. (U. S. Patent No. 8,068,619).

Zhang et al. show all aspects of the instant invention (e.g. Figure 2) including:

- A microphone array including a first physical microphone **212a** outputting a first microphone signal $\mathbf{s_1(n)}$ and a second physical microphone **212b** outputting a second microphone signal **a(n)**
- a processing component coupled to the microphone array and generating a virtual microphone array comprising a first virtual microphone $\mathbf{b_1(n)}$ comprising a first combination of the first microphone signal and the second microphone signal, the second virtual microphone $\mathbf{r_1(n)}$ comprising a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone and the second virtual microphone have substantially similar responses to noise and substantially dissimilar responses to speech
- an adaptive noise removal application **270** coupled to the processing component and generating denoised output signals $\mathbf{b_0(n)}$ by forming a plurality of combinations of signals output from the first virtual microphone and the second virtual microphone, wherein the denoised output signals include less acoustic noise than acoustic signals received at the microphone array

***Double Patenting***

6. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory double patenting rejection is appropriate where the claims at issue are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140

F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the reference application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement. A terminal disclaimer must be signed in compliance with 37 CFR 1.321(b).

The USPTO internet Web site contains terminal disclaimer forms which may be used. Please visit http://www.uspto.gov/forms/. The filing date of the application will determine what form should be used. A web-based eTerminal Disclaimer may be filled out completely online using web-screens. An eTerminal Disclaimer that meets all requirements is auto-processed and approved immediately upon submission. For more information about eTerminal Disclaimers, refer to http://www.uspto.gov/patents/process/file/efs/guidance/eTD-info-I.jsp.

7. Claim 1 is rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1, 25, 29, 45 and 51 of U.S. Patent No. 8,494,177. Although the claims at issue are not identical, they are not patentably distinct from each other because both claim a microphone array including a first physical microphone outputting a first microphone signal and a second physical microphone outputting a second microphone signal, a processing component coupled to the microphone array and generating a virtual microphone array comprising a first virtual microphone comprising a first combination of the first microphone signal and the second microphone signal, the second virtual microphone comprising a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone and the second virtual microphone have substantially similar responses to noise and substantially dissimilar responses to speech and an adaptive noise removal application coupled to the processing component and generating denoised output signals by forming a plurality of combinations of signals output from

the first virtual microphone and the second virtual microphone, wherein the denoised output signals include less acoustic noise than acoustic signals received at the microphone array. The instant invention is a broader statement of the invention of U.S. Patent No. 8,494,177.

8. Claim 1 is rejected on the ground of nonstatutory double patenting as being unpatentable over claims 27, 29 and 41 of U.S. Patent No. 8,503,691. Although the claims at issue are not identical, they are not patentably distinct from each other because both claim a microphone array including a first physical microphone outputting a first microphone signal and a second physical microphone outputting a second microphone signal, a processing component coupled to the microphone array and generating a virtual microphone array comprising a first virtual microphone comprising a first combination of the first microphone signal and the second microphone signal, the second virtual microphone comprising a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone and the second virtual microphone have substantially similar responses to noise and substantially dissimilar responses to speech and an adaptive noise removal application coupled to the processing component and generating denoised output signals by forming a plurality of combinations of signals output from the first virtual microphone and the second virtual microphone, wherein the denoised output signals include less acoustic noise than acoustic signals received at the microphone array. The instant invention is a broader statement of the invention of U.S. Patent No. 8,503,691.

9. Claim 1 is provisionally rejected on the ground of nonstatutory double patenting as being unpatentable over Claim 1 of copending Application No. 13/959,708 in view of Zhang et al. Copending Application No. 13/959,708 claim most aspects of the instant invention including a microphone array including a first physical microphone outputting a first microphone signal and a second physical microphone outputting a

second microphone signal, a processing component coupled to the microphone array and generating a virtual microphone array comprising a first virtual microphone comprising a first combination of the first microphone signal and the second microphone signal, the second virtual microphone comprising a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone and the second virtual microphone have substantially similar responses to noise and substantially dissimilar responses to speech. Copending Application No. 13/959,708 does not claim an adaptive noise removal application coupled to the processing component and generating denoised output signals by forming a plurality of combinations of signals output from the first virtual microphone and the second virtual microphone, wherein the denoised output signals include less acoustic noise than acoustic signals received at the microphone array. Zhang et al. teach (e.g. Figure 1) to use an adaptive noise removal application **270** coupled to the processing component and generating denoised output signals $\mathbf{b_0(n)}$ by forming a plurality of combinations of signals output from the first virtual microphone and the second virtual microphone, wherein the denoised output signals include less acoustic noise than acoustic signals received at the microphone array to reduce noise (Column 6 Lines 35 to 56). It would have been obvious to a person of ordinary skill in the art at the time of invention to use an adaptive noise removal application coupled to the processing component and generating denoised output signals by forming a plurality of combinations of signals output from the first virtual microphone and the second virtual microphone, wherein the denoised output signals include less acoustic noise than acoustic signals received at the microphone array as taught by Zhang et al. in the claimed invention of Copending Application No. 13/959,708 to reduce noise .

This is a provisional nonstatutory double patenting rejection.

***Conclusion***

10. Papers related to this application may be submitted directly to Art Unit 2814 by facsimile transmission. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (15 November 1989). The Art Unit 2814 Fax Center number is **(571) 273-8300**. The Art Unit 2814 Fax Center is to be used only for papers related to Art Unit 2814 applications.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Howard Weiss at **(571) 272-1720** and between the hours of 7:00 AM to 3:00 PM (Eastern Standard Time) Monday through Friday or by e-mail via **Howard.Weiss@uspto.gov**. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy, can be reached on **(571) 272-1705**.

12. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at **866-217-9197** (toll-free).

13. The following list is the Examiner's field of search for the present Office Action:

| Field of Search | Date |
|---|---|
| U.S. Class / Subclass(es): 381/ 92, 94.7; 704/ 233, E21.004; G10L 2021/ 02165, 21/ 0208; H04R 3/ 005 | 5/7/2014 |
| Other Documentation: search from 12/139,355 | 5/7/2014 |

| | |
|---|---|
| Electronic Database(s): EAST | 5/7/2014 |

HW/hw
9 May 2014

/Howard Weiss/
Primary Examiner
Art Unit 2814

| Notice of References Cited | Application/Control No. 13/948,160 | Applicant(s)/Patent Under Reexamination BURNETT, GREGORY C. | |
|---|---|---|---|
| | Examiner HOWARD WEISS | Art Unit 2814 | Page 1 of 1 |

**U.S. PATENT DOCUMENTS**

| * | | Document Number Country Code-Number-Kind Code | Date MM-YYYY | Name | Classification |
|---|---|---|---|---|---|
| * | A | US-8,494,177 | 07-2013 | Burnett | 381/92 |
| * | B | US-8,068,619 | 11-2011 | Zhang et al. | 381/92 |
| * | C | US-8,503,691 | 08-2013 | Burnett | 381/92 |
| | D | US- | | | |
| | E | US- | | | |
| | F | US- | | | |
| | G | US- | | | |
| | H | US- | | | |
| | I | US- | | | |
| | J | US- | | | |
| | K | US- | | | |
| | L | US- | | | |
| | M | US- | | | |

**FOREIGN PATENT DOCUMENTS**

| * | | Document Number Country Code-Number-Kind Code | Date MM-YYYY | Country | Name | Classification |
|---|---|---|---|---|---|---|
| | N | | | | | |
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**NON-PATENT DOCUMENTS**

| * | | Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages) |
|---|---|---|
| | U | |
| | V | |
| | W | |
| | X | |

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

**EAST Search History**

**EAST Search History (Prior Art)**

| Ref # | Hits | Search Query | DBs | Default Operator | Plurals | Time Stamp |
|---|---|---|---|---|---|---|
| S44 | 5 | "8494177" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | ADJ | OFF | 2014/05/06 14:12 |
| S45 | 23 | "8503692" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | ADJ | OFF | 2014/05/06 14:13 |
| S46 | 32 | (("8494177") or ("8503692") or ("8503691")).PN. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | OFF | 2014/05/06 14:13 |
| S47 | 5 | burnett.in. and S46 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | ADJ | OFF | 2014/05/06 14:14 |
| S48 | 2 | burnett.in. and S45 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | ADJ | OFF | 2014/05/06 14:21 |
| S49 | 2 | burnett.in. and S44 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | ADJ | OFF | 2014/05/06 14:21 |
| S50 | 1081 | ( (G10L2021/02165).CPC. ) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | ADJ | OFF | 2014/05/06 14:24 |
| S51 | 40 | S50 and (virtual near microphone) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | ADJ | OFF | 2014/05/06 14:25 |
| S52 | 24 | S50 and (virtual near microphone).clm. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | ADJ | OFF | 2014/05/06 14:26 |
| S53 | 0 | S52 not burnett.in. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | ADJ | OFF | 2014/05/06 14:27 |
| S54 | 3 | (US-8503692-$ or US-8503691-$ or US-8494177-$).did. | USPAT | ADJ | OFF | 2014/05/07 08:55 |
| S55 | 1081 | ( (G10L2021/02165).CPC. ) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | ADJ | OFF | 2014/05/07 08:56 |
| S56 | 122 | S55 AND ( (G10L2021/02165 OR G10L21/0208 OR | USPAT | ADJ | OFF | 2014/05/07 08:56 |

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|---|---|---|---|---|---|---|
| | | H04R3/005).CPC. ) | | | | |
| S57 | 4 | ("4649505" \| "5278780" \| "5608804" \| "5644596").PN. | US-PGPUB; USPAT; USOCR | ADJ | OFF | 2014/05/07 09:04 |
| S58 | 81 | ( (G10L2021/02165 and G10L21/0208).CPC. ) | USPAT | ADJ | OFF | 2014/05/07 09:06 |
| S59 | 37 | S58 and (adaptive noise) | USPAT | ADJ | OFF | 2014/05/07 09:07 |
| S60 | 19 | S59 and @ad<"20070801" | USPAT | ADJ | OFF | 2014/05/07 09:08 |
| S61 | 8 | @ad<"20070801" AND ( ( G10L21/0208 and H04R3/005).CPC. ) and (adaptive noise) | USPAT | ADJ | OFF | 2014/05/07 09:13 |
| S62 | 24 | @ad<"20070801" AND ( S55) and (adaptive noise) | USPAT | ADJ | OFF | 2014/05/07 09:18 |
| S63 | 20 | S62 not S61 | USPAT | ADJ | OFF | 2014/05/07 09:18 |
| S64 | 5 | S62 not (S61 or S60) | USPAT | ADJ | OFF | 2014/05/07 09:18 |
| S65 | 2828 | (704/233,E21.004).CCLS. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | OFF | 2014/05/07 09:19 |
| S66 | 364 | (381/94.7).CCLS. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | OFF | 2014/05/07 09:19 |
| S67 | 1778 | (381/92).CCLS. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | OFF | 2014/05/07 09:19 |
| S68 | 4743 | (S65 or S66 or S67) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | OFF | 2014/05/07 09:19 |
| S69 | 851 | S68 AND ( (G10L2021/02165 OR G10L21/0208 OR H04R3/005).CPC. ) | USPAT | ADJ | OFF | 2014/05/07 09:20 |
| S70 | 664 | S69 and @ad<"20070801" | USPAT | ADJ | OFF | 2014/05/07 09:20 |
| S71 | 87 | S70 AND (adaptive noise) | USPAT | ADJ | OFF | 2014/05/07 09:22 |

**EAST Search History (Interference)**

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**5/7/2014 1:24:07 PM**
**C:\ Users\ hweiss\ Documents\ EAST\ Workspaces\ 13948160.wsp**

| Search Notes | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 13948160 | BURNETT, GREGORY C. |
| | Examiner | Art Unit |
| | HOWARD WEISS | 2814 |

| CPC- SEARCHED | | |
|---|---|---|
| Symbol | Date | Examiner |
| G10L2021/02165, G10L21/0208, H04R3/005 | 5/7/2014 | HW |

| CPC COMBINATION SETS - SEARCHED | | |
|---|---|---|
| Symbol | Date | Examiner |
| | | |

| US CLASSIFICATION SEARCHED | | | |
|---|---|---|---|
| Class | Subclass | Date | Examiner |
| 381 | 92, 94.7 | 5/7/2014 | HW |
| 704 | 233, E21.004 | 5/7/2014 | HW |

| SEARCH NOTES | | |
|---|---|---|
| Search Notes | Date | Examiner |
| | | |

| INTERFERENCE SEARCH | | | |
|---|---|---|---|
| US Class/ CPC Symbol | US Subclass / CPC Group | Date | Examiner |
| | | | |

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| Index of Claims | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 13948160 | BURNETT, GREGORY C. |
| | **Examiner** | **Art Unit** |
| | HOWARD WEISS | 2814 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| ✓ | Rejected | - | Cancelled | N | Non-Elected | A | Appeal |
| = | Allowed | ÷ | Restricted | I | Interference | O | Objected |

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

| CLAIM | | DATE | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Final | Original | 05/07/2014 | | | | | | | | |
| | 1 | ✓ | | | | | | | | |

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| APPLICATION NUMBER | FILING OR 371(C) DATE | FIRST NAMED APPLICANT | ATTY. DOCKET NO./TITLE |
|---|---|---|---|
| 13/948,160 | 07/22/2013 | Gregory C. Burnett | ALI-050CCON1 |

**CONFIRMATION NO. 2184**

15516
Kokka & Backus, PC
703 High Street
Palo Alto, CA 94301

**PUBLICATION NOTICE**

*OC00000069310561*

**Title:**DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)

**Publication No.**US-2014-0177860-A1
**Publication Date:**06/26/2014

## NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Office of Public Records. The Office of Public Records can be reached by telephone at (703) 308-9726 or (800) 972-6382, by facsimile at (703) 305-8759, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, Alexandria, VA 22313-1450 or via the Internet.

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Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

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Office of Data Managment, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re the Application of:
**Gregory C. Burnett**

Application Serial No.: **13/948,160**

Filing Date: **July 22, 2013**

For: **DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)**

Examiner: **WEISS, Howard**

Confirmation No.: **2184**

Group Art Unit: **2814**

Transmission Date: **August 12, 2014**

Atty. Docket No.: **ALI-050CCON1**

**CERTIFICATE OF TRANSMISSION**

I hereby certify that this correspondence is being transmitted via the U.S. Patent and Trademark Office electronic filing system (**EFS-Web**) to the **USPTO** on **August 12, 2014**.
**Signed:** _____
**Heather N. Erwin**

## AMENDMENT A

Dear Sir or Madam:

Please find enclosed the following items:

1. Amendments to the Specification;
2. a complete, updated claim listing and remarks in response to the **Non-Final Office Action** mailed **May 12, 2014**, and;
3. Supplemental Application Data Sheet.

## AMENDMENTS TO THE SPECIFICATION

a. Kindly replace paragraph **[0001]** of the present application as filed with the replacement paragraph as indicated below.

**[0001]** This application is continuation of U.S. Nonprovisional Patent Application No. 12/139,355, filed June 13, 2008, **now U.S. Patent No. 8,494,177,** entitled "Dual Omnidirectional Microphone Array (DOMA)," which claims the benefit of U.S. Provisional Patent Application No. 60/934,551, filed June 13, 2007, U.S. Provisional Patent Application No. 60/953,444, filed August 1, 2007, U.S. Provisional Patent Application No.60/954,712, filed August 8, 2007, and U.S. Provisional Patent Application No. 61/045,377, filed April 16, 2008, all of which are incorporated by reference herein in their entirety for all purposes.

**AMENDMENTS TO THE CLAIMS:** This listing of claims will replace all prior versions, and listings, of claims in the application.

**Listing of Claims:**

1. (**Cancelled**)

2. (**New**) A system, comprising:

a microphone array including a first physical microphone outputting a first microphone signal and a second physical microphone outputting a second microphone signal;

a processing component coupled to the microphone array and generating a virtual microphone array including a first virtual microphone and a second virtual microphone, the first virtual microphone including a first combination of the first microphone signal and the second microphone signal, the second virtual microphone including a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone and the second virtual microphone have substantially similar responses to noise and substantially dissimilar responses to speech; and

an adaptive noise removal application coupled to the processing component and generating denoised output signals by forming a plurality of combinations of signals output from the first virtual microphone and the second virtual microphone, by filtering and summing the plurality of combinations of signals in the time domain, and by a varying linear transfer function between the plurality of combinations of signals, wherein the denoised output signals include less acoustic noise than acoustic signals received at the microphone array.



**Meta Platforms, Inc. - Exhibit 1002**
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3. (**New**) The system of Claim 2, wherein the acoustic noise comprises noise content and the acoustic signals comprise speech content.

4. (**New**) The system of Claim 3, wherein the speech content comprises human speech.

5. (**New**) The system of Claim 2 and further comprising: a voice activity detector (VAD) coupled with the processing component and operative to generate voice activity signals.

6. (**New**) The system of Claim 2 and further comprising: a communications channel coupled with the processing component and including one or more of a wireless channel, a wired channel, and a hybrid wireless/wired channel.

7. (**New**) The system of Claim 6 and further comprising: a communication device wirelessly coupled with the wireless channel of the communications channel.



**Meta Platforms, Inc. - Exhibit 1002**
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8. (**New**) A system, comprising:

a first virtual microphone formed from a first combination of a first microphone signal and a second microphone signal, wherein the first microphone signal is generated by a first physical microphone and the second microphone signal is generated by a second physical microphone;

a second virtual microphone formed from a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone has a first linear response to speech and first linear response to noise, the first linear response to speech being substantially similar across a plurality of frequencies for a speech source located within a predetermined angle relative to an axis of the microphone array and devoid of a null, wherein the second virtual microphone has a second linear response to speech that has a single null oriented in a direction toward a source of the speech and a second linear response to noise, wherein the second linear response to noise is substantially similar to the first linear response to noise, one or both of the first linear response to noise and the second linear response to noise being non-zero in a direction toward a source of noise, and the second linear response to speech is substantially dissimilar to the first linear response to speech, wherein the speech is human speech; and

an adaptive noise removal application coupled to the first and second virtual microphones and generating denoised output signals by forming a plurality of combinations of signals output from the first virtual microphone and the second virtual microphone, by filtering and summing the plurality of combinations of signals in the time



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domain, and by a varying linear transfer function between the plurality of combinations of signals, wherein the denoised output signals include less acoustic noise than acoustic signals received at the first and second physical microphones.

9. (**New**) The system of Claim 8 and further comprising:

a microphone array, the first and second physical microphones positioned in the microphone array.

10. (**New**) The system of Claim 8, wherein the single null is a region of the second linear response to speech having a measured response level that is lower than the measured response level of any other region of the second linear response to speech.

11. (**New**) The system of Claim 8 and further comprising: a voice activity detector (VAD) coupled with the processing component and operative to generate voice activity signals.

12. (**New**) The system of Claim 8 and further comprising: a communications channel coupled with the processing component and including one or more of a wireless channel, a wired channel, and a hybrid wireless/wired channel.

13. (**New**) The system of Claim 12 and further comprising: a communication device wirelessly coupled with the wireless channel of the communications channel.



**Meta Platforms, Inc. - Exhibit 1002**
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14. (**New**) The system of Claim 8, wherein the second microphone signal is multiplied by a ratio, wherein the ratio is a ratio of a third distance to a fourth distance, the third distance being between the first physical microphone and the speech source and the fourth distance being between the second physical microphone and the speech source.



**Meta Platforms, Inc. - Exhibit 1002**
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15. (**New**) A system, comprising:

a first virtual microphone comprising a first combination of a first microphone signal and a second microphone signal, the first virtual microphone having a first linear response to speech and a first linear response to noise, the first linear response to speech being substantially similar across a plurality of frequencies for a speech source located within a predetermined angle relative to an axis of a microphone array, wherein the first microphone signal is output from a first physical microphone and the second microphone signal is output from a second physical microphone;

a second virtual microphone comprising a second combination of the first microphone signal and the second microphone signal, the second virtual microphone having a second linear response to speech and a second linear response to noise, the second linear response to noise being substantially similar to the first linear response to noise, one or both of the first linear response to noise and the second linear response to noise being non-zero in a direction toward a source of noise, and the second linear response to speech being substantially dissimilar to the first linear response to speech, wherein the second combination is different from the first combination, wherein the first virtual microphone and the second virtual microphone are distinct virtual directional microphones; and

a processing component coupled to the first and second virtual microphones, the processing component including an adaptive noise removal application receiving acoustic signals from the first virtual microphone and the second virtual microphone,



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filtering and summing the acoustic signals in the time domain, applying a varying linear transfer function between the acoustic signals, and generating an output signal, wherein the output signal is a denoised acoustic signal.

16. (**New**) The system of Claim 15 and further comprising: a voice activity detector (VAD) coupled with the processing component and operative to generate voice activity signals.

17. (**New**) The system of Claim 15 and further comprising: a communications channel coupled with the processing component and including one or more of a wireless channel, a wired channel, and a hybrid wireless/wired channel.

18. (**New**) The system of Claim 17 and further comprising: a communication device wirelessly coupled with the wireless channel of the communications channel.

19. (**New**) The system of Claim 15, wherein the acoustic signals from the first virtual microphone, the second virtual microphone or both are delayed.

20. (**New**) The system of Claim 19, wherein the delay is raised to a power that is proportional to a time difference between arrival of the speech at the first virtual microphone and arrival of the speech at the second virtual microphone.



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21. (**New**) The system of Claim 20, wherein the power is proportional to a sampling frequency multiplied by a quantity equal to a third distance subtracted from a fourth distance, the third distance being between a first physical microphone and the speech source, the fourth distance being between a second physical microphone and the speech source, and the first and second physical microphones are positioned in the microphone array.



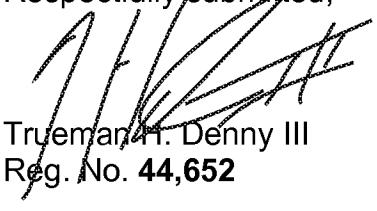
**Meta Platforms, Inc. - Exhibit 1002**
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## REMARKS

The status of the claims is as follows: **New Claims 2 – 21** are **Pending**; and **Claim 1** has been **Cancelled** herein. Paragraph **[0001]** of the **Specification** has been amended herein by replacement paragraph to overcome the Examiner's objections to the disclosure. The Examiner has rejected **Claim 1** under **pre-AIA 35 U.S.C. §102(e)** as being anticipated by U.S. Patent No. **8,068,619** to *Zhang*. **Claim 1** is provisionally rejected on grounds of **Non-Statutory Double Patenting** in view of Claims 1, 25, 29, 45 and 51 of U.S. Patent No. **8,494,177**, Claims 27, 29 and 36 of U.S. Patent No. **8,503,692**, and Claim 1 of co-pending U.S. Patent Application s/n **13/959,708**. The rejections are respectfully traversed. The **pre-AIA 35 U.S.C. §102(e)** and the provisional **Non-Statutory Double Patenting** rejections of **Claim 1** are mooted by the cancellation of independent **Claim 1**. New **Claims 2 – 21** are patentably distinct, are non-obvious, and are not anticipated by the cited sections of *Zhang*.

Reconsideration of the application and allowance of all claims are respectfully requested based on the preceding remarks. If at any time the Examiner believes that an interview would be helpful, please contact the undersigned.

Respectfully submitted,



Trueman H. Denny III
Reg. No. **44,652**

KOKKA & BACKUS, PC
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Palo Alto, CA 94301-2447
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# Supplemental Application Data Sheet

## Cross-Reference to Related Applications

This application is continuation of U.S. Nonprovisional Patent Application No. 12/139,355, filed June 13, 2008, **now U.S. Patent No. 8,494,177,** entitled "Dual Omnidirectional Microphone Array (DOMA)," which claims the benefit of U.S. Provisional Patent Application No. 60/934,551, filed June 13, 2007, U.S. Provisional Patent Application No. 60/953,444, filed August 1, 2007, U.S. Provisional Patent Application No.60/954,712, filed August 8, 2007, and U.S. Provisional Patent Application No. 61/045,377, filed April 16, 2008, all of which are incorporated by reference herein in their entirety for all purposes.

## Application Information

| | |
|---|---|
| **Filing Date::** | July 22, 2013 |
| **Application Type::** | Continuation |
| **Subject Matter::** | Utility |
| **Suggested Group Art Unit::** | None |
| **CD-ROM or CD-R?::** | None |
| **Title::** | DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA) |
| **Attorney Docket Number::** | ALI-050CCON1 |
| **Request for Early Publication?::** | No |
| **Request for Non-Publication?::** | No |
| **Suggested Drawing Figure::** | FIG. 1 |
| **Total Drawing Sheets::** | 17 |
| **Small Entity::** | Yes |
| **Petition included?::** | No |
| **Secrecy Order in Parent Appl.?::** | No |



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## Applicant Information

| | |
|---|---|
| **Applicant Authority type::** | Inventor |
| **Primary Citizenship Country::** | United States of America |
| **Status::** | Full Capacity |
| **Given Name::** | Gregory C. |
| **Family Name::** | Burnett |
| **City of Residence::** | Dodge Center |
| **State or Province of Residence::** | MN |
| **Country of Residence::** | United States of America |
| **Street of mailing address::** | 10550 First Timberlane Drive |
| **City of mailing address::** | Dodge Center |
| **Country of mailing address::** | United States of America |
| **State or Province of mailing address::** | MN |
| **Postal or Zip Code of mailing address::** | 55057 |

## Correspondence Information

| | |
|---|---|
| **Customer Number::** | 15516 |
| **Name::** | Kokka & Backus, PC |
| **Street of mailing address::** | 703 High Street |
| **City of mailing address::** | Palo Alto |
| **Country of mailing address::** | USA |
| **State or Province of mailing address::** | CA |
| **Postal or Zip Code of mailing address::** | 94301 |



Meta Platforms, Inc. - Exhibit 1002
125 of 450

**Telephone::** (650) 566-9921

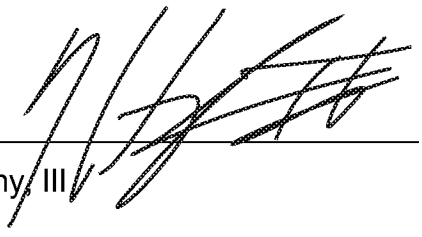
**Fax::** (650) 566-9922

## Representative Information

**Representative Customer Number::** 15516

| Representative Designation:: | Registration Number:: | Name:: |
|---|---|---|
| Primary | 44,652 | Trueman H. Denny, III |

## Signature



Trueman H. Denny, III

Reg. No. 44,652

**August 12, 2014**

Date



**Meta Platforms, Inc. - Exhibit 1002**
**126 of 450**

# Electronic Acknowledgement Receipt

| | |
|---|---|
| **EFS ID:** | 19848888 |
| **Application Number:** | 13948160 |
| **International Application Number:** | |
| **Confirmation Number:** | 2184 |
| **Title of Invention:** | DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA) |
| **First Named Inventor/Applicant Name:** | Gregory C. Burnett |
| **Customer Number:** | 15516 |
| **Filer:** | Trueman Homer Denny |
| **Filer Authorized By:** | |
| **Attorney Docket Number:** | ALI-050CCON1 |
| **Receipt Date:** | 12-AUG-2014 |
| **Filing Date:** | 22-JUL-2013 |
| **Time Stamp:** | 23:14:25 |
| **Application Type:** | Utility under 35 USC 111(a) |

## Payment information:

| | |
|---|---|
| Submitted with Payment | no |

## File Listing:

| Document Number | Document Description | File Name | File Size(Bytes)/ Message Digest | Multi Part /.zip | Pages (if appl.) |
|---|---|---|---|---|---|
| 1 | | ALI-050CCON1_Amendment_A_and_Supplemental_ADS_asfiled.pdf | 145515<br>81c88aa26228892592fedca757de74c141bd5075 | yes | 14 |

| | Multipart Description/PDF files in .zip description | | |
|---|---|---|---|
| | **Document Description** | **Start** | **End** |
| | Amendment/Req. Reconsideration-After Non-Final Reject | 1 | 11 |
| | Application Data Sheet | 12 | 14 |

| | |
|---|---|
| **Warnings:** | |
| **Information:** | |
| **Total Files Size (in bytes):** | 145515 |

**This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.**

**New Applications Under 35 U.S.C. 111**
**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

**National Stage of an International Application under 35 U.S.C. 371**
**If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.**

**New International Application Filed with the USPTO as a Receiving Office**
**If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.**

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

| PATENT APPLICATION FEE DETERMINATION RECORD<br>Substitute for Form PTO-875 | Application or Docket Number<br>13/948,160 | Filing Date<br>07/22/2013 | ☐ To be Mailed |
|---|---|---|---|

**ENTITY:** ☒ LARGE ☐ SMALL ☐ MICRO

## APPLICATION AS FILED – PART I

| FOR | (Column 1) NUMBER FILED | (Column 2) NUMBER EXTRA | RATE ($) | FEE ($) |
|---|---|---|---|---|
| ☐ BASIC FEE (37 CFR 1.16(a), (b), or (c)) | N/A | N/A | N/A | |
| ☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m)) | N/A | N/A | N/A | |
| ☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q)) | N/A | N/A | N/A | |
| TOTAL CLAIMS (37 CFR 1.16(i)) | minus 20 = | * | X $ = | |
| INDEPENDENT CLAIMS (37 CFR 1.16(h)) | minus 3 = | * | X $ = | |
| ☐ APPLICATION SIZE FEE (37 CFR 1.16(s)) | If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s). | | | |
| ☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j)) | | | | |
| * If the difference in column 1 is less than zero, enter "0" in column 2. | | | TOTAL | |

## APPLICATION AS AMENDED – PART II

AMENDMENT **08/12/2014**

| | (Column 1) CLAIMS REMAINING AFTER AMENDMENT | | (Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR | (Column 3) PRESENT EXTRA | RATE ($) | ADDITIONAL FEE ($) |
|---|---|---|---|---|---|---|
| Total (37 CFR 1.16(i)) | * 13 | Minus | ** 20 | = 0 | X $80 = | 0 |
| Independent (37 CFR 1.16(h)) | * 2 | Minus | ***3 | = 0 | X $420 = | 0 |
| ☐ Application Size Fee (37 CFR 1.16(s)) | | | | | | |
| ☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) | | | | | | |
| | | | | | TOTAL ADD'L FEE | 0 |

AMENDMENT

| | (Column 1) CLAIMS REMAINING AFTER AMENDMENT | | (Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR | (Column 3) PRESENT EXTRA | RATE ($) | ADDITIONAL FEE ($) |
|---|---|---|---|---|---|---|
| Total (37 CFR 1.16(i)) | * | Minus | ** | = | X $ = | |
| Independent (37 CFR 1.16(h)) | * | Minus | *** | = | X $ = | |
| ☐ Application Size Fee (37 CFR 1.16(s)) | | | | | | |
| ☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) | | | | | | |
| | | | | | TOTAL ADD'L FEE | |

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
/ROLITA WIMBUSH/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

*If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*

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www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 13/948,160 | 07/22/2013 | Gregory C. Burnett | ALI-050CCON1 | 2184 |

15516 7590 10/14/2014

Kokka & Backus, PC
703 High Street
Palo Alto, CA 94301

| EXAMINER | |
|---|---|
| WEISS, HOWARD | |
| ART UNIT | PAPER NUMBER |
| 2814 | |

| MAIL DATE | DELIVERY MODE |
|---|---|
| 10/14/2014 | PAPER |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. 13/948,160 | Applicant(s) BURNETT, GREGORY C. | |
|---|---|---|---|
| | Examiner HOWARD WEISS | Art Unit 2814 | AIA (First Inventor to File) Status No |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *8/12/2014*.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims***

5)☒ Claim(s) *2-21* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☐ Claim(s) _____ is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☒ Claim(s) *2-21* are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

**Application Papers**

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

**Certified copies:**

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

Attorney's Docket Number: ALI-050CCON1

Filing Date: 7/22/2013

Continuing Data: a continuation of 12/139,355 (06/13/2008 now U. S. Patent No. 8,494,177) which claims benefit of 60/934,551 (06/13/2007) and claims benefit of 60/953,444 (08/01/2007) and claims benefit of 60/954,712 (08/08/2007) and claims benefit of 61/045,377 (04/16/2008)

Claimed Foreign Priority Date: none

Applicant(s): Burnett

Examiner: Howard Weiss

***Notice of Pre-AIA or AIA Status***

1. The present application is being examined under the pre-AIA first to invent provisions.

***Double Patenting***

2. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory double patenting rejection is appropriate where the claims at issue are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

   A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the reference application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement. A terminal disclaimer must be signed in compliance with 37 CFR 1.321(b).

   The USPTO internet Web site contains terminal disclaimer forms which may be used. Please visit http://www.uspto.gov/forms/. The filing date of the application will

determine what form should be used. A web-based eTerminal Disclaimer may be filled out completely online using web-screens. An eTerminal Disclaimer that meets all requirements is auto-processed and approved immediately upon submission. For more information about eTerminal Disclaimers, refer to http://www.uspto.gov/patents/process/file/efs/guidance/eTD-info-I.jsp.

3. Claims 2 to 14 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1 to 29 of U.S. Patent No. 8,494,177. Although the claims at issue are not identical, they are not patentably distinct from each other because both claim a microphone array including a first physical microphone outputting a first microphone signal and a second physical microphone outputting a second microphone signal, a processing component coupled to the microphone array and generating a virtual microphone array comprising a first virtual microphone comprising a first combination of the first microphone signal and the second microphone signal, the second virtual microphone comprising a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone and the second virtual microphone have substantially similar responses to noise and substantially dissimilar responses to speech and an adaptive noise removal application coupled to the processing component and generating denoised output signals by forming a plurality of combinations of signals output from the first virtual microphone and the second virtual microphone, by filtering and summing the plurality of combinations of signals in the time domain, and by a varying linear transfer function between the plurality of combinations of signals, wherein the denoised output signals include less acoustic noise than acoustic signals received at the microphone array

4. Claim 2 to 21 are rejected on the ground of nonstatutory double patenting as being unpatentable over Claims 1 to 27 of U.S. Patent No. 8,503,691. Although the claims at issue are not identical, they are not patentably distinct from each other because both claim a first virtual microphone formed from a first combination of a first

microphone signal and a second microphone signal, wherein the first microphone signal is generated by a first physical microphone and the second microphone signal is generated by a second physical microphone, a second virtual microphone formed from a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone has a first linear response to speech and first linear response to noise, the first linear response to speech being substantially similar across a plurality of frequencies for a speech source located within a predetermined angle relative to an axis of the microphone array and devoid of a null, wherein the second virtual microphone has a second linear response to speech that has a single null oriented in a direction toward a source of the speech and a second linear response to noise, wherein the second linear response to noise is substantially similar to the first linear response to noise, one or both of the first linear response to noise and the second linear response to noise being non-zero in a direction toward a source of noise, and the second linear response to speech is substantially dissimilar to the first linear response to speech, wherein the speech is human speech and an adaptive noise removal application coupled to the first and second virtual microphones and generating denoised output signals by forming a plurality of combinations of signals output from the first virtual microphone and the second virtual microphone, by filtering and summing the plurality of combinations of signals in the time domain, and by a varying linear transfer function between the plurality of combinations of signals, wherein the denoised output signals include less acoustic noise than acoustic signals received at the first and second physical microphones.

### *Response to Arguments*

5. Applicant's arguments with respect to Claims 2 to 21 have been considered but are moot because the arguments do not apply to any of the references being used in the current rejection.

***Conclusion***

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

   A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

7. Papers related to this application may be submitted directly to Art Unit 2814 by facsimile transmission. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (15 November 1989). The Art Unit 2814 Fax Center number is **(571) 273-8300**. The Art Unit 2814 Fax Center is to be used only for papers related to Art Unit 2814 applications.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Howard Weiss at **(571) 272-1720** and between the hours of 7:00 AM to 3:00 PM (Eastern Standard Time) Monday through Friday or by e-mail via **Howard.Weiss@uspto.gov**. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy, can be reached on **(571) 272-1705**.

9. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at **866-217-9197** (toll-free).

10. The following list is the Examiner's field of search for the present Office Action:

| Field of Search | Date |
|---|---|
| U.S. Class / Subclass(es): 381/ 92, 94.7; 704/ 233, E21.004; G10L 2021/ 02165, 21/ 0208; H04R 3/ 005 | Thru 10/10/2014 |
| Other Documentation: none | |
| Electronic Database(s): EAST | Thru 10/10/2014 |

HW/hw
14 October 2014

/Howard Weiss
Primary Examiner
Art Unit 2814

| Index of Claims | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 13948160 | BURNETT, GREGORY C. |
| | **Examiner** | **Art Unit** |
| | HOWARD WEISS | 2814 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| ✓ | Rejected | - | Cancelled | N | Non-Elected | A | Appeal |
| = | Allowed | ÷ | Restricted | I | Interference | O | Objected |

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

| CLAIM | | DATE | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Final | Original | 05/07/2014 | 10/10/2014 | | | | | | | |
| | 1 | ✓ | - | | | | | | | |
| | 2 | | ✓ | | | | | | | |
| | 3 | | ✓ | | | | | | | |
| | 4 | | ✓ | | | | | | | |
| | 5 | | ✓ | | | | | | | |
| | 6 | | ✓ | | | | | | | |
| | 7 | | ✓ | | | | | | | |
| | 8 | | ✓ | | | | | | | |
| | 9 | | ✓ | | | | | | | |
| | 10 | | ✓ | | | | | | | |
| | 11 | | ✓ | | | | | | | |
| | 12 | | ✓ | | | | | | | |
| | 13 | | ✓ | | | | | | | |
| | 14 | | ✓ | | | | | | | |
| | 15 | | ✓ | | | | | | | |
| | 16 | | ✓ | | | | | | | |
| | 17 | | ✓ | | | | | | | |
| | 18 | | ✓ | | | | | | | |
| | 19 | | ✓ | | | | | | | |
| | 20 | | ✓ | | | | | | | |
| | 21 | | ✓ | | | | | | | |

**EAST Search History**

**EAST Search History (Prior Art)**

| Ref # | Hits | Search Query | DBs | Default Operator | Plurals | Time Stamp |
|---|---|---|---|---|---|---|
| L12 | 2983 | (704/233,E21.004).CCLS. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | OFF | 2014/10/10 09:33 |
| L13 | 399 | (381/94.7).CCLS. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | OFF | 2014/10/10 09:33 |
| L14 | 1940 | (381/92).CCLS. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | OFF | 2014/10/10 09:33 |
| L15 | 5081 | (L12 or L13 or L14) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | OFF | 2014/10/10 09:33 |
| L16 | 2872 | L15 or ( (G10L2021/02165 OR G10L21/0208 OR H04R3/005).CPC. ) | USPAT | ADJ | OFF | 2014/10/10 09:33 |
| L17 | 14805 | L15 or ( (G10L2021/02165 OR G10L21/0208 OR H04R3/005).CPC. ) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | ADJ | OFF | 2014/10/10 09:33 |
| L18 | 396 | 17 and @pd>"20140507" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; IBM_TDB | ADJ | OFF | 2014/10/10 09:34 |

**EAST Search History (Interference)**

< This search history is empty>

**10/10/2014 10:09:20 AM**
**C:\Users\hweiss\Documents\EAST\Workspaces\13948160.wsp**



**Meta Platforms, Inc. - Exhibit 1002**
**138 of 450**

| Search Notes | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 13948160 | BURNETT, GREGORY C. |
| | Examiner | Art Unit |
| | HOWARD WEISS | 2814 |

| CPC- SEARCHED | | |
|---|---|---|
| Symbol | Date | Examiner |
| G10L2021/02165, G10L21/0208, H04R3/005 | 5/7/2014 | HW |
| updated | 10/10/2014 | HW |

| CPC COMBINATION SETS - SEARCHED | | |
|---|---|---|
| Symbol | Date | Examiner |
| | | |

| US CLASSIFICATION SEARCHED | | | |
|---|---|---|---|
| Class | Subclass | Date | Examiner |
| 381 | 92, 94.7 | 5/7/2014 | HW |
| 704 | 233, E21.004 | 5/7/2014 | HW |
| all updated | all updated | 10/10/2014 | HW |

| SEARCH NOTES | | |
|---|---|---|
| Search Notes | Date | Examiner |
| | | |

| INTERFERENCE SEARCH | | | |
|---|---|---|---|
| US Class/ CPC Symbol | US Subclass / CPC Group | Date | Examiner |
| | | | |

PTO/SB/30EFS (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

# REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL
## (Submitted Only via EFS-Web)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Application Number | 13948160 | Filing Date | 2013-07-22 | Docket Number (if applicable) | ALI-050CCON1 | Art Unit | 2814 |
| First Named Inventor | Gregory C. Burnett | | | Examiner Name | WEISS, Howard | | |

**This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.**
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV

### SUBMISSION REQUIRED UNDER 37 CFR 1.114

Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

☐ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

- ☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____
- ☐ Other _____

☒ Enclosed

- ☒ Amendment/Reply
- ☐ Information Disclosure Statement (IDS)
- ☐ Affidavit(s)/ Declaration(s)
- ☐ Other _____

### MISCELLANEOUS

☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months _____ (Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

☐ Other _____

### FEES

☐ **The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.**
The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No _____

### SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature

☐ Applicant Signature

PTO/SB/30EFS (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

| Signature of Registered U.S. Patent Practitioner | | | |
|---|---|---|---|
| Signature |  | Date (YYYY-MM-DD) | 2014-04-14 |
| Name | Scott S. Kokka | Registration Number | 51893 |

This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450.

*If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:
Gregory C. Burnett

Application Serial No.: 13/948,160

Filing Date: July 22, 2013

For: DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)

Examiner: WEISS, Howard

Confirmation No.: 2184

Group Art Unit: 2814

Transmission Date: April 14, 2015

Atty. Docket No.: ALI-050CCON1

CERTIFICATE OF EFS-WEB TRANSMISSION

I hereby certify that this correspondence is being transmitted via the U.S. Patent and Trademark Office electronic filing system (EFS-Web) to the USPTO on **April 14, 2015**.

Signed: 
Kate M. Cleland

**RESPONSE**

Dear Sir or Madam:

In response to the *Final Office Action* mailed October 14, 2014, please find enclosed a complete, updated claim listing and remarks as well as a *Terminal Disclaimer under 37 C.F.R. § 1.321 to Obviate a Non-Statutory Double Patenting Rejection*. Applicant hereby submits the $160 fee to cover the statutory disclaimer fee for undiscounted entity as well as a 3-month extension of time fee of $1,400.



**Meta Platforms, Inc. - Exhibit 1002**
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## CLAIM LISTING

1. (Cancelled)

2. (Previously presented) A system, comprising:

a microphone array including a first physical microphone outputting a first microphone signal and a second physical microphone outputting a second microphone signal;

a processing component coupled to the microphone array and generating a virtual microphone array including a first virtual microphone and a second virtual microphone, the first virtual microphone including a first combination of the first microphone signal and the second microphone signal, the second virtual microphone including a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone and the second virtual microphone have substantially similar responses to noise and substantially dissimilar responses to speech; and

an adaptive noise removal application coupled to the processing component and generating denoised output signals by forming a plurality of combinations of signals output from the first virtual microphone and the second virtual microphone, by filtering and summing the plurality of combinations of signals in the time domain, and by a varying linear transfer function between the plurality of combinations of signals, wherein the denoised output signals include less acoustic noise than acoustic signals received at the microphone array.



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3. (Previously presented) The system of Claim 2, wherein the acoustic noise comprises noise content and the acoustic signals comprise speech content.

4. (Previously presented) The system of Claim 3, wherein the speech content comprises human speech.

5. (Previously presented) The system of Claim 2 and further comprising: a voice activity detector (VAD) coupled with the processing component and operative to generate voice activity signals.

6. (Previously presented) The system of Claim 2 and further comprising: a communications channel coupled with the processing component and including one or more of a wireless channel, a wired channel, and a hybrid wireless/wired channel.

7. (Previously presented) The system of Claim 6 and further comprising: a communication device wirelessly coupled with the wireless channel of the communications channel.



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8. (Previously presented) A system, comprising:

a first virtual microphone formed from a first combination of a first microphone signal and a second microphone signal, wherein the first microphone signal is generated by a first physical microphone and the second microphone signal is generated by a second physical microphone;

a second virtual microphone formed from a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone has a first linear response to speech and first linear response to noise, the first linear response to speech being substantially similar across a plurality of frequencies for a speech source located within a predetermined angle relative to an axis of the microphone array and devoid of a null, wherein the second virtual microphone has a second linear response to speech that has a single null oriented in a direction toward a source of the speech and a second linear response to noise, wherein the second linear response to noise is substantially similar to the first linear response to noise, one or both of the first linear response to noise and the second linear response to noise being non-zero in a direction toward a source of noise, and the second linear response to speech is substantially dissimilar to the first linear response to speech, wherein the speech is human speech; and

an adaptive noise removal application coupled to the first and second virtual microphones and generating denoised output signals by forming a plurality of combinations of signals output from the first virtual microphone and the second virtual microphone, by filtering and summing the plurality of combinations of signals in the time domain, and by a varying linear transfer function between the plurality of combinations of signals, wherein the denoised output signals



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include less acoustic noise than acoustic signals received at the first and second physical microphones.

9. (Previously presented) The system of Claim 8 and further comprising:

a microphone array, the first and second physical microphones positioned in the microphone array.

10. (Previously presented) The system of Claim 8, wherein the single null is a region of the second linear response to speech having a measured response level that is lower than the measured response level of any other region of the second linear response to speech.

11. (Previously presented) The system of Claim 8 and further comprising: a voice activity detector (VAD) coupled with the processing component and operative to generate voice activity signals.

12. (Previously presented) The system of Claim 8 and further comprising: a communications channel coupled with the processing component and including one or more of a wireless channel, a wired channel, and a hybrid wireless/wired channel.

13. (Previously presented) The system of Claim 12 and further comprising: a communication device wirelessly coupled with the wireless channel of the communications channel.



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14. (Previously presented) The system of Claim 8, wherein the second microphone signal is multiplied by a ratio, wherein the ratio is a ratio of a third distance to a fourth distance, the third distance being between the first physical microphone and the speech source and the fourth distance being between the second physical microphone and the speech source.



**Meta Platforms, Inc. - Exhibit 1002**
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15. (Previously presented) A system, comprising:

a first virtual microphone comprising a first combination of a first microphone signal and a second microphone signal, the first virtual microphone having a first linear response to speech and a first linear response to noise, the first linear response to speech being substantially similar across a plurality of frequencies for a speech source located within a predetermined angle relative to an axis of a microphone array, wherein the first microphone signal is output from a first physical microphone and the second microphone signal is output from a second physical microphone;

a second virtual microphone comprising a second combination of the first microphone signal and the second microphone signal, the second virtual microphone having a second linear response to speech and a second linear response to noise, the second linear response to noise being substantially similar to the first linear response to noise, one or both of the first linear response to noise and the second linear response to noise being non-zero in a direction toward a source of noise, and the second linear response to speech being substantially dissimilar to the first linear response to speech, wherein the second combination is different from the first combination, wherein the first virtual microphone and the second virtual microphone are distinct virtual directional microphones; and

a processing component coupled to the first and second virtual microphones, the processing component including an adaptive noise removal application receiving acoustic signals from the first virtual microphone and the second virtual microphone, filtering and summing the



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acoustic signals in the time domain, applying a varying linear transfer function between the acoustic signals, and generating an output signal, wherein the output signal is a denoised acoustic signal.

16. (Previously presented) The system of Claim 15 and further comprising: a voice activity detector (VAD) coupled with the processing component and operative to generate voice activity signals.

17. (Previously presented) The system of Claim 15 and further comprising: a communications channel coupled with the processing component and including one or more of a wireless channel, a wired channel, and a hybrid wireless/wired channel.

18. (Previously presented) The system of Claim 17 and further comprising: a communication device wirelessly coupled with the wireless channel of the communications channel.

19. (Previously presented) The system of Claim 15, wherein the acoustic signals from the first virtual microphone, the second virtual microphone or both are delayed.

20. (Previously presented) The system of Claim 19, wherein the delay is raised to a power that is proportional to a time difference between arrival of the speech at the first virtual microphone and arrival of the speech at the second virtual microphone.



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21. (Previously presented) The system of Claim 20, wherein the power is proportional to a sampling frequency multiplied by a quantity equal to a third distance subtracted from a fourth distance, the third distance being between a first physical microphone and the speech source, the fourth distance being between a second physical microphone and the speech source, and the first and second physical microphones are positioned in the microphone array.



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## REMARKS

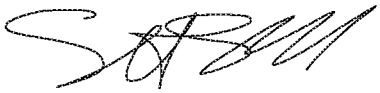
Claims 2-21 remain pending.

The examiner has rejected claims 2 to14 on the ground of non-statutory double patenting as being unpatentable over claims 1 to 29 of U.S. Patent No. 8,494,177. The Examiner has rejected claims 2 to 21 on the ground of non-statutory double patenting as being unpatentable over claims 1 to 27 of U.S. Patent No. 8,503,691.

Applicant respectfully submits the enclosed *Terminal Disclaimer under 37 C.F.R. § 1.321 to Obviate an Obviousness-Type Double Patenting Rejection* to overcome the Examiner's non-statutory double patenting rejections.

Reconsideration of the application and allowance of all claims are respectfully requested based on the preceding remarks. If at any time the Examiner believes that an interview would be helpful, please contact the undersigned.

Respectfully submitted,



Scott S. Kokka
Reg. No. 51,893

KOKKA & BACKUS, PC
703 High Street
Palo Alto, CA 94301-2447
Tel: (650) 566-9921
Fax: (650) 566-9922



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**151 of 450**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

| | |
|---|---|
| In re Application of:<br>Gregory C. Burnett<br><br>Application No.: 13/948,160<br><br>Filed: July 22, 2013<br><br>For: DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA) | Confirmation No.: 2184<br><br>Examiner: WEISS, Howard<br><br>Group Art Unit: 2814<br><br>Date: April 14, 2015<br><br>Atty. Docket No.: ALI-050CCON1 |

CERTIFICATE OF EFS-WEBTRANSMISSION

I hereby certify that this correspondence is being transmitted to the United States Patent and Trademark Office via EFS Web on **April 14, 2015**.

Signed: K. Cleland
Kate M. Cleland

## TERMINAL DISCLAIMER UNDER 37 C.F.R. § 1.321(c) TO OBVIATE AN OBVIOUSNESS-TYPE DOUBLE PATENTING REJECTION

Dear Sir:

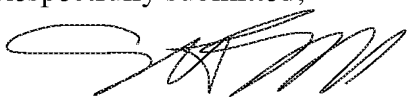
The owner, AliphCom, Inc. (Assignee), of the entire interest in the above-identified application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the above-identified application (hereafter "instant application"), which would extend beyond the expiration date of the full statutory term, as defined in 35 U.S.C. §§ 154 and 173, of prior United States Patent No. 8,494,177 and prior United States Patent No. 8,503,691 (hereafter "prior patents"), as presently shortened by any terminal disclaimer. The owner hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and the prior patents are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

In making the above disclaimer, the owner does not disclaim the terminal part of any patent granted on the instant application that would extend to the expiration date of the full statutory term, as defined in 35 U.S.C. §§ 154 and 173, of the prior patents, as presently shortened by any terminal disclaimer, in the event that it later: expires for failure to pay a

maintenance fee, is held unenforceable, is found invalid by a court of competent jurisdiction, is statutorily disclaimed in whole or terminally disclaimed under 37 CFR § 1.321, has all claims canceled by a reexamination certificate, is reissued, or is in any manner terminated prior to the expiration of its full statutory term as presently shortened by any terminal disclaimer.

We hereby submit the amount of $160.00 to cover the statutory disclaimer fee. If any questions arise regarding this statutory disclaimer, please contact the undersigned attorney or agent of record.

Respectfully submitted,



Date: April 14, 2015

Scott S. Kokka
Reg. No. 51,893

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703 High Street
Palo Alto, CA 94301-2447
Tel: (650) 566-9921
Fax: (650) 566-9922



**Meta Platforms, Inc. - Exhibit 1002**
**153 of 450**

# Electronic Patent Application Fee Transmittal

| | |
|---|---|
| **Application Number:** | 13948160 |
| **Filing Date:** | 22-Jul-2013 |
| **Title of Invention:** | DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA) |
| **First Named Inventor/Applicant Name:** | Gregory C. Burnett |
| **Filer:** | Scott Susumu Kokka/Kate Cleland |
| **Attorney Docket Number:** | ALI-050CCON1 |

Filed as Large Entity

**Filing Fees for Utility under 35 USC 111(a)**

| Description | Fee Code | Quantity | Amount | Sub-Total in USD($) |
|---|---|---|---|---|
| **Basic Filing:** | | | | |
| **Pages:** | | | | |
| **Claims:** | | | | |
| **Miscellaneous-Filing:** | | | | |
| **Petition:** | | | | |
| **Patent-Appeals-and-Interference:** | | | | |
| **Post-Allowance-and-Post-Issuance:** | | | | |
| **Extension-of-Time:** | | | | |

| Description | Fee Code | Quantity | Amount | Sub-Total in USD($) |
|---|---|---|---|---|
| Extension - 3 months with $0 paid | 1253 | 1 | 1400 | 1400 |
| **Miscellaneous:** | | | | |
| Request for Continued Examination | 1801 | 1 | 1200 | 1200 |
| Statutory or Terminal Disclaimer | 1814 | 1 | 160 | 160 |
| | | **Total in USD ($)** | | **2760** |

# Electronic Acknowledgement Receipt

| | |
|---|---|
| **EFS ID:** | 22063119 |
| **Application Number:** | 13948160 |
| **International Application Number:** | |
| **Confirmation Number:** | 2184 |
| **Title of Invention:** | DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA) |
| **First Named Inventor/Applicant Name:** | Gregory C. Burnett |
| **Customer Number:** | 15516 |
| **Filer:** | Scott Susumu Kokka |
| **Filer Authorized By:** | |
| **Attorney Docket Number:** | ALI-050CCON1 |
| **Receipt Date:** | 14-APR-2015 |
| **Filing Date:** | 22-JUL-2013 |
| **Time Stamp:** | 23:14:54 |
| **Application Type:** | Utility under 35 USC 111(a) |

## Payment information:

| | |
|---|---|
| Submitted with Payment | yes |
| Payment Type | Credit Card |
| Payment was successfully received in RAM | $2760 |
| RAM confirmation Number | 7257 |
| Deposit Account | |
| Authorized User | |
| The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: | |

## File Listing:

| Document Number | Document Description | File Name | File Size(Bytes)/ Message Digest | Multi Part /.zip | Pages (if appl.) |
|---|---|---|---|---|---|
| 1 | Request for Continued Examination (RCE) | ALI-050CCON1_RCE_asfiled.pdf | 37566<br>6604521736f468a3948759287a4626fa45385d1e | no | 2 |
| **Warnings:** | | | | | |
| This is not a USPTO supplied RCE SB30 form. | | | | | |
| **Information:** | | | | | |
| 2 | Amendment Submitted/Entered with Filing of CPA/RCE | ALI-050CCON1_Response_asfiled.pdf | 114537<br>2edb66ba6ea0061e3a91e5e3dc6b767192bd8dd3 | no | 10 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 3 | Terminal Disclaimer Filed | ALI-050CCON1_Terminal_Disclaimer_asfiled.pdf | 89191<br>f6ea68814f2dfe63e0dffdfea6ccd1cad11f378e | no | 2 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 4 | Fee Worksheet (SB06) | fee-info.pdf | 34485<br>e11b8dbef97c9bfbe16fcddf3e37b7d23724d1d3 | no | 2 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| | | **Total Files Size (in bytes):** | 275779 | | |

**This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.**

**New Applications Under 35 U.S.C. 111**

**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

**National Stage of an International Application under 35 U.S.C. 371**

**If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.**

**New International Application Filed with the USPTO as a Receiving Office**

**If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.**

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

| PATENT APPLICATION FEE DETERMINATION RECORD<br>Substitute for Form PTO-875 | Application or Docket Number<br>13/948,160 | Filing Date<br>07/22/2013 | ☐ To be Mailed |
|---|---|---|---|

**ENTITY**: ☒ LARGE ☐ SMALL ☐ MICRO

## APPLICATION AS FILED – PART I

| | (Column 1) | (Column 2) | | |
|---|---|---|---|---|
| FOR | NUMBER FILED | NUMBER EXTRA | RATE ($) | FEE ($) |
| ☐ BASIC FEE (37 CFR 1.16(a), (b), or (c)) | N/A | N/A | N/A | |
| ☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m)) | N/A | N/A | N/A | |
| ☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q)) | N/A | N/A | N/A | |
| TOTAL CLAIMS (37 CFR 1.16(i)) | minus 20 = | * | X $ = | |
| INDEPENDENT CLAIMS (37 CFR 1.16(h)) | minus 3 = | * | X $ = | |
| ☐ APPLICATION SIZE FEE (37 CFR 1.16(s)) | If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s). | | | |
| ☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j)) | | | | |
| * If the difference in column 1 is less than zero, enter "0" in column 2. | | | TOTAL | |

## APPLICATION AS AMENDED – PART II

| AMENDMENT | 04/14/2015 | (Column 1) CLAIMS REMAINING AFTER AMENDMENT | | (Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR | (Column 3) PRESENT EXTRA | RATE ($) | ADDITIONAL FEE ($) |
|---|---|---|---|---|---|---|---|
| | Total (37 CFR 1.16(i)) | * 20 | Minus | ** 20 | = 0 | X $80 = | 0 |
| | Independent (37 CFR 1.16(h)) | * 3 | Minus | ***3 | = 0 | X $420 = | 0 |
| | ☐ Application Size Fee (37 CFR 1.16(s)) | | | | | | |
| | ☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) | | | | | | |
| | | | | | | TOTAL ADD'L FEE | 0 |

| AMENDMENT | | (Column 1) CLAIMS REMAINING AFTER AMENDMENT | | (Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR | (Column 3) PRESENT EXTRA | RATE ($) | ADDITIONAL FEE ($) |
|---|---|---|---|---|---|---|---|
| | Total (37 CFR 1.16(i)) | * | Minus | ** | = | X $ = | |
| | Independent (37 CFR 1.16(h)) | * | Minus | *** | = | X $ = | |
| | ☐ Application Size Fee (37 CFR 1.16(s)) | | | | | | |
| | ☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) | | | | | | |
| | | | | | | TOTAL ADD'L FEE | |

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
/PAULA BRITTON/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**
*If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*

| Application Number | Application/Control No. | Applicant(s)/Patent under Reexamination | |
|---|---|---|---|
| | 13/948,160 | BURNETT, GREGORY C. | |

| Document Code - DISQ | Internal Document – DO NOT MAIL |
|---|---|

| TERMINAL DISCLAIMER | ☐ APPROVED | ☒ DISAPPROVED |
|---|---|---|
| **Date Filed : 04/14/15** | **This patent is subject to a Terminal Disclaimer** | |

**Approved/Disapproved by:**

Td identifies a party who is not the applicant (for applications filed on/after 9/16/12), see FP 14.26.10.

Below is what needs to be done by Applicant to remedy the defects:

A request under 37 CFR 1.46(c) to change the applicant needs to be filed, which is:

1. A request, signed by a 1.33(b) party,
2. A corrected ADS (37 CFR 1.76(c) that identifies the “NEW” Applicant in the applicant information, and is Underlined since its new, and,
3. A 3.73(c) statement showing chain of title to the New Applicant.
4. We need a POA that gives power to the attorney who is signing the Td,
5. Along with another copy of the Td.

NO FEE is required.

Angie Walker

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 13/948,160 | 07/22/2013 | Gregory C. Burnett | ALI-050CCON1 | 2184 |

15516 7590 06/09/2015

Kokka & Backus, PC
703 High Street
Palo Alto, CA 94301

| EXAMINER |
|---|
| WEISS, HOWARD |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2814 | |

| MAIL DATE | DELIVERY MODE |
|---|---|
| 06/09/2015 | PAPER |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. 13/948,160 | Applicant(s) BURNETT, GREGORY C. | |
|---|---|---|---|
| | Examiner HOWARD WEISS | Art Unit 2814 | AIA (First Inventor to File) Status No |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *4/14/2015*.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims***

5)☒ Claim(s) *2-21* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *2-21* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

**Application Papers**

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

**Certified copies:**

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

Attorney's Docket Number: ALI-050CCON1

Filing Date: 7/22/2013

Continuing Data: a continuation of 12/139,355 (06/13/2008 now U. S. Patent No. 8,494,177) which claims benefit of 60/934,551 (06/13/2007) and claims benefit of 60/953,444 (08/01/2007) and claims benefit of 60/954,712 (08/08/2007) and claims benefit of 61/045,377 (04/16/2008); RCE established 4/14/2015

Claimed Foreign Priority Date: none

Applicant(s): Burnett

Examiner: Howard Weiss

***Notice of Pre-AIA or AIA Status***

1. The present application is being examined under the pre-AIA first to invent provisions.

***Continued Examination Under 37 CFR 1.114***

2. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 4/14/2015 has been entered.

***Terminal Disclaimer***

3. The terminal disclaimer filed on 4/14/2015 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of U.S. Patent Nos. 8,494,177 and 8,503,691 has been reviewed and is NOT accepted.

4. The terminal disclaimer does not comply with 37 CFR 1.321 because:
This application was filed on or after September 16, 2012. The party identified in the terminal disclaimer (TD) is not the applicant of record. A request to change the applicant under 37 CFR 1.46(c) must be filed and must include an application data sheet specifying the applicant in the applicant information section and comply with 37 CFR 3.71 and 3.73. To be reconsidered, the terminal disclaimer must be filed with the request under 37 CFR 1.46(c). See MPEP 1490.

5. To remedy the defects, Applicant needs to file a request under 37 CFR 1.46(c) to change the applicant, which requires:
   a. A request, signed by a 1.33(b) party;
   b. A corrected ADS (37 CFR 1.76(c)) that identifies the "NEW" Applicant in the applicant information, and is underlined since it is new;
   c. A 3.73(c) statement showing chain of title to the New Applicant;
   d. A POA that gives power to the attorney who is signing the TD, along with another copy of the TD. NO FEE is required.

***Double Patenting***

6. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory double patenting rejection is appropriate where the claims at issue are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

   A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the reference application or patent either is shown

to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement. A terminal disclaimer must be signed in compliance with 37 CFR 1.321(b).

The USPTO internet Web site contains terminal disclaimer forms which may be used. Please visit http://www.uspto.gov/forms/. The filing date of the application will determine what form should be used. A web-based eTerminal Disclaimer may be filled out completely online using web-screens. An eTerminal Disclaimer that meets all requirements is auto-processed and approved immediately upon submission. For more information about eTerminal Disclaimers, refer to http://www.uspto.gov/patents/process/file/efs/guidance/eTD-info-I.jsp.

7. Claims 2 to 14 are rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1 to 29 of U.S. Patent No. 8,494,177. Although the claims at issue are not identical, they are not patentably distinct from each other because both claim a microphone array including a first physical microphone outputting a first microphone signal and a second physical microphone outputting a second microphone signal, a processing component coupled to the microphone array and generating a virtual microphone array comprising a first virtual microphone comprising a first combination of the first microphone signal and the second microphone signal, the second virtual microphone comprising a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone and the second virtual microphone have substantially similar responses to noise and substantially dissimilar responses to speech and an adaptive noise removal application coupled to the processing component and generating denoised output signals by forming a plurality of combinations of signals output from the first virtual microphone and the second virtual microphone, by filtering and summing the plurality of combinations of signals in the time domain, and by a varying linear transfer function between the plurality of combinations of signals, wherein the denoised output signals include less acoustic noise than acoustic signals received at the microphone array

8. Claim 2 to 21 are rejected on the ground of nonstatutory double patenting as being unpatentable over Claims 1 to 27 of U.S. Patent No. 8,503,691. Although the claims at issue are not identical, they are not patentably distinct from each other because both claim a first virtual microphone formed from a first combination of a first microphone signal and a second microphone signal, wherein the first microphone signal is generated by a first physical microphone and the second microphone signal is generated by a second physical microphone, a second virtual microphone formed from a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone has a first linear response to speech and first linear response to noise, the first linear response to speech being substantially similar across a plurality of frequencies for a speech source located within a predetermined angle relative to an axis of the microphone array and devoid of a null, wherein the second virtual microphone has a second linear response to speech that has a single null oriented in a direction toward a source of the speech and a second linear response to noise, wherein the second linear response to noise is substantially similar to the first linear response to noise, one or both of the first linear response to noise and the second linear response to noise being non-zero in a direction toward a source of noise, and the second linear response to speech is substantially dissimilar to the first linear response to speech, wherein the speech is human speech and an adaptive noise removal application coupled to the first and second virtual microphones and generating denoised output signals by forming a plurality of combinations of signals output from the first virtual microphone and the second virtual microphone, by filtering and summing the plurality of combinations of signals in the time domain, and by a varying linear transfer function between the plurality of combinations of signals, wherein the denoised output signals include less acoustic noise than acoustic signals received at the first and second physical microphones.

***Conclusion***

9. Papers related to this application may be submitted directly to Art Unit 2814 by facsimile transmission. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (15 November 1989). The Art Unit 2814 Fax Center number is **(571) 273-8300**. The Art Unit 2814 Fax Center is to be used only for papers related to Art Unit 2814 applications.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Howard Weiss at **(571) 272-1720** and between the hours of 7:00 AM to 3:00 PM (Eastern Standard Time) Monday through Friday or by e-mail via **Howard.Weiss@uspto.gov**. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy, can be reached on **(571) 272-1705**.

11. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at **866-217-9197** (toll-free).

12. The following list is the Examiner's field of search for the present Office Action:

| Field of Search | Date |
|---|---|
| U.S. Class / Subclass(es): G10L 2021/ 02165, 21/ 0208; H04R 3/ 005 | Thru 6/5/2015 |
| Other Documentation: none | |
| Electronic Database(s): EAST | Thru 6/5/2015 |

HW/hw
8 June 2015

/Howard Weiss/
Primary Examiner
Art Unit 2814

**EAST Search History**

**EAST Search History (Prior Art)**

| Ref # | Hits | Search Query | DBs | Default Operator | Plurals | Time Stamp |
|---|---|---|---|---|---|---|
| L1 | 962 | @pd>"20141010" and ( (G10L2021/02165 OR G10L21/0208 OR H04R3/005).CPC. ) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | ADJ | OFF | 2015/06/05 08:04 |
| L2 | 576 | @pd>"20141010" and ( (G10L2021/02165 OR G10L21/0208 OR H04R3/005).CPC. ) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; IBM_TDB | ADJ | OFF | 2015/06/05 08:05 |

**EAST Search History (Interference)**

< This search history is empty>

**6/5/2015 8:25:57 AM**
**C:\ Users\ hweiss\ Documents\ EAST\ Workspaces\ 13948160.wsp**

| Search Notes | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 13948160 | BURNETT, GREGORY C. |
| | Examiner | Art Unit |
| | HOWARD WEISS | 2814 |

| CPC- SEARCHED | | |
|---|---|---|
| Symbol | Date | Examiner |
| G10L2021/02165, G10L21/0208, H04R3/005 | 5/7/2014 | HW |
| updated | 10/10/2014 | HW |
| updated | 6/5/2015 | HW |

| CPC COMBINATION SETS - SEARCHED | | |
|---|---|---|
| Symbol | Date | Examiner |
| | | |

| US CLASSIFICATION SEARCHED | | | |
|---|---|---|---|
| Class | Subclass | Date | Examiner |
| 381 | 92, 94.7 | 5/7/2014 | HW |
| 704 | 233, E21.004 | 5/7/2014 | HW |
| all updated | all updated | 10/10/2014 | HW |

| SEARCH NOTES | | |
|---|---|---|
| Search Notes | Date | Examiner |
| | | |

| INTERFERENCE SEARCH | | | |
|---|---|---|---|
| US Class/ CPC Symbol | US Subclass / CPC Group | Date | Examiner |
| | | | |

| Index of Claims | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 13948160 | BURNETT, GREGORY C. |
| | **Examiner** | **Art Unit** |
| | HOWARD WEISS | 2814 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| ✓ | Rejected | - | Cancelled | N | Non-Elected | A | Appeal |
| = | Allowed | ÷ | Restricted | I | Interference | O | Objected |

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

| CLAIM | | DATE | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Final | Original | 05/07/2014 | 10/10/2014 | 06/05/2015 | | | | | | |
| | 1 | ✓ | - | - | | | | | | |
| | 2 | | ✓ | ✓ | | | | | | |
| | 3 | | ✓ | ✓ | | | | | | |
| | 4 | | ✓ | ✓ | | | | | | |
| | 5 | | ✓ | ✓ | | | | | | |
| | 6 | | ✓ | ✓ | | | | | | |
| | 7 | | ✓ | ✓ | | | | | | |
| | 8 | | ✓ | ✓ | | | | | | |
| | 9 | | ✓ | ✓ | | | | | | |
| | 10 | | ✓ | ✓ | | | | | | |
| | 11 | | ✓ | ✓ | | | | | | |
| | 12 | | ✓ | ✓ | | | | | | |
| | 13 | | ✓ | ✓ | | | | | | |
| | 14 | | ✓ | ✓ | | | | | | |
| | 15 | | ✓ | ✓ | | | | | | |
| | 16 | | ✓ | ✓ | | | | | | |
| | 17 | | ✓ | ✓ | | | | | | |
| | 18 | | ✓ | ✓ | | | | | | |
| | 19 | | ✓ | ✓ | | | | | | |
| | 20 | | ✓ | ✓ | | | | | | |
| | 21 | | ✓ | ✓ | | | | | | |

# PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1
Stylesheet Version v1.2

EPAS ID: PAT3502102

| | |
|---|---|
| **SUBMISSION TYPE:** | NEW ASSIGNMENT |
| **NATURE OF CONVEYANCE:** | SECURITY INTEREST |

**CONVEYING PARTY DATA**

| Name | Execution Date |
|---|---|
| ALIPHCOM | 08/26/2015 |
| MACGYVER ACQUISITION LLC | 08/26/2015 |
| ALIPH, INC. | 08/26/2015 |
| BODYMEDIA, INC. | 08/26/2015 |
| PROJECT PARIS ACQUISITION LLC | 08/26/2015 |

**RECEIVING PARTY DATA**

| | |
|---|---|
| **Name:** | BLACKROCK ADVISORS, LLC |
| **Street Address:** | 1 UNIVERSITY SQUARE DRIVE |
| **Internal Address:** | C/O GLOBAL ALLOCATION GROUP |
| **City:** | PRINCETON |
| **State/Country:** | NEW JERSEY |
| **Postal Code:** | 08540 |

**PROPERTY NUMBERS Total: 604**

| Property Type | Number |
|---|---|
| **Application Number:** | 10159770 |
| **Application Number:** | 13069244 |
| **Application Number:** | 13069264 |
| **Application Number:** | 13069275 |
| **Application Number:** | 13753441 |
| **Application Number:** | 29333427 |
| **Application Number:** | 29333428 |
| **Application Number:** | 29333430 |
| **Application Number:** | 29333431 |
| **Application Number:** | 29333432 |
| **Application Number:** | 10400292 |
| **Application Number:** | 10667207 |
| **Application Number:** | 10769302 |
| **Application Number:** | 11199856 |
| **Application Number:** | 11704552 |

| Property Type | Number |
|---|---|
| Application Number: | 11859460 |
| Application Number: | 11860004 |
| Application Number: | 11969737 |
| Application Number: | 11982956 |
| Application Number: | 12006607 |
| Application Number: | 12039718 |
| Application Number: | 12123364 |
| Application Number: | 12139333 |
| Application Number: | 12139344 |
| Application Number: | 12139355 |
| Application Number: | 12139361 |
| Application Number: | 12163592 |
| Application Number: | 12163617 |
| Application Number: | 12163647 |
| Application Number: | 12163675 |
| Application Number: | 12243718 |
| Application Number: | 12244670 |
| Application Number: | 12354689 |
| Application Number: | 12606140 |
| Application Number: | 12606146 |
| Application Number: | 12756051 |
| Application Number: | 12772947 |
| Application Number: | 12772963 |
| Application Number: | 12772975 |
| Application Number: | 12826643 |
| Application Number: | 12826658 |
| Application Number: | 12882482 |
| Application Number: | 12886919 |
| Application Number: | 13037057 |
| Application Number: | 13109839 |
| Application Number: | 13117539 |
| Application Number: | 13135728 |
| Application Number: | 13158372 |
| Application Number: | 13158416 |
| Application Number: | 13180000 |
| Application Number: | 13180320 |
| Application Number: | 13181486 |
| Application Number: | 13181500 |

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| Application Number: | 13181511 |
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| Application Number: | 13181513 |
| Application Number: | 13184422 |
| Application Number: | 13209047 |
| Application Number: | 13246617 |
| Application Number: | 13247975 |
| Application Number: | 13270976 |
| Application Number: | 13346719 |
| Application Number: | 13361919 |
| Application Number: | 13374746 |
| Application Number: | 13405240 |
| Application Number: | 13405241 |
| Application Number: | 13420568 |
| Application Number: | 13421576 |
| Application Number: | 13427839 |
| Application Number: | 13431725 |
| Application Number: | 13433204 |
| Application Number: | 13433208 |
| Application Number: | 13433213 |
| Application Number: | 13436765 |
| Application Number: | 13454040 |
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| Application Number: | 13670419 |
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| Application Number: | 13672398 |

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| Application Number: | 13802646 |
| Application Number: | 13802674 |
| Application Number: | 13802689 |
| Application Number: | 13827683 |
| Application Number: | 13827754 |
| Application Number: | 13830770 |
| Application Number: | 13830860 |
| Application Number: | 13830927 |
| Application Number: | 13831139 |
| Application Number: | 13831260 |
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| Application Number: | 13831689 |
| Application Number: | 13831698 |
| Application Number: | 13870843 |
| Application Number: | 13886173 |
| Application Number: | 13886254 |
| Application Number: | 13890143 |
| Application Number: | 13894850 |
| Application Number: | 13898451 |
| Application Number: | 13898465 |
| Application Number: | 13898472 |
| Application Number: | 13898474 |
| Application Number: | 13900943 |

| Property Type | Number |
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| Application Number: | 13906109 |
| Application Number: | 13906244 |
| Application Number: | 13917225 |
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| Application Number: | 13919339 |
| Application Number: | 13919919 |
| Application Number: | 13929718 |
| Application Number: | 13942503 |
| Application Number: | 13942623 |
| Application Number: | 13942674 |
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**Fax Number:** (617)235-9802

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**Address Line 1:** PRUDENTIAL TOWER, 800 BOYLSTON STREET
**Address Line 2:** ROPES & GRAY LLP
**Address Line 4:** BOSTON, MASSACHUSETTS 02199-3600

| | |
|---|---|
| **ATTORNEY DOCKET NUMBER:** | MFOG-652 |
| **NAME OF SUBMITTER:** | JOSHUA S. JACKSON |
| **SIGNATURE:** | /j jackson/ |
| **DATE SIGNED:** | 08/27/2015 |
| | This document serves as an Oath/Declaration (37 CFR 1.63). |

**Total Attachments: 32**
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# AMENDED AND RESTATED PATENT SECURITY AGREEMENT

THIS AMENDED AND RESTATED PATENT SECURITY AGREEMENT (as it may be amended, restated or otherwise modified from time to time, the "Patent Security Agreement") is entered into as of August 26, 2015 by and among (i) AliphCom, a California corporation (the "Company"), MacGyver Acquisition LLC, a Delaware limited liability company, Aliph, Inc., a Delaware Corporation, BodyMedia, Inc., a Delaware corporation, and Project Paris Acquisition LLC, a Delaware limited liability company (each, a "Grantor", and collectively, the "Grantors"), and (ii) BlackRock Advisors, LLC, a Delaware limited liability company (the "Agent").

W I T N E S S E T H:

WHEREAS, each of the Grantors, the Purchasers identified therein and the Agent are entering into the Note Purchase Agreement, dated as of April 28, 2015, as amended by the First Amendment to Note Purchase Agreement; Omnibus Amendment to Secured Convertible Promissory Notes and Limited Consent, dated as of July 22, 2015 (as amended, restated, supplemented, or otherwise modified from time to time, the "Existing Note Purchase Agreement"), pursuant to which the Company issued certain secured convertible promissory notes (the "Notes") and the other Grantors agreed to Guarantee the Obligations;

WHEREAS, each of the Grantors and the Agent entered into the original Security Agreement, dated as of April 28, 2015 (as amended, restated, supplemented, or otherwise modified from time to time, the "Original Security Agreement"), in order to induce the Purchasers to purchase the Notes and to secure the Secured Obligations; and

WHEREAS, pursuant to the Original Security Agreement, each of the Grantors is required to execute and deliver to Agent the original Patent Security Agreement, dated as of April 28, 2015 (the "Original Patent Security Agreement");

WHEREAS, each of the Grantors, the Purchasers identified therein and the Agent entered into the Note Purchase Agreement, dated as of July 21, 2015 (as amended, restated, supplemented, or otherwise modified from time to time, the "July 2015 Note Purchase Agreement"), pursuant to which the Company issued certain additional Notes and the other Grantors agreed to Guarantee the Secured Obligations;

WHEREAS, each of the Grantors and the Agent entered into the Amended and Restated Security Agreement, dated as of July 22, 2015 (as amended, restated, supplemented, or otherwise modified from time to time, the "Security Agreement"), in order to induce the Purchasers to purchase the additional Notes and to secure the Secured Obligations; and

WHEREAS, the parties to the Original Patent Security Agreement wish to amend and restate the Original Patent Security Agreement in its entirety;

NOW, THEREFORE, in consideration of the premises and mutual covenants herein contained and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, each Grantor hereby agrees as follows:

1. DEFINED TERMS. All initially capitalized terms used but not otherwise defined herein have the meanings given to them in the Security Agreement, and this Patent Security Agreement shall be subject to the rules of construction set forth in the Security Agreement, which rules of construction are incorporated herein by this reference, *mutatis mutandis*.

2. GRANT OF SECURITY INTEREST IN PATENT COLLATERAL. Each Grantor does hereby unconditionally grant, assign, and pledge to Agent, and agrees to unconditionally grant, assign, and pledge to Agent, for its benefit and the benefit of each of the Noteholders, to secure the Secured Obligations, as applicable, a continuing security interest (referred to in this Patent Security Agreement as the "Security Interest") in all of such Grantor's entire right, title and interest in and to the following, whether now owned or hereafter acquired or arising (collectively, the "Patent Collateral"):

(a) all of such Grantor's Patents and Patent Intellectual Property Licenses to which it is a party including those referred to on Schedule I;

(b) all applications, improvements, divisionals, continuations, continuations-in-part, reissues, reexaminations, or extensions of the foregoing, foreign counterparts, and the inventions covered thereby;

(c) all files and records relating to the prosecution, exploitation, and defense of any of the foregoing, and all rights of action pertaining to the Grantor's Patents; and

(d) all products and proceeds of the foregoing, including any claim by such Grantor against third parties for past, present or future infringement of any Patent or any Patent exclusively licensed under any Intellectual Property License, including the right to receive damages, or right to receive license fees, royalties, and other compensation under any Patent Intellectual Property License.

3. SECURITY FOR SECURED OBLIGATIONS. This Patent Security Agreement and the Security Interest created hereby secures the payment and performance of the Secured Obligations, whether now existing or arising hereafter. Without limiting the generality of the foregoing, this Patent Security Agreement secures the payment of all amounts which constitute part of the Secured Obligations and would be owed by Grantors, or any of them, to Agent, or the Noteholders, whether or not they are unenforceable or not allowable due to the existence of an Insolvency Proceeding involving any Grantor.

4. SECURITY AGREEMENT. The Security Interest granted pursuant to this Patent Security Agreement is granted in conjunction with the security interests granted to Agent, for its benefit and the benefit of the Noteholders, pursuant to the Security Agreement. Each Grantor hereby acknowledges and affirms that the rights and remedies of Agent with respect to the Security Interest in the Patent Collateral made and granted hereby are more fully set forth in the Security Agreement, the terms and provisions of which are incorporated by reference herein as if fully set forth herein. To the extent there is any inconsistency between this Patent Security Agreement and the Security Agreement, the Security Agreement shall control.

5. AUTHORIZATION TO SUPPLEMENT. If any Grantor shall obtain rights to any new patent application or issued patent or become entitled to the benefit of any patent application or patent for any improvement, divisional, continuation, continuation-in-part, reissue, or reexamination of any existing patent or patent application, or any inventions covered thereby, the provisions of this Patent Security Agreement shall automatically apply thereto. Grantors hereby authorize Agent unilaterally to modify this Patent Security Agreement by amending Schedule I to include any such new patent rights of each Grantor. Notwithstanding the foregoing, no failure to so modify this Patent Security Agreement or amend Schedule I shall in any way affect, invalidate or detract from Agent's continuing security interest in all Collateral, whether or not listed on Schedule I.

6. COUNTERPARTS. This Patent Security Agreement is a Note Document. This Patent Security Agreement may be executed in any number of counterparts and by different parties on separate counterparts, each of which, when executed and delivered, shall be deemed to be an original, and all of which, when taken together, shall constitute but one and the same Patent Security Agreement. Delivery

of an executed counterpart of this Patent Security Agreement by telefacsimile or other electronic method of transmission shall be equally as effective as delivery of an original executed counterpart of this Patent Security Agreement. Any party delivering an executed counterpart of this Patent Security Agreement by telefacsimile or other electronic method of transmission also shall deliver an original executed counterpart of this Patent Security Agreement but the failure to deliver an original executed counterpart shall not affect the validity, enforceability, and binding effect of this Patent Security Agreement.

7. CHOICE OF LAW AND VENUE, JURY TRIAL WAIVER. THIS PATENT SECURITY AGREEMENT SHALL BE SUBJECT TO THE PROVISIONS REGARDING CHOICE OF LAW AND VENUE AND JURY TRIAL WAIVER SET FORTH IN SECTIONS 8.16, 8.17 AND 8.18 OF THE SECURITY AGREEMENT, AND SUCH PROVISIONS ARE INCORPORATED HEREIN BY THIS REFERENCE, *MUTATIS MUTANDIS*.

8. ORIGINAL PATENT SECURITY AGREEMENT AMENDED AND RESTATED. This Patent Security Agreement is an amendment and restatement of the Original Patent Security Agreement. This Patent Security Agreement is in no way intended to constitute a novation of the Original Patent Security Agreement or the "Obligations" (as defined in the Existing Note Purchase Agreement and the July 2015 Note Purchase Agreement). Any security granted pursuant to or in connection with the Original Patent Security Agreement and the other documents executed in connection therewith shall continue to secure the Secured Obligations.

[signature page follows]

IN WITNESS WHEREOF, the parties hereto have caused this Patent Security Agreement to be executed and delivered as of the day and year first above written.

**GRANTORS:**

**ALIPHCOM**,
a California corporation

DocuSigned by:
By: Hosain Rahman
8E4D8FA187D24C8...
Name: Hosain Rahman
Title: Chief Executive Officer

**ALIPH, INC.**,
a Delaware corporation

DocuSigned by:
By: Hosain Rahman
8E4D8FA187D24C8...
Name: Hosain Rahman
Title: Chief Executive Officer

**MACGYVER ACQUISITION, LLC**,
a Delaware limited liability company
by ALIPHCOM, as sole member

DocuSigned by:
By: Hosain Rahman
8E4D8FA187D24C8...
Name: Hosain Rahman
Title: Chief Executive Officer

**BODYMEDIA, INC.**,
a Delaware corporation

DocuSigned by:
By: Hosain Rahman
8E4D8FA187D24C8...
Name: Hosain Rahman
Title: Chief Executive Officer

**PROJECT PARIS ACQUISITION LLC**, a
Delaware limited liability company
by ALIPHCOM, as sole member

DocuSigned by:
By: Hosain Rahman
8E4D8FA187D24C8...
Name: Hosain Rahman
Title: Chief Executive Officer

**AGENT:**

**ACCEPTED AND ACKNOWLEDGED BY:**

**BLACKROCK ADVISORS, LLC**

By: Lisa O'Donnell
Name: Lisa O'Donnell
Title: Managing Director, Authorized Signatory

[SIGNATURE PAGE TO AMENDED AND RESTATED PATENT SECURITY AGREEMENT]

**SCHEDULE I**
**to**
**PATENT SECURITY AGREEMENT**

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| AliphCom | U.S. | D0641341S | 29383495 | 1/18/2011 |
| AliphCom | U.S. | D0664948S | 29383712 | 1/20/2011 |
| AliphCom | U.S. | D0664949S | 29383714 | 1/20/2011 |
| AliphCom | U.S. | D0653149S | 29393916 | 6/10/2011 |
| AliphCom | U.S. | D0695758S | 29405617 | 11/3/2011 |
| AliphCom | U.S. | D0696272S | 29405623 | 11/3/2011 |
| AliphCom | U.S. | D0695759S | 29405625 | 11/3/2011 |
| AliphCom | U.S. | D0695760S | 29405626 | 11/3/2011 |
| AliphCom | U.S. | D0695761S | 29405627 | 11/3/2011 |
| AliphCom | U.S. | D0696273S | 29405628 | 11/3/2011 |
| AliphCom | U.S. | D0696274S | 29405630 | 11/3/2011 |

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| AliphCom | U.S. | D0695762S | 29405631 | 11/3/2011 |
| AliphCom | U.S. | D0699252S | 29405633 | 11/3/2011 |
| AliphCom | U.S. | D0695763S | 29405634 | 11/3/2011 |
| AliphCom | U.S. | D0696275S | 29405635 | 11/3/2011 |
| AliphCom | U.S. | D0695764S | 29405636 | 11/3/2011 |
| AliphCom | U.S. | D0695765S | 29405637 | 11/3/2011 |
| AliphCom | U.S. | D0695766S | 29405638 | 11/3/2011 |
| AliphCom | U.S. | D0695767S | 29405639 | 11/3/2011 |
| AliphCom | U.S. | D0695768S | 29405640 | 11/3/2011 |
| AliphCom | U.S. | D0695769S | 29405641 | 11/3/2011 |
| AliphCom | U.S. | D0695770S | 29405642 | 11/3/2011 |
| AliphCom | U.S. | D0695771S | 29405643 | 11/3/2011 |
| AliphCom | U.S. | D0695772S | 29405644 | 11/3/2011 |
| AliphCom | U.S. | D0695773S | 29405645 | 11/3/2011 |
| AliphCom | U.S. | D0696276S | 29405646 | 11/3/2011 |
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| AliphCom | U.S. | D0678865S | 29413572 | 2/16/2012 |

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| AliphCom | U.S. | D0678244S | 29413573 | 2/16/2012 |
| AliphCom | U.S. | D0698757S | 29445283 | 2/8/2013 |
| AliphCom | U.S. | D0698758S | 29445286 | 2/8/2013 |
| AliphCom | U.S. | D0698759S | 29445287 | 2/8/2013 |
| AliphCom | U.S. | D0710325S | 29459899 | 7/3/2013 |
| AliphCom | U.S. | D0713389S | 29459900 | 7/3/2013 |
| AliphCom | U.S. | | 62019327 | 6/30/2014 |
| AliphCom | U.S. | | 62067428 | 10/22/2014 |
| AliphCom | U.S. | | 62107411 | 1/25/2015 |
| AliphCom | U.S. | | 14/121,355 | 8/22/2014 |
| AliphCom | U.S. | | 14/121,463 | 9/8/2014 |
| AliphCom | U.S. | | 14/121,465 | 9/8/2014 |
| AliphCom | U.S. | | 14/121,938 | 11/4/2014 |
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| AliphCom | U.S. | | 14/121,941 | 11/4/2014 |
| AliphCom | U.S. | | 14/121,942 | 11/4/2014 |
| AliphCom | U.S. | | 14/121,943 | 11/4/2014 |
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| AliphCom | U.S. | | 14/313901 | 6/24/2014 |
| AliphCom | U.S. | | 14/480,048 | 9/8/2014 |
| AliphCom | U.S. | | 14/480,070 | 9/8/2014 |
| AliphCom | U.S. | | 14/480,427 | 9/8/2014 |
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| AliphCom | U.S. | | 14/480,462 | 9/8/2014 |
| AliphCom | U.S. | | 14/480,628 | 9/8/2014 |
| AliphCom | U.S. | | 14/486,978 | 9/15/2014 |
| AliphCom | U.S. | | 14/486,997 | 9/15/2014 |

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| AliphCom | U.S. | | 14/488,042 | 9/16/2014 |
| AliphCom | U.S. | | 14/493,298 | 9/22/2014 |
| AliphCom | U.S. | | 14/519,116 | 10/20/2014 |
| AliphCom | U.S. | | 14/526,503 | 10/28/2014 |
| AliphCom | U.S. | | 14/532,789 | 11/4/2014 |
| AliphCom | U.S. | | 14/541,064 | 11/13/2014 |
| AliphCom | U.S. | | 14/541,134 | 11/13/2014 |
| AliphCom | U.S. | | 14/541,135 | 11/13/2014 |
| AliphCom | U.S. | | 14/578,297 | 12/19/2014 |
| AliphCom | U.S. | | 14/596,127 | 1/13/2015 |
| AliphCom | U.S. | | 14/606,995 | 1/27/2015 |
| AliphCom | U.S. | | 14/637,387 | 3/3/2015 |
| AliphCom | U.S. | | 14/640,013 | 3/5/2015 |
| AliphCom | U.S. | | 14/656,683 | 3/12/2015 |
| AliphCom | U.S. | | 14/659,521 | 3/16/2015 |
| BodyMedia, Inc. | U.S. | 6,527,711 | 9419600 | 10/18/1999 |
| BodyMedia, Inc. | U.S. | 7,689,437 | 9595660 | 6/16/2000 |
| BodyMedia, Inc. | U.S. | 6605038B1 | 9602537 | 6/23/2000 |
| BodyMedia, Inc. | U.S. | | 9620579 | 7/20/2000 |
| BodyMedia, Inc. | U.S. | 6595929B2 | 9822890 | 3/30/2001 |
| BodyMedia, Inc. | U.S. | 7261690B2 | 9923181 | 8/6/2001 |
| BodyMedia, Inc. | U.S. | 7020508B2 | 10227575 | 8/22/2002 |
| Bodymedia, Inc. | U.S. | 7153262B2 | 10313255 | 12/6/2002 |
| BodyMedia | U.S. | | 10612894 | 7/7/2003 |
| BodyMedia, Inc. | U.S. | 8157731B2 | 10682293 | 10/9/2003 |
| BodyMedia, Inc. | U.S. | 7285090B2 | 10682759 | 10/9/2003 |
| BodyMedia, Inc. | U.S. | 8398546B2 | 10940214 | 9/13/2004 |
| BodyMedia, Inc. | U.S. | 7502643B2 | 10940889 | 9/13/2004 |
| BodyMedia, Inc. | U.S. | 8663106B2 | 11088002 | 3/22/2005 |

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| Bodymedia, Inc. | U.S. | | 11239748 | 9/30/2005 |
| Bodymedia, Inc. | U.S. | 8073707 | 11247049 | 10/11/2005 |
| Bodymedia, Inc. | U.S. | 8961413 | 11434949 | 5/16/2006 |
| Bodymedia, Inc. | U.S. | 8403845 | 11481147 | 7/5/2006 |
| BodyMedia, Inc. | U.S. | | 11582896 | 10/17/2006 |
| Bodymedia, Inc. | U.S. | 8961414B2 | 11724373 | 3/15/2007 |
| Bodymedia, Inc. | U.S. | 7,959,567 | 11876623 | 10/22/2007 |
| Bodymedia, Inc. | U.S. | | 11925906 | 10/27/2007 |
| BodyMedia, Inc. | U.S. | 8708904B2 | 11925965 | 10/28/2007 |
| Bodymedia, Inc. | U.S. | | 11928039 | 10/30/2007 |
| Bodymedia, Inc. | U.S. | | 11930036 | 10/30/2007 |
| Bodymedia, Inc. | U.S. | | 11930053 | 10/30/2007 |
| Bodymedia, Inc. | U.S. | | 11930081 | 10/30/2007 |
| Bodymedia, Inc. | U.S. | 8641612B2 | 11930091 | 10/31/2007 |
| Bodymedia, Inc. | U.S. | 8,968,196 | 11930092 | 10/31/2007 |
| Bodymedia, Inc. | U.S. | 8852098B2 | 11930094 | 10/31/2007 |

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| BodyMedia, Inc. | U.S. | | 12033722 | 2/19/2008 |
| BodyMedia, Inc. | U.S. | | 12033731 | 2/19/2008 |
| BodyMedia, Inc. | U.S. | | 12033741 | 2/19/2008 |
| BodyMedia, Inc. | U.S. | | 12033746 | 2/19/2008 |
| BodyMedia, Inc. | U.S. | | 12033751 | 2/19/2008 |
| BodyMedia, Inc. | U.S. | 8382590B2 | 12033753 | 2/19/2008 |
| BodyMedia, Inc. | U.S. | 8275635B2 | 12033760 | 2/19/2008 |
| BodyMedia, Inc. | U.S. | | 12033766 | 2/19/2008 |
| BodyMedia | U.S. | | 12352911 | 1/13/2009 |
| BodyMedia, Inc. | U.S. | 8369936B2 | 12840109 | 7/20/2010 |
| BodyMedia, Inc.<br><br>Virginia Commonwealth University | U.S. | | 13130282 | 6/18/2012 |
| Bodymedia, Inc. | U.S. | 8870766 | 13291879 | 11/8/2011 |
| Bodymedia, Inc. | U.S. | | 13291982 | 11/8/2011 |
| BodyMedia, Inc. | U.S. | | 13734433 | 1/4/2013 |
| BodyMedia, Inc. | U.S. | | 13761409 | 2/7/2013 |
| BODYMEDIA, INC. | U.S. | | 13761557 | 2/7/2013 |

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| BodyMedia, Inc. | U.S. | | 14058485 | 10/21/2013 |
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| BodyMedia, Inc. | U.S. | | 14058563 | 10/21/2013 |
| BodyMedia, Inc. | U.S. | | 14059054 | 10/21/2013 |
| BodyMedia, Inc. | U.S. | | 14059072 | 10/21/2013 |
| BodyMedia, Inc. | U.S. | | 14059117 | 10/21/2013 |
| BODYMEDIA, INC. | U.S. | | 14060004 | 10/22/2013 |
| BodyMedia, Inc. | U.S. | | 14060010 | 10/22/2013 |
| BodyMedia, Inc. | U.S. | | 14060029 | 10/22/2013 |
| BodyMedia, Inc. | U.S. | | 14060047 | 10/22/2013 |
| BodyMedia, Inc. | U.S. | | 14060072 | 10/22/2013 |
| BodyMedia, Inc. | U.S. | | 14060082 | 10/22/2013 |
| BodyMedia, Inc. | U.S. | | 14060092 | 10/22/2013 |
| BODYMEDIA, INC. | U.S. | | 14060122 | 10/22/2013 |
| BodyMedia, Inc. | U.S. | | 14081369 | 11/15/2013 |
| BodyMedia, Inc. | U.S. | | 14081406 | 11/15/2013 |
| BodyMedia, Inc. | U.S. | | 14081880 | 11/15/2013 |
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| BodyMedia, Inc. | U.S. | | 14081901 | 11/15/2013 |
| BodyMedia, Inc. | U.S. | | 14081928 | 11/15/2013 |
| BodyMedia, Inc. | U.S. | | 14081935 | 11/15/2013 |
| BodyMedia, Inc. | U.S. | | 14081942 | 11/15/2013 |
| BodyMedia, Inc. | U.S. | | 14081951 | 11/15/2013 |
| BodyMedia, Inc. | U.S. | | 14081956 | 11/15/2013 |
| BodyMedia, Inc. | U.S. | | 14081967 | 11/15/2013 |
| BodyMedia, Inc. | U.S. | | 14081972 | 11/15/2013 |
| BodyMedia, Inc. | U.S. | | 14081979 | 11/15/2013 |
| BodyMedia, Inc. | U.S. | | 14082070 | 11/15/2013 |
| BodyMedia, Inc. | U.S. | | 14082176 | 11/17/2013 |
| BodyMedia, Inc. | U.S. | | 14082178 | 11/17/2013 |
| BodyMedia, Inc. | U.S. | | 14082179 | 11/17/2013 |
| BODYMEDIA, INC. | U.S. | | 14082180 | 11/17/2013 |
| BodyMedia, Inc. | U.S. | | 14082183 | 11/17/2013 |
| BODYMEDIA, INC. | U.S. | | 14082185 | 11/17/2013 |
| BodyMedia, Inc. | U.S. | | 14082186 | 11/17/2013 |
| BodyMedia, Inc. | U.S. | | 14082188 | 11/17/2013 |
| BodyMedia, Inc. | U.S. | | 14082189 | 11/17/2013 |
| BodyMedia, Inc. | U.S. | | 14082190 | 11/17/2013 |
| BodyMedia, Inc. | U.S. | | 14082192 | 11/17/2013 |
| BodyMedia, Inc. | U.S. | | 14083372 | 11/18/2013 |

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| BodyMedia, Inc. | U.S. | | 14083382 | 11/18/2013 |
| BodyMedia, Inc. | U.S. | | 14083389 | 11/18/2013 |
| BodyMedia, Inc. | U.S. | | 14083397 | 11/18/2013 |
| BodyMedia, Inc. | U.S. | | 14083401 | 11/18/2013 |
| BodyMedia, Inc. | U.S. | | 14083404 | 11/18/2013 |
| BodyMedia, Inc. | U.S. | | 14083407 | 11/18/2013 |
| BodyMedia, Inc. | U.S. | | 14133607 | 12/18/2013 |
| BodyMedia, Inc. | U.S. | | 14133610 | 12/18/2013 |
| BodyMedia, Inc. | U.S. | | 14133612 | 12/18/2013 |
| BodyMedia, Inc. | U.S. | | 14133615 | 12/18/2013 |
| BodyMedia, Inc. | U.S. | | 14133619 | 12/18/2013 |
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| BodyMedia, Inc. | U.S. | | 14133622 | 12/18/2013 |
| BodyMedia, Inc. | U.S. | | 14133625 | 12/18/2013 |
| BodyMedia, Inc. | U.S. | | 14133626 | 12/18/2013 |
| BodyMedia, Inc. | U.S. | | 14133634 | 12/18/2013 |
| BodyMedia, Inc. | U.S. | | 14133638 | 12/19/2013 |
| BodyMedia, Inc. | U.S. | | 14133640 | 12/19/2013 |
| BodyMedia, Inc. | U.S. | | 14133641 | 12/19/2013 |
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| BodyMedia, Inc. | U.S. | | 14137027 | 12/20/2013 |
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| BodyMedia, Inc. | U.S. | | 14137126 | 12/20/2013 |
| BodyMedia, Inc. | U.S. | | 14137233 | 12/20/2013 |
| BodyMedia, Inc. | U.S. | | 14138030 | 12/21/2013 |
| BodyMedia, Inc. | U.S. | | 14138033 | 12/21/2013 |
| BodyMedia, Inc. | U.S. | | 14138042 | 12/21/2013 |
| BodyMedia, Inc. | U.S. | | 14138043 | 12/21/2013 |
| BodyMedia, Inc. | U.S. | | 14138046 | 12/21/2013 |
| BodyMedia, Inc. | U.S. | | 14139871 | 12/24/2013 |
| BodyMedia, Inc. | U.S. | | 14139872 | 12/24/2013 |
| BodyMedia, Inc. | U.S. | | 14139873 | 12/24/2013 |
| Bodymedia, Inc. | U.S. | | 14139875 | 12/24/2013 |
| BodyMedia, Inc. | U.S. | | 14221506 | 3/21/2014 |
| BODYMEDIA, INC. | U.S. | | 14248576 | 4/9/2014 |
| BodyMedia, Inc. | U.S. | | 14248776 | 4/9/2014 |
| BodyMedia | U.S. | | 14248830 | 4/9/2014 |
| BodyMedia | U.S. | | 14248853 | 4/9/2014 |
| BodyMedia | U.S. | | 14248885 | 4/9/2014 |
| BodyMedia, Inc. | U.S. | | 14249135 | 4/9/2014 |

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| BodyMedia, Inc. | U.S. | | 14249211 | 4/9/2014 |
| BodyMedia | U.S. | | 14249235 | 4/9/2014 |
| BodyMedia, Inc. | U.S. | | 14249262 | 4/9/2014 |
| BodyMedia, Inc. | U.S. | | 14249290 | 4/9/2014 |
| BodyMedia, Inc. | U.S. | | 14249314 | 4/9/2014 |
| BodyMedia | U.S. | | 14249318 | 4/9/2014 |
| BodyMedia | U.S. | | 14249328 | 4/9/2014 |
| BodyMedia | U.S. | | 14252090 | 4/14/2014 |
| BodyMedia | U.S. | | 14284947 | 5/22/2014 |
| BodyMedia | U.S. | | 14285018 | 5/22/2014 |
| BodyMedia | U.S. | | 14285036 | 5/22/2014 |
| BodyMedia | U.S. | | 14285092 | 5/22/2014 |
| BodyMedia, Inc. | U.S. | | 14285159 | 5/22/2014 |
| BodyMedia, Inc. | U.S. | | 14285194 | 5/22/2014 |
| BodyMedia | U.S. | | 14285232 | 5/22/2014 |
| BodyMedia, Inc. | U.S. | | 14292105 | 5/30/2014 |
| BodyMedia, Inc. | U.S. | | 14292368 | 5/30/2014 |
| BodyMedia, Inc. | U.S. | | 14292735 | 5/30/2014 |
| BodyMedia | U.S. | | 14292831 | 5/31/2014 |
| BodyMedia | U.S. | | 14292833 | 5/31/2014 |
| BodyMedia | U.S. | | 14336413 | 7/21/2014 |
| BodyMedia | U.S. | | 14336448 | 7/21/2014 |
| BodyMedia | U.S. | | 14336539 | 7/21/2014 |
| BodyMedia | U.S. | | 14336571 | 7/21/2014 |
| BodyMedia | U.S. | | 14336598 | 7/21/2014 |
| BodyMedia | U.S. | | 14336625 | 7/21/2014 |
| BodyMedia, Inc. | U.S. | D0439981S | 29127587 | 8/9/2000 |
| BodyMedia, Inc. | U.S. | D0451604S | 29129931 | 9/25/2000 |
| BodyMedia, Inc. | U.S. | D0460971S | 29143975 | 6/21/2001 |
| BodyMedia, Inc. | U.S. | D632396 | 29256362 | 3/20/2006 |
| BodyMedia, Inc. | U.S. | D631552 | 29256753 | 3/24/2006 |

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| BodyMedia, Inc. | U.S. | D0645968S | 29383860 | 1/24/2011 |
| BodyMedia, Inc. | U.S. | D0698028S | 29434003 | 10/9/2012 |
| BodyMedia | U.S. | | 14/509,034 | 10/7/2014 |
| BodyMedia | U.S. | | 14/526,499 | 10/28/2014 |
| BodyMedia | U.S. | | 14/630,618 | 2/24/2015 |
| BodyMedia | U.S. | | 14/630,618 | 2/24/2015 |
| BodyMedia | U.S. | | 14/636,157 | 3/2/2015 |
| BodyMedia | U.S. | | 14/636,158 | 3/2/2015 |
| BodyMedia, Inc. | U.S. | | 95/002,354 | 9/14/2012 |
| BodyMedia, Inc. | U.S. | | 95/002,360 | 9/14/2012 |
| BodyMedia, Inc. | U.S. | | 95/002,366 | 9/14/2012 |
| BodyMedia, Inc. | U.S. | | 95/002,367 | 9/14/2012 |
| BodyMedia, Inc. | U.S. | | 95/002,371 | 9/14/2014 |
| Bodymedia, Inc. | U.S. | | 95/002,376 | 9/14/2012 |
| BodyMedia, Inc. | U.S. | | 95/002,382 | 9/14/2012 |
| Project Paris Acquisition LLC | U.S. | | 14039258 | 9/27/2013 |
| University of Maryland, College park Office of Technology Commercialization | U.S. | 6,399,306 | 9622910 | 9/5/2000 |
| University of Maryland, College park Office of Technology Commercialization | U.S. | 6743587 | 9986989 | 11/13/2001 |
| | U.S. | | 29445284 | 2/8/2013 |

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| | U.S. | | 29466527 | 9/9/2013 |
| | U.S. | | 29466531 | 9/9/2013 |
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| | U.S. | | 29/478,533 | 1/6/2014 |
| | U.S. | | 29/479,052 | 1/10/2014 |
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| | U.S. | | 29/485,103 | 3/14/2014 |
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| | U.S. | | 29/495,368 | 6/30/2014 |
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| | U.S. | | 29/495,407 | 6/30/2014 |
| | U.S. | | 29/495,669 | 7/2/2014 |
| | U.S. | | 29/495,670 | 7/2/2014 |
| | U.S. | | 29/495,674 | 7/2/2014 |
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| | U.S. | | 29/508,200 | 11/4/2014 |
| | U.S. | | 29/508,205 | 11/4/2014 |
| | U.S. | | 29/508,207 | 11/4/2014 |
| | U.S. | | 29/516,012 | 1/28/2015 |
| | U.S. | | 29/516,014 | 1/28/2015 |
| | U.S. | | 29/516,015 | 1/28/2015 |
| | U.S. | | 29/516,016 | 1/28/2015 |
| | U.S. | | 29/516,017 | 1/28/2015 |
| | U.S. | | 29/517,054 | 2/9/2015 |
| | U.S. | | 29/517,056 | 2/9/2015 |

**Patent License**

OPAP AKIMA-10
SEP 15 2015
U.S. TRADEMARK OFFICE

DEW



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

| | |
|---|---|
| In re the Application of:<br>Gregory C. Burnett | Examiner: WEISS, Howard |
| Application Serial No.: 13/948,160 | Group Art Unit: 2814 |
| Filing Date: July 22, 2013 | Confirmation No.: 2184 |
| For: DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA) | Transmission Date: September 9, 2015<br>Atty. Docket No.: ALI-050CCON1 |

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450 on **September 9, 2015**.

Signed: _____
Kate M. Cleland

## RESPONSE TO OFFICE ACTION

Dear Sir or Madam:

In response to the *Non-Final Office Action*, mailed June 9, 2015, Applicant respectfully submits herewith a complete claim listing and remarks as well as a *Terminal Disclaimer under 37 C.F.R. § 1.321(c) to Obviate a Non-Statutory Double Patenting Rejection.* Please find enclosed (1) an *Application Data Sheet* (corrected) (Exhibit A), (2) a *Statement Under 37 C.F.R. § 3.73(c)* (Exhibit B), and (3) a *Power of Attorney* (Form PTO/SB/80) (Exhibit C).

## CLAIM LISTING

1. (Cancelled)

2. (Previously presented) A system, comprising:

a microphone array including a first physical microphone outputting a first microphone signal and a second physical microphone outputting a second microphone signal;

a processing component coupled to the microphone array and generating a virtual microphone array including a first virtual microphone and a second virtual microphone, the first virtual microphone including a first combination of the first microphone signal and the second microphone signal, the second virtual microphone including a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone and the second virtual microphone have substantially similar responses to noise and substantially dissimilar responses to speech; and

an adaptive noise removal application coupled to the processing component and generating denoised output signals by forming a plurality of combinations of signals output from the first virtual microphone and the second virtual microphone, by filtering and summing the plurality of combinations of signals in the time domain, and by a varying linear transfer function between the plurality of combinations of signals, wherein the denoised output signals include less acoustic noise than acoustic signals received at the microphone array.

3. (Previously presented) The system of Claim 2, wherein the acoustic noise comprises noise content and the acoustic signals comprise speech content.

4. (Previously presented) The system of Claim 3, wherein the speech content comprises human speech.

5. (Previously presented) The system of Claim 2 and further comprising: a voice activity detector (VAD) coupled with the processing component and operative to generate voice activity signals.

6. (Previously presented) The system of Claim 2 and further comprising: a communications channel coupled with the processing component and including one or more of a wireless channel, a wired channel, and a hybrid wireless/wired channel.

7. (Previously presented) The system of Claim 6 and further comprising: a communication device wirelessly coupled with the wireless channel of the communications channel.

8. (Previously presented) A system, comprising:

a first virtual microphone formed from a first combination of a first microphone signal and a second microphone signal, wherein the first microphone signal is generated by a first physical microphone and the second microphone signal is generated by a second physical microphone;

a second virtual microphone formed from a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone has a first linear response to speech and first linear response to noise, the first linear response to speech being substantially similar across a plurality of frequencies for a speech source located within a predetermined angle relative to an axis of the microphone array and devoid of a null, wherein the second virtual microphone has a second linear response to speech that has a single null oriented in a direction toward a source of the speech and a second linear response to noise, wherein the second linear response to noise is substantially similar to the first linear response to noise, one or both of the first linear response to noise and the second linear response to noise being non-zero in a direction toward a source of noise, and the second linear response to speech is substantially dissimilar to the first linear response to speech, wherein the speech is human speech; and

an adaptive noise removal application coupled to the first and second virtual microphones and generating denoised output signals by forming a plurality of combinations of signals output from the first virtual microphone and the second virtual microphone, by filtering and summing the plurality of combinations of signals in the time domain, and by a varying linear transfer function between the plurality of combinations of signals, wherein the denoised output signals include less acoustic noise than acoustic signals received at the first and second physical microphones.

9. (Previously presented) The system of Claim 8 and further comprising:

a microphone array, the first and second physical microphones positioned m the microphone array.

10. (Previously presented) The system of Claim 8, wherein the single null is a region of the second linear response to speech having a measured response level that is lower than the measured response level of any other region of the second linear response to speech.

11. (Previously presented) The system of Claim 8 and further comprising: a voice activity detector (VAD) coupled with the processing component and operative to generate voice activity signals.

12. (Previously presented) The system of Claim 8 and further comprising: a communications channel coupled with the processing component and including one or more of a wireless channel, a wired channel, and a hybrid wireless/wired channel.

13. (Previously presented) The system of Claim 12 and further comprising: a communication device wirelessly coupled with the wireless channel of the communications channel.

14. (Previously presented) The system of Claim 8, wherein the second microphone signal is multiplied by a ratio, wherein the ratio is a ratio of a third distance to a fourth distance, the third distance being between the first physical microphone and the speech source and the fourth distance being between the second physical microphone and the speech source.

15. (Previously presented) A system, comprising:

a first virtual microphone comprising a first combination of a first microphone signal and a second microphone signal, the first virtual microphone having a first linear response to speech and a first linear response to noise, the first linear response to speech being substantially similar across a plurality of frequencies for a speech source located within a predetermined angle relative to an axis of a microphone array, wherein the first microphone signal is output from a first physical microphone and the second microphone signal is output from a second physical microphone;

a second virtual microphone comprising a second combination of the first microphone signal and the second microphone signal, the second virtual microphone having a second linear response to speech and a second linear response to noise, the second linear response to noise being substantially similar to the first linear response to noise, one or both of the first linear response to noise and the second linear response to noise being non-zero in a direction toward a source of noise, and the second linear response to speech being substantially dissimilar to the first linear response to speech, wherein the second combination is different from the first combination, wherein the first virtual microphone and the second virtual microphone are distinct virtual directional microphones; and

a processing component coupled to the first and second virtual microphones, the processing component including an adaptive noise removal application receiving acoustic signals from the first virtual microphone and the second virtual microphone, filtering and summing the acoustic signals in the time domain, applying a varying linear transfer function between the acoustic signals, and generating an output signal, wherein the output signal is a denoised acoustic signal.

16. (Previously presented) The system of Claim 15 and further comprising: a voice activity detector (VAD) coupled with the processing component and operative to generate voice activity signals.

17. (Previously presented) The system of Claim 15 and further comprising: a communications channel coupled with the processing component and including one or more of a wireless channel, a wired channel, and a hybrid wireless/wired channel.

18. (Previously presented) The system of Claim 17 and further comprising: a communication device wirelessly coupled with the wireless channel of the communications channel.

19. (Previously presented) The system of Claim 15, wherein the acoustic signals from the first virtual microphone, the second virtual microphone or both are delayed.

20. (Previously presented) The system of Claim 19, wherein the delay is raised to a power that is proportional to a time difference between arrival of the speech at the first virtual microphone and arrival of the speech at the second virtual microphone.

21. (Previously presented) The system of Claim 20, wherein the power is proportional to a sampling frequency multiplied by a quantity equal to a third distance subtracted from a fourth distance, the third distance being between a first physical microphone and the speech source, the fourth distance being between a second physical microphone and the speech source, and the first and second physical microphones are positioned in the microphone array.

## REMARKS

Claims 2-21 remain pending.

The Examiner has rejected claims 2-21 on the ground of non-statutory double patenting as being unpatentable over claims 1-29 of U.S. Patent No. 8,4945,177. Additionally, the Examiner has rejected claims 2-21 on the ground of non-statutory double patenting as being unpatentable over claims 1-27 of U.S. Patent No. 8,503,691.

The Examiner has set forth the non-statutory double patenting rejections as set forth above. Applicant respectfully submits the enclosed *Terminal Disclaimer under 37 C.F.R. § 1.321 to Obviate an Obviousness-Type Double Patenting Rejection* to overcome the Examiner's non-statutory double patenting rejections.

Additionally, Applicant respectfully requests to update the Applicant information in accordance with 37 C.F.R. § 1.46(c), and submits herewith (1) an *Application Data Sheet* (corrected) (Exhibit A), (2) a *Statement Under 37 C.F.R. § 3.73(c)* (Exhibit B), and (3) a *Power of Attorney* (Form PTO/SB/80) (Exhibit C).

Reconsideration of the application and allowance of all claims are respectfully requested based on the preceding remarks. If at any time the Examiner believes that an interview would be helpful, please contact the undersigned.

Respectfully submitted,



Scott S. Kokka
Reg. No. 51,893

KOKKA & BACKUS, PC
703 High Street
Palo Alto, CA 94301-2447
Tel: (650) 566-9921
Fax: (650) 566-9922



Meta Platforms, Inc. - Exhibit 1002
230 of 450

# Exhibit C

PTO/SB/80 (11-08)
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# POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(b).

I hereby appoint:

☑ Practitioners associated with the Customer Number: 15516

*OR*

☐ Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

| Name | Registration Number | Name | Registration Number |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

as attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(b).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(b) to:

☑ The address associated with Customer Number: 15516

*OR*

| | | | |
|---|---|---|---|
| ☐ Firm or Individual Name | | | |
| Address | | | |
| City | | State | Zip |
| Country | | | |
| Telephone | | Email | |

Assignee Name and Address:

AliphCom
99 Rhode Island St., 3rd Floor
San Francisco, CA 94103

**A copy of this form, together with a statement under 37 CFR 3.73(b) (Form PTO/SB/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(b) may be completed by one of the practitioners appointed in this form if the appointed practitioner is authorized to act on behalf of the assignee, and must identify the application in which this Power of Attorney is to be filed.**

**SIGNATURE of Assignee of Record**
The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

| | | | |
|---|---|---|---|
| Signature | | Date | 10-23-2011 |
| Name | Michael Edward Smith Luna | Telephone | (877) 254-7426 |
| Title | Chief Technology Officer, AliphCom | | |

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

| | |
|---|---|
| In re the Application of:<br>Gregory C. Burnett | Examiner: WEISS, Howard |
| Application Serial No.: 13/948,160 | Group Art Unit: 2814 |
| Filing Date: July 22, 2013 | Confirmation No.: 2184 |
| For: DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA) | Transmission Date: September 9, 2015<br>Atty. Docket No.: ALI-050CCON1 |

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450 on **September 9, 2015**.

Signed: _____
Kate M. Cleland

**TERMINAL DISCLAIMER UNDER 37 C.F.R. § 1.321(c) TO OBVIATE AN OBVIOUSNESS-TYPE DOUBLE PATENTING REJECTION**

Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Dear Sir or Madam:

The owner(s), AliphCom (Assignee), of the entire interest in the above-identified application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the above-identified application (hereafter "instant application"), which would extend beyond the expiration date of the full statutory term, as defined in 35 U.S.C. §§ 154 and 173, of prior United States Patent Nos. 8,494,177, and No. 8,503,691 (hereafter "prior patents"), as presently shortened by any terminal disclaimer. The owner hereby agrees that any

patent so granted on the instant application shall be enforceable only for and during such period that it and the prior patents are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

In making the above disclaimer, the owner does not disclaim the terminal part of any patent granted on the instant application that would extend to the expiration date of the full statutory term, as defined in 35 U.S.C. §§ 154 and 173, of the prior patents, as presently shortened by any terminal disclaimer, in the event that it later: expires for failure to pay a maintenance fee, is held unenforceable, is found invalid by a court of competent jurisdiction, is statutorily disclaimed in whole or terminally disclaimed under 37 CFR § 1.321, has all claims canceled by a reexamination certificate, is reissued, or is in any manner terminated prior to the expiration of its full statutory term as presently shortened by any terminal disclaimer.

The required fee of $160.00 to cover the statutory disclaimer fees for undiscounted entity was remitted on April 14, 2015 (EFS ID 22063119). If any questions arise regarding this statutory disclaimer, please contact the undersigned attorney or agent of record.

Respectfully submitted,



Date: September 9, 2015

Scott S. Kokka
Reg. No. 51,893

KOKKA & BACKUS, PC
703 High Street
Palo Alto, CA 94301-2447
Tel: (650) 566-9921
Fax: (650) 566-9922

# Exhibit A




# Application Data Sheet

## Cross-Reference to Related Applications

This application is continuation of U.S. Nonprovisional Patent Application No. 12/139,355, filed June 13, 2008, now U.S. Patent No. 8,494,177 and entitled "Dual Omnidirectional Microphone Array (DOMA)," which claims the benefit of U.S. Provisional Patent Application No. 60/934,551, filed June 13, 2007, U.S. Provisional Patent Application No. 60/953,444, filed August 1, 2007, U.S. Provisional Patent Application No.60/954,712, filed August 8, 2007, and U.S. Provisional Patent Application No. 61/045,377, filed April 16, 2008, all of which are incorporated by reference herein in their entirety for all purposes.

## Application Information

| | |
|---|---|
| **Filing Date::** | July 22, 2013 |
| **Application Type::** | Continuation |
| **Subject Matter::** | Utility |
| **Suggested Group Art Unit::** | None |
| **CD-ROM or CD-R?::** | None |
| **Title::** | DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA) |
| **Attorney Docket Number::** | ALI-050CCON1 |
| **Request for Early Publication?::** | No |
| **Request for Non-Publication?::** | No |
| **Suggested Drawing Figure::** | FIG. 1 |
| **Total Drawing Sheets::** | 17 |
| **Small Entity::** | Yes |
| **Petition included?::** | No |
| **Secrecy Order in Parent Appl.?::** | No |

## Applicant Information

**Applicant Authority type::** Assignee

**Organization Name::** AliphCom

**Street of mailing address::** 99 Rhode Island Street, Third Floor

**City of mailing address::** San Francisco

**Country of mailing address::** United States of America

**State or Province of mailing address::** CA

**Postal or Zip Code of mailing address::** 94103

~~**Applicant Authority type::** Inventor~~

~~**Primary Citizenship Country::** United States of America~~

~~**Status::** Full Capacity~~

~~**Given Name::** Gregory C.~~

~~**Family Name::** Burnett~~

~~**City of Residence::** Dodge Center~~

~~**State or Province of Residence::** MN~~

~~**Country of Residence::** United States of America~~

~~**Street of mailing address::** 10550 First Timberlane Drive~~

~~**City of mailing address::** Dodge Center~~

~~**Country of mailing address::** United States of America~~

~~**State or Province of mailing address::** MN~~

~~**Postal or Zip Code of mailing address::** 55057~~



Meta Platforms, Inc. - Exhibit 1002
237 of 450

## Correspondence Information

| | |
|---|---|
| **Customer Number::** | 15516 |
| **Name::** | Kokka & Backus, PC |
| **Street of mailing address::** | 703 High Street |
| **City of mailing address::** | Palo Alto |
| **Country of mailing address::** | USA |
| **State or Province of mailing address::** | CA |
| **Postal or Zip Code of mailing address::** | 94301 |
| **Telephone::** | (650) 566-9921 |
| **Fax::** | (650) 566-9922 |

## Representative Information

**Representative Customer Number::** 15516

| Representative Designation:: | Registration Number:: | Name:: |
|---|---|---|
| Primary | 51,893 | Scott S. Kokka |



Meta Platforms, Inc. - Exhibit 1002
238 of 450

## Assignee Information

**Name::** AliphCom

**Mailing address::** 99 Rhode Island Street, Third Floor, San Francisco, CA 94103

**Signature**



9/9/2015

Scott S. Kokka

Date

Reg. No. 51,893

# Exhibit B

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# STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: Gregory C. Burnett

Application No./Patent No.: 13/948,160 Filed/Issue Date: July 22, 2013

Titled: DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)

AliphCom, a Corporation

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. ☑ The assignee of the entire right, title, and interest.

2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):

   ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.

   ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (*e.g.*, bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

A. ☑ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel 035727, Frame 0877, or for which a copy thereof is attached.

B. ☐ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

   1. From: _____ To: _____

      The document was recorded in the United States Patent and Trademark Office at

      Reel _____, Frame _____, or for which a copy thereof is attached.

   2. From: _____ To: _____

      The document was recorded in the United States Patent and Trademark Office at

      Reel _____, Frame _____, or for which a copy thereof is attached.



This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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## STATEMENT UNDER 37 CFR 3.73(c)

3. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

4. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☑ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

| | |
|---|---|
| Signature | September 9, 2015<br>Date |
| Scott S. Kokka<br>Printed or Typed Name | 51,893<br>Title or Registration Number |

PTO/SB/06 (09-11)
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| PATENT APPLICATION FEE DETERMINATION RECORD<br>Substitute for Form PTO-875 | Application or Docket Number<br>13/948,160 | Filing Date<br>07/22/2013 | ☐ To be Mailed |
|---|---|---|---|

**ENTITY:** ☒ LARGE ☐ SMALL ☐ MICRO

## APPLICATION AS FILED – PART I

| FOR | (Column 1) NUMBER FILED | (Column 2) NUMBER EXTRA | RATE ($) | FEE ($) |
|---|---|---|---|---|
| ☐ BASIC FEE (37 CFR 1.16(a), (b), or (c)) | N/A | N/A | N/A | |
| ☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m)) | N/A | N/A | N/A | |
| ☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q)) | N/A | N/A | N/A | |
| TOTAL CLAIMS (37 CFR 1.16(i)) | minus 20 = | * | X $ = | |
| INDEPENDENT CLAIMS (37 CFR 1.16(h)) | minus 3 = | * | X $ = | |
| ☐ APPLICATION SIZE FEE (37 CFR 1.16(s)) | If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s). | | | |
| ☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j)) | | | | |
| * If the difference in column 1 is less than zero, enter "0" in column 2. | | | TOTAL | |

## APPLICATION AS AMENDED – PART II

| AMENDMENT | 09/15/2015 | (Column 1) CLAIMS REMAINING AFTER AMENDMENT | | (Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR | (Column 3) PRESENT EXTRA | RATE ($) | ADDITIONAL FEE ($) |
|---|---|---|---|---|---|---|---|
| | Total (37 CFR 1.16(i)) | * 20 | Minus | ** 20 | = 0 | X $80 = | 0 |
| | Independent (37 CFR 1.16(h)) | * 3 | Minus | ***3 | = 0 | X $420 = | 0 |
| | ☐ Application Size Fee (37 CFR 1.16(s)) | | | | | | |
| | ☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) | | | | | | |
| | | | | | | TOTAL ADD'L FEE | 0 |

| AMENDMENT | | (Column 1) CLAIMS REMAINING AFTER AMENDMENT | | (Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR | (Column 3) PRESENT EXTRA | RATE ($) | ADDITIONAL FEE ($) |
|---|---|---|---|---|---|---|---|
| | Total (37 CFR 1.16(i)) | * | Minus | ** | = | X $ = | |
| | Independent (37 CFR 1.16(h)) | * | Minus | *** | = | X $ = | |
| | ☐ Application Size Fee (37 CFR 1.16(s)) | | | | | | |
| | ☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) | | | | | | |
| | | | | | | TOTAL ADD'L FEE | |

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
/LYNNELL JOHNSON/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**
*If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NUMBER | FILING OR 371(C) DATE | FIRST NAMED APPLICANT | ATTY. DOCKET NO./TITLE |
|---|---|---|---|
| 13/948,160 | 07/22/2013 | Gregory C. Burnett | ALI-050CCON1 |

**CONFIRMATION NO. 2184**

15516
Kokka & Backus, PC
703 High Street
Palo Alto, CA 94301

**POA ACCEPTANCE LETTER**

*OC000000077681045*

Date Mailed: 09/25/2015

## NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 09/15/2015.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/agizaw/

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NUMBER | FILING or 371(c) DATE | GRP ART UNIT | FIL FEE REC'D | ATTY.DOCKET.NO | TOT CLAIMS | IND CLAIMS |
|---|---|---|---|---|---|---|
| 13/948,160 | 07/22/2013 | 2814 | 1740 | ALI-050CCON1 | 1 | 1 |

**CONFIRMATION NO. 2184**

**REPLACEMENT FILING RECEIPT**

15516
Kokka & Backus, PC
703 High Street
Palo Alto, CA 94301

OC000000077680997

Date Mailed: 09/25/2015

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

**Inventor(s)**

Gregory C. Burnett, Dodge Center, MN;

**Applicant(s)**

AliphCom, San Francisco, CA;

**Assignment For Published Patent Application**

AliphCom, San Francisco, CA

**Power of Attorney:** The patent practitioners associated with Customer Number 15516

**Domestic Priority data as claimed by applicant**

This application is a CON of 12/139,355 06/13/2008 PAT 8494177
which claims benefit of 60/934,551 06/13/2007
and claims benefit of 60/953,444 08/01/2007
and claims benefit of 60/954,712 08/08/2007
and claims benefit of 61/045,377 04/16/2008

**Foreign Applications** for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
*Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.*

**If Required, Foreign Filing License Granted:** 08/06/2013
The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 13/948,160**
**Projected Publication Date:** Not Applicable
**Non-Publication Request:** No

**Early Publication Request:** No
**Title**

DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)

**Preliminary Class**

381

**Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications:** No

## PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

## LICENSE FOR FOREIGN FILING UNDER

## Title 35, United States Code, Section 184

## Title 37, Code of Federal Regulations, 5.11 & 5.15

**GRANTED**

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

**NOT GRANTED**

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

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## *SelectUSA*

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

| Application Number | Application/Control No. | Applicant(s)/Patent under Reexamination | |
|---|---|---|---|
| | 13/948,160 | BURNETT, GREGORY C. | |

| Document Code - DISQ | Internal Document – DO NOT MAIL |
|---|---|

| TERMINAL DISCLAIMER | ☒ APPROVED | ☐ DISAPPROVED |
|---|---|---|
| Date Filed : 9/15/15 | This patent is subject to a Terminal Disclaimer | |

**Approved/Disapproved by:**

jean proctor

U.S. Patent and Trademark Office

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

# NOTICE OF ALLOWANCE AND FEE(S) DUE

15516 7590 12/28/2015

Kokka & Backus, PC
703 High Street
Palo Alto, CA 94301

| EXAMINER |
|---|
| WEISS, HOWARD |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2814 | |

DATE MAILED: 12/28/2015

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 13/948,160 | 07/22/2013 | Gregory C. Burnett | ALI-050CCON1 | 2184 |

TITLE OF INVENTION: DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)

| APPLN. TYPE | ENTITY STATUS | ISSUE FEE DUE | PUBLICATION FEE DUE | PREV. PAID ISSUE FEE | TOTAL FEE(S) DUE | DATE DUE |
|---|---|---|---|---|---|---|
| nonprovisional | UNDISCOUNTED | $960 | $0 | $0 | $960 | 03/28/2016 |

**THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.**

**THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.**

**HOW TO REPLY TO THIS NOTICE:**

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

**IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.**

## PART B - FEE(S) TRANSMITTAL

**Complete and send this form, together with applicable fee(s), to: Mail** **Mail Stop ISSUE FEE**
**Commissioner for Patents**
**P.O. Box 1450**
**Alexandria, Virginia 22313-1450**
**or Fax (571)-273-2885**

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

15516 7590 12/28/2015

Kokka & Backus, PC
703 High Street
Palo Alto, CA 94301

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

**Certificate of Mailing or Transmission**

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

| |
|---|
| (Depositor's name) |
| (Signature) |
| (Date) |

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 13/948,160 | 07/22/2013 | Gregory C. Burnett | ALI-050CCON1 | 2184 |

TITLE OF INVENTION: DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)

| APPLN. TYPE | ENTITY STATUS | ISSUE FEE DUE | PUBLICATION FEE DUE | PREV. PAID ISSUE FEE | TOTAL FEE(S) DUE | DATE DUE |
|---|---|---|---|---|---|---|
| nonprovisional | UNDISCOUNTED | $960 | $0 | $0 | $960 | 03/28/2016 |

| EXAMINER | ART UNIT | CLASS-SUBCLASS |
|---|---|---|
| WEISS, HOWARD | 2814 | 381-092000 |

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

(1) The names of up to 3 registered patent attorneys or agents OR, alternatively, 1_____

(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. 2_____ 3_____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. The following fee(s) are submitted:

❑ Issue Fee

❑ Publication Fee (No small entity discount permitted)

❑ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**

❑ A check is enclosed.

❑ Payment by credit card. Form PTO-2038 is attached.

❑ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)

❑ Applicant certifying micro entity status. See 37 CFR 1.29

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

❑ Applicant asserting small entity status. See 37 CFR 1.27

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

❑ Applicant changing to regular undiscounted fee status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____



PTOL-85 Part B (10-13) Approved for use through 10/31/2013. OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

**Meta Platforms, Inc. - Exhibit 1002**
**250 of 450**

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 13/948,160 | 07/22/2013 | Gregory C. Burnett | ALI-050CCON1 | 2184 |

15516 7590 12/28/2015

Kokka & Backus, PC
703 High Street
Palo Alto, CA 94301

| EXAMINER | |
|---|---|
| WEISS, HOWARD | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2814 | |

DATE MAILED: 12/28/2015

**Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)**
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

## OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

## Privacy Act Statement

**The Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

| Notice of Allowability | Application No. 13/948,160 | Applicant(s) BURNETT, GREGORY C. | |
|---|---|---|---|
| | Examiner /HOWARD WEISS/ | Art Unit 2814 | AIA (First Inventor to File) Status No |

***-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--***

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *a TD received 9/15/2015*.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on_____.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are *2-21*. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov .
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   **Certified copies:**

   a) ☐ All b) ☐ Some *c) ☐ None of the:
   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE**.

5. ☐ CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   **Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
5. ☐ Examiner's Amendment/Comment
6. ☒ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

Attorney's Docket Number: ALI-050CCON1

Filing Date: 7/22/2013

Continuing Data: a continuation of 12/139,355 (06/13/2008 now U. S. Patent No. 8,494,177) which claims benefit of 60/934,551 (06/13/2007) and claims benefit of 60/953,444 (08/01/2007) and claims benefit of 60/954,712 (08/08/2007) and claims benefit of 61/045,377 (04/16/2008); RCE established 4/14/2015

Claimed Foreign Priority Date: none

Applicant(s): Burnett

Examiner: Howard Weiss

***Notice of Pre-AIA or AIA Status***

1. The present application is being examined under the pre-AIA first to invent provisions.

***Terminal Disclaimer***

2. The terminal disclaimer filed on 9/15/2015 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of U.S. Patent Nos. 8,494,177 and 8,503,691 has been reviewed and is accepted. The terminal disclaimer has been recorded.

***Reasons for Allowance***

3. Claims 2 to 21 are allowed.

4. The following is an Examiner's statement of reasons for allowance: a dual virtual microphone array as claimed including having a linear response to both speech and noise could not be anticipated nor, in combination, be rendered obvious over the prior art of record.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

***Conclusion***

5. Papers related to this application may be submitted directly to Art Unit 2814 by facsimile transmission. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (15 November 1989). The Art Unit 2814 Fax Center number is **(571) 273-8300**. The Art Unit 2814 Fax Center is to be used only for papers related to Art Unit 2814 applications.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Howard Weiss at **(571) 272-1720** and between the hours of 7:00 AM to 3:00 PM (Eastern Standard Time) Monday through Friday or by e-mail via **Howard.Weiss@uspto.gov**. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy, can be reached on **(571) 272-1705**.

7. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at **866-217-9197** (toll-free).

8. The following list is the Examiner's field of search for the present Office Action:

| Field of Search | Date |
|---|---|
| U.S. Class / Subclass(es): G10L 2021/ 02165, 21/ 0208; H04R 3/ 005 | Thru 12/17/2015 |
| Other Documentation: none | |
| Electronic Database(s): EAST | Thru 12/17/2015 |

HW/hw
27 December 2015

/Howard Weiss/
Primary Examiner
Art Unit 2814

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

# BIB DATA SHEET

**CONFIRMATION NO. 2184**

| SERIAL NUMBER | FILING or 371(c) DATE<br>RULE | CLASS | GROUP ART UNIT | ATTORNEY DOCKET NO. |
|---|---|---|---|---|
| 13/948,160 | 07/22/2013 | 381 | 2814 | ALI-050CCON1 |

**APPLICANTS**
AliphCom, San Francisco, CA;

**INVENTORS**
Gregory C. Burnett, Dodge Center, MN;

**** CONTINUING DATA ***************************
This application is a CON of 12/139,355 06/13/2008 PAT 8494177
which claims benefit of 60/934,551 06/13/2007
and claims benefit of 60/953,444 08/01/2007
and claims benefit of 60/954,712 08/08/2007
and claims benefit of 61/045,377 04/16/2008

**** FOREIGN APPLICATIONS ***************************

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ****
08/06/2013

| Foreign Priority claimed | 35 USC 119(a-d) conditions met | Verified and Acknowledged | Met after Allowance | STATE OR COUNTRY | SHEETS DRAWINGS | TOTAL CLAIMS | INDEPENDENT CLAIMS |
|---|---|---|---|---|---|---|---|
| ☐ Yes ☑ No | ☐ Yes ☐ No | /Howard Weiss /<br>Examiner's Signature | ☐<br>Initials | MN | 17 | 1 | 1 |

**ADDRESS**

Kokka & Backus, PC
703 High Street
Palo Alto, CA 94301
UNITED STATES

**TITLE**

DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)

| FILING FEE RECEIVED | | |
|---|---|---|
| 1740 | FEES: Authority has been given in Paper<br>No._____ to charge/credit DEPOSIT ACCOUNT<br>No._____ for following: | ☐ All Fees<br>☐ 1.16 Fees (Filing)<br>☐ 1.17 Fees (Processing Ext. of time)<br>☐ 1.18 Fees (Issue)<br>☐ Other _____<br>☐ Credit |

**EAST Search History**

**EAST Search History (Prior Art)**

| Ref # | Hits | Search Query | DBs | Default Operator | Plurals | Time Stamp |
|---|---|---|---|---|---|---|
| L1 | 518 | @pd>"20150605" and ( (G10L2021/02165 OR G10L21/0208 OR H04R3/005).CPC. ) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; IBM_TDB | ADJ | OFF | 2015/12/17 13:52 |

**EAST Search History (Interference)**

| Ref # | Hits | Search Query | DBs | Default Operator | Plurals | Time Stamp |
|---|---|---|---|---|---|---|
| L2 | 3 | ((microphone array) and (processing component) and (adaptive noise) and (denoised output)).clm. | US-PGPUB; USPAT | ADJ | OFF | 2015/12/17 14:04 |
| L3 | 49 | ((first virtual microphone) and burnett.in.) not L2 | US-PGPUB; USPAT | ADJ | OFF | 2015/12/17 14:07 |

**12/17/2015 2:09:09 PM**
**C:\Users\hweiss\Documents\EAST\Workspaces\13948160.wsp**

| Search Notes | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 13948160 | BURNETT, GREGORY C. |
| | Examiner | Art Unit |
| | HOWARD WEISS | 2814 |

| CPC- SEARCHED | | |
|---|---|---|
| Symbol | Date | Examiner |
| G10L2021/02165, G10L21/0208, H04R3/005 | 5/7/2014 | HW |
| updated | 10/10/2014 | HW |
| updated | 6/5/2015 | HW |
| updated | 12/17/2015 | HW |

| CPC COMBINATION SETS - SEARCHED | | |
|---|---|---|
| Symbol | Date | Examiner |
| | | |

| US CLASSIFICATION SEARCHED | | | |
|---|---|---|---|
| Class | Subclass | Date | Examiner |
| 381 | 92, 94.7 | 5/7/2014 | HW |
| 704 | 233, E21.004 | 5/7/2014 | HW |
| all updated | all updated | 10/10/2014 | HW |

| SEARCH NOTES | | |
|---|---|---|
| Search Notes | Date | Examiner |
| | | |

| INTERFERENCE SEARCH | | | |
|---|---|---|---|
| US Class/ CPC Symbol | US Subclass / CPC Group | Date | Examiner |
| all | all (see printout) | 12/17/2015 | HW |

| Issue Classification | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 13948160 | BURNETT, GREGORY C. |
| | **Examiner** | **Art Unit** |
| | HOWARD WEISS | 2814 |

| CPC | | | | | | | |
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| **Symbol** | | | | | | **Type** | **Version** |
| H04R | | 3 | / | 002 | | F | 2013-01-01 |
| G10L | | 21 | / | 0208 | | I | 2013-01-01 |
| G10L | | 2021 | / | 02165 | | A | 2013-01-01 |
| H04R | | 1 | / | 406 | | I | 2013-01-01 |
| H04R | | 3 | / | 005 | | I | 2013-01-01 |
| H04R | | 3 | / | 04 | | I | 2013-01-01 |
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| **Symbol** | | | | | **Type** | **Set** | **Ranking** | **Version** |
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| NONE<br><br>(Assistant Examiner) | (Date) | **Total Claims Allowed:**<br>20 | |
|---|---|---|---|
| /HOWARD WEISS/<br>Primary Examiner.Art Unit 2814<br><br>(Primary Examiner) | 12/17/2015<br><br>(Date) | O.G. Print Claim(s)<br>1 | O.G. Print Figure<br>1 |

| Issue Classification | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 13948160 | BURNETT, GREGORY C. |
| | **Examiner** | **Art Unit** |
| | HOWARD WEISS | 2814 |

| US ORIGINAL CLASSIFICATION | | INTERNATIONAL CLASSIFICATION | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CLASS | SUBCLASS | CLAIMED | | | | | NON-CLAIMED | | | | | |
| | | H | 0 | 4 | R | 3 / 00 (2006.01.01) | | | | | | |
| CROSS REFERENCE(S) | | | | | | | | | | | | |
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| NONE<br><br>(Assistant Examiner) (Date) | **Total Claims Allowed:**<br>20 | |
|---|---|---|
| /HOWARD WEISS/<br>Primary Examiner.Art Unit 2814 12/17/2015<br><br>(Primary Examiner) (Date) | O.G. Print Claim(s)<br>1 | O.G. Print Figure<br>1 |

| Issue Classification | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 13948160 | BURNETT, GREGORY C. |
| | **Examiner** | **Art Unit** |
| | HOWARD WEISS | 2814 |

☒ Claims renumbered in the same order as presented by applicant ☐ CPA ☒ T.D. ☐ R.1.47

| Final | Original | Final | Original | Final | Original | Final | Original | Final | Original | Final | Original | Final | Original | Final | Original |
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|---|---|---|---|
| NONE<br><br>(Assistant Examiner) | (Date) | **Total Claims Allowed:**<br>20 | |
| /HOWARD WEISS/<br>Primary Examiner.Art Unit 2814<br><br>(Primary Examiner) | 12/17/2015<br><br>(Date) | O.G. Print Claim(s)<br>1 | O.G. Print Figure<br>1 |

UNITED STATES PATENT AND TRADEMARK OFFICE

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United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 13/948,160 | 07/22/2013 | Gregory C. Burnett | ALI-050CCON1 | 2184 |

7590 01/13/2016

Kokka & Backus, PC
703 High Street
Palo Alto, CA 94301

| EXAMINER | |
|---|---|
| WEISS, HOWARD | |
| ART UNIT | PAPER NUMBER |
| 2814 | |
| MAIL DATE | DELIVERY MODE |
| 01/13/2016 | PAPER |

## NOTICE REQUIRING INVENTOR'S OATH OR DECLARATION

☐ An inventor's oath or declaration in compliance with 37 CFR 1.63 or substitute statement in compliance with 37 CFR 1.64 executed by or with respect to each inventor has not yet been submitted.

The inventor's oath or declaration or substitute statement dated 08 27 2015 is defective. The inventor's oath or declaration does not comply with 37 CFR 1.63 or the substitute statement does not comply with 37 CFR 1.64 because it:

☐ does not include a statement that the person executing the oath or declaration or substitute statement believes the named inventor or joint inventor to be the original inventor or an original joint inventor of a claimed invention in the application for which the oath or declaration is being submitted.

☐ does not state that the application was made or was authorized to be made by the person executing the oath or declaration or substitute statement.

☐ does not acknowledge that any willful false statement made in such oath or declaration or substitute statement is punishable under section 1001 of title 18 by fine or imprisonment of not more than 5 years, or both.

☐ does not identify the person executing the oath or declaration or substitute statement by his or her legal name.

☐ does not identify the application to which the oath or declaration or substitute statement is directed.

☑ Other: The signature of Inventor Gregory BURNETT is missing.

The substitute statement dated _____ does not comply with 37 CFR 1.64 because it:

☐ does not identify the inventor with respect to whom the statement applies.

☐ does not identify the relationship to the non-signing inventor.

☐ does not identify the circumstances permitting execution of the statement.

☐ was signed by someone other than the applicant.

☐ Other: _____

An oath or declaration in compliance with 37 CFR 1.63, or a substitute statement in compliance with 37 CFR 1.64, executed by or with respect to each inventor MUST be filed **no later than the date on which the issue fee is paid.** See 35 U.S.C. 115(f). Failure to timely comply will result in ABANDONMENT of this application. This period for reply is not extendable under 37 CFR 1.136(a).

Questions relating to this Notice should be directed to the Application Assistance Unit at 571-272-4200.

(571)-272-4200 or 1(888)-786-0101
Patent Publication Branch
Office of Data Management

PTO/SB/30EFS (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

# REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL
## (Submitted Only via EFS-Web)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Application Number | 13/948,160 | Filing Date | 2013-07-22 | Docket Number (if applicable) | ALI-050CCON1 | Art Unit | 2814 |
| First Named Inventor | Gregory C. Burnett | | | Examiner Name | WEISS, Howard | | |

**This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.**
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV

### SUBMISSION REQUIRED UNDER 37 CFR 1.114

Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

☐ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

- ☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____
- ☐ Other _____

☒ Enclosed

- ☐ Amendment/Reply
- ☒ Information Disclosure Statement (IDS)
- ☐ Affidavit(s)/ Declaration(s)
- ☐ Other _____

### MISCELLANEOUS

☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months _____
(Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

☐ Other _____

### FEES

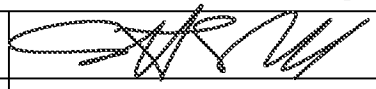
☐ **The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.**
The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No _____

### SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature

☐ Applicant Signature

PTO/SB/30EFS (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

| Signature of Registered U.S. Patent Practitioner | | | |
|---|---|---|---|
| Signature |  | Date (YYYY-MM-DD) | 2015-03-28 |
| Name | Scott S. Kokka | Registration Number | 51893 |

This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450.

*If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

| | |
|---|---|
| In re Application for: | Confirmation No.: 2184 |
| Gregory C. Burnett | Examiner: WEISS, Howard |
| Application Serial No.: 13/948,160 | Group Art Unit: 2814 |
| Filing Date: July 22, 2013 | Date: March 28, 2016 |
| For: DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA) | Atty. Docket No.: ALI-050CCON1 |

**CERTIFICATE OF TRANSMISSION**

I hereby certify that this correspondence is being transmitted via the U.S. Patent and Trademark Office electronic filing system (EFS-Web) to the USPTO on March 28, 2016.

Signed: _____
Yasmin R. Alleje

## INFORMATION DISCLOSURE STATEMENT

Sir or Madam:

In accordance with 37 CFR §§ 1.97 and 1.98, the items identified in this Information Disclosure Statement (IDS) are being brought to the attention of the Office. The items are listed on the attached forms PTO/SB/08a. The Examiner is requested to make these documents of record.

The items identified in this IDS may or may not be "material" pursuant to 37 CFR § 1.56. The submission thereof by Applicants is not to be construed as an admission that any such patent, publication or other information referred to therein is material or considered to be material (37 CFR § 1.97(h)), or even qualifies as "prior art" under 35 USC § 102 with respect to this invention unless specifically designated by Applicants as such.

**1. Timing of the Information Disclosure Statement:**

☒ This IDS is believed to be timely in that it is being submitted under 37 CFR § 1.97(b), that is (1) with the new patent application submitted herein (37 CFR § 1.97(a)); or (2) within three months of the filing date of the application, which is not a continued prosecution application filed under § 1.53(d) or (3) within three months of entry of the national stage as set forth in 37 CFR § 1.491; or (4) before the

mailing of a first Office action on the merits; or (5) before the mailing of a first Office action after filing a request for continued examination under § 1.114. Thus, no fee is required.

☐ However, if the undersigned is in error in this regard, Applicant respectfully requests that the Office consider this IDS as filed under 37 CFR § 1.97(c), if applicable.

☐ However, if the undersigned is in error in this regard, Applicant respectfully requests that the Office consider this IDS as filed under 37 CFR § 1.97(c), if applicable, and a statement under 37 CFR § 1.97(e) is included below, thus no fee is required.

☐ This IDS is being submitted under 37 CFR § 1.97(c), that is after mailing of a first Office Action on the merits, but before a Final Action under 37 CFR § 1.113 or a Notice of Allowance under 37 CFR § 1.311.

☐ The fee due under 37 CFR § 1.17(p) is submitted herewith.

☐ A statement under 37 CFR § 1.97(e) is included below, thus no fee is required. In the event that this IDS is not mailed before a Final Action or a Notice of Allowance, then Applicant respectfully requests that the Office consider the filing of these papers to be submitted under 37 CFR § 1.97(d).

☐ This IDS is being submitted under 37 CFR § 1.97(d), that is after a Final Action under 37 CFR § 1.113 or a Notice of Allowance under 37 CFR § 1.311, but before payment of the issue fee. A statement under 37 CFR § 1.97(e) is included below. The fee due under 37 CFR § 1.17(p) is submitted herewith.

**STATEMENT UNDER 37 CFR § 1.97(e):**

☐ Non-Patent Literature Document Cite No. X contained in the IDS was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the IDS.

☐ No item contained in this IDS was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing this statement after making reasonable inquiry, no item of information contained in this IDS was known to any individual designated in 37 CFR § 1.56(c) more than three months prior to the filing of this IDS.

**2. Copies of the Cited Items:**

☐ Copies of all items listed on the attached form PTO/SB/08a are enclosed.

☐ Copies of all Foreign Patent Documents listed on form PTO/SB/08a are enclosed as required by 37 CFR § 1.98(a)(2).



**Meta Platforms, Inc. - Exhibit 1002**
**267 of 450**

☐ Copies of the following documents listed in PTO/SB/08a (Item Nos. X) are not supplied as they were previously cited by the Office or submitted in Information Disclosure Statements in related applications (Application No. X, filed X) and relied upon in this application for an earlier filing date under 35 USC § 120. See 37 CFR § 1.98(d). The Examiner is requested to make these documents of record.

☐ Copies of the following items listed on the attached forms PTO/SB/08a (Non-Patent Literature Documents Item Nos. 1) were cited in a foreign examination report in a related case. A copy of the search report is attached hereto.

**3. Concise Explanation of Relevance:**

☐ A concise explanation of relevance of the items listed on forms PTO/SB/08a is not given.

☐ A concise explanation of relevance of [some of] the items listed on forms PTO/SB/08a is in the form of an English language copy of a Search Report from a foreign patent office, issued in a counterpart application, which refers to the relevant portions of the references (copy attached).

**4. Related Applications:**

☒ Applicant(s) bring to the Office's attention the following related application(s): U.S. Patent Application No. 12/139,355 filed June 13, 2008, Attorney Docket No. ALI-050C.

**5. Conclusion:**

Citation of the above documents shall not be construed as:

1. an admission that the documents are necessarily prior art with respect to the instant invention;
2. a representation that a search has been made, other than as described above; and
3. an admission that the information cited herein is, or is considered to be, material to patentability as defined in § 1.56(b).

It is respectfully requested that the Examiner indicate consideration of the cited references by returning a copy of the attached forms PTO/SB/08a with initials or other appropriate marks. In the unlikely event that the transmittal letter is separated from this document and the U.S. Patent Office determines that an extension and/or other relief is required, Applicants petition for any required relief

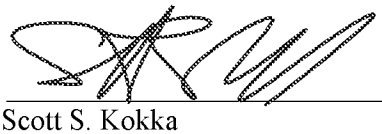


**Meta Platforms, Inc. - Exhibit 1002**
**268 of 450**

including extensions of time. However, the Commissioner is not authorized to charge the cost of the issue fee to the Deposit Account.

Respectfully submitted,

Dated: March 28, 2016

By: 

Scott S. Kokka
Registration No. 51,893

PTO/SB/08a (03-15)
Approved for use through 07/31/2016. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

# INFORMATION DISCLOSURE STATEMENT BY APPLICANT

**( Not for submission under 37 CFR 1.99)**

| | |
|---|---|
| Application Number | 13948160 |
| Filing Date | 2013-07-22 |
| First Named Inventor | Gregroy C. Burnett |
| Art Unit | 2814 |
| Examiner Name | WEISS, Howard |
| Attorney Docket Number | ALI-050CCON1 |

**U.S.PATENTS**

| Examiner Initial* | Cite No | Patent Number | Kind Code[1] | Issue Date | Name of Patentee or Applicant of cited Document | Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear |
|---|---|---|---|---|---|---|
| | 1 | 8494177 | | 2013-07-23 | Burnett, Gregory C. | |
| | 2 | 7706549 | | 2010-04-27 | Zhang et al. | |
| | 3 | 6473733 | | 2002-10-29 | McArthur et al. | |
| | 4 | 5473701 | | 1995-12-05 | Cezanne et al. | |

If you wish to add additional U.S. Patent citation information please click the Add button.

**U.S.PATENT APPLICATION PUBLICATIONS**

| Examiner Initial* | Cite No | Publication Number | Kind Code[1] | Publication Date | Name of Patentee or Applicant of cited Document | Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear |
|---|---|---|---|---|---|---|
| | 1 | | | | | |

If you wish to add additional U.S. Published Application citation information please click the Add button.

**FOREIGN PATENT DOCUMENTS**

| Examiner Initial* | Cite No | Foreign Document Number[3] | Country Code[2] i | Kind Code[4] | Publication Date | Name of Patentee or Applicant of cited Document | Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear | T[5] |
|---|---|---|---|---|---|---|---|---|

| INFORMATION DISCLOSURE STATEMENT BY APPLICANT ( Not for submission under 37 CFR 1.99) | | |
|---|---|---|
| | Application Number | 13948160 |
| | Filing Date | 2013-07-22 |
| | First Named Inventor | Gregroy C. Burnett |
| | Art Unit | 2814 |
| | Examiner Name | WEISS, Howard |
| | Attorney Docket Number | ALI-050CCON1 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1 | | | | | | | ☐ |

If you wish to add additional Foreign Patent Document citation information please click the Add button

**NON-PATENT LITERATURE DOCUMENTS**

| Examiner Initials* | Cite No | Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published. | T[5] |
|---|---|---|---|
| | 1 | WEISS, Howard; Office Action mailed by U.S. Patent and Trademark Office on March 15, 2012 for U.S. Patent Application No. 12/139,355. | ☐ |
| | 2 | WEISS, Howard; Office Action mailed by U.S. Patent and Trademark Office on June 13, 2008 for U.S. Patent Application No. 12/139,355. | ☐ |

If you wish to add additional non-patent literature document citation information please click the Add button

**EXAMINER SIGNATURE**

| Examiner Signature | | Date Considered | |
|---|---|---|---|

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

# INFORMATION DISCLOSURE STATEMENT BY APPLICANT

**( Not for submission under 37 CFR 1.99)**

| | |
|---|---|
| Application Number | 13948160 |
| Filing Date | 2013-07-22 |
| First Named Inventor | Gregroy C. Burnett |
| Art Unit | 2814 |
| Examiner Name | WEISS, Howard |
| Attorney Docket Number | ALI-050CCON1 |

**CERTIFICATION STATEMENT**

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

**OR**

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☒ See attached certification statement.

☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☐ A certification statement is not submitted herewith.

**SIGNATURE**

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

| | | | |
|---|---|---|---|
| Signature |  | Date (YYYY-MM-DD) | 2016-03-28 |
| Name/Print | Scott S. Kokka | Registration Number | 51893 |

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

# Electronic Patent Application Fee Transmittal

| | |
|---|---|
| **Application Number:** | 13948160 |
| **Filing Date:** | 22-Jul-2013 |
| **Title of Invention:** | DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA) |
| **First Named Inventor/Applicant Name:** | Gregory C. Burnett |
| **Filer:** | Scott Susumu Kokka/Yasmin Alleje |
| **Attorney Docket Number:** | ALI-050CCON1 |

Filed as Large Entity

**Filing Fees for Utility under 35 USC 111(a)**

| Description | Fee Code | Quantity | Amount | Sub-Total in USD($) |
|---|---|---|---|---|
| **Basic Filing:** | | | | |
| **Pages:** | | | | |
| **Claims:** | | | | |
| **Miscellaneous-Filing:** | | | | |
| **Petition:** | | | | |
| **Patent-Appeals-and-Interference:** | | | | |
| **Post-Allowance-and-Post-Issuance:** | | | | |
| **Extension-of-Time:** | | | | |

| Description | Fee Code | Quantity | Amount | Sub-Total in USD($) |
|---|---|---|---|---|
| **Miscellaneous:** | | | | |
| RCE- 2nd and Subsequent Request | 1820 | 1 | 1700 | 1700 |
| | | **Total in USD ($)** | | **1700** |

# Electronic Acknowledgement Receipt

| | |
|---|---|
| **EFS ID:** | 25321407 |
| **Application Number:** | 13948160 |
| **International Application Number:** | |
| **Confirmation Number:** | 2184 |
| **Title of Invention:** | DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA) |
| **First Named Inventor/Applicant Name:** | Gregory C. Burnett |
| **Customer Number:** | 15516 |
| **Filer:** | Scott Susumu Kokka/Kate Cleland |
| **Filer Authorized By:** | Scott Susumu Kokka |
| **Attorney Docket Number:** | ALI-050CCON1 |
| **Receipt Date:** | 28-MAR-2016 |
| **Filing Date:** | 22-JUL-2013 |
| **Time Stamp:** | 22:42:21 |
| **Application Type:** | Utility under 35 USC 111(a) |

## Payment information:

| | |
|---|---|
| Submitted with Payment | yes |
| Payment Type | Credit Card |
| Payment was successfully received in RAM | $1700 |
| RAM confirmation Number | 6382 |
| Deposit Account | |
| Authorized User | |
| The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: | |

## File Listing:

| Document Number | Document Description | File Name | File Size(Bytes)/ Message Digest | Multi Part /.zip | Pages (if appl.) |
|---|---|---|---|---|---|
| 1 | Request for Continued Examination (RCE) | ALI-050CCON1_RCE_asFILED.pdf | 110673<br>68b9a4061cd83384ea3d0564208abcd0b205ad2a | no | 2 |
| **Warnings:** | | | | | |
| This is not a USPTO supplied RCE SB30 form. | | | | | |
| **Information:** | | | | | |
| 2 | Transmittal Letter | ALI-050CCON1_IDS_Transmittal_asFILED.pdf | 110109<br>59af108d8b7ec7a0932f9d64904633e58863fab3 | no | 4 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 3 | Information Disclosure Statement (IDS) Form (SB08) | ALI-050CCON1_PTO_sb08a_asFILED.pdf | 78750<br>2517eccebb4cc9b887dccf29ed7b0824a9462ecb | no | 3 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| This is not an USPTO supplied IDS fillable form | | | | | |
| 4 | Fee Worksheet (SB06) | fee-info.pdf | 30894<br>c7ad6a56952039b4aa183e8b99808f9d621c7dbc | no | 2 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| | | **Total Files Size (in bytes):** | 330426 | | |

**This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.**

**New Applications Under 35 U.S.C. 111**

**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

**National Stage of an International Application under 35 U.S.C. 371**

**If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.**

**New International Application Filed with the USPTO as a Receiving Office**

**If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.**

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

| PATENT APPLICATION FEE DETERMINATION RECORD<br>Substitute for Form PTO-875 | Application or Docket Number<br>13/948,160 | Filing Date<br>07/22/2013 | ☐ To be Mailed |
|---|---|---|---|

**ENTITY:** ☒ LARGE ☐ SMALL ☐ MICRO

## APPLICATION AS FILED – PART I

| FOR | (Column 1) NUMBER FILED | (Column 2) NUMBER EXTRA | RATE ($) | FEE ($) |
|---|---|---|---|---|
| ☐ BASIC FEE (37 CFR 1.16(a), (b), or (c)) | N/A | N/A | N/A | |
| ☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m)) | N/A | N/A | N/A | |
| ☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q)) | N/A | N/A | N/A | |
| TOTAL CLAIMS (37 CFR 1.16(i)) | minus 20 = | * | X $ = | |
| INDEPENDENT CLAIMS (37 CFR 1.16(h)) | minus 3 = | * | X $ = | |
| ☐ APPLICATION SIZE FEE (37 CFR 1.16(s)) | If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s). | | | |
| ☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j)) | | | | |
| * If the difference in column 1 is less than zero, enter "0" in column 2. | | | TOTAL | |

## APPLICATION AS AMENDED – PART II

AMENDMENT **03/28/2016**

| | (Column 1) CLAIMS REMAINING AFTER AMENDMENT | | (Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR | (Column 3) PRESENT EXTRA | RATE ($) | ADDITIONAL FEE ($) |
|---|---|---|---|---|---|---|
| Total (37 CFR 1.16(i)) | * 20 | Minus | ** 20 | = 0 | X $80 = | 0 |
| Independent (37 CFR 1.16(h)) | * 3 | Minus | ***3 | = 0 | X $420 = | 0 |
| ☐ Application Size Fee (37 CFR 1.16(s)) | | | | | | |
| ☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) | | | | | | |
| | | | | | TOTAL ADD'L FEE | 0 |

AMENDMENT

| | (Column 1) CLAIMS REMAINING AFTER AMENDMENT | | (Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR | (Column 3) PRESENT EXTRA | RATE ($) | ADDITIONAL FEE ($) |
|---|---|---|---|---|---|---|
| Total (37 CFR 1.16(i)) | * | Minus | ** | = | X $ = | |
| Independent (37 CFR 1.16(h)) | * | Minus | *** | = | X $ = | |
| ☐ Application Size Fee (37 CFR 1.16(s)) | | | | | | |
| ☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) | | | | | | |
| | | | | | TOTAL ADD'L FEE | |

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
/LAJUAN HICKSON/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**
*If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

# NOTICE OF ALLOWANCE AND FEE(S) DUE

15516 7590 05/05/2016

Kokka & Backus, PC
703 High Street
Palo Alto, CA 94301

| EXAMINER |
|---|
| HA, NATHAN W |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2814 | |

DATE MAILED: 05/05/2016

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 13/948,160 | 07/22/2013 | Gregory C. Burnett | ALI-050CCON1 | 2184 |

TITLE OF INVENTION: DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)

| APPLN. TYPE | ENTITY STATUS | ISSUE FEE DUE | PUBLICATION FEE DUE | PREV. PAID ISSUE FEE | TOTAL FEE(S) DUE | DATE DUE |
|---|---|---|---|---|---|---|
| nonprovisional | UNDISCOUNTED | $960 | $0 | $0 | $960 | 08/05/2016 |

**THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.**

**THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.**

**HOW TO REPLY TO THIS NOTICE:**

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

**IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.**

# PART B - FEE(S) TRANSMITTAL

**Complete and send this form, together with applicable fee(s), to: Mail** **Mail Stop ISSUE FEE**
**Commissioner for Patents**
**P.O. Box 1450**
**Alexandria, Virginia 22313-1450**
**or Fax (571)-273-2885**

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

15516 7590 05/05/2016

Kokka & Backus, PC
703 High Street
Palo Alto, CA 94301

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

**Certificate of Mailing or Transmission**

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

| |
|---|
| (Depositor's name) |
| (Signature) |
| (Date) |

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 13/948,160 | 07/22/2013 | Gregory C. Burnett | ALI-050CCON1 | 2184 |

TITLE OF INVENTION: DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)

| APPLN. TYPE | ENTITY STATUS | ISSUE FEE DUE | PUBLICATION FEE DUE | PREV. PAID ISSUE FEE | TOTAL FEE(S) DUE | DATE DUE |
|---|---|---|---|---|---|---|
| nonprovisional | UNDISCOUNTED | $960 | $0 | $0 | $960 | 08/05/2016 |

| EXAMINER | ART UNIT | CLASS-SUBCLASS |
|---|---|---|
| HA, NATHAN W | 2814 | 381-092000 |

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,

(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____

2 _____

3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. The following fee(s) are submitted:

❑ Issue Fee

❑ Publication Fee (No small entity discount permitted)

❑ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**

❑ A check is enclosed.

❑ Payment by credit card. Form PTO-2038 is attached.

❑ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)

❑ Applicant certifying micro entity status. See 37 CFR 1.29

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

❑ Applicant asserting small entity status. See 37 CFR 1.27

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

❑ Applicant changing to regular undiscounted fee status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____



PTOL-85 Part B (10-13) Approved for use through 10/31/2013. OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 13/948,160 | 07/22/2013 | Gregory C. Burnett | ALI-050CCON1 | 2184 |

15516 7590 05/05/2016

Kokka & Backus, PC
703 High Street
Palo Alto, CA 94301

| EXAMINER | |
|---|---|
| HA, NATHAN W | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2814 | |

DATE MAILED: 05/05/2016

**Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)**
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

## OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

## Privacy Act Statement

**The Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

| Notice of Allowability | Application No. 13/948,160 | Applicant(s) BURNETT, GREGORY C. | |
|---|---|---|---|
| | Examiner NATHAN HA | Art Unit 2814 | AIA (First Inventor to File) Status No |

***-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--***

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *3/28/16*.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on_____.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are *2-21*. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov .
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   **Certified copies:**

   a) ☐ All b) ☐ Some *c) ☐ None of the:
   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE**.

5. ☐ CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   **Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

1. ☐ Notice of References Cited (PTO-892)
2. ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date 3/28/16
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
5. ☐ Examiner's Amendment/Comment
6. ☐ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/NATHAN HA/
Primary Examiner, Art Unit 2814

| INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99) | | |
|---|---|---|
| | Application Number | 13948160 |
| | Filing Date | 2013-07-22 |
| | First Named Inventor | Gregroy C. Burnett |
| | Art Unit | 2814 |
| | Examiner Name | WEISS, Howard |
| | Attorney Docket Number | ALI-050CCON1 |

**U.S.PATENTS**

| Examiner Initial* | Cite No | Patent Number | Kind Code[1] | Issue Date | Name of Patentee or Applicant of cited Document | Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear |
|---|---|---|---|---|---|---|
| | 1 | 8494177 | | 2013-07-23 | Burnett, Gregory C. | |
| | 2 | 7706549 | | 2010-04-27 | Zhang et al. | |
| | 3 | 6473733 | | 2002-10-29 | McArthur et al. | |
| | 4 | 5473701 | | 1995-12-05 | Cezanne et al. | |

If you wish to add additional U.S. Patent citation information please click the Add button.

**U.S.PATENT APPLICATION PUBLICATIONS**

| Examiner Initial* | Cite No | Publication Number | Kind Code[1] | Publication Date | Name of Patentee or Applicant of cited Document | Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear |
|---|---|---|---|---|---|---|
| | 1 | | | | | |

If you wish to add additional U.S. Published Application citation information please click the Add button.

**FOREIGN PATENT DOCUMENTS**

| Examiner Initial* | Cite No | Foreign Document Number[3] | Country Code[2] | Kind Code[4] | Publication Date | Name of Patentee or Applicant of cited Document | Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear | T[5] |
|---|---|---|---|---|---|---|---|---|

EFS Web 2.1.17

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /N.H./

| Receipt date: 03/28/2016 | Application Number | 13948160 | 13948160 - GAU: 2814 |
|---|---|---|---|
| **INFORMATION DISCLOSURE STATEMENT BY APPLICANT** ( **Not for submission under 37 CFR 1.99)** | Filing Date | 2013-07-22 | |
| | First Named Inventor | Gregroy C. Burnett | |
| | Art Unit | 2814 | |
| | Examiner Name | WEISS, Howard | |
| | Attorney Docket Number | ALI-050CCON1 | |

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|---|---|---|---|---|---|---|---|---|
| | 1 | | | | | | | ☐ |

If you wish to add additional Foreign Patent Document citation information please click the Add button

**NON-PATENT LITERATURE DOCUMENTS**

| Examiner Initials* | Cite No | Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published. | T[5] |
|---|---|---|---|
| | 1 | WEISS, Howard; Office Action mailed by U.S. Patent and Trademark Office on March 15, 2012 for U.S. Patent Application No. 12/139,355. | ☐ |
| | 2 | WEISS, Howard; Office Action mailed by U.S. Patent and Trademark Office on June 13, 2008 for U.S. Patent Application No. 12/139,355. | ☐ |

If you wish to add additional non-patent literature document citation information please click the Add button

**EXAMINER SIGNATURE**

| Examiner Signature | /Nathan Ha/ | Date Considered | 05/02/2016 |
|---|---|---|---|

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.



ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /N.H./

| Search Notes | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 13948160 | BURNETT, GREGORY C. |
| | Examiner | Art Unit |
| | HOWARD WEISS | 2814 |

| CPC- SEARCHED | | |
|---|---|---|
| Symbol | Date | Examiner |
| G10L2021/02165, G10L21/0208, H04R3/005 | 5/7/2014 | HW |
| updated | 10/10/2014 | HW |
| updated | 6/5/2015 | HW |
| updated | 12/17/2015 | HW |

| CPC COMBINATION SETS - SEARCHED | | |
|---|---|---|
| Symbol | Date | Examiner |
| | | |

| US CLASSIFICATION SEARCHED | | | |
|---|---|---|---|
| Class | Subclass | Date | Examiner |
| 381 | 92, 94.7 | 5/7/2014 | HW |
| 704 | 233, E21.004 | 5/7/2014 | HW |
| all updated | all updated | 10/10/2014 | HW |
| | ABOVE SEARCH UPDATED | 5/2/2016 | NH |

| SEARCH NOTES | | |
|---|---|---|
| Search Notes | Date | Examiner |
| SEE NOTES | 5/2/2016 | NH |

| INTERFERENCE SEARCH | | | |
|---|---|---|---|
| US Class/ CPC Symbol | US Subclass / CPC Group | Date | Examiner |
| all | all (see printout) | 5/2/2016 | N H |

| Index of Claims | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 13948160 | BURNETT, GREGORY C. |
| | **Examiner** | **Art Unit** |
| | NATHAN W. HA | 2814 |

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|---|---|---|---|---|---|---|---|
| ✓ | Rejected | - | Cancelled | N | Non-Elected | A | Appeal |
| = | Allowed | ÷ | Restricted | I | Interference | O | Objected |

☒ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

| CLAIM | | DATE | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Final | Original | 05/07/2014 | 10/10/2014 | 06/05/2015 | 05/02/2016 | | | | | |
| | 1 | ✓ | - | - | - | | | | | |
| | 2 | | ✓ | ✓ | = | | | | | |
| | 3 | | ✓ | ✓ | = | | | | | |
| | 4 | | ✓ | ✓ | = | | | | | |
| | 5 | | ✓ | ✓ | = | | | | | |
| | 6 | | ✓ | ✓ | = | | | | | |
| | 7 | | ✓ | ✓ | = | | | | | |
| | 8 | | ✓ | ✓ | = | | | | | |
| | 9 | | ✓ | ✓ | = | | | | | |
| | 10 | | ✓ | ✓ | = | | | | | |
| | 11 | | ✓ | ✓ | = | | | | | |
| | 12 | | ✓ | ✓ | = | | | | | |
| | 13 | | ✓ | ✓ | = | | | | | |
| | 14 | | ✓ | ✓ | = | | | | | |
| | 15 | | ✓ | ✓ | = | | | | | |
| | 16 | | ✓ | ✓ | = | | | | | |
| | 17 | | ✓ | ✓ | = | | | | | |
| | 18 | | ✓ | ✓ | = | | | | | |
| | 19 | | ✓ | ✓ | = | | | | | |
| | 20 | | ✓ | ✓ | = | | | | | |
| | 21 | | ✓ | ✓ | = | | | | | |

**EAST Search History**

**EAST Search History (Prior Art)**

| Ref # | Hits | Search Query | DBs | Default Operator | Plurals | Time Stamp |
|---|---|---|---|---|---|---|
| L1 | 2325 | H04R1/1091.CPC. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | OFF | 2016/05/02 09:58 |
| L2 | 3338 | H04R1/406.CPC. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | OFF | 2016/05/02 09:59 |
| L3 | 3349 | 381/92 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | OFF | 2016/05/02 10:02 |

**5/2/2016 10:17:19 AM**

| Issue Classification | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 13948160 | BURNETT, GREGORY C. |
| | **Examiner** | **Art Unit** |
| | NATHAN W. HA | 2814 |

| CPC | | | | | | |
|---|---|---|---|---|---|---|
| **Symbol** | | | | | **Type** | **Version** |
| H04R | | 1 | / | 1091 | F | 2013-01-01 |
| G10L | | 21 | / | 0208 | I | 2013-01-01 |
| G10L | | 2021 | / | 02165 | A | 2013-01-01 |
| H04R | | 1 | / | 406 | I | 2013-01-01 |
| H04R | | 3 | / | 005 | I | 2013-01-01 |
| H04R | | 3 | / | 04 | I | 2013-01-01 |
| H04R | | 3 | / | 002 | I | 2013-01-01 |
| H04R | | 2460 | / | 01 | A | 2013-01-01 |
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| CPC Combination Sets | | | | | | | |
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| **Symbol** | | | | | **Type** | **Set** | **Ranking** | **Version** |
| | | | / | | | | | |
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| NONE | | **Total Claims Allowed:** | |
|---|---|---|---|
| (Assistant Examiner) | (Date) | 20 | |
| /NATHAN W. HA/<br>Primary Examiner.Art Unit 2814 | 5/2/16 | O.G. Print Claim(s) | O.G. Print Figure |
| (Primary Examiner) | (Date) | 1 | 1 |

| Issue Classification | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 13948160 | BURNETT, GREGORY C. |
| | **Examiner** | **Art Unit** |
| | NATHAN W. HA | 2814 |

| US ORIGINAL CLASSIFICATION | | INTERNATIONAL CLASSIFICATION | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CLASS | SUBCLASS | CLAIMED | | | | | NON-CLAIMED | | | | | |
| 381 | 92 | H | 0 | 4 | R | 3 / 00 (2006.01.01) | | | | | | |

| CROSS REFERENCE(S) | | | | | |
|---|---|---|---|---|---|
| CLASS | SUBCLASS (ONE SUBCLASS PER BLOCK) | | | | |
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|---|---|---|---|
| NONE | | **Total Claims Allowed:** | |
| (Assistant Examiner) | (Date) | 20 | |
| /NATHAN W. HA/<br>Primary Examiner.Art Unit 2814 | 5/2/16 | O.G. Print Claim(s) | O.G. Print Figure |
| (Primary Examiner) | (Date) | 1 | 1 |

| Issue Classification | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 13948160 | BURNETT, GREGORY C. |
| | **Examiner** | **Art Unit** |
| | NATHAN W. HA | 2814 |

☒ Claims renumbered in the same order as presented by applicant ☐ CPA ☒ T.D. ☐ R.1.47

| Final | Original | Final | Original | Final | Original | Final | Original | Final | Original | Final | Original | Final | Original | Final | Original |
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|---|---|---|---|
| NONE<br><br>(Assistant Examiner) | (Date) | **Total Claims Allowed:**<br>20 | |
| /NATHAN W. HA/<br>Primary Examiner.Art Unit 2814<br><br>(Primary Examiner) | 5/2/16<br><br>(Date) | O.G. Print Claim(s)<br>1 | O.G. Print Figure<br>1 |

Document Description: Issue Fee Payment (PTO-85B)

# Issue Fee Transmittal Form

| Application Number | Filing Date | First Named Inventor | Atty. Docket No. | Confirmation No. |
|---|---|---|---|---|
| 13948160 | 22-Jul-2013 | Gregory Burnett | ALI-050CCON1 | 2184 |

**TITLE OF INVENTION :**

DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)

| Entity Status | Application Type | Art Unit | Class - Subclass | EXAMINER |
|---|---|---|---|---|
| Regular Undiscounted | Utility under 35 USC 111(a) | 2814 | 092000 | NATHAN HA |

| Issue Fee Due | Publication Due | Total Fee(s) Due | Date Due | Prev. Paid Fee |
|---|---|---|---|---|
| $960 | $0 | $960 | 05-Aug-2016 | $0 |

## 1.Change of Correspondence Address and/or Indication Of Fee Address (37 CFR 1.33 & 1.363)

| Current Correspondence Address: | Current Indicated Fee Address : |
|---|---|
| 15516<br>Kokka & Backus, PC<br><br>703 High Street<br><br>Palo Alto CA 94301<br>UNITED STATES<br>650 566 9912<br>docketing@kokkalaw.com | |
| ☐ Change of correspondence address requested, system generated AIA/122-EFS form attached | ☐ Fee Address indication requested, system generated SB/47-EFS form attached |

## 2.Entity Status

**Change in Entity Status**

○ Applicant certifying micro entity status; system generated Micro Entity certification form attached. See 37 CFR 1.29.
Note: Absent a valid certification of micro entity status, issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment. If this box is checked, you will be prompted to choose a micro entity status on the gross income basis (37 CFR 1.29(a)) or the institution of higher education basis (37 CFR 1.29(d)), and make the applicable certification online.

○ Applicant asserting small entity status. See 37 CFR 1.27.
Note: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

◉ Applicant changing to regular undiscounted fee status.
Note: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

Document Description: Issue Fee Payment (PTO-85B)

**3.The Following Fee(s) Are Submitted:**

| | |
|---|---|
| ☒ Issue Fee | ☐ I authorize USPTO to apply my previously paid issue fee to the current fees due |
| ☐ Publication Fee | ☐ The Director is hereby authorized to apply my previously paid issue fee to the current fee due and to charge deficient fees to Deposit Account Number _____ |
| ☐ Advance Order - # of copies _____ | ☐ If **in addition to** the payment of the issue fee amount submitted with this form, there are any discrepancies in any amount(s) due, the Director is authorized to charge any deficiency, or credit any overpayment, to Deposit Account Number _____ . The **issue fee must be submitted** with this form. **If payment of the issue fee does not accompany this form, checking this box and providing a deposit account number will NOT be effective to satisfy full payment of the fee(s) due.** |

**4.Firm and/or Attorney Names To Be Printed**

**NOTE: If no name is listed, no name will be printed**
For printing on the patent front page, list to be displayed as entered

1. KOKKA & BACKUS, PC
2.
3.

**5.Assignee Name(s) and Residence Data To Be Printed**

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

| Name | City | State | Country | Category |
|---|---|---|---|---|
| AliphCom | San Francisco | CALIFORNIA | united states | corporation |

**6.Signature**

I certify, in accordance with 37 CFR 1.4(d)(4) that I am an attorney or agent registered to practice before the Patent and Trademark Office who has filed and has been granted power of attorney in this application. I also certify that this Fee(s) Transmittal form is being transmitted to the USPTO via EFS-WEB on the date indicated below.

| | | | |
|---|---|---|---|
| **Signature** | /Scott S. Kokka/ | **Date** | 08-05-2016 |
| **Name** | Scott Susumu Kokka | **Registration Number** | 51893 |

# Electronic Patent Application Fee Transmittal

| | |
|---|---|
| **Application Number:** | 13948160 |
| **Filing Date:** | 22-Jul-2013 |
| **Title of Invention:** | DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA) |
| **First Named Inventor/Applicant Name:** | Gregory C. Burnett |
| **Filer:** | Scott Susumu Kokka/Kate Cleland |
| **Attorney Docket Number:** | ALI-050CCON1 |

Filed as Large Entity

**Filing Fees for Utility under 35 USC 111(a)**

| Description | Fee Code | Quantity | Amount | Sub-Total in USD($) |
|---|---|---|---|---|
| **Basic Filing:** | | | | |
| Utility Appl Issue Fee | 1501 | 1 | 960 | 960 |
| Publ. Fee- Early, Voluntary, or Normal | 1504 | 1 | 0 | 0 |
| **Pages:** | | | | |
| **Claims:** | | | | |
| **Miscellaneous-Filing:** | | | | |
| **Petition:** | | | | |
| **Patent-Appeals-and-Interference:** | | | | |

| Description | Fee Code | Quantity | Amount | Sub-Total in USD($) |
|---|---|---|---|---|
| **Post-Allowance-and-Post-Issuance:** | | | | |
| **Extension-of-Time:** | | | | |
| **Miscellaneous:** | | | | |
| | | | **Total in USD ($)** | **960** |

# Electronic Acknowledgement Receipt

| | |
|---|---|
| **EFS ID:** | 26568338 |
| **Application Number:** | 13948160 |
| **International Application Number:** | |
| **Confirmation Number:** | 2184 |
| **Title of Invention:** | DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA) |
| **First Named Inventor/Applicant Name:** | Gregory C. Burnett |
| **Customer Number:** | 15516 |
| **Filer:** | Scott Susumu Kokka/Kate Cleland |
| **Filer Authorized By:** | Scott Susumu Kokka |
| **Attorney Docket Number:** | ALI-050CCON1 |
| **Receipt Date:** | 05-AUG-2016 |
| **Filing Date:** | 22-JUL-2013 |
| **Time Stamp:** | 22:51:14 |
| **Application Type:** | Utility under 35 USC 111(a) |

## Payment information:

| | |
|---|---|
| Submitted with Payment | yes |
| Payment Type | Credit Card |
| Payment was successfully received in RAM | $960 |
| RAM confirmation Number | 5468 |
| Deposit Account | |
| Authorized User | |
| The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: | |

## File Listing:

| Document Number | Document Description | File Name | File Size(Bytes)/ Message Digest | Multi Part /.zip | Pages (if appl.) |
|---|---|---|---|---|---|
| 1 | Issue Fee Payment (PTO-85B) | Web85b.pdf | 46065<br>35b27bc60d90130ab70e820c53be2eafdfc0b697 | no | 2 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 2 | Fee Worksheet (SB06) | fee-info.pdf | 32569<br>deabed199242f7df134ede5d2bef208689895877 | no | 2 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| | | **Total Files Size (in bytes):** | 78634 | | |

**This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.**

**New Applications Under 35 U.S.C. 111**

**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

**National Stage of an International Application under 35 U.S.C. 371**

**If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.**

**New International Application Filed with the USPTO as a Receiving Office**

**If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.**

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

# CORRECTED
# NOTICE OF ALLOWANCE AND FEE(S) DUE

15516 7590 08/12/2016

Kokka & Backus, PC
703 High Street
Palo Alto, CA 94301

| EXAMINER | |
|---|---|
| HA, NATHAN W | |
| ART UNIT | PAPER NUMBER |
| 2814 | |

DATE MAILED: 08/12/2016

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 13/948,160 | 07/22/2013 | Gregory C. Burnett | ALI-050CCON1 | 2184 |

TITLE OF INVENTION: DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)

| APPLN. TYPE | ENTITY STATUS | ISSUE FEE DUE | PUBLICATION FEE DUE | PREV. PAID ISSUE FEE | TOTAL FEE(S) DUE | DATE DUE |
|---|---|---|---|---|---|---|
| nonprovisional | UNDISCOUNTED | $960 | $0 | $960 | $960 | 11/14/2016 |

**THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.**

**THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.**

**HOW TO REPLY TO THIS NOTICE:**

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

**IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.**

## PART B - FEE(S) TRANSMITTAL

**Complete and send this form, together with applicable fee(s), to: Mail** **Mail Stop ISSUE FEE**
**Commissioner for Patents**
**P.O. Box 1450**
**Alexandria, Virginia 22313-1450**
**or Fax (571)-273-2885**

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

15516 7590 08/12/2016
Kokka & Backus, PC
703 High Street
Palo Alto, CA 94301

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

**Certificate of Mailing or Transmission**
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

| |
|---|
| (Depositor's name) |
| (Signature) |
| (Date) |

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 13/948,160 | 07/22/2013 | Gregory C. Burnett | ALI-050CCON1 | 2184 |

TITLE OF INVENTION: DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)

| APPLN. TYPE | ENTITY STATUS | ISSUE FEE DUE | PUBLICATION FEE DUE | PREV. PAID ISSUE FEE | TOTAL FEE(S) DUE | DATE DUE |
|---|---|---|---|---|---|---|
| nonprovisional | UNDISCOUNTED | $960 | $0 | $960 | $960 | 11/14/2016 |

| EXAMINER | ART UNIT | CLASS-SUBCLASS |
|---|---|---|
| HA, NATHAN W | 2814 | 381-092000 |

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.
1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:
☐ Issue Fee
☐ Publication Fee (No small entity discount permitted)
☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
☐ A check is enclosed.
☐ Payment by credit card. Form PTO-2038 is attached.
☐ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
☐ Applicant certifying micro entity status. See 37 CFR 1.29
NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
☐ Applicant asserting small entity status. See 37 CFR 1.27
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
☐ Applicant changing to regular undiscounted fee status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____



PTOL-85 Part B (10-13) Approved for use through 10/31/2013. OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

UNITED STATES PATENT AND TRADEMARK OFFICE

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| 13/948,160 | 07/22/2013 | Gregory C. Burnett | ALI-050CCON1 | 2184 |

15516 7590 08/12/2016

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703 High Street
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| EXAMINER | |
|---|---|
| HA, NATHAN W | |
| ART UNIT | PAPER NUMBER |
| 2814 | |

DATE MAILED: 08/12/2016

**Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)**
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

## OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

## Privacy Act Statement

**The Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

## Letter Withdrawing the Notice of Allowance and Fee(s) Due

This application is being withdrawn from issue because an inventor's oath or declaration, executed by or with respect to each inventor, in compliance with 35 U.S.C. § 115 and 37 CFR 1.63 or 1.64 has not been submitted. While the claims remain allowed and prosecution on the merits remains closed, the Notice of Allowance and Fee(s) Due is hereby withdrawn. The Notice of Allowability is not being withdrawn. As a result, any time period set forth in the Notice of Allowability continues to run from the mailing date of the Notice of Allowability.

Oath/Declaration:

An inventor's oath or declaration in compliance with 35 U.S.C. § 115 and 37 CFR 1.63 or 1.64, executed by or with respect to each inventor MUST be filed no later than the date on which the issue fee is paid. See 35 U.S.C. 115(f). In this instance, a compliant inventor's oath or declaration must be submitted before, or at the time, the signed part B of the attached "Notice of Allowance and Fee(s) Due" (PTOL-85) is returned (see below). Failure to timely comply will result in ABANDONMENT of this application. To ensure compliance with 35 U.S.C. § 115 and 37 CFR 1.63 or 1.64, the Office suggests using the appropriate USPTO form(s) available on the USPTO Web site (e.g., PTO/AIA/01 for a declaration under 37 CFR 1.63 or PTO/AIA/02 for a substitute statement under 37 CFR 1.64).

An inventor's oath or declaration in compliance with 35 U.S.C. § 115 and 37 CFR 1.63 or 1.64 must include the following (in addition to meeting the other requirements of 35 U.S.C. § 115 and 37 CFR 1.63 or 1.64):

(1) a statement that the application was made or was authorized to be made by the affiant or declarant;

(2) a statement that such individual believes himself or herself to be the original inventor or an original joint inventor of a claimed invention in the application; and

(3) an acknowledgment that any willful false statement made in such declaration or statement is punishable under section 1001 of title 18 by fine or imprisonment of not more than 5 years, or both.

Reapplication of Issue Fee and Publication Fee:

A new Notice of Allowance and Fee(s) Due is being issued herewith. The issue fee and any required publication fee set forth in the new Notice of Allowance and Fee(s) Due, including any fee adjustment since the fees were previously paid, must be paid within three months from the mailing date of the new Notice of Allowance and Fee(s) Due. Since fees were previously paid, applicant may request that the previously submitted issue fee and publication fee be applied toward payment of the issue fee and publication fee in the amount identified on the new Notice of Allowance and Fee(s) Due. The return of part B of the new Notice of Allowance and Fee(s) Due will be considered a request to apply any previously submitted issue fee and publication fee toward the issue fee and any publication fee now due. Failure to timely comply will result in ABANDONMENT of this application. This three-month time period is not extendable under 37 CFR 1.136(a).

Diane Terry
Application Assistance Unit
571-272-4200

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 13/948,160 | 07/22/2013 | Gregory C. Burnett | ALI-050CCON1 | 2184 |

7590 12/01/2016

Kokka & Backus, PC
1 Embarcadero Center
Suite 4150
San Francisco, CA 94111-3740

| EXAMINER | |
|---|---|
| HA, NATHAN W | |
| ART UNIT | PAPER NUMBER |
| 2814 | |
| NOTIFICATION DATE | DELIVERY MODE |
| 12/01/2016 | ELECTRONIC |

# Notice of Abandonment

This application is abandoned in view of:

1. ☐ The applicant's failure to timely file a proper reply to the Office letter mailed on _____.
   (a) ☐ A reply was received on _____ (with a Certificate of Mailing or Transmission date _____ ), which is after the expiration of the period for reply (including a total extension of ____ month(s)) which expired on _____.
   (b) ☐ No reply has been received.
2. ☒ Applicant's failure to timely pay the required issue fee and publication fee, if applicable, within the statutory period of three months from the mailing date of the Notice of Allowance (PTOL-85).
   (a) ☐ The issue fee and publication fee, if applicable, was received on _____ (with a Certificate of Mailing or Transmission date _____), which is after the expiration of the statutory period for payment of the issue fee (and publication fee) set in the Notice of Allowance (PTOL-85).
   (b) ☐ The submitted fee of $_____ is insufficient. A balance of $_____ is due.
   The issue fee required by 37 CFR 1.18 is $_____.
   The publication fee, if required by 37 CFR 1.18(d), is $_____.
   (c) ☒ The issue fee and publication fee, if applicable, has not been received.
3. ☐ Applicant's failure to timely file corrected drawings as required by, and within the three-month period set in, the Notice of Allowability (PTO-37).
   (a) ☐ Proposed corrected drawings were received on _____ (with a Certificate of Mailing or Transmission dated _____), which is after the expiration of the period for reply.
   (b) ☐ No corrected drawing have been received.
4. ☐ Applicant's failure to timely file the inventor's oath or declaration no later than the date on which the issue fee was paid as required by the Notice Requiring Inventor's Oath or Declaration (PTO-2306).
   (a) ☐ An inventor's oath or declaration was received on _____ (with a Certificate of Mailing or Transmission date _____), which is after the date on which the issue fee was paid.
   (b) ☐ While an oath or declaration (or substitute statement) for one or more inventors was received, an oath or declaration (or substitute statement) for at least one other inventor has not been received.
   (c) ☐ No inventor's oath or declaration has been received.
5. ☐ Drawings received on _____ were disapproved by examiner. See examiner's response dated _____.
6. ☐ Corrected drawings were received on _____ , which is after the expiration of the one-month period for reply set in examiner's response dated _____.
7. ☐ No corrected drawings have been received in reply to one-month period set in examiner's response dated _____.
8. ☐ The reason(s) below:

Petitions to revive under 37 CFR 1.137(a) or (b), or request to withdraw the holding of abandonment under 37 CFR 1.181, should be promptly filed to minimize any negative effects on patent term.

/Brandi Ayler for/

(571)-272-4200 or 1(888)-786-0101
Patent Publication Branch
Office of Data Management

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

**Statement under 37 C.F.R. 3.73(b) and POA**

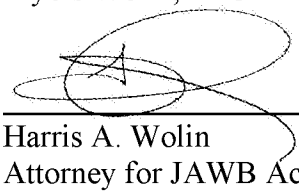
SIR:

The undersigned, who is authorized, by virtue of an attached Power of Attorney to Prosecute Applications Before the USPTO, to act on behalf of JAWB Acquisition, LLC, of 321 West 44th Street, Suite 1000, New York, NY 10036, hereby states that such Assignee is the Assignee of Record of the entire right, title and interest in the applications listed in the attached Exhibit A. The Assignee further revokes all previous powers of attorney given in such applications and hereby appoints all practitioners associated with **Customer Number 61650**. Please change the Correspondence Address for all applications listed in attached Exhibit A to the address associated with **Customer Number 61650**. Please change the **Attorney Docket Number** for all applications listed in attached Exhibit A to the New Attorney Docket Number identified in such Exhibit A.

The undersigned is authorized to act on behalf of the Assignee.

Respectfully submitted,

Myers Wolin, LLC



Harris A. Wolin
Attorney for JAWB Acquisition, LLC
Registration Number 39,432
Date: February 25, 2019
Telephone: 973-828-1284

# Exhibit A

*REVOCATION OF POWER OF ATTORNEY*
*AND*
*NEW POWER OF ATTORNEY (**61650**)*
*AND*
*CHANGE OF CORRESPONDENCE ADDRESS (**61650**)*

| SERIAL NO. | NEW ATTY DOCKET NUMBER |
|---|---|
| 13/959,708 | JAWB 8947 |
| 14/224,868 | JAWB 8948 |
| 14/149,805 | JAWB 8949 |
| 14/215,047 | JAWB 8950 |
| 14/215,051 | JAWB 8951 |
| 13/431,725 | JAWB 8952 |
| 13/346,719 | JAWB 8953 |
| 13/919,307 | JAWB 8954 |
| 13/952,532 | JAWB 8955 |
| 13/954,331 | JAWB 8956 |
| 14/243,747 | JAWB 8957 |
| 14/519,116 | JAWB 8958 |
| 13/954,367 | JAWB 8959 |
| 14/105,157 | JAWB 8960 |
| 14/209,959 | JAWB 8961 |
| 14/281,856 | JAWB 8962 |
| 13/957,337 | JAWB 8963 |
| 13/184,429 | JAWB 8964 |
| 13/374,746 | JAWB 8965 |
| 13/830,770 | JAWB 8966 |
| 13/831,698 | JAWB 8967 |
| 14/640,013 | JAWB 8968 |
| 13/069,264 | JAWB 8969 |
| 13/917,225 | JAWB 8970 |
| 13/959,683 | JAWB 8971 |
| 14/070,446 | JAWB 8972 |
| 14/192,432 | JAWB 8973 |
| 14/637,387 | JAWB 8974 |
| 13/669,375 | JAWB 8975 |
| 13/948,160 | JAWB 8976 |

PTO/AIA/82 (07-17)
Approved for use through 01/31/2018. OMB 0651-0035
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no person is required to respond to a collection of information unless it displays a valid OMB control number

# POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(c).

I hereby appoint:

[XX] Practitioners associated with Customer Number: 61650

**OR**

[ ] Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

| Name | Registration Number | Name | Registration Number |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

As attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(c).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(c) to:

[XX] The address associated with Customer Number: 61650

**OR**

[ ]

| | | |
|---|---|---|
| Firm or individual name | | |
| Address | | |
| City | State | Zip |
| Country | | |
| Telephone | Email | |

Assignee name and address: JAWB ACQUISITION, LLC
321 West 44th Street, Suite 1000
New York, NY 10036

**A copy of this form, together with a statement under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(c) may be completed by one of the practitioners appointed in this form, and must identify the application in which this Power of Attorney is to be filed.**

**SIGNATURE of Assignee of Record**

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee.

| | | |
|---|---|---|
| X | Signature | Date February 12, 2019 |
| | Name Daniel Sutton | Telephone 646-677-3911 |
| | Title CEO | |

This collection of information is required by 37 CFR 3.81, 3.82, and 3.83. The information is required to obtain or retain a benefit by the public, which is to update (and by the USPTO to process) the file of a patent or reexamination proceeding. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 15 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.
*If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*

# Electronic Acknowledgement Receipt

| | |
|---|---|
| **EFS ID:** | 35717561 |
| **Application Number:** | 13948160 |
| **International Application Number:** | |
| **Confirmation Number:** | 2184 |
| **Title of Invention:** | DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA) |
| **First Named Inventor/Applicant Name:** | Gregory C. Burnett |
| **Customer Number:** | 15516 |
| **Filer:** | Harris Wolin/Loa Heymann |
| **Filer Authorized By:** | Harris Wolin |
| **Attorney Docket Number:** | JAL-050CCON1 |
| **Receipt Date:** | 12-APR-2019 |
| **Filing Date:** | 22-JUL-2013 |
| **Time Stamp:** | 18:18:12 |
| **Application Type:** | Utility under 35 USC 111(a) |

## Payment information:

| | |
|---|---|
| Submitted with Payment | no |

## File Listing:

| Document Number | Document Description | File Name | File Size(Bytes)/ Message Digest | Multi Part /.zip | Pages (if appl.) |
|---|---|---|---|---|---|
| 1 | Transmittal Letter | jawb_8976_20190412_poa_cover.pdf | 164146<br>a19e0cd7d0312a73958162e46bd907f09152798d | no | 1 |

**Warnings:**

| Information: | | | | | |
|---|---|---|---|---|---|
| 2 | Power of Attorney | jawb_8947_8976_20190412_poa_revoation.pdf | 753662<br>9b200e8f08706aedfc6cdd3c1fba73d2e39b6ee1 | no | 3 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| | | | **Total Files Size (in bytes):** | 917808 | |

**This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.**

**New Applications Under 35 U.S.C. 111**

**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

**National Stage of an International Application under 35 U.S.C. 371**

**If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.**

**New International Application Filed with the USPTO as a Receiving Office**

**If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.**

Doc Code: PA..
Document Description: Power of Attorney

PTO/AIA/82A (07-13)
Approved for use through 11/30/2014. OMB 0651-0051
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

# TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5, unless the application number and filing date are identified in the Power of Attorney by Applicant form. If neither form PTO/AIA/82A nor form PTO/AIA82B identifies the application to which the Power of Attorney is directed, the Power of Attorney will not be recognized in the application.

| | |
|---|---|
| Application Number | 13948160 |
| Filing Date | 07-22-2013 |
| First Named Inventor | Gregory C. Burnett |
| Title | DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA) |
| Art Unit | 2814 |
| Examiner Name | HA, NATHAN W |
| Attorney Docket Number | JAWB 8976 |

**SIGNATURE of Applicant or Patent Practitioner**

| | | | |
|---|---|---|---|
| Signature | /Harris A. Wolin/ | Date (Optional) | |
| Name | Harris A. Wolin | Registration Number | 39432 |
| Title (if Applicant is a juristic entity) | | | |
| Applicant Name (if Applicant is a juristic entity) | | | |

**NOTE:** This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.

☑ *Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

*If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
**United States Patent and Trademark Office**
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NUMBER | FILING OR 371(C) DATE | FIRST NAMED APPLICANT | ATTY. DOCKET NO./TITLE |
|---|---|---|---|
| 13/948,160 | 07/22/2013 | Gregory C. Burnett | JAL-050CCON1 |

**CONFIRMATION NO. 2184**

15516
Kokka & Backus, PC
550 S. California Ave.
Suite 300
Palo Alto, CA 94306

**MISCELLANEOUS NOTICE**

*OC000000107448060*

Date Mailed: 04/17/2019

A communication which cannot be delivered in electronic form has been mailed to the applicant.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NUMBER | FILING DATE | FIRST NAMED APPLICANT | ATTY. DOCKET NO./TITLE |
|---|---|---|---|
| 13/948,160 | 07/22/2013 | Gregory C. Burnett | JAL-050CCON1 |

**CONFIRMATION NO. 2184**

15516
Kokka & Backus, PC
550 S. California Ave.
Suite 300
Palo Alto, CA 94306

Cc: MYERS WOLIN, LLC
100 HEADQUARTERS PLAZA
WEST TOWER, FLOOR 7
MORRISTOWN, NJ 07960-6834

**Date Mailed: 04//17/2019**

## DENIAL OF REQUEST FOR POWER OF ATTORNEY

The request for Power of Attorney filed 04/12/2019 is acknowledged. However, the request cannot be granted at this time for the reason stated below.

- ☐ The Power of Attorney you provided did not comply with the new Power of Attorney rules that became effective on June 25, 2004. See 37 CFR 1.32.
- ☐ The revocation is not signed by the applicant, the assignee of the entire interest, or one particular principal attorney having the authority to revoke.
- ☐ The Power of Attorney is from an assignee and the Certificate required by 37 CFR 3.73(c) has not been received.
- ☐ The person signing for the assignee has omitted their empowerment to sign on behalf of the assignee.
- ☐ The inventor(s) is without authority to appoint attorneys since the assignee has intervened as provided by 37 CFR 3.71.
- ☐ The signature(s) of _____, a co-inventor in this application, has been omitted. The Power of Attorney will be entered upon receipt of confirmation signed by said co-inventor(s).
- ☐ The person(s) appointed in the Power of Attorney is not registered to practice before the U.S. Patent and Trademark Office.
- ☐ Only one Customer Number can be designated for the Power of Attorney in an application. The Customer Number that was captured is the first Customer Number provided on the Power of Attorney document.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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Alexandria, Virginia 22313-1450
www.uspto.gov

- ☐ A request under 37 CFR 1.48 to add an inventor was granted in this application, however, no power of attorney consistent with the power of attorney granted by the originally named inventive entity has been received. Thus, the addition of the inventor has resulted in the loss of power of attorney in the application. See 37 CFR 1.32(e).

- ☑ The power of attorney has not been accepted because the party who is giving power of attorney has not been identified. Power of attorney may only be signed by the applicant for patent (37 CFR 1.42) or the patent owner. A patent owner who was not the applicant must appoint any power of attorney in compliance with 37 CFR 3.71 and 3.73. See 37 CFR 1.32(b)(4).

- ☐ The power of attorney from the inventors has not been accepted because it is a copy from a prior national application for which benefit is claimed and the continuing application names an inventor who was not named as an inventor in the prior application.

- ☐ The power of attorney from the inventors has not been accepted because the power of attorney must be signed by the applicant for patent. See 37 CFR 1.32(b)(4).

- ☑ Any request to correct or update the name of the applicant must include an application data sheet (ADS) in compliance with 37 CFR 1.76 specifying the correct or updated name of the applicant in the applicant information section. Any request to change the applicant after an original applicant has been specified under 37 CFR 1.46(b) must include a new ADS in compliance with 37 CFR 1.76 specifying the applicant in the applicant information section and comply with 37 CFR 3.71 and 3.73. See 37 CFR 1.46(c).

Any inquiries regarding this notice should be directed to the Application Assistance Unit at 571-272-4200.

/DV/

Application Assistance Unit
571-272-4200

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Kokka & Backus, PC
550 S. California Ave.
Suite 300
Palo Alto, CA 94306

**Courtesy Reminder for**
**Application Serial No: 13/948,160**

Attorney Docket No: JAL-050CCON1
Customer Number: 15516
Date of Electronic Notification: 04/17/2019

This is a courtesy reminder that new correspondence is available for this application. If you have not done so already, please review the correspondence. The official date of notification of the outgoing correspondence will be indicated on the form PTOL-90 accompanying the correspondence.

An email notification regarding the correspondence was sent to the following email address(es) associated with your customer number:

docketing@kokkalaw.com
skokka@kokkalaw.com
kcleland@kokkalaw.com

To view your correspondence online or update your email addresses, please visit us anytime at **https://ppair-my.uspto.gov/pair/PrivatePair.**
If you have any questions, please email the Electronic Business Center (EBC) at EBC@uspto.gov or call 1-866-217-9197.

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AUG 0 8 2019

Small Entity Declaration

**ASSERTION OF SMALL ENTITY STATUS PURSUANT TO 37 C.F.R. §1.27 (c)(1)**

Commissioner for Patents
Mail Stop M Correspondence
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This communication hereby asserts that the above-identified patents are entitled to small entity status.

**COMPANY or FIRM NAME AND ADDRESS:**

JAWB Acquisition LLC
321 West 44th Street
New York, NY 10036

Respectfully submitted,

*Luke Conticello*

**Signature**

Luke Conticello

**Printed Name**

Assignee

**Title**

**Reg. # If US Attorney**_____

RECEIVED
CENTRAL FAX CENTER
AUG 0 8 2019



Small Entity Declaration

## Schedule A – Patents assigned to *Assignee*

| APPLICATION NUMBER | FILING DATE | PATENT NUMBER | ISSUE DATE |
|---|---|---|---|
| 13/948160 | 7/22/2013 | N/A | N/A |
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PTO/AIA/80 (07-12)
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# POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(c).

I hereby appoint:

☐ Practitioners associated with Customer Number: 150413

**OR**

☐ Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

| Name | Registration Number | Name | Registration Number |
|---|---|---|---|
| | | | |
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| | | | |
| | | | |
| | | | |

As attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignments documents attached to this form in accordance with 37 CFR 3.73(c).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(c) to:

■ The address associated with Customer Number: 150413

**OR**

| | | | |
|---|---|---|---|
| ☐ | Firm or Individual Name | | |
| | Address | | |
| | City | State | Zip |
| | Country | | |
| | Telephone | Email | |

Assignee Name and Address: JAWB Acquisition LLC
321 West 44th Street, Suite 1000
New York, NY 10036

**A copy of this form, together with a statement under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent) is required to be Filed in each application in which this form is used. The statement under 37 CFR 3.73(c) may be completed by one of The practitioners appointed in this form, and must identify the application in which this Power of Attorney is to be filed.**

**SIGNATURE of Assignee of Record**

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

| | | | |
|---|---|---|---|
| Signature |  | Date | |
| Name | Daniel Setton | Telephone | |
| Title | CEO | | |

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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# Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PTO/AIA/14 (02-18)
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| Application Data Sheet 37 CFR 1.76 | Attorney Docket Number | JAL-050CCON1 |
|---|---|---|
| | Application Number | 13948160 |
| Title of Invention | DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA) | |

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

## Secrecy Order 37 CFR 5.2:

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

## Inventor Information:

**Inventor 1** Remove

**Legal Name**

| Prefix | Given Name | Middle Name | Family Name | Suffix |
|---|---|---|---|---|
| | Gregory | C. | Burnett | |

**Residence Information (Select One)** ◉ US Residency ○ Non US Residency ○ Active US Military Service

| City | Dodge Center | State/Province | MN | Country of Residence | US |
|---|---|---|---|---|---|

**Mailing Address of Inventor:**

| Address 1 | 10550 First Timberlane Drive | | |
|---|---|---|---|
| Address 2 | | | |
| City | Dodge Center | State/Province | MN |
| Postal Code | 55057 | Country | US |

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

## Correspondence Information:

**Enter either Customer Number or complete the Correspondence Information section below.**
**For further information see 37 CFR 1.33(a).**

☐ **An Address is being provided for the correspondence Information of this application.**

| Customer Number | ~~45516~~ 150413 | | |
|---|---|---|---|
| Email Address | patent@hard-ip.net | Add Email | Remove Email |

## Application Information:

| Title of the Invention | DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA) | | |
|---|---|---|---|
| Attorney Docket Number | JAL-050CCON1 | Small Entity Status Claimed | ☒ |
| Application Type | Nonprovisional | | |
| Subject Matter | Utility | | |
| Total Number of Drawing Sheets (if any) | 17 | Suggested Figure for Publication (if any) | 1 |

PTO/AIA/14 (02-18)
Approved for use through 11/30/2020. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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| Application Data Sheet 37 CFR 1.76 | Attorney Docket Number | JAL-050CCON1 |
|---|---|---|
| | Application Number | 13948160 |
| Title of Invention | DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA) | |

## Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

| Application number of the previously filed application | Filing date (YYYY-MM-DD) | Intellectual Property Authority or Country |
|---|---|---|
| | | |

## Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

## Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

| Please Select One: | ◉ Customer Number | ○ US Patent Practitioner | ○ Limited Recognition (37 CFR 11.9) |
|---|---|---|---|
| Customer Number | ~~15516~~ 150413 | | |

## Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the "Application Number" field blank.

| Prior Application Status | Patented | Remove |
|---|---|---|

| Application Number | Continuity Type | Prior Application Number | Filing Date (YYYY-MM-DD) | Patent Number | Issue Date (YYYY-MM-DD) |
|---|---|---|---|---|---|
| 13948160 | Continuation of | 12139355 | 2008-06-13 | 8494177 | 2013-07-23 |

| Application Data Sheet 37 CFR 1.76 | Attorney Docket Number | JAL-050CCON1 |
|---|---|---|
| | Application Number | 13948160 |
| Title of Invention | DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA) | |

| Prior Application Status | Expired | | Remove |
|---|---|---|---|
| Application Number | Continuity Type | Prior Application Number | Filing or 371(c) Date (YYYY-MM-DD) |
| 12139355 | Claims benefit of provisional | 61045377 | 2008-04-16 |
| Prior Application Status | Expired | | Remove |
| Application Number | Continuity Type | Prior Application Number | Filing or 371(c) Date (YYYY-MM-DD) |
| 12139355 | Claims benefit of provisional | 60954712 | 2007-08-08 |
| Prior Application Status | Expired | | Remove |
| Application Number | Continuity Type | Prior Application Number | Filing or 371(c) Date (YYYY-MM-DD) |
| 12139355 | Claims benefit of provisional | 60953444 | 2007-08-01 |
| Prior Application Status | Expired | | Remove |
| Application Number | Continuity Type | Prior Application Number | Filing or 371(c) Date (YYYY-MM-DD) |
| 12139355 | Claims benefit of provisional | 60934551 | 2007-06-13 |
| Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button. | | | |

## Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)[i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

| | | | Remove |
|---|---|---|---|
| Application Number | Country[i] | Filing Date (YYYY-MM-DD) | Access Code[i] (if applicable) |
| | | | |
| Additional Foreign Priority Data may be generated within this form by selecting the **Add** button. | | | |

## Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

PTO/AIA/14 (02-18)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

| **Application Data Sheet 37 CFR 1.76** | Attorney Docket Number | JAL-050CCON1 |
|---|---|---|
| | Application Number | 13948160 |
| Title of Invention | DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA) | |

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

| Application Data Sheet 37 CFR 1.76 | Attorney Docket Number | JAL-050CCON1 |
|---|---|---|
| | Application Number | 13948160 |
| Title of Invention | DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA) | |

# Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

**NOTE**: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

**1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)**

**A. Priority Document Exchange (PDX)** - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

**B. Search Results from U.S. Application to EPO** - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

**2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)**

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

**NOTE:** Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

PTO/AIA/14 (02-18)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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| Application Data Sheet 37 CFR 1.76 | Attorney Docket Number | JAL-050CCON1 |
|---|---|---|
| | Application Number | 13948160 |
| Title of Invention | DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA) | |

## Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

**Applicant 1**

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

| | | |
|---|---|---|
| ◉ Assignee | ○ Legal Representative under 35 U.S.C. 117 | ○ Joint Inventor |
| ○ Person to whom the inventor is obligated to assign. | ○ Person who shows sufficient proprietary interest | |

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here. ☒

| | | | |
|---|---|---|---|
| Organization Name | ~~AliphCom~~ JAWB Acquisition LLC | | |
| **Mailing Address Information For Applicant:** | | | |
| **Address 1** | ~~99 Rhode Island Street, Third Floor~~ 321 West 44th Street, Suite 1000 | | |
| Address 2 | | | |
| **City** | ~~San Francisco~~ New York | **State/Province** | ~~CA~~ NY |
| **Country** US | | Postal Code | ~~94103~~ 10036 |
| Phone Number | | Fax Number | |
| Email Address | | | |

Additional Applicant Data may be generated within this form by selecting the Add button.

## Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

PTO/AIA/14 (02-18)
Approved for use through 11/30/2020. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

| Application Data Sheet 37 CFR 1.76 | Attorney Docket Number | JAL-050CCON1 |
|---|---|---|
| | Application Number | 13948160 |
| Title of Invention | DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA) | |

**Assignee 1**

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

If the Assignee or Non-Applicant Assignee is an Organization check here. ☒

| Organization Name | ~~AliphCom~~ JAWB Acquisition LLC |
|---|---|

**Mailing Address Information For Assignee including Non-Applicant Assignee:**

| | | | |
|---|---|---|---|
| **Address 1** | ~~99 Rhode Island Street, Third Floor~~ 321 West 44th Street, Suite 1000 | | |
| Address 2 | | | |
| **City** | ~~San Francisco~~ New York | **State/Province** | ~~CA~~ NY |
| **Country** | US | Postal Code | ~~94103~~ 10036 |
| Phone Number | | Fax Number | |
| Email Address | | | |

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button.

## Signature:

**NOTE:** This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). **However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).**

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

| **Signature** | /Kinza Hecht/ | | | Date (YYYY-MM-DD) | 2020-07-04 |
|---|---|---|---|---|---|
| First Name | Kinza | Last Name | Hecht | Registration Number | 62325 |

Additional Signature may be generated within this form by selecting the Add button.

| **Application Data Sheet 37 CFR 1.76** | Attorney Docket Number | JAL-050CCON1 |
|---|---|---|
| | Application Number | 13948160 |
| Title of Invention | DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA) | |

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

# Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1 The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3 A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent CooperationTreaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

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Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

# STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: JAWB Acquisition LLC

Application No./Patent No.: 13/948,160 Filed/Issue Date: 07-22-2013

Titled: DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)

JAWB Acquisition LLC, a corporation

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. ☑ The assignee of the entire right, title, and interest.

2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):

   ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.

   ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (*e.g.*, bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.

B. ☑ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: BURNETT, GREGORY C. To: ALIPHCOM

   The document was recorded in the United States Patent and Trademark Office at
   Reel 035335, Frame 0007, or for which a copy thereof is attached.

2. From: ALIPHCOM To: ALIPHCOM (ASSIGNMENT FOR THE BENEFIT OF CREDITORS), LLC

   The document was recorded in the United States Patent and Trademark Office at
   Reel 043711, Frame 0001, or for which a copy thereof is attached.



This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

*If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*

PTO/AIA/96 (08-12)
Approved for use through 01/31/2013. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

## STATEMENT UNDER 37 CFR 3.73(c)

3. From: ALIPHCOM (ASSIGNMENT FOR THE BENEFIT OF CREDITORS), LLC To: JAWB ACQUISITION LLC

The document was recorded in the United States Patent and Trademark Office at
Reel 043746, Frame 0693, or for which a copy thereof is attached.

4. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☑ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

| | |
|---|---|
| /Kinza Hecht/ | July 3, 2020 |
| Signature | Date |
| Kinza Hecht | 62325 |
| Printed or Typed Name | Title or Registration Number |

# Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

# Electronic Acknowledgement Receipt

| | |
|---|---|
| **EFS ID:** | 39908767 |
| **Application Number:** | 13948160 |
| **International Application Number:** | |
| **Confirmation Number:** | 2184 |
| **Title of Invention:** | DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA) |
| **First Named Inventor/Applicant Name:** | Gregory C. Burnett |
| **Customer Number:** | 15516 |
| **Filer:** | Kinza Hecht |
| **Filer Authorized By:** | |
| **Attorney Docket Number:** | JAL-050CCON1 |
| **Receipt Date:** | 04-JUL-2020 |
| **Filing Date:** | 22-JUL-2013 |
| **Time Stamp:** | 00:19:02 |
| **Application Type:** | Utility under 35 USC 111(a) |

## Payment information:

| | |
|---|---|
| Submitted with Payment | no |

## File Listing:

| Document Number | Document Description | File Name | File Size(Bytes)/ Message Digest | Multi Part /.zip | Pages (if appl.) |
|---|---|---|---|---|---|
| 1 | Power of Attorney | POA_80_JAWB_Acquisition_LLC.pdf | 59925<br>734b2bc575fffa27ad817d4e8984f23d483e0d9d | no | 2 |

**Warnings:**

| Information: | | | | | |
|---|---|---|---|---|---|
| 2 | Application Data Sheet | 0014_V2Marked-UP_ADS.pdf | 1565966<br>8c2db12253ca48e405ef68b71fc54f9b8823f76a | no | 9 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| This is not an USPTO supplied ADS fillable form | | | | | |
| 3 | Assignee showing of ownership per 37 CFR 3.73 | 00014_373CStatement.pdf | 121605<br>4ef49065960c09e2805c53ed54d082bc19d45062 | no | 3 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| | | **Total Files Size (in bytes):** | 1747496 | | |

**This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.**

**New Applications Under 35 U.S.C. 111**

**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

**National Stage of an International Application under 35 U.S.C. 371**

**If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.**

**New International Application Filed with the USPTO as a Receiving Office**

**If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.**

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NUMBER | FILING OR 371(C) DATE | FIRST NAMED APPLICANT | ATTY. DOCKET NO./TITLE |
|---|---|---|---|
| 13/948,160 | 07/22/2013 | Gregory C. Burnett | JAL-050CCON1 |

**CONFIRMATION NO. 2184**

150413
Hard IP LLC (JAWB)
48 Speir Dr.
South Orange, NJ 07079

**POA ACCEPTANCE LETTER**

*OC000000118281661*

Date Mailed: 07/09/2020

## NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 07/04/2020.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/cnguyen/

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NUMBER | FILING OR 371(C) DATE | FIRST NAMED APPLICANT | ATTY. DOCKET NO./TITLE |
|---|---|---|---|
| 13/948,160 | 07/22/2013 | Gregory C. Burnett | JAL-050CCON1 |

**CONFIRMATION NO. 2184**

**POWER OF ATTORNEY NOTICE**

15516
Kokka & Backus, PC
550 S. California Ave.
Suite 300
Palo Alto, CA 94306

*OC000000118281625*

Date Mailed: 07/09/2020

## NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 07/04/2020.

- The Power of Attorney to you in this application has been revoked by the applicant. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/cnguyen/

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NUMBER | FILING or 371(c) DATE | GRP ART UNIT | FIL FEE REC'D | ATTY.DOCKET.NO | TOT CLAIMS | IND CLAIMS |
|---|---|---|---|---|---|---|
| 13/948,160 | 07/22/2013 | 2814 | 1740 | JAL-050CCON1 | 1 | 1 |

**CONFIRMATION NO. 2184**

**CORRECTED FILING RECEIPT**

150413
Hard IP LLC (JAWB)
48 Speir Dr.
South Orange, NJ 07079

OC000000118281680

Date Mailed: 07/09/2020

Receipt is acknowledged of this non-provisional utility patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF FIRST INVENTOR, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection.

**Please verify the accuracy of the data presented on this receipt.** If an error is noted on this Filing Receipt, please submit a written request for a corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections provided that the request is grantable.

**Inventor(s)**

Gregory C. Burnett, Dodge Center, MN;

**Applicant(s)**

JAWB Acquisition LLC, New York, NY;

**Assignment For Published Patent Application**

JAWB Acquisition LLC, New York, NY

**Power of Attorney:** The patent practitioners associated with Customer Number 150413

**Domestic Priority data as claimed by applicant**

This application is a CON of 12/139,355 06/13/2008 PAT 8494177
which claims benefit of 60/934,551 06/13/2007
and claims benefit of 60/953,444 08/01/2007
and claims benefit of 60/954,712 08/08/2007
and claims benefit of 61/045,377 04/16/2008

**Foreign Applications** for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
*Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.*

**Permission to Access Application via Priority Document Exchange:** No

**Permission to Access Search Results:** No

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

**If Required, Foreign Filing License Granted:** 08/06/2013
The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 13/948,160**
**Projected Publication Date:** Not Applicable
**Non-Publication Request:** No
**Early Publication Request:** No
**** SMALL ENTITY ****
**Title**

DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)

**Preliminary Class**

381

**Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications:** No

## PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative,

this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

## LICENSE FOR FOREIGN FILING UNDER

## Title 35, United States Code, Section 184

## Title 37, Code of Federal Regulations, 5.11 & 5.15

**GRANTED**

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

**NOT GRANTED**

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

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## *SelectUSA*

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop

technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

## PART B - FEE(S) TRANSMITTAL

**Complete and send this form, together with applicable fee(s), to: Mail** **Mail Stop ISSUE FEE**
**Commissioner for Patents**
**P.O. Box 1450**
**Alexandria, Virginia 22313-1450**
**or Fax (571)-273-2885**

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

15516 7590 08/12/2016
Kokka & Backus, PC
703 High Street
Palo Alto, CA 94301

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

**Certificate of Mailing or Transmission**
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

| | |
|---|---|
| Nancy Joyce Simmons | (Depositor's name) |
| /Nancy Joyce Simmons/ | (Signature) |
| August 10, 2020 | (Date) |

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 13/948,160 | 07/22/2013 | Gregory C. Burnett | ALI-050CCON1 | 2184 |

TITLE OF INVENTION: DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)

| APPLN. TYPE | ENTITY STATUS | ISSUE FEE DUE | PUBLICATION FEE DUE | PREV. PAID ISSUE FEE | TOTAL FEE(S) DUE | DATE DUE |
|---|---|---|---|---|---|---|
| nonprovisional | UNDISCOUNTED | $960 | $0 | $960 | $960 | 11/14/2016 |

| EXAMINER | ART UNIT | CLASS-SUBCLASS |
|---|---|---|
| HA, NATHAN W | 2814 | 381-092000 |

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.
1 Hard IP LLC
2
3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE: JAWB ACQUISITION LLC
(B) RESIDENCE: (CITY and STATE OR COUNTRY): New York, New York

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:
☒ Issue Fee
☐ Publication Fee (No small entity discount permitted)
☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
☐ A check is enclosed.
☒ Payment by credit card. Form PTO-2038 is attached.
☐ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
☐ Applicant certifying micro entity status. See 37 CFR 1.29
NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
☒ Applicant asserting small entity status. See 37 CFR 1.27
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
☐ Applicant changing to regular undiscounted fee status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature /Kinza Hecht/ Date August 10, 2020
Typed or printed name Kinza Hecht Registration No. 62,325



PTOL-85 Part B (10-13) Approved for use through 10/31/2013. OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

PTO/AIA/02 (07-13)
Approved for use through 11/30/2020. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

# SUBSTITUTE STATEMENT IN LIEU OF AN OATH OR DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (35 U.S.C. 115(d) AND 37 CFR 1.64)

| **Title of Invention** | DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA) |
|---|---|

This statement is directed to:

☐ The attached application,

OR

☒ United States application or PCT international application number 13/948,160 filed on July 22, 2013.

**LEGAL NAME of inventor to whom this substitute statement applies:**

(*E.g.*, Given Name (first and middle (if any)) and Family Name or Surname)

Gregory C. Burnett

Residence (except for a deceased or legally incapacitated inventor):

| City | State | Country |
|---|---|---|
| Omaha | NE | US |

Mailing Address (except for a deceased or legally incapacitated inventor):

9004 Pacific Street

| City | State | Zip | Country |
|---|---|---|---|
| Omaha | NE | 68114 | US |

I believe the above-named inventor or joint inventor to be the original inventor or an original joint inventor of a claimed invention in the application.

The above-identified application was made or authorized to be made by me.

I hereby acknowledge that any willful false statement made in this statement is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

Relationship to the inventor to whom this substitute statement applies:

- ☐ Legal Representative (for deceased or legally incapacitated inventor only),
- ☒ Assignee,
- ☐ Person to whom the inventor is under an obligation to assign,
- ☐ Person who otherwise shows a sufficient proprietary interest in the matter (petition under 37 CFR 1.46 is required), or
- ☐ Joint Inventor.



This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

*If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*

PTO/SB/AIA02 (07-13)
Approved for use through 11/30/2020. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

# SUBSTITUTE STATEMENT

Circumstances permitting execution of this substitute statement:

- ☐ Inventor is deceased,
- ☐ Inventor is under legal incapacity,
- ☐ Inventor cannot be found or reached after diligent effort, or
- ■ Inventor has refused to execute the oath or declaration under 37 CFR 1.63.

If there are joint inventors, please check the appropriate box below:

- ■ An application data sheet under 37 CFR 1.76 (PTO/AIA/14 or equivalent) naming the entire inventive entity has been or is currently submitted.

OR

- ☐ An application data sheet under 37 CFR 1.76 (PTO/AIA/14 or equivalent) has not been submitted. Thus, a Substitute Statement Supplemental Sheet (PTO/AIA/11 or equivalent) naming the entire inventive entity and providing inventor information is attached. See 37 CFR 1.64(b).

## WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

**PERSON EXECUTING THIS SUBSTITUTE STATEMENT:**

| Name: Sason Gabay | Date (Optional): |
|---|---|

Signature: /Sason Gabay/

**APPLICANT NAME AND TITLE OF PERSON EXECUTING THIS SUBSTITUTE STATEMENT:**

If the applicant is a juristic entity, list the applicant name and the title of the signer:

Applicant Name: JAWB ACQUISITION LLC

Title of Person Executing This Substitute Statement: COO

The signer, whose title is supplied above, is authorized to act on behalf of the applicant.

**Residence of the signer (unless provided in an application data sheet, PTO/AIA/14 or equivalent):**

| City New York | State NY | Country US |
|---|---|---|

**Mailing Address of the signer (unless provided in an application data sheet, PTO/AIA/14 or equivalent)**

321 West 44th Street, Suite 1000

| City New York | State NY | Zip 10036 | Country US |
|---|---|---|---|

Note: Use an additional PTO/AIA/02 form for each inventor who is deceased, legally incapacitated, cannot be found or reached after diligent effort, or has refused to execute the oath or declaration under 37 CFR 1.63.

# Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant ( *i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

| Doc Code: PET.AUTO<br>Document Description: Petition automatically granted by EFS-Web | PTO/SB/64<br>U.S. Patent and Trademark Office<br>Department of Commerce |
|---|---|

| | |
|---|---|
| Electronic Petition Request | PETITION FOR REVIVAL OF AN APPLICATION FOR PATENT ABANDONED UNINTENTIONALLY UNDER 37 CFR 1.137(a) |
| Application Number | 13948160 |
| Filing Date | 22-Jul-2013 |
| First Named Inventor | Gregory Burnett |
| Art Unit | 2814 |
| Examiner Name | NATHAN HA |
| Attorney Docket Number | 2064-0014 |
| Title | DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA) |

The above-identified application became abandoned for failure to file a timely and proper reply to a notice or action by the United States Patent and Trademark Office. The date of abandonment is the day after the expiration date of the period set for reply in the office notice or action plus any extensions of time actually obtained.

APPLICANT HEREBY PETITIONS FOR REVIVAL OF THIS APPLICATION

NOTE: A grantable petition requires the following items:
(1) Petition fee;
(2) Reply and/or issue fee;
(3) Terminal disclaimer with disclaimer fee – required for all utility and plant applications filed before June 8, 1995; and for all design applications;
(4) Statement that the entire delay was unintentional.

Petition Fee

- (◉) Small Entity
- (○) Micro Entity
- (○) Regular Undiscounted

**Issue Fee and Publication Fee :**

Issue Fee and Publication Fee are not due.

☒ Issue Fee Transmittal is attached

**Drawing corrections and/ or other deficiencies.**

| |
|---|
| ◯ Drawing corrections and/ or other deficiencies are not required<br><br>◯ I certify, in accordance with 37 CFR 1.4.(d)(4), that drawing corrections and/ or other deficiencies have previously been filed on<br><br>◉ Drawing corrections and/ or other deficiencies are attached.<br><br>☒ STATEMENT: The entire delay in filing the required reply from the due date for the required reply until the filing of a grantable petition under 37 CFR 1.137(a) was unintentional. |
| THIS PORTION MUST BE COMPLETED BY THE SIGNATORY OR SIGNATORIES<br><br>I certify, in accordance with 37 CFR 1.4(d)(4) that I am:<br><br>◉ An attorney or agent registered to practice before the Patent and Trademark Office who has been given power of attorney in this application.<br><br>◯ An attorney or agent registered to practice before the Patent and Trademark Office, acting in a representative capacity.<br><br>◯ A sole inventor<br><br>◯ A joint inventor; I certify that I am authorized to sign this submission on behalf of all of the inventors as evidenced by the power of attorney in the application<br><br>◯ A joint inventor; all of whom are signing this e-petition. |

| | |
|---|---|
| Signature | /Kinza Hecht/ |
| Name | Kinza Hecht |
| Registration Number | 62325 |

# Electronic Patent Application Fee Transmittal

| | |
|---|---|
| **Application Number:** | 13948160 |
| **Filing Date:** | 22-Jul-2013 |
| **Title of Invention:** | DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA) |
| **First Named Inventor/Applicant Name:** | Gregory C. Burnett |
| **Filer:** | Kinza Hecht/Nancy Joyce Simmons |
| **Attorney Docket Number:** | 2064-0014 |

Filed as Small Entity

**Filing Fees for Utility under 35 USC 111(a)**

| Description | Fee Code | Quantity | Amount | Sub-Total in USD($) |
|---|---|---|---|---|
| **Basic Filing:** | | | | |
| PET. REVIVE ABANDON APP, DELAY PYMT-RESP | 2453 | 1 | 1000 | 1000 |
| **Pages:** | | | | |
| **Claims:** | | | | |
| **Miscellaneous-Filing:** | | | | |
| **Petition:** | | | | |
| **Patent-Appeals-and-Interference:** | | | | |
| **Post-Allowance-and-Post-Issuance:** | | | | |

| Description | Fee Code | Quantity | Amount | Sub-Total in USD($) |
|---|---|---|---|---|
| **Extension-of-Time:** | | | | |
| **Miscellaneous:** | | | | |
| | | | **Total in USD ($)** | **1000** |

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

Decision Date : August 10, 2020

In re Application of :

Gregory Burnett

Application No : 13948160

Filed : 22-Jul-2013

Attorney Docket No : 2064-0014

DECISION ON PETITION

UNDER CFR 1.137(a)

This is an electronic decision on the petition under 37 CFR 1.137(a), filed August 10, 2020 , to revive the above-identified application.

The petition is **GRANTED.**

The above-identified application became abandoned for failure to reply in a timely manner to the Notice of Allowance and Issue Fee(s) Due. The date of abandonment is the day after the expiration date of the period set for reply in the Notice.

The electronic petition satisfies the conditions for revival pursuant to the provisions of 37 CFR 1.137(a) in that (1) the reply in the form of payment of the Issue Fee and the Publication Fee (if necessary); (2) the petition fee as set forth in 37 CFR 1.17 (m); (3) the drawing correction and/or other deficiencies (if necessary); and (4) the required statement of unintentional delay have been received. Accordingly, the Issue Fee payment is accepted as having been unintentionally delayed.

Telephone inquiries concerning this decision should be directed to the Patent Electronic Business Center (EBC) at 866-217-9197.

This application file is being directed to the Office of Data Management.

Office of Petitions

# Electronic Acknowledgement Receipt

| | |
|---|---|
| **EFS ID:** | 40238697 |
| **Application Number:** | 13948160 |
| **International Application Number:** | |
| **Confirmation Number:** | 2184 |
| **Title of Invention:** | DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA) |
| **First Named Inventor/Applicant Name:** | Gregory C. Burnett |
| **Customer Number:** | 150413 |
| **Filer:** | Kinza Hecht/Nancy Joyce Simmons |
| **Filer Authorized By:** | Kinza Hecht |
| **Attorney Docket Number:** | 2064-0014 |
| **Receipt Date:** | 10-AUG-2020 |
| **Filing Date:** | 22-JUL-2013 |
| **Time Stamp:** | 17:04:55 |
| **Application Type:** | Utility under 35 USC 111(a) |

## Payment information:

| | |
|---|---|
| Submitted with Payment | yes |
| Payment Type | CARD |
| Payment was successfully received in RAM | $1000 |
| RAM confirmation Number | E202080H04493565 |
| Deposit Account | 600366 |
| Authorized User | Nancy Joyce Simmons |
| The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:<br>37 CFR 1.20 (Post Issuance fees)<br>37 CFR 1.21 (Miscellaneous fees and charges) | |

## File Listing:

| Document Number | Document Description | File Name | File Size(Bytes)/ Message Digest | Multi Part /.zip | Pages (if appl.) |
|---|---|---|---|---|---|
| 1 | Issue Fee Payment (PTO-85B) | 2064-0014-Issue-Fee-Transmittal.pdf | 91928<br>c40a354955a2ecfdf0f808af0b295a61c5ddea32 | no | 1 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 2 | Oath or Declaration filed | 2064-0014-Substitute-Statement-Burnett-Signed.pdf | 252890<br>8567ad2e40624e65b2b0591b8f48ac4561380934 | no | 3 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 3 | Petition automatically granted by EFS | petition-request.pdf | 31950<br>be908156a475caa59d3584fcc3bb566e89a5e1a2 | no | 2 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 4 | Fee Worksheet (SB06) | fee-info.pdf | 30716<br>a12983c8944cd093b169e16d5890e07b5f883335 | no | 2 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| | | **Total Files Size (in bytes):** | 407484 | | |

**This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.**

**New Applications Under 35 U.S.C. 111**

**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

**National Stage of an International Application under 35 U.S.C. 371**

**If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.**

**New International Application Filed with the USPTO as a Receiving Office**

**If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.**

## PART B - FEE(S) TRANSMITTAL

**Complete and send this form, together with applicable fee(s), to: Mail** **Mail Stop ISSUE FEE**
**Commissioner for Patents**
**P.O. Box 1450**
**Alexandria, Virginia 22313-1450**
**or Fax (571)-273-2885**

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

15516 7590 08/12/2016
Kokka & Backus, PC
703 High Street
Palo Alto, CA 94301

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

**Certificate of Mailing or Transmission**
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

| | |
|---|---|
| Nancy Joyce Simmons | (Depositor's name) |
| /Nancy Joyce Simmons/ | (Signature) |
| August 10, 2020 | (Date) |

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 13/948,160 | 07/22/2013 | Gregory C. Burnett | ALI-050CCON1 | 2184 |

TITLE OF INVENTION: DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)

| APPLN. TYPE | ENTITY STATUS | ISSUE FEE DUE | PUBLICATION FEE DUE | PREV. PAID ISSUE FEE | TOTAL FEE(S) DUE | DATE DUE |
|---|---|---|---|---|---|---|
| nonprovisional | UNDISCOUNTED | $960 | $0 | $960 | $960 | 11/14/2016 |

| EXAMINER | ART UNIT | CLASS-SUBCLASS |
|---|---|---|
| HA, NATHAN W | 2814 | 381-092000 |

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.
1 Hard IP LLC
2
3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE: JAWB ACQUISITION LLC
(B) RESIDENCE: (CITY and STATE OR COUNTRY): New York, New York

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:
☒ Issue Fee
☐ Publication Fee (No small entity discount permitted)
☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
☐ A check is enclosed.
☒ Payment by credit card. Form PTO-2038 is attached.
☐ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
☐ Applicant certifying micro entity status. See 37 CFR 1.29
☒ Applicant asserting small entity status. See 37 CFR 1.27
☐ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature /Kinza Hecht/ Date August 10, 2020
Typed or printed name Kinza Hecht Registration No. 62,325



PTOL-85 Part B (10-13) Approved for use through 10/31/2013. OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

# Electronic Patent Application Fee Transmittal

| | |
|---|---|
| **Application Number:** | 13948160 |
| **Filing Date:** | 22-Jul-2013 |
| **Title of Invention:** | DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA) |
| **First Named Inventor/Applicant Name:** | Gregory C. Burnett |
| **Filer:** | Kinza Hecht/Nancy Joyce Simmons |
| **Attorney Docket Number:** | 2064-0014 |

Filed as Small Entity

**Filing Fees for Utility under 35 USC 111(a)**

| Description | Fee Code | Quantity | Amount | Sub-Total in USD($) |
|---|---|---|---|---|
| **Basic Filing:** | | | | |
| **Pages:** | | | | |
| **Claims:** | | | | |
| **Miscellaneous-Filing:** | | | | |
| **Petition:** | | | | |
| **Patent-Appeals-and-Interference:** | | | | |
| **Post-Allowance-and-Post-Issuance:** | | | | |
| UTILITY APPL ISSUE FEE | 2501 | 1 | 480 | 480 |

| Description | Fee Code | Quantity | Amount | Sub-Total in USD($) |
|---|---|---|---|---|
| **Extension-of-Time:** | | | | |
| **Miscellaneous:** | | | | |
| | | | **Total in USD ($)** | **480** |

# Electronic Acknowledgement Receipt

| | |
|---|---|
| **EFS ID:** | 40242433 |
| **Application Number:** | 13948160 |
| **International Application Number:** | |
| **Confirmation Number:** | 2184 |
| **Title of Invention:** | DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA) |
| **First Named Inventor/Applicant Name:** | Gregory C. Burnett |
| **Customer Number:** | 150413 |
| **Filer:** | Kinza Hecht/Nancy Joyce Simmons |
| **Filer Authorized By:** | Kinza Hecht |
| **Attorney Docket Number:** | 2064-0014 |
| **Receipt Date:** | 10-AUG-2020 |
| **Filing Date:** | 22-JUL-2013 |
| **Time Stamp:** | 17:08:33 |
| **Application Type:** | Utility under 35 USC 111(a) |

## Payment information:

| | |
|---|---|
| Submitted with Payment | yes |
| Payment Type | CARD |
| Payment was successfully received in RAM | $480 |
| RAM confirmation Number | E202080H09333652 |
| Deposit Account | |
| Authorized User | |
| The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: | |

## File Listing:

| Document Number | Document Description | File Name | File Size(Bytes)/ Message Digest | Multi Part /.zip | Pages (if appl.) |
|---|---|---|---|---|---|
| 1 | Issue Fee Payment (PTO-85B) | 2064-0014-Issue-Fee-Transmittal.pdf | 91928<br>c40a354955a2ecfdf0f808af0b295a61c5ddea32 | no | 1 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 2 | Fee Worksheet (SB06) | fee-info.pdf | 30817<br>e91450ff3f62b7d7aa5f364455e5c0bb87dad2d8 | no | 2 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| | | **Total Files Size (in bytes):** | 122745 | | |

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**New Applications Under 35 U.S.C. 111**

**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

**National Stage of an International Application under 35 U.S.C. 371**

**If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.**

**New International Application Filed with the USPTO as a Receiving Office**

**If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.**

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | ISSUE DATE | PATENT NO. | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 13/948,160 | 09/15/2020 | 10779080 | 2064-0014 | 2184 |

150413 7590 08/26/2020

Hard IP LLC (JAWB)
48 Speir Dr.
South Orange, NJ 07079

# ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

**Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)**
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 0 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

Gregory C. Burnett, Dodge Center, MN;
JAWB Acquisition LLC, New York, NY;

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

AMENDED

AO 120 (Rev. 08/10)

| TO: | REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK |
|---|---|
| Mail Stop 8<br>Director of the U.S. Patent and Trademark Office<br>P.O. Box 1450<br>Alexandria, VA 22313-1450 | |

In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court for the Eastern District of Texas, Marshall Division on the following

☐ Trademarks or ☑ Patents. ( ☐ the patent action involves 35 U.S.C. § 292.):

| DOCKET NO. | DATE FILED | U.S. DISTRICT COURT |
|---|---|---|
| 2:21-cv-00186-JRG | 10/26/2021 | for the Eastern District of Texas, Marshall Division |

| PLAINTIFF | DEFENDANT |
|---|---|
| JAWBONE INNOVATIONS, LLC | SAMSUNG ELECTRONICS CO. LTD. and SAMSUNG ELECTRONICS AMERICA, INC. |

| | PATENT OR TRADEMARK NO. | DATE OF PATENT OR TRADEMARK | HOLDER OF PATENT OR TRADEMARK |
|---|---|---|---|
| 1 | 8,019,091 | 9/13/2011 | Jawbone Innovations, LLC |
| 2 | 8,280,072 | 10/2/2012 | Jawbone Innovations, LLC |
| 3 | 7,246,058 | 7/17/2007 | Jawbone Innovations, LLC |
| 4 | 10,779,080 | 9/15/2020 | Jawbone Innovations, LLC |
| 5 | 11,122,357 | 9/14/2021 | Jawbone Innovations, LLC |

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

| DATE INCLUDED | INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading | |
|---|---|---|
| PATENT OR TRADEMARK NO. | DATE OF PATENT OR TRADEMARK | HOLDER OF PATENT OR TRADEMARK |
| 1 | | |
| 2 | | |
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| 4 | | |
| 5 | | |

In the above—entitled case, the following decision has been rendered or judgement issued:

| DECISION/JUDGEMENT |
|---|
| |

| CLERK | (BY) DEPUTY CLERK | DATE |
|---|---|---|
| | | |

Copy 1—Upon initiation of action, mail this copy to Director Copy 3—Upon termination of action, mail this copy to Director
Copy 2—Upon filing document adding patent(s), mail this copy to Director Copy 4—Case file copy

AMENDED

AO 120 (Rev. 08/10)

| TO: | REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK |
|---|---|
| Mail Stop 8<br>Director of the U.S. Patent and Trademark Office<br>P.O. Box 1450<br>Alexandria, VA 22313-1450 | |

In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court for the Eastern District of Texas, Marshall Division on the following

☐ Trademarks or ☑ Patents. ( ☐ the patent action involves 35 U.S.C. § 292.):

| DOCKET NO. | DATE FILED | U.S. DISTRICT COURT |
|---|---|---|
| 2:21-cv-00186-JRG | 10/26/2021 | for the Eastern District of Texas, Marshall Division |

| PLAINTIFF | DEFENDANT |
|---|---|
| JAWBONE INNOVATIONS, LLC | SAMSUNG ELECTRONICS CO. LTD. and SAMSUNG ELECTRONICS AMERICA, INC. |

| | PATENT OR TRADEMARK NO. | DATE OF PATENT OR TRADEMARK | HOLDER OF PATENT OR TRADEMARK |
|---|---|---|---|
| 1 | 8,467,543 | 6/18/2013 | Jawbone Innovations, LLC |
| 2 | 8,503,691 | 8/6/2013 | Jawbone Innovations, LLC |
| 3 | | | |
| 4 | | | |
| 5 | | | |

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

| DATE INCLUDED | INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading | |
|---|---|---|
| | PATENT OR TRADEMARK NO. | DATE OF PATENT OR TRADEMARK | HOLDER OF PATENT OR TRADEMARK |
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In the above—entitled case, the following decision has been rendered or judgement issued:

| DECISION/JUDGEMENT |
|---|
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| CLERK | (BY) DEPUTY CLERK | DATE |
|---|---|---|
| | | |

*Copy 1—Upon initiation of action, mail this copy to Director* *Copy 3—Upon termination of action, mail this copy to Director*
*Copy 2—Upon filing document adding patent(s), mail this copy to Director* *Copy 4—Case file copy*

AO 120 (Rev. 08/10)

| TO: | REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK |
|---|---|
| Mail Stop 8<br>Director of the U.S. Patent and Trademark Office<br>P.O. Box 1450<br>Alexandria, VA 22313-1450 | |

In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court for the Eastern District of Texas, Marshall Division on the following

☐ Trademarks or ☒ Patents. ( ☐ the patent action involves 35 U.S.C. § 292.):

| DOCKET NO.<br>2:21-cv-00435 | DATE FILED<br>11/29/2021 | U.S. DISTRICT COURT<br>for the Eastern District of Texas, Marshall Division |
|---|---|---|
| PLAINTIFF<br>Jawbone Innovations, LLC | | DEFENDANT<br>Amazon.com, Inc. and Amazon.com Services, Inc. |

| | PATENT OR TRADEMARK NO. | DATE OF PATENT OR TRADEMARK | HOLDER OF PATENT OR TRADEMARK |
|---|---|---|---|
| 1 | 8,019,091 | 9/13/2011 | Jawbone Innovations, LLC |
| 2 | 7,246,058 | 7/17/2007 | Jawbone Innovations, LLC |
| 3 | 8,280,072 | 10/2/2012 | Jawbone Innovations, LLC |
| 4 | 8,321,213 | 11/17/2012 | Jawbone Innovations, LLC |
| 5 | 8,326,611 | 12/4/2012 | Jawbone Innovations, LLC |

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

| DATE INCLUDED | INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading | |
|---|---|---|
| | PATENT OR TRADEMARK NO. | DATE OF PATENT OR TRADEMARK | HOLDER OF PATENT OR TRADEMARK |
| 1 | | | |
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| 5 | | | |

In the above—entitled case, the following decision has been rendered or judgement issued:

| DECISION/JUDGEMENT |
|---|
| |

| CLERK | (BY) DEPUTY CLERK | DATE |
|---|---|---|
| | | |

Copy 1—Upon initiation of action, mail this copy to Director Copy 3—Upon termination of action, mail this copy to Director
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AO 120 (Rev. 08/10)

| TO: | REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK |
|---|---|
| Mail Stop 8<br>Director of the U.S. Patent and Trademark Office<br>P.O. Box 1450<br>Alexandria, VA 22313-1450 | |

In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court for the Eastern District of Texas, Marshall Division on the following

☐ Trademarks or ☑ Patents. ( ☐ the patent action involves 35 U.S.C. § 292.):

| DOCKET NO. | DATE FILED | U.S. DISTRICT COURT |
|---|---|---|
| 2:21-cv-00436 | 11/29/2021 | for the Eastern District of Texas, Marshall Division |

| PLAINTIFF | DEFENDANT |
|---|---|
| Jawbone Innovations, LLC | Amazon.com, Inc. and Amazon.com Services, Inc. |

| | PATENT OR TRADEMARK NO. | DATE OF PATENT OR TRADEMARK | HOLDER OF PATENT OR TRADEMARK |
|---|---|---|---|
| 1 | 10,779,080 | 9/15/2020 | Jawbone Innovations, LLC |
| 2 | 11,122,357 | 9/14/2021 | Jawbone Innovations, LLC |
| 3 | 8,467,543 | 6/18/2013 | Jawbone Innovations, LLC |
| 4 | | | |
| 5 | | | |

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

| DATE INCLUDED | INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading | |
|---|---|---|
| | PATENT OR TRADEMARK NO. | DATE OF PATENT OR TRADEMARK | HOLDER OF PATENT OR TRADEMARK |
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| 2 | | | |
| 3 | | | |
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| 5 | | | |

In the above—entitled case, the following decision has been rendered or judgement issued:

| DECISION/JUDGEMENT |
|---|
| |

| CLERK | (BY) DEPUTY CLERK | DATE |
|---|---|---|
| | | |

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Copy 2—Upon filing document adding patent(s), mail this copy to Director Copy 4—Case file copy

AO 120 (Rev. 08/10)

| TO: | REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK |
|---|---|
| Mail Stop 8<br>Director of the U.S. Patent and Trademark Office<br>P.O. Box 1450<br>Alexandria, VA 22313-1450 | |

In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court for the Eastern District of Texas, Marshall Division on the following

☐ Trademarks or ☒ Patents. ( ☐ the patent action involves 35 U.S.C. § 292.):

| DOCKET NO. | DATE FILED | U.S. DISTRICT COURT |
|---|---|---|
| 2:21-cv-00435 | 11/29/2021 | for the Eastern District of Texas, Marshall Division |

| PLAINTIFF | DEFENDANT |
|---|---|
| Jawbone Innovations, LLC | Amazon.com, Inc. and Amazon.com Services, Inc. |

| | PATENT OR TRADEMARK NO. | DATE OF PATENT OR TRADEMARK | HOLDER OF PATENT OR TRADEMARK |
|---|---|---|---|
| 1 | 8,019,091 | 9/13/2011 | Jawbone Innovations, LLC |
| 2 | 7,246,058 | 7/17/2007 | Jawbone Innovations, LLC |
| 3 | 8,280,072 | 10/2/2012 | Jawbone Innovations, LLC |
| 4 | 8,321,213 | 11/17/2012 | Jawbone Innovations, LLC |
| 5 | 8,326,611 | 12/4/2012 | Jawbone Innovations, LLC |

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

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|---|---|---|
| PATENT OR TRADEMARK NO. | DATE OF PATENT OR TRADEMARK | HOLDER OF PATENT OR TRADEMARK |
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |

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| DECISION/JUDGEMENT |
|---|
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| CLERK | (BY) DEPUTY CLERK | DATE |
|---|---|---|
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In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court for the Eastern District of Texas, Marshall Division on the following

☐ Trademarks or ☑ Patents. ( ☐ the patent action involves 35 U.S.C. § 292.):

| DOCKET NO. | DATE FILED | U.S. DISTRICT COURT |
|---|---|---|
| 2:21-cv-00435 | 11/29/2021 | for the Eastern District of Texas, Marshall Division |

| PLAINTIFF | DEFENDANT |
|---|---|
| Jawbone Innovations, LLC | Amazon.com, Inc. and Amazon.com Services, Inc. |

| | PATENT OR TRADEMARK NO. | DATE OF PATENT OR TRADEMARK | HOLDER OF PATENT OR TRADEMARK |
|---|---|---|---|
| 1 | 10,779,080 | 9/15/2020 | Jawbone Innovations, LLC |
| 2 | 11,122,357 | 9/14/2021 | Jawbone Innovations, LLC |
| 3 | 8,467,543 | 6/18/2013 | Jawbone Innovations, LLC |
| 4 | | | |
| 5 | | | |

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

| DATE INCLUDED | INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading | |
|---|---|---|
| PATENT OR TRADEMARK NO. | DATE OF PATENT OR TRADEMARK | HOLDER OF PATENT OR TRADEMARK |
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |

In the above—entitled case, the following decision has been rendered or judgement issued:

| DECISION/JUDGEMENT |
|---|
| |

| CLERK | (BY) DEPUTY CLERK | DATE |
|---|---|---|
| | | |

**Copy 1—Upon initiation of action, mail this copy to Director** **Copy 3—Upon termination of action, mail this copy to Director**
**Copy 2—Upon filing document adding patent(s), mail this copy to Director** **Copy 4—Case file copy**



Meta Platforms, Inc. - Exhibit 1002
361 of 450

DocuSign Envelope ID: C544647C-BDCC-4496-BBED-120D984CBFFC

Doc Code: PA..
Document Description: Power of Attorney

PTO/AIA/82B (07-13)
Approved for use through 03/31/2021. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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# POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in either the attached transmittal letter or the boxes below.

| Application Number | Filing Date |
|---|---|
| | |

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)

[x] I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above: 21125

**OR**

[ ] I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

**Please recognize or change the correspondence address for the application identified in the attached transmittal letter or the boxes above to:**

[x] The address associated with the above-mentioned Customer Number

**OR**

[ ] The address associated with Customer Number:

**OR**

| | | | | | |
|---|---|---|---|---|---|
| [ ] Firm or Individual Name | | | | | |
| Address | | | | | |
| City | | State | | Zip | |
| Country | | | | | |
| Telephone | | Email | | | |

I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

Jawbone Innovations, LLC

[ ] Inventor or Joint Inventor (title not required below)

[ ] Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)

[x] Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)

[ ] Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

**SIGNATURE of Applicant for Patent**

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

| | | | |
|---|---|---|---|
| Signature | DocuSigned by: York Eggleston 97088274C3825434... | Date (Optional) | 5/25/2021 |
| Name | York Eggleston | | |
| Title | Manager | | |

**NOTE:** Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.

[ ] Total of 1 forms are submitted.

# STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: Gregory C. Burnett

Application No./Patent No.: 10,779,080 Filed/Issue Date: September 15, 2020

Titled: DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)

Jawbone Innovations, LLC , a Limited Liability Company
(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. [x] The assignee of the entire right, title, and interest.

2. [ ] An assignee of less than the entire right, title, and interest (check applicable box):

   [ ] The extent (by percentage) of its ownership interest is _____ %. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.

   [ ] There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. [ ] The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. [ ] The recipient, via a court proceeding or the like (*e.g.*, bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

A. [ ] An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____ , Frame _____, or for which a copy thereof is attached.

B. [x] A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: Gregory C. Burnett To: AliphCom, Inc.
   The document was recorded in the United States Patent and Trademark Office at
   Reel 035335 , Frame 0007 , or for which a copy thereof is attached.

2. From: Gregory C. Burnett To: AliphCom
   The document was recorded in the United States Patent and Trademark Office at
   Reel 035727 , Frame 0877 , or for which a copy thereof is attached.

PTO/AIA/96 (08-12)
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# STATEMENT UNDER 37 CFR 3.73(c)

3. From: AliphCom dba Jawbone To: AliphCom, LLC
The document was recorded in the United States Patent and Trademark Office at
Reel 043637 , Frame 0796 , or for which a copy thereof is attached.

4. From: AliphCom To: AliphCom (assignment for the benefit of creditors), LLC
The document was recorded in the United States Patent and Trademark Office at
Reel 043711 0001 , or for which a copy thereof is attached.

5. From: AliphCom, LLC To: JAWB Acquisition, LLC
The document was recorded in the United States Patent and Trademark Office at
Reel 043638 , Frame 0025 , or for which a copy thereof is attached.

6. From: AliphCom (assignment for the benefit of creditors), LLC To: JAWB Acquisition LLC
The document was recorded in the United States Patent and Trademark Office at
Reel 043746 , Frame 0693 , or for which a copy thereof is attached.

[x] Additional documents in the chain of title are listed on a supplemental sheet(s).

[x] As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

| /Mark S. Leonardo/ | April 5, 2022 |
|---|---|
| Signature | Date |
| Mark S. Leonardo | 41,433 |
| Printed or Typed Name | Title or Registration Number |

## STATEMENT UNDER 37 CFR 3.73(c) - Supplemental Sheet

Continuation of chain of title from the inventor(s) to the current assignee:

7. From: JAWB Acquisition LLC To: JI Audio Holdings LLC
The document was recorded in the United States Patent and Trademark Office at
Reel 056320 , Frame 0195 , or for which a copy thereof is attached.

8. From: JI Audio Holdings LLC To: Jawbone Innovations, LLC
The document was recorded in the United States Patent and Trademark Office at
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9. From: _____ To: _____
The document was recorded in the United States Patent and Trademark Office at
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The document was recorded in the United States Patent and Trademark Office at
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12. From: _____ To: _____
The document was recorded in the United States Patent and Trademark Office at
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The document was recorded in the United States Patent and Trademark Office at
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Reel _____ , Frame _____ , or for which a copy thereof is attached.

16. From: _____ To: _____
The document was recorded in the United States Patent and Trademark Office at
Reel _____ , Frame _____ , or for which a copy thereof is attached.

# Electronic Acknowledgement Receipt

| | |
|---|---|
| **EFS ID:** | 45394567 |
| **Application Number:** | 13948160 |
| **International Application Number:** | |
| **Confirmation Number:** | 2184 |
| **Title of Invention:** | DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA) |
| **First Named Inventor/Applicant Name:** | Gregory C. Burnett |
| **Customer Number:** | 150413 |
| **Filer:** | Mark S. Leonardo |
| **Filer Authorized By:** | |
| **Attorney Docket Number:** | 2064-0014 |
| **Receipt Date:** | 05-APR-2022 |
| **Filing Date:** | 22-JUL-2013 |
| **Time Stamp:** | 10:17:32 |
| **Application Type:** | Utility under 35 USC 111(a) |

## Payment information:

| | |
|---|---|
| Submitted with Payment | no |

## File Listing:

| Document Number | Document Description | File Name | File Size(Bytes)/ Message Digest | Multi Part /.zip | Pages (if appl.) |
|---|---|---|---|---|---|
| 1 | Power of Attorney | 122174_POA_Jawbone_executed.pdf | 223726<br>c3be042904ae588b8cd483853d8861bee83ff9f3 | no | 1 |
| **Warnings:** | | | | | |

The PDF file has been signed with a digital signature and the legal effect of the document will be based on the contents of the file not the digital signature.

**Information:**

| | | | | | |
|---|---|---|---|---|---|
| 2 | Assignee showing of ownership per 37 CFR 3.73 | 122174-10132_Statement_3_73.pdf | 113932<br>57afff9e3f2aef36a630c26225b7ede1ea1d5ffd | no | 3 |

**Warnings:**

**Information:**

| | |
|---|---|
| **Total Files Size (in bytes):** | 337658 |

**This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.**

**New Applications Under 35 U.S.C. 111**

**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

**National Stage of an International Application under 35 U.S.C. 371**

**If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.**

**New International Application Filed with the USPTO as a Receiving Office**

**If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.**

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NUMBER | FILING OR 371(C) DATE | FIRST NAMED APPLICANT | ATTY. DOCKET NO./TITLE |
|---|---|---|---|
| 13/948,160 | 07/22/2013 | Gregory C. Burnett | 2064-0014 |

**CONFIRMATION NO. 2184**

**POA ACCEPTANCE LETTER**

21125
NUTTER MCCLENNEN & FISH LLP
SEAPORT WEST
155 SEAPORT BOULEVARD
BOSTON, MA 02210-2604

*OC000000133056385*

Date Mailed: 04/11/2022

## NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 04/05/2022.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/mbeyene/

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NUMBER | FILING OR 371(C) DATE | FIRST NAMED APPLICANT | ATTY. DOCKET NO./TITLE |
|---|---|---|---|
| 13/948,160 | 07/22/2013 | Gregory C. Burnett | 2064-0014 |

**CONFIRMATION NO. 2184**

**POWER OF ATTORNEY NOTICE**

150413
Hard IP LLC (JAWB)
48 Speir Dr.
South Orange, NJ 07079

*OC000000133056352*

Date Mailed: 04/11/2022

## NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 04/05/2022.

- The Power of Attorney to you in this application has been revoked by the assignee who has intervened as provided by 37 CFR 3.71. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/mbeyene/

The United States Patent and Trademark Office
PATENT TRIAL AND APPEAL BOARD

A petition has been filed in Patent Number 10,779,080, Application Number 13/948,160 on 05/27/2022 (Date).

The Case Number is IPR2022-01059.
(IPR, CBM, PGR, DER #)

To view the documents filed in this petition, go to https://ptab.uspto.gov.

Use the Search PTAB tab and enter the Patent Number or the Trial or Case Number and select the Search button.

Questions regarding this notice should be directed to the Patent Trial and Appeal Board at 571-272-7822.

# END





Official Correspondence (OC) System

Trials@uspto.gov
571-272-7822

Paper 12
Entered: December 7, 2022

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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GOOGLE LLC,
Petitioner,

v.

JAWBONE INNOVATIONS, LLC,
Patent Owner.

---

IPR2022-01059
Patent 10,779,080 B2

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Before GEORGIANNA W. BRADEN, STEVEN M. AMUNDSON, and JASON M. REPKO, *Administrative Patent Judges.*

BRADEN, *Administrative Patent Judge.*

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

# I. INTRODUCTION

Google LLC ("Petitioner") filed a Petition requesting an *inter partes* review of claims 1–20 (the "challenged claims") of U.S. Patent No. 10,779,080 B2 (Ex. 1001, "the '080 patent"). Paper 1 ("Pet."). Jawbone Innovations, LLC ("Patent Owner") filed a Preliminary Response. Paper 6 ("Prelim. Resp."). With our permission, Petitioner filed a Reply, to address arguments as to discretionary denial under § 314(a). Paper 7 ("Reply"). Patent Owner filed a Sur-reply. Paper 9 ("Sur-reply").

We have authority to determine whether to institute an *inter partes* review under 35 U.S.C. § 314 and 37 C.F.R. § 42.4. An *inter partes* review may not be instituted unless it is determined that "the information presented in the petition filed under section 311 and any response filed under section 313 shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition." 35 U.S.C. § 314 (2018); *see also* 37 C.F.R § 42.4(a) (2022) ("The Board institutes the trial on behalf of the Director."). The reasonable likelihood standard is "a higher standard than mere notice pleading," but "lower than the 'preponderance' standard to prevail in a final written decision." *Hulu, LLC v. Sound View Innovations, LLC*, IPR2018-01039, Paper 29 at 13 (PTAB Dec. 20, 2019) (precedential).

For the reasons provided below and based on the record before us, we determine Petitioner has demonstrated a reasonable likelihood that it would prevail in showing the unpatentability of at least one of the challenged claims. We decline to deny the Petition on a discretionary basis as requested by Patent Owner. Accordingly, we institute an *inter partes* review of the '080 patent and all of the asserted challenges to patentability.

## II. BACKGROUND

### *A. Real Parties in Interest*

Petitioner lists Google LLC as a real party-in-interest.[1] Pet. 86. Patent Owner states that it is a "real party-in-interest." Paper 5 (Patent Owner's Mandatory Notice), 2.

### *B. Related Proceedings*

The parties both identify the following district court cases involving the '080 patent: *Jawbone Innovations, LLC v. Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc.*, Case No. 2:21-cv-00186-JRG (E.D. Tex.); *Jawbone Innovations, LLC v. Apple Inc.*, Case No. 6:21-cv-00984-ADA (W.D. Tex.); *Jawbone Innovations, LLC v. Google LLC*, Case No. 6:21-cv-00985-ADA (W.D. Tex.); and *Jawbone Innovations, LLC v. Amazon.com, Inc. and Amazon.com Services, Inc.*, Case No. 2:21-cv-00435-JRG (E.D. Tex.). Pet. 86; Paper 5, 2.

### *C. The '080 Patent (Ex. 1001)*

The '080 patent is titled "Dual Omnidirectional Microphone Array (DOMA)," and issued on September 15, 2020. Ex. 1001, codes (45), (54). It is a continuation of a U.S. Patent Application and relies on several provisional applications, the earliest of which was filed on June 13, 2007. *Id.* at codes (60), (63).

#### *1. Written Description*

The '080 patent relates to the use of a "dual omnidirectional microphone array noise suppression" system to create microphone arrays

[1] Petitioner notes that Google LLC is a subsidiary of XXVI Holdings Inc., a subsidiary of Alphabet Inc., but contends XXVI Holdings Inc. and Alphabet Inc. are not real parties-in-interest. Pet. 80 n. 2.



**Meta Platforms, Inc. - Exhibit 1002**
**374 of 450**

with enhanced noise suppression." *Id.* at code (57). The '080 patent explains that the

> array of an embodiment is used to form two distinct virtual directional microphones which are configured to have very similar noise responses and very dissimilar speech responses. The only null formed is one used to remove the speech of the user from V2 . The two virtual microphones may be paired with an adaptive filter algorithm and VAD algorithm to significantly reduce the noise without distorting the speech, significantly improving the SNR of the desired speech over conventional noise suppression systems."

*Id.* According to the '080 patent "[t]he only null formed by the DOMA is one used to remove the speech of the user from [the second virtual microphone]." *Id.* at 3:56–57. The similarity of the '080 patent's virtual microphones' noise responses, however, allows them to be cancelled while leaving the speech response intact, "resulting in excellent noise suppression performance and minimal speech removal and distortion." *Id.* at 6:59–62; *see id.* at 9:22–38. The '080 patent discloses that its two virtual microphones can be "paired with an adaptive filter algorithm" to reduce noise. *Id.* at 3:57–62.

In one embodiment, two virtual directional microphones $V_1$ and $V_2$ are formed based on two physical omnidirectional microphones $O_1$ and $O_2$ according to the following equations expressed in the z (digital frequency) domain:

$$V_1(z) = O_1(z) \cdot z^{-\gamma} - \beta O_2(z)$$

$$V_2(z) = O_2(z) - z^{-\gamma}\beta O_1(z)$$

where

$$\beta = \frac{d_1}{d_2}$$

$$\gamma = \frac{d_2 - d_1}{c} \cdot f_s(\text{samples})$$

$$d_1 = \sqrt{d_s^2 - 2d_{s1}d_0\cos(\theta) + d_0^2}$$

$$d_2 = \sqrt{d_s^2 + 2d_s d_0\cos(\theta) + d_0^2}$$

Ex. 1001, 4:33–67, 9:46–53, 11:1–2. In the equations $d_1$ and $d_2$ "are the distance from O1 and O2 to the speech source," respectively; c is the speed of sound; and $f_s$ is a sampling frequency. *Id.* at 9:54–67. The equations for $V_1$ and $V_2$ (above) are represented visually in Figure 2, reproduced below.

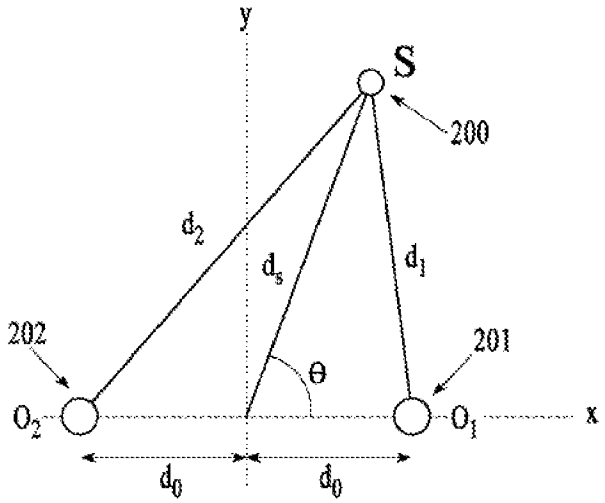



FIG.2

Figure 2 is a diagram illustrating a generalized two-microphone array (DOMA) including array 201/202 and speech source ( S ) with

microphones separated by a distance approximately equal to $2d_o$, and the speech source located a distance $d_s$ away from the midpoint of the array at an angle θ. According to the '080 patent, the system is axially symmetric so only d and θ need be specified. *Id.* at 2:28–34, 7:17–38, Fig. 2.

The result of one embodiment of the '080 patent is shown in Figure 9, reproduced below.

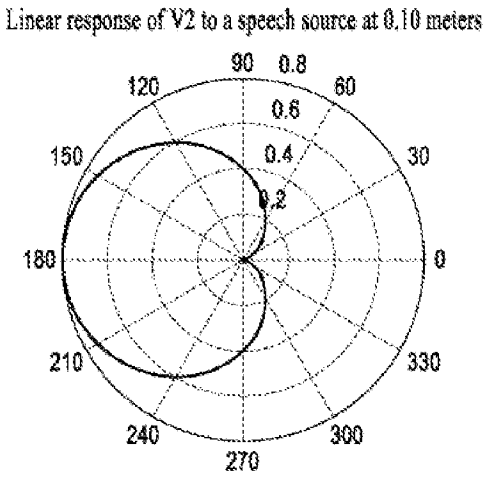



FIG.9

Figure 9 is a plot of linear response of virtual microphone $V_2$ with β=0.8 to a 1 kHz speech source at a distance of 0.1 m. *Id.* at 10:18–20. According to the '080 patent, the null in the linear response of virtual microphone $V_2$ to speech is located at 0 degrees, where the speech is typically expected to be located. *Id.* at 10:20–22. Figure 10, reproduced below, is another plot of a linear response of virtual microphone $V_2$ with β=0.8 to a 1 kHz noise source, but at a distance of 1.0 m. *Id.* at 10:22–24.

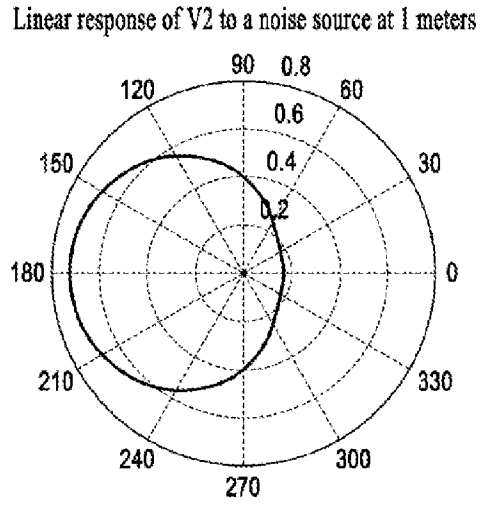



FIG.10

Regarding Figure 10, above, the '080 patent states that "[t]he linear response of $V_2$ to noise is devoid of or includes no null, meaning all noise sources are detected." *Id.* at 10:25–27.

The '080 patent discloses that the formulation for $V_2(z)$ has a null at the speech location, and therefore, will exhibit minimal response to the speech. *Id.* at 10:28–30. The '080 patent then explains that the speech null at zero degrees is not present for noise in the far field for the same microphone, as shown in Figure 10, above, with a noise source distance of approximately 1 meter. *Id.* at 10:32–35. The '080 patent states this insures that noise in front of the user will be detected so that it can be removed. *Id.* at 10:35–36. According to the '080 patent, this differs from conventional systems that can have difficulty removing noise in the direction of the mouth of the user. *Id.* at 10:36–38.

The '080 patent further discloses different linear responses for the virtual microphone $V_1$ and $V_2$ when exposed to a near-field speech source. *Id.* at 10:18–22, 11:20–24, 11:62–65, 16:4–6. This difference is seen when comparing Figures 9 and 11, both reproduced below.

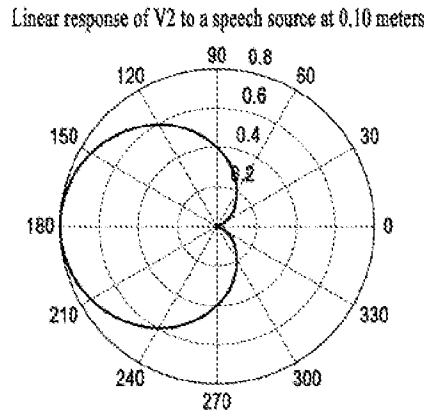



FIG.9

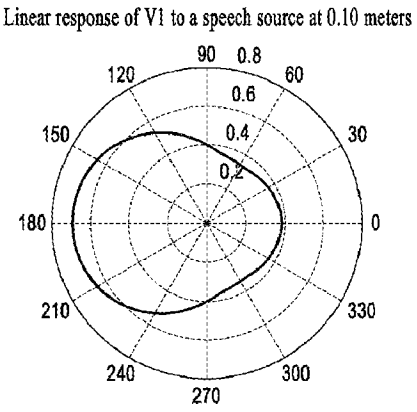



FIG.11

Figure 11 is a plot of linear response of virtual microphone $V_1$ to a 1 kHz speech source at a distance of 0.1 m. Ex. 1001, 2:60-62. The '080 patent states that "[t]here is no null and the response for speech is greater than that shown in Figure 9." *Id.* at 2:62–63.

In contrast, the '080 patent describes similar linear responses for virtual microphones $V_1$ and $V_2$, respectively, to a far-field noise source. *Id.* at 10:22–27, 11:25–29, 11:62–65, 16:4–6. This similarity is seen when comparing Figures 10 and 12, both reproduced below.

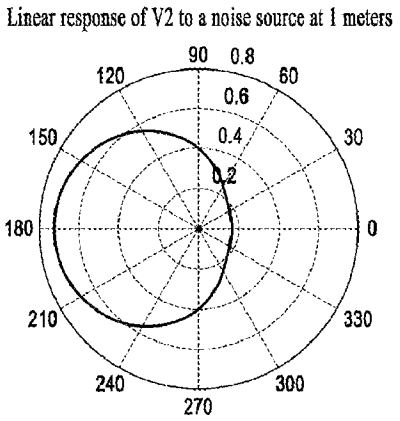



FIG.10

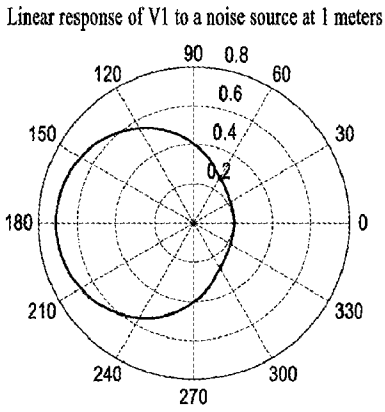



FIG.12

Figure 12, above, is a plot of linear response of virtual microphone $V_1$ to a 1 kHz noise source at a distance of 1.0 m, under an embodiment. *Id.* at 2:64–66. The '080 patent states that "[t]here is no null and the response is very similar to $V_2$ shown in Figure 10." *Id.* at 2:66–67.

The '080 patent contemplates that the linear response of the virtual microphone $V_1$ is "flat for all frequencies within approximately +−30 degrees of the axis of the array," as shown in Figure 13 (reproduced below). Ex. 1001, 11:30–35, 11:43–61;

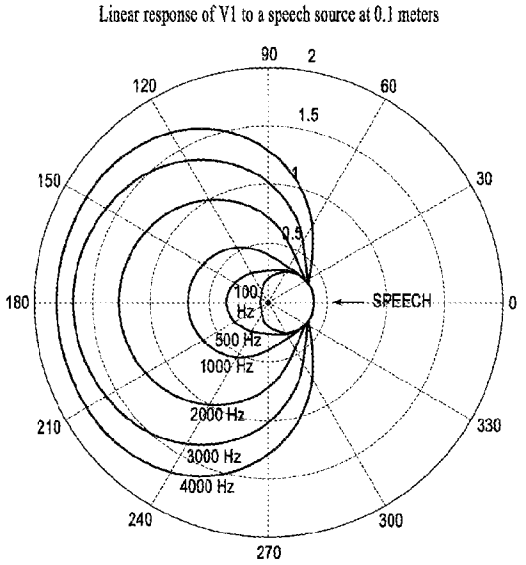



FIG.13

"Figure 13 is a plot of linear response of virtual microphone $V_1$ to a speech source at a distance of 0.1 m for frequencies of 100, 500, 1000, 2000, 3000, and 4000 Hz." *Id.* at 3:1–3.

The virtual microphone signals are input to an adaptive noise removal system, which can use "any adaptive filter or noise removal algorithm." *Id.* at 3:57–62, 6:67–7:3, 8:50–9:3, 9:22–38; *see id.* at 4:52–7:16. In an embodiment, the adaptive noise removal system combines the signals from virtual microphones $V_1$ and $V_2$ "by filtering and summing in the time domain." *Id.* at 7:4–16, 8:50–9:3, 9:22–38. "The adaptive filter generally uses the signal received from a first microphone . . . to remove noise from the speech received from at least one other microphone . . . , which relies on

a slowly varying linear transfer function between the two microphones for sources of noise." *Id.* at 7:7–12. The system then generates an output signal "in which the noise content is attenuated with respect to the speech content." *Id.* at 7:12–16.

*2. Illustrative Claims*

As noted previously, Petitioner challenges claims 1–20 of the '080 patent, of which claims 1, 7, and 14 are independent. Pet. 2; Ex. 1001, 33:39–36:25. Claim 7 is illustrative of the challenged subject matter and is reproduced below.

> 7. A method comprising:
>
> a first virtual microphone formed from a first combination of a first microphone signal and a second microphone signal, wherein the first microphone signal is generated by a first physical microphone and the second microphone signal is generated by a second physical microphone;
>
> a second virtual microphone formed from a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone has a first linear response to speech and first linear response to noise, the first linear response to speech being substantially similar across a plurality of frequencies for a speech source located within a predetermined angle relative to an axis of the microphone array and devoid of a null, wherein the second virtual microphone has a second linear response to speech that has a single null oriented in a direction toward a source of the speech and a second linear response to noise, wherein the second linear response to noise is substantially similar to the first linear response to noise, one or both of the first linear response to noise and the second linear response to noise being non-zero in a direction toward a source of noise, and the second linear response to speech is substantially dissimilar to the first linear response to speech, wherein the speech is human speech; and
>
> an adaptive noise removal application coupled to the first and second virtual microphones and generating denoised output signals by

> forming a plurality of combinations of signals output from the first virtual microphone and the second virtual microphone, by filtering and summing the plurality of combinations of signals in the time domain, and by a varying linear transfer function between the plurality of combinations of signals, wherein the denoised output signals include less acoustic noise than acoustic signals received at the first and second physical microphones.

Ex. 1001, 34:16–54.

*D. Asserted Challenges to Patentability and Evidence of Record*

Petitioner challenges the patentability of claims 1–20 of the '080 patent based on the following reference or combination of references:

| Claims Challenged | 35 U.S.C. § | Reference(s)/Basis |
|---|---|---|
| 1–3, 5–9, 11–14, 16–20 | 103[2] | Ikeda[3], McCowan[4], Kanamori[5] |
| 4, 10, 15 | 103 | Ikeda, McCowan, Kanamori, Yang[6] |

In support of its patentability challenge, Petitioner relies on, *inter alia*, the Declaration of Jeffrey S. Vipperman, Ph.D. ("Dr. Vipperman"). Ex. 1003.

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[2] The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) ("AIA"), included revisions to 35 U.S.C. § 103 that became effective as of March 16, 2013. Although the application for the '080 patent was filed after March 16, 2013, it includes a priority claim to an application filed before this date. Ex. 1001, codes (22), (60), (63). Accordingly, for purposes of institution, we apply the pre-AIA version of 35 U.S.C. § 103.

[3] Japanese Unexamined Patent Application Publication No. H11-18186, filed June 25, 1997, published January 22, 1999; ("Ikeda," Ex. 1006).

[4] Iain A. McCowan et al., *Near-Field Adaptive Beamformer for Robust Speech Recognition*, Digital Signal Processing, Vol. 12, Issue 1 (2002), 87–106 ("McCowan," Ex. 1007).

[5] US Patent Application Publication No. 2004/0185804, published September 23, 2004 ("Kanamori," Ex. 1008).

[6] US Patent Application Publication No. 2002/0193130, published December 19, 2002 ("Yang," Ex. 1009).



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## III. PRELIMINARY MATTERS

### *A. Analysis of Discretionary Denial Under 35 U.S.C. § 314(a)*

Institution of an *inter partes* review is discretionary. Section 314(a) of Title 35 of the United States Code provides that "[t]he Director may not authorize an inter partes review to be instituted unless the Director determines that the information presented in the petition . . . and any response . . . shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition." The U.S. Supreme Court has explained that because § 314 includes no mandate to institute review, "the agency's decision to deny a petition is a matter committed to the Patent Office's discretion." *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2140 (2016); *see also Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1367 (Fed. Cir. 2016) (explaining that under § 314(a), "the PTO is permitted, but never compelled, to institute an IPR proceeding"). The Director has delegated this authority under § 314(a) to the Board. 37 C.F.R. § 42.4(a) ("The Board institutes the trial on behalf of the Director.").

In this proceeding, Patent Owner argues that we should exercise discretion to deny institution under § 314(a), because the "trial (set for July 2023) will be complete before the projected statutory deadline for a Final Written Decision in December 2023" and Petitioner's proposed stipulation falls short and fails to overcome concerns regarding overlapping issues with the district court proceeding. Prelim. Resp. 6, 10; Sur-reply 4. Patent Owner contends that all of the factors identified in *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 at 6 (PTAB Mar. 20, 2020) (precedential) ("*Fintiv*"), weigh in favor of denying institution. Prelim.

Resp. 12. Petitioner contests Patent Owner's arguments and stipulates that, if the Board institutes, Petitioner "will not challenge the validity of the '080 patent in the parallel litigation based on the grounds advanced in [this IPR] petition or on any ground that utilizes Ikeda (Ex. 1006) or McCowan (Ex. 1007)." Reply 4.

In *Fintiv*, the Board ordered supplemental briefing on a nonexclusive list of factors for consideration in analyzing whether the circumstances of a parallel district court action are a basis for discretionary denial of trial institution under *NHK Spring Co. v. Intri-Plex Techs., Inc.*, IPR2018-00752, Paper 8 (PTAB Sept. 12, 2018) (precedential). *Fintiv*, Paper 11 at 5–16. Those factors include:

> 1. whether the court granted a stay or evidence exists that one may be granted if a proceeding is instituted;
>
> 2. proximity of the court's trial date to the Board's projected statutory deadline for a final written decision;
>
> 3. investment in the parallel proceeding by the court and the parties;
>
> 4. overlap between issues raised in the petition and in the parallel proceeding;
>
> 5. whether the petitioner and the defendant in the parallel proceeding are the same party; and
>
> 6. other circumstances that impact the Board's exercise of discretion, including the merits.

*Id.* at 5–6. Here, we consider these factors to determine whether we should exercise discretion to deny institution. In evaluating the factors, we take a holistic view of whether efficiency and integrity of the system are best served by denying or instituting review. *Id.* at 6; *see Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District*

*Court Litigation* at 9 (June 21, 2022), https://www.uspto.gov/sites/default/files/documents/interim_proc_discretionary_denials_aia_parallel_district_court_litigation_memo_20220621_.pdf.

*Factor 1: Whether the court granted a stay or evidence exists that one may be granted if a proceeding is instituted*

Patent Owner argues that this factor supports denial because Petitioner has not moved for a stay in any district court and "there is no evidence that a stay will be granted if a proceeding is instituted." Prelim. Resp. 21 (citing Pet. 83). Patent Owner further argues that although the Board has found previously that this factor should be neutral in such a case, here there is no evidence that a stay may be granted if a proceeding is instituted and accordingly, this factor should weigh against institution. Sur-reply 2 (citing *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 at 6 (PTAB Mar. 20, 2020) (precedential) (considering "whether the court granted a stay or evidence exists that one may be granted if a proceeding is instituted")).

Petitioner argues it intends to seek a stay if this proceeding is instituted. Pet. 83. Petitioner further argues that "neither party has requested a stay of the parallel litigation at the time of institution." Reply 5. Therefore, Petitioner concludes that "*Fintiv* factor one is neutral." Pet. 83.

On the record before us, we decline to speculate how the district court might decide the motion to stay in the event it is filed. Accordingly, we find that this factor does not weigh for or against exercising our discretion to deny institution.

*Factor 2: Proximity of the court's trial date to the Board's projected statutory deadline for a final written decision*

Patent Owner contends the trial (set for July 2023) will be complete before the projected statutory deadline for a Final Written Decision in

December 2023. Prelim. Resp. 20–22. Per Patent Owner, this trial date was set by the district court in its January 7, 2022 Docket Control Order. *Id.* (citing Ex. 1021). Patent Owner argues there is no evidence the district court will not be able to meet the July 2023 trial date. Sur-reply 3.

Petitioner, however, argues that trial date set in the January 7, 2022 Docket Control Order by the district court is "unreliable" and "not by itself a good indicator of whether the district court trial will occur before the statutory deadline for a final written decision." Reply 2 (citing "USPTO Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation (June 21, 2022)" ("Interim Procedure"), at 8). Relying on the Interim Procedure, Petitioner notes that the "median time from the filing of a civil case to trial in the Western District of Texas is 28.3 months, placing the expected trial date in the parallel litigation around January 30, 2024." *Id.* at 3 (citing Ex. 1034, 5). Petitioner argues that this would place the trial later than the statutory deadline of December 9, 2023, for a final written decision in this IPR. *Id.* Accordingly, Petitioner concludes this factor weighs against discretionary denial. *Id.* (citing *Hanwha Sols. Corp. v. Rec Solar Pte. Ltd.*, IPR2021-00989, Paper 12 at 14 (PTAB Dec. 13, 2021)).

Although the district court has set a trial for July 2023, in view of the median time for a civil case to go to trial in the relevant judicial district, we are not persuaded that the alleged proximity to trial should outweigh other factors in our analysis. Rather, we find that factor 2 weighs against exercising our discretion to deny institution.

*Factor 3: Investment in the parallel proceeding by the court and the parties*

Patent Owner contends the third *Fintiv* factor also weighs in favor of denial because "[s]ignificant work in the [parallel district court litigation] has already begun and claim construction proceedings will be complete by the Board's institution decision in December 2022." Prelim. Resp. 22–23. According to Patent Owner, *Markman* briefing will be complete as of July 13, 2022, with a hearing set for October 14, 2022, and discovery that opened on July 28, 2022 "will be nearly complete when the Board issues its institution decision in December 2022." Sur-Reply 3. Thus, Patent Owner concludes that this factor weighs in favor of denial.

Petitioner disputes Patent Owner's contentions. Petitioner first argues that "the parties have expended few resources in the litigation," because no experts have prepared reports and "Petitioner's diligence averts parallel, duplicative proceedings, and unfair costs to Patent Owner." Pet. 83; Reply 3–4. According to Petitioner, the early stage of this case, combined with the diligence with which Petitioner acted in filing its Petition, favors institution. *Id.* Petitioner further argues that the Markman hearing was postponed from its original date and the issue of venue has yet to be resolved. Reply 4 (citing Exs. 1037, 1038, 1040, 1042).

Based on the present record, we are persuaded by Petitioner's showing that neither the district court nor the parties have invested substantially in the district court proceeding. Specifically, the parties appear only to have exchanged invalidity contentions (*see* Exs. 2002, 2003) and *Markman* briefing before they jointly stipulated to extend venue discovery deadlines (*see* Ex. 1040). We agree with Petitioner, therefore, that a large portion of work still remains to be done in the district court proceeding.

Accordingly, weighing the facts in this particular case, including the time invested by the parties and the district court in the parallel litigation, and the extent to which the current investment in the district court proceeding relates to issues of patent validity, we find that factor 3 weighs against exercising our discretion to deny institution.

*Factor 4: Overlap between issues raised in the petition and in the parallel proceeding*

Petitioner argues that this factor weighs heavily against discretionary denial, because the Petition stipulates that Petitioner "will not challenge the validity of the '080 patent in the parallel litigation based on the grounds advanced in Petition or on any ground that utilizes Ikeda (Ex. 1006)." Reply 5.

Patent Owner contends this factor favors discretionary denial of institution because the claims asserted in the parallel district court proceeding are exactly the same as those challenged in the Petition. Prelim. Resp. 23–24 (citing Exs. 2002, 2003). Additionally, Patent Owner further challenges Petitioner's stipulation as too narrow because it is not an "absolute" stipulation, such as that filed in *Sotera Wireless, Inc. v. Masimo Corp.*, IPR2020-01019, Paper 12 at 18–19 (PTAB Dec. 1, 2020) (precedential as to § II.A) ("*Sotera*"). Prelim. Resp. 24; Sur-reply 4. Patent Owner also argues that Petitioner's proposed stipulation does not affect overlapping issues, because "the District Court will still make rulings on overlapping issues related to validity." Sur-reply 4.

Although Petitioner's stipulation does minimize overlap with regards to Ikeda specifically, it does not mitigate completely the concerns of duplicative efforts between the district court and the Board, as well as

concerns of potentially conflicting decisions. *See Sand Revolution II, LLC v. Cont'l Intermodal Grp.-Trucking LLC*, IPR2019-01393, Paper 24 at 11–12 (PTAB June 16, 2020) (informative) ("*Sand Revolution*"). Therefore, similar to the holding in *Sand Revolution*, we determine that this factor weighs marginally against exercising our discretion to deny institution.

*Factor 5: Whether the petitioner and the defendant in the parallel proceeding are the same party*

It is undisputed that Petitioner is a defendant in the parallel litigation. *See* Pet. 84; Prelim. Resp. 24.

As the Board explained in *Fintiv*, "[i]f a petitioner is unrelated to a defendant in an earlier court proceeding, the Board has weighed this fact *against exercising discretion* to deny institution under *NHK*." *Fintiv*, Paper 11 at 13–14 (emphasis added). The Board determined in *Sand Revolution* that "[a]lthough it is far from an unusual circumstance that a petitioner in *inter partes* review and a defendant in a parallel district court proceeding are the same, or where a district court is scheduled to go to trial before the Board's final decision would be due in a related *inter partes* review, this factor weighs in favor of discretionary denial." *Sand Revolution*, IPR2019-01393, Paper 24 at 12–13. Here, it is undisputed that Petitioner is a defendant in the parallel litigation but there is uncertainty as to whether the district court will go to trial before the final written decision is due in this proceeding. Therefore, we find that factor 5 does not weigh for or against exercising our discretion to deny institution.

*Factor 6: Other circumstances that impact the Board's exercise of discretion, including the merits.*

The final *Fintiv* factor is a catch-all that considers any other relevant circumstances. The decision whether to exercise discretion to deny institution is based on "a balanced assessment of all relevant circumstances in the case, including the merits." Consolidated Trial Practice Guide 58 (Nov. 2019), *available at* https://www.uspto.gov/TrialPracticeGuide Consolidated. "For example, if the merits of a ground raised in the petition seem particularly strong on the preliminary record, . . . the institution of a trial may serve the interest of overall system efficiency and integrity because it allows the proceeding to continue in the event that the parallel proceeding settles or fails to resolve the patentability question presented in the PTAB proceeding." *Fintiv*, Paper 11 at 14–15. A full merits analysis is not necessary as part of deciding whether to exercise discretion not to institute, but rather the parties may point out, as part of the factor-based analysis, particular "strengths or weaknesses" to aid the Board in deciding whether the merits tip the balance one way or another. *Id.* at 15–16.

With respect to the merits of the proceeding, Patent Owner argues that the proposed challenges lack multiple key claim limitations. Prelim. Resp. 25. Patent Owner, thus, contends this factor weighs in favor of discretionary denial. *Id.*; Sur-reply 4–5.

We have reviewed Petitioner's unpatentability arguments and supporting evidence. As discussed below, on this record, we determine that Petitioner has demonstrated sufficiently for purposes of this Decision a reasonable likelihood that the challenged claims of the '080 patent are unpatentable. Based on this preliminary record, however, we are unable to discern whether the merits are "particularly strong."

Therefore, weighing the facts in this particular case, including the strength of the merits of the grounds in the petition, we find that factor 6 weighs neither in favor of nor against exercising our discretion to deny institution.

*Conclusion on Discretionary Denial Under § 314(a)*

As noted in *Fintiv*, we consider the above factors when taking "a holistic view of whether efficiency and integrity of the system are best served by denying or instituting review." *Fintiv*, Paper 11 at 6. Under such a holistic view, we determine that the above-discussed factors do not support exercising our discretion to deny institution.

Accordingly, under the particular circumstances of this case, we are not persuaded that the interests of efficiency and integrity of the system would be best served by invoking our discretion under § 314(a) to deny institution of a potentially meritorious Petition.

*B. Claim Construction*

A claim "shall be construed using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. [§] 282(b)." 37 C.F.R. § 42.100(b). Under that standard, the "words of a claim 'are generally given their ordinary and customary meaning.'" *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (en banc).

Both parties state that express claim construction is unnecessary at this stage of the proceeding and that all terms are to given their plain and ordinary meaning. Pet. 8; Prelim. Resp. 9. We agree.

Construction is needed only for those terms "that are in controversy, and only to the extent necessary to resolve the controversy." *See Nidec*



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*Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)). Consequently, we need not construe any terms for purposes of institution.

*C. Principles of Law Regarding Obviousness*

A claim is unpatentable under 35 U.S.C. § 103 if "the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) where in evidence, objective evidence of non-obviousness.[7] *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). When evaluating a combination of teachings, we must also "determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue." *KSR*, 550 U.S. at 418 (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)). Whether a combination of prior art elements would have produced a predictable result weighs in the ultimate determination of obviousness. *Id.* at 416–417.

In an *inter partes* review, the petitioner must show with particularity why each challenged claim is unpatentable. *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016); 37 C.F.R. § 42.104(b). The

[7] At this stage of the proceeding, Patent Owner has not presented objective evidence of non-obviousness.



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burden of persuasion never shifts to the patent owner. *Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015).

We analyze the challenges presented in the Petition in accordance with the above-stated principles.

*D. Level of Ordinary Skill in the Art*

In determining the level of ordinary skill in the art, various factors may be considered, including the "type of problems encountered in the art; prior art solutions to those problems; rapidity with which innovations are made; sophistication of the technology; and educational level of active workers in the field." *In re GPAC, Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995) (quotation marks omitted). Furthermore, the prior art itself can reflect the appropriate level of ordinary skill in the art. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001).

Here, Petitioner asserts a person of ordinary skill in the art by June 27, 2007, would have had "a bachelor's degree in computer engineering, computer science, electrical engineering, mechanical engineering, or a similar field, and approximately three years of industry or academic experience in a field related to acoustics, speech recognition, speech detection, or signal processing." Pet. 8 (citing Ex. 1003 ¶¶ 22–23). Dr. Vipperman supports Petitioner position and further testifies that "[w]ork experience can substitute for formal education and additional formal education can substitute for work experience." Ex. 1003 ¶ 23.

Patent Owner does not assert a different level of skill in the art at the time of the alleged invention and uses Petitioner's proposed level of skill. Prelim. Resp. 9.

For the purposes of this Decision, we too adopt Petitioner's level of ordinary skill in the art because it appears consistent with the problems addressed in the '080 Patent and the prior art of record.

*E. Overview of Asserted Prior Art of Record*

*1. Ikeda (Ex. 1006)*

Ikeda is an unexamined Japanese Patent Application Publication No. H11-18186, published on January 22, 1999, titled "Primary Pressure Gradient Microphone." Ex. 1006,[8] codes (11), (43), (54). Ikeda discloses a microphone apparatus including an adaptive noise suppression with "three omnidirectional microphone units" M1, M2, and M3. Ex. 1006 ¶¶ 8, 11–13, 16–18, 27–29, 31, 36, Fig. 8.

One embodiment of Ikeda is illustrated in Figure 1, reproduced below.

[8] In this Decision we will refer to Ex. 1006, which is a certified translation of the original Japanese publication found at Ex. 1005.



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FIG. 1

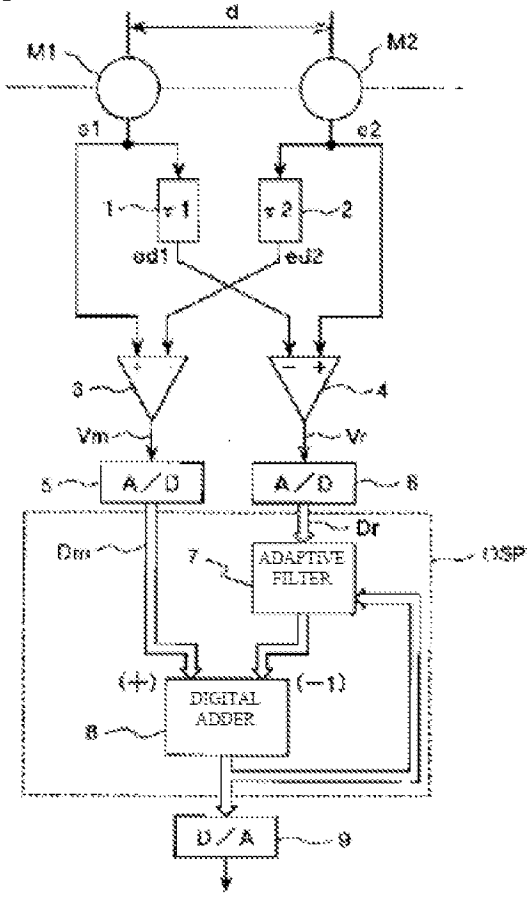



Figure 1 of Ikeda, above, is a circuit diagram of a primary pressure gradient microphone using two omnidirectional microphone units. *Id.* ¶ 11. According to Figure 1, the output "of the microphone unit M2 is delayed . . . by a delay circuit 2," and an inversion adding circuit 3 outputs a main signal Vm by "calculating the difference between the output . . . of the microphone unit M1 and the output . . . of the delay circuit 2." *Id.* ¶¶ 18, 20, 31. Ikeda discloses that main signal Vm is generated by subtracting the output signal of microphone M2, as delayed by delay circuit 2, from the output signal of microphone M1. *Id.* ¶¶ 18, 21. Ikeda further discloses a signal system constructed using microphones M1 and M2, delay circuit 2, and inversion adding circuit 3 for outputting main signal Vm functions as a main

microphone. *Id.* ¶¶ 12, 20–22, Fig. 2. According to Ikeda, the main microphone has directional characteristics. *Id.* ¶¶ 2–4, 21, 22, Fig. 3.

Another embodiment of Ikeda illustrated in Figure 8, reproduced below.

FIG. 8

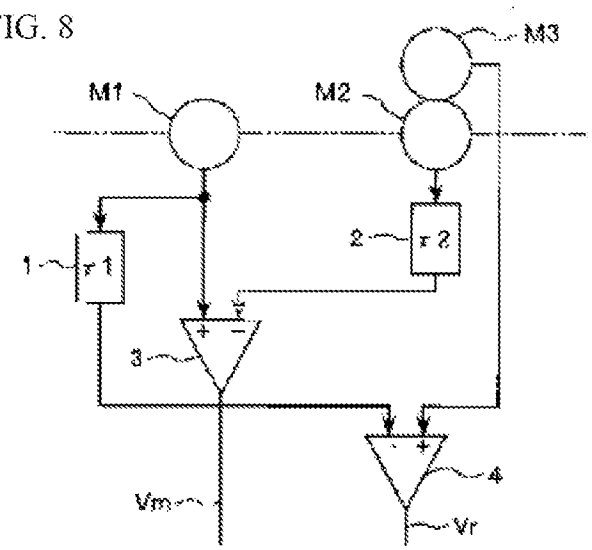



Figure 8 of Ikeda, above, is a circuit diagram of a primary pressure gradient microphone using three omnidirectional microphone units. *Id.* ¶ 42. According to Figure 8, the output "of the microphone unit M1 is delayed . . . by a delay circuit 1." *Id.* ¶¶ 18, 31. Ikeda discloses that reference signal Vr "is generated by obtaining the difference between the output of third microphone unit M3 and the output of delay circuit 1 with inversion adding circuit 4." *Id.* ¶ 31, Fig. 8. Ikeda further discloses that reference signal Vr is generated by subtracting the output signal of microphone M1, as delayed by delay circuit 1, from the output signal of microphone M3. *Id.* ¶¶ 18, 23, 31, Fig. 8. According to Ikeda, the signal system constructed using microphones M1 and M3, delay circuit 1, and inversion adding circuit 4 for outputting reference signal Vr functions as a reference microphone. *Id.* ¶¶ 12, 20, 23–24, 31, Fig. 4.

Ikeda states that the "reference microphone has directional characteristics on the back surface side." *Id.* ¶¶ 23–24, Fig. 5. Ikeda explains that the main microphone is configured to pick up a target sound and noise, and the reference microphone is configured to pick up noise. *Id.* ¶¶ 21, 23. The main signal Vm (as converted to a digital signal Dm) and the reference signal Vr (as converted to a digital signal Dr) in Ikeda are input to the adaptive noise cancellation system including an adaptive filter 7 and a digital adder 8. *Id.* ¶¶ 12–13, 27–29, 31, Fig. 1. Ikeda states "[m]ain [*sic* Reference] signal data Dr outputted from the A/D converter 6 is supplied to an adaptive filter 7 . . . , and the difference between the filter output of the adaptive filter 7 and the main signal data Dm outputted from the A/D converter 5 is calculated by a digital adder 8." *Id.* ¶ 27, Fig. 1. Ikeda then discloses that the filter response characteristics of adaptive filter 7 "are determined so as to cancel the respective noise components contained in the main signal data Dm and the reference signal data Dr." *Id.* ¶ 28. Ikeda further discloses

> [a]s a result of the response characteristics of the adaptive filter 7 being determined successively in this way, the noise component contained in the main signal Vm is cancelled by the noise component contained in the reference signal Vr due to subtraction by digital adder 8. The output of the digital adder 8 is converted to an analog signal by a D/A converter 9. A signal primarily consisting of the target sound component can be acquired from the D/A converter 9.

*Id.* ¶¶ 29, 12, 13, 31.

*2. McCowan (Ex. 1007)*

McCowan is an article titled "Near-Field Adaptive Beamformer for Robust Speech Recognition" published in the Digital Signal Processing



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Review Journal. Ex. 1007, 87.[9] McCowan discloses an adaptive noise cancellation system for near-field speech sources with a near-field adaptive beamformer that is "implemented using the standard generalized sidelobe canceler (GSC) system structure." *Id.* McCowan uses a "near-field compensation unit" and "a standard generalized sidelobe canceling blocking matrix and adaptive filters." *Id.* at 88–89.

One embodiment of McCowan is shown in Figure 3, reproduced below.

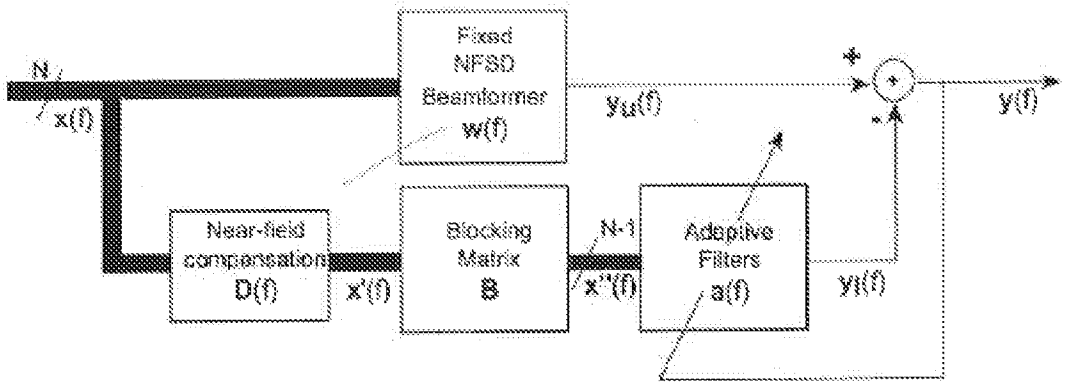


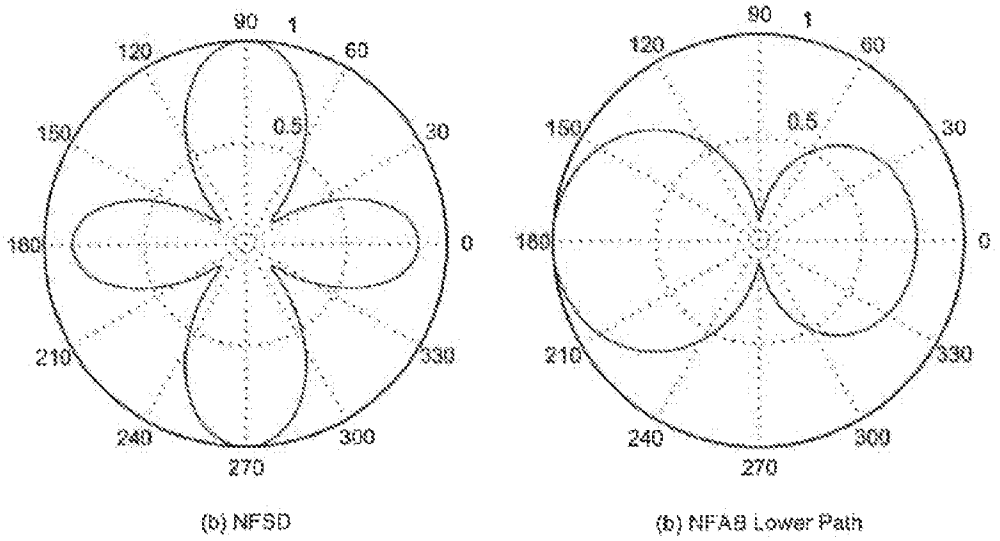

FIG. 3. Near-field adaptive beamformer

Figure 3, above, illustrates a block diagram of McCowan's adaptive noise cancellation system with a near-field adaptive beamformer. *Id.* at 91. McCowan discloses that input **x**(f) including signals from multiple microphones is processed via two signal paths. *Id.* at 90, 93 (equation 15), 95–96. McCowan's Figure 3 shows that the lower path includes a near-field compensation, a blocking matrix, and adaptive filters. *Id.* McCowen explains that the lower path generates a noise estimate, which is used to cancel, at a subtraction component, noise in the output signal of a fixed

[9] To avoid confusion, the page citations are based on the numbers printed in the upper corners of McCowan.

NFSD (near-field superdirective) beamformer in the upper path. *Id.* at 87–91, 93–96.

McCowan's Figures 6(b) and 7(b) (reproduced below) show that the upper path includes a near-field adaptive beamformer ("NFAB"), that includes at least four nulls, while its lower path NFAB includes at least two nulls, and many more at higher frequencies:




Ex. 1007, 98–99. The "overall beamformer directivity pattern" of McCowan's NFAB also includes four nulls. *Id.* at 100.

McCowan discloses that the blocking matrix "block[s] the desired signal from the adaptive noise estimate" by subtracting one microphone signal from another. *Id.* at 93, 95 (equations 18, 19). McCowan states that "[t]o ensure complete blocking, the desired signal must both be time aligned and have equal amplitudes across all channels." *Id.* at 93. McCowan discloses that for a near-field sound source, phase misalignment across microphones results from "[t]he difference in propagation time to [the *i*th] microphone with respect to the reference microphone ($i$=1)," defined as:

$$\tau_i = \frac{d_i - d_1}{c}$$

where d*i* is the distance between the source and the *i*th microphone and c is the speed of sound. Ex. 1007, 89–90. Additionally, according to McCowan, amplitude differences across microphones are "negligible for far-field sources, but can be significant in the near-field case." *Id.* at 90. McCowan discloses that the attenuation factor of wave amplitude on the *i*th microphone, with respect to the amplitude on the reference microphone (*i*=1), is defined as:

$$\alpha_i = \frac{d_1}{d_i}$$

McCowan explains that "[f]or a near-field desired source, to align the desired signal on all channels, a near-field compensation must first be applied to the input channels prior to blocking." *Id.* at 93; *see id.* at 87. According to McCowan, the near-field compensation unit "compensate[s] for both phase misalignment and amplitude scaling of the desired signal across sensors." *Id.* at 93. With the near-field compensation, McCowan teaches multiplying microphone 2's signal by d2/d1, delaying by (d1−d2)/c, and subtracting the result from microphone 1's signal to create "a true null . . . in the beam-pattern . . . in the direction *and* distance corresponding to the desired source." *Id.* at 90, 93–95.

*3. Kanamori (Ex. 1008)*

Kanamori is a U.S. Patent Application Publication, published on September 23, 2004, titled "Microphone Device and Audio Player."

Ex. 1008, codes (12), (43), (54). Kanamori discloses a technique "to generate a main signal and noise reference signal used in a noise suppressing process." *Id.* ¶ 18. One embodiment of Kanamori is shown in Figure 17A, reproduced below.

FIG. 17A

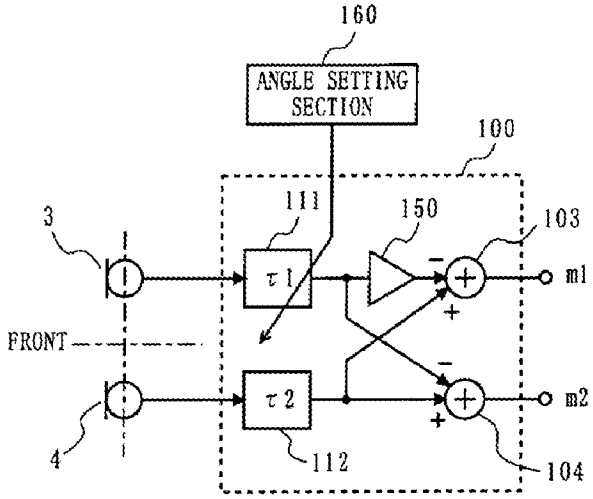



Figure 17A is a schematic perspective view of the configuration of a microphone device according to Kanamori's embodiment number 8. *Id.* ¶ 66. Specifically, Figure 17A illustrates a technique, where a main signal m1 and a noise reference signal m2 are generated using signals from microphone units 3 and 4. *Id.* ¶¶ 151, 166, 172–174. In this embodiment, directivity combining section **100** includes, in addition to the components of directivity combining section **100,** angle setting section **160** and second signal delaying section **112.** *Id.* ¶ 173. According to Kanamori, the target sound direction can be changed by angle setting section **160.** *Id.* ¶ 174.

Kanamori discloses that

> angle setting section **160** can change a signal delay amount τl of the first signal delaying section **111** in a range of $0 \leq \tau l \leq 2d/c$ (where d is a distance between the microphone units and c is the speed of sound). Here, if the second signal delaying section **112**

> is not provided, even with the signal delay amount τl of the first signal delaying section **111** being changed in the above range, the target sound direction can be changed merely in a range of 0 to +90 degrees with respect to the front direction. With the second signal delaying section **112** being provided and its signal delay amount τ2 being set as τ2 = d/c, the target sound direction can be changed in a range of ±90 degrees with respect to the front direction.

Ex. 1008 ¶ 175. Based on this information, Kanamori states "the direction of collecting sounds (the target sound direction) of the microphone device can be changed." According to Kanamori, "it is possible to achieve a directivity pattern illustrated in Figure 17B [reproduced below], as well as a directivity pattern illustrated in Figure 17C [reproduced below] by changing the signal delay amount of the signal delay section." *Id.* ¶ 176.

FIG. 17B

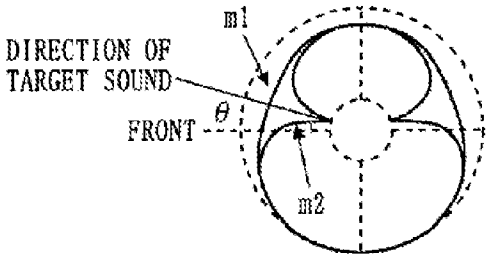
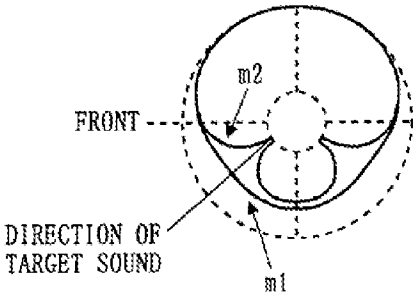



FIG. 17C




Figures 17B and 17C are illustrations showing directivity patterns of Kanamori's microphone device. *Id.* ¶ 66. Kanamori teaches that the "variable delay characteristic can be easily attained by forming the signal delaying section with an all-pass filter $H(w)=(A+z^{-1})/(a+Az^{-1})$ where a coefficient A is $0 \leq A < 1$." *Id.* ¶ 176. Kanamori further teaches that "[t]o change the signal delay amount, the angle setting section **160** changes this coefficient A." *Id.* According to Kanamori,

"[i]f a large delay amount or a linear delay frequency characteristic is required, a secondary all-pass filter and/or an all-pass filter is subordinately connected." *Id.*

Kanamori discloses "suppress[ing], based on the noise reference signal, noise components included in the main signal." Ex. 1008 ¶ 168; *see id.* ¶¶ 76–115, Figs. 1–7. Kanamori further discloses a filter coefficient calculating section 40 that calculates the power spectrums of the main and reference signals and, based on the ratio of those power spectrums, calculates the estimated noise spectrum in the main signal, which is used to suppress "noise components included in the main signal." *Id.* ¶¶ 100–115, 168, Fig. 4; *see id.* ¶¶ 80–86, 93–99.

Kanamori states that, when "noise is coming from a plurality of directions," suppressing "noise components included in the main signal" requires that the ratio of the power spectrums of the main and reference signals "be constant irrespectively of the direction from which noise is coming." *Id.* ¶ 168. Otherwise, according to Kanamori, the estimated noise spectrum in the main signal will be correct only "in a specific direction." *Id.* Kanamori also teaches that the directivity patterns of main signal m1 and noise reference signal m2 are preferably as similar as possible in directions from which noise is coming. *Id.* ¶¶ 167–170.

*4. Yang (Ex. 1009)*

Yang is a U.S. Patent Application Publication, published on December 19, 2002, titled "Noise Suppression for a Wireless Communication Device." Ex. 1009, codes (12), (43), (54). Yang discloses



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an adaptive noise reduction system with "[t]echniques to suppress noise from a signal comprised of speech plus noise." Ex. 1009, code (57), ¶¶ 58–62. One embodiment of Yang is shown in Figure 4, reproduced below.

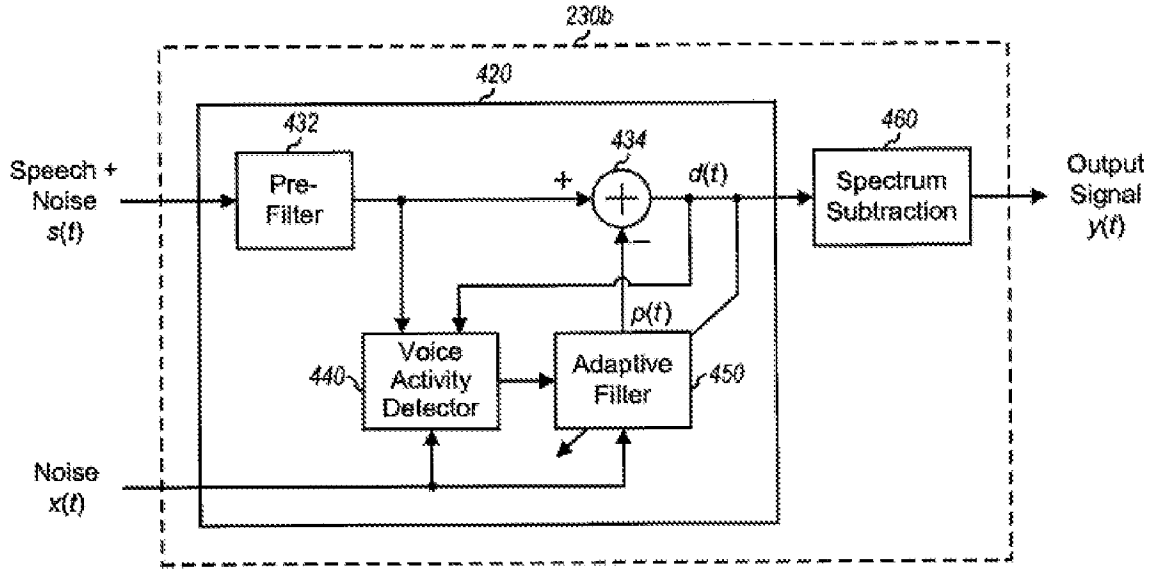



FIG. 4

Figure 4 is a block diagram of Yang's noise suppression unit 230b. *Id.* ¶¶ 18, 58. Yang discloses that noise suppression unit 230b capable of removing background noise from a speech-plus-noise signal and it achieves the noise reduction/suppression in the time domain. *Id.* ¶ 58.

Yang states:

> The mostly noise signal x(t) is provided to an adaptive filter 450, which filters the noise with a particular transfer function h(t). The filtered noisee [*sic*] p(t) is then provided to summer 434 and subtracted from the filtered speech plus noise signal to provide an intermediate signal d(t) having predominantly speech and some amount of noise.

*Id.* ¶ 59. According to Yang, adaptive filter 450 "is adapted during periods of non-speech activity." *Id.* ¶¶ 60–61. Yang discloses that voice activity detector 440 "detects the presence of speech activity . . . and provides a

control signal that enables the adaptation of the coefficients of [adaptive filter 450] when no speech activity is detected." *Id.*

## IV. ANALYSIS

### *A. Alleged Obviousness of Claims 1–3, 5–9, 11–14, and 16–20 in view of Ikeda, McCowan, and Kanamori*

Petitioner contends claims 1–3, 5–9, 11–14, and 16–20 would have been obvious to person of ordinary skill in the art in view of the combined teachings of Ikeda, McCowan, and Kanamori. Pet. 2, 19–79. Patent Owner disputes Petitioner's contentions. Prelim. Resp. 1–18. For the reasons discussed below, at this stage of the proceeding, we are persuaded that Petitioner has established a reasonable likelihood of success on this challenge.

#### *1. Analysis of Independent Claim 7*

*a) "A method comprising: a first virtual microphone formed from a first combination of a first microphone signal and a second microphone signal, wherein the first microphone signal is generated by a first physical microphone and the second microphone signal is generated by a second physical microphone; a second virtual microphone formed from a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone has a first linear response to speech and first linear response to noise, the first linear response to speech being substantially similar across a plurality of frequencies for a speech source located within a predetermined angle relative to an axis of the microphone array and devoid of a null, wherein the second virtual microphone has a second linear response to speech that has a single null oriented in a direction toward a source of the speech and a second linear response to noise, wherein the second linear response to noise is substantially similar to the first linear response to noise, one or both of the first linear response to noise and the second linear response to noise being non-zero in a direction toward a source of*

> *noise, and the second linear response to speech is substantially dissimilar to the first linear response to speech, wherein the speech is human speech"*

Petitioner contends that Ikeda discloses omnidirectional physical microphone units M1 and M2 and the output e1 of microphone M1 is a first microphone signal generated by the first physical microphone, and that output e2 of microphone M2 is a second microphone signal generated by the second physical microphone. Pet. 37–38 (citing Ex. 1006 ¶¶ 18–20, Figs. 1–2; Ex. 1006 ¶ 95; Ex. 1001, 34:16–54). According to Petitioner, Ikeda in combination with McCowan and Kanamori teaches the generation of main signal Vm as well as "a first virtual microphone formed from a first combination of a first microphone signal and a second microphone signal." *Id.* at 40 (citing Ex. 1006 ¶¶ 18–22, 27; Ex. 1003 ¶¶ 96–98).

Petitioner further contends Ikeda discloses a second virtual microphone by disclosing the reference microphone that constructs reference signal Vr that "[t]he reference microphone has directional characteristics" and includes two omnidirectional microphones M1 and M2 and associated signal processing (e.g., delay circuit 1 and inversion adding circuit 4). *Id.* at 41 (citing Ex. 1006 ¶¶ 18–20, 23–24, Figs. 1, 4–5; Ex. 1003 ¶¶ 99–100). Petitioner argues that "[i]n the reference microphone, a delayed version of output e1 and output e2 are combined (a second combination of the first microphone signal and the second microphone signal) at inversion adding circuit 4, which outputs reference signal Vr." *Id.* (citing Ex. 1006 ¶¶ 18–20, 23–24; Ex. 1003 ¶¶ 99–100).

Petitioner then contends that a person of ordinary skill in the art would have understood that the combined teachings of Ikeda, McCowan, and Kanamori would have rendered "main signal Vm with linear responses

because the main signal Vm's response to a sound source at a particular distance, frequency, and direction is linearly proportional to its input." *Id.* at 44 (citing Ex. 1003 ¶ 106). According to Petitioner, "main signal Vm has linear responses just like the virtual microphone V1 described in the '080 patent has linear responses, because they are constructed using the same signal processing." *Id.* at 45 (citing Ex. 1001, 2:60–3:4, 4:42–43, 11:1–2, 11:20–35, Figs. 11–13; Ex. 1003 ¶ 106).

Petitioner relies on the testimony of and a simulation created by Dr. Vipperman to support its position that the linear response of the proposed combination to speech is substantially similar across a plurality of frequencies for a speech source located within an angle of approximately ±30 degrees relative to an axis of the microphone array. *Id.* at 46 (citing Ex. 1003 ¶¶ 107–108). Thus, Petitioner, argues that in Dr. Vipperman's simulation "the linear response to speech is devoid of a null." *Id.* (citing Ex. 1001, 4:31–32 (defining the term "null"); Ex. 1003 ¶¶ 107–108). Again, relying on Dr. Vipperman's simulation, Petitioner asserts that a person of ordinary skill in the art would have understood that in the combined teachings of Ikeda, McCowan, and Kanamori "reference signal Vr has linear responses because the reference signal Vr's response to a sound source at a particular distance, frequency, and direction is linearly proportional to its input." *Id.* at 48–49 (citing Ex. 1003 ¶ 113).

Petitioner also contends that Ikeda discloses applying its teachings "to a wide range of devices," including "a voice input microphone of a hands-free telephone unit or a car navigation system." *Id.* at 53 (citing Ex. 1006 ¶ 36). According to Petitioner, a person of ordinary skill in the art would have understood that "voice input" refers to human speech, thereby

rendering it obvious to use Ikeda's system to receive human speech. *Id.* (citing Ex. 1006 ¶ 36; Ex. 1003 ¶ 125).

Patent Owner has not provided any arguments regarding Ikeda and this specific claim limitation. *See generally* Prelim. Resp. Nonetheless, the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

At this stage of the proceeding, we are satisfied Petitioner has shown that Ikeda in combination with the teachings of McCowan and Kanamori would have render it obvious to create method comprising

> a first virtual microphone formed from a first combination of a first microphone signal and a second microphone signal, wherein the first microphone signal is generated by a first physical microphone and the second microphone signal is generated by a second physical microphone;
>
> a second virtual microphone formed from a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone has a first linear response to speech and first linear response to noise, the first linear response to speech being substantially similar across a plurality of frequencies for a speech source located within a predetermined angle relative to an axis of the microphone array and devoid of a null, wherein the second virtual microphone has a second linear response to speech that has a single null oriented in a direction toward a source of the speech and a second linear response to noise, wherein the second linear response to noise is substantially similar to the first linear response to noise, one or both of the first linear response to noise and the second linear response to noise being non-zero in a direction toward a source of noise, and the second linear response to speech is substantially dissimilar to the first linear response to speech, wherein the speech is human speech



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as required by claim 7. We credit the testimony of Dr. Vipperman that a simulation based by the proposed Ikeda, McCowan, and Kanamori combination would have created (1) one or both of the first linear response to noise and the second linear response to noise being nonzero in a direction toward a source of noise and (2) a second linear response to speech that would have been substantially dissimilar to a first response to speech. *See* Ex. 1003 ¶¶ 82–93, 119, 122. Consequently, for purposes of institution, we determine Petitioner has shown sufficiently that the proposed Ikeda, McCowan, and Kanamori combination would have rendered the required claim limitations obvious to a person of ordinary skill of the art at the critical time.

> b) *"an adaptive noise removal application coupled to the first and second virtual microphones and generating denoised output signals by forming a plurality of combinations of signals output from the first virtual microphone and the second virtual microphone, by filtering and summing the plurality of combinations of signals in the time domain"*

Claim 7 recites "an adaptive noise removal application coupled to the first and second virtual microphones and generating denoised output signals by forming a plurality of combinations of signals output from the first virtual microphone and the second virtual microphone, by filtering and summing the plurality of combinations of signals in the time domain." Ex. 1001, 34:16–54.

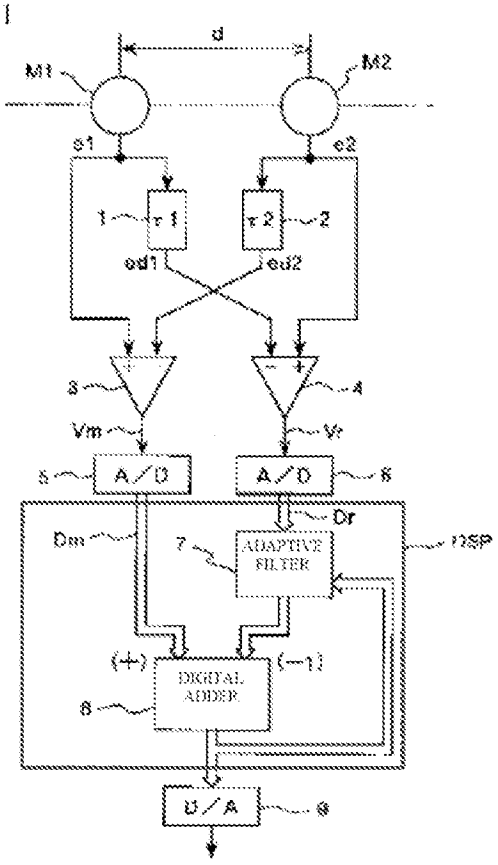
Petitioner contends that Ikeda discloses an adaptive noise cancellation system including adaptive filter 7 and digital adder 8, which is implemented using a digital signal processor and therefore is an adaptive noise removal "application." Pet. 53–54 (citing Ex. 1006 ¶¶ 16, 17, 27–30, Fig. 1; Ex. 1003 ¶ 126). Petitioner specifically argues that "the adaptive noise



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cancellation system is coupled to the main and reference microphones and the corresponding main signal Vm and reference signal Vr . . . via A/D converters 5 and 6." *Id.* at 54 (citing Ex. 1006 ¶¶ 11–13, 18, 31, Figs. 1, 8; Ex. 1003 ¶ 58). Petitioner annotated Figure 1, as reproduced below, with a box around the DSP to indicate what it contends is the adaptive noise cancellation system.

FIG. 1




According to Petitioner, "Ikeda's adaptive noise cancellation system forms a plurality of combinations of signals output from the first virtual microphone and the second virtual microphone because main signal Vm and reference signal Vr are continuously converted to digital signals and input to the adaptive noise cancellation system implemented on a digital signal processor DSP so that, over time, they form multiple combinations of signals

output from the first and second virtual microphones." *Id.* at 55 (citing Ex. 1006 ¶¶ 27–29; Ex. 1003 ¶ 129; Ex. 1001, 32:61–63). Petitioner argues its contention is consistent with the '080 patent's description that an adaptive noise removal system "combin[es] the two microphone signals (e.g., Mic1, Mic2) by filtering and summing in the time domain." *Id.* at 56 (citing Ex. 1001, 7:4–16, 8:50–9:3, 9:22–38; Ex. 1003 ¶ 129). Petitioner also asserts that Ikeda's adaptive noise cancellation system filters and sums the plurality of combinations of signals in the time domain because "Ikeda discloses that digital versions of reference signal Vr are 'supplied to an adaptive filter' (filtering) and the output of adaptive filter 7 and digital versions of main signal Vm are differenced at digital adder 8 (summing)." *Id.* at 55–56 (citing Ex. 1006 ¶¶ 27–29; Ex. 1003 ¶ 130).

Petitioner also relies on Dr. Vipperman's testimony to support its position. Dr. Vipperman opines that person of ordinary skill in the art at the time of the alleged invention would have understood that "adaptive filter 7 filters in the time domain, and digital adder 8 adds in the time domain [because] (1) Ikeda's system does not include components for converting signals from the time domain to the frequency domain or from the frequency domain to the time domain, and (2) a signal picked up by a microphone is in the time domain if it is not processed by a component and converted to the frequency domain." Ex. 1003 ¶ 130 (citing Ex. 1006 ¶¶ 27–29; Ex. 1009, 42–43, 58–62).

Patent Owner contends Ikeda is insufficient and that Petitioner fails to identify any "adaptive" component coupled to Vm. Prelim. Resp. 11. Patent Owner argues that Petitioner tries to "cure Ikeda's failure to disclose any adaptive noise removal application coupled to both Vm and Vr by



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attempting to conflate the 'application' with Ikeda's DSP as a whole." *Id.* Patent Owner further argues that (1) Ikeda does not disclose any adaptive noise cancellation application that "generat[es] denoised output signals by forming a plurality of combinations of signals output from the first virtual microphone and the second virtual microphone," as required by claims 1–6, and that (2) Petitioner does not identify anything that makes Ikeda's DSP as a whole "adaptive" or where the DPS forms "a plurality of combinations of signals output from the first virtual microphone and the second virtual microphone." *Id.* at 12.

At this stage of the proceeding, we are satisfied Petitioner has demonstrated sufficiently that Ikeda discloses the challenged limitation and we credit Dr. Vipperman's supporting testimony. *See* Ex. 1003 ¶ 130. Specifically, we find that Figure 1 of Ikeda includes notations indicating that adaptive filter 7 and digital adder 8 are part of the DSP (i.e., digital signal processor) and that Vm is combined with Vr in digital adder 8, which then may recirculate together into adaptive filter 7. Thus, we are persuaded that Ikeda teaches a system where Vm does go through adaptive filter 7. Additionally, if the entire DSP of Ikeda is considered the adaptive noise removal application, then both Vr and Vm go directly into the application. Based on the current record, we are persuaded that Patent Owner's reading of Ikeda is not commensurate with the scope of the claims nor the disclosure of the '080 patent itself. *See* Ex. 1001, 7:4–16, 8:50–9:3, 9:22–38. During trial, the parties are invited to discuss whether the term "application" excludes the part of Ikeda's system that Petitioner maps to the "an adaptive noise removal application."



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In view of the evidence presented at this preliminary stage of the proceedings, and for purposes of institution, we determine Petitioner has sufficiently shown that Ikeda teaches "an adaptive noise removal application coupled to the first and second virtual microphones and generating denoised output signals by forming a plurality of combinations of signals output from the first virtual microphone and the second virtual microphone, by filtering and summing the plurality of combinations of signals in the time domain" as required by the challenged claims.

c) *"by a varying linear transfer function between the plurality of combinations of signals, wherein the denoised output signals include less acoustic noise than acoustic signals received at the first and second physical microphones"*

Claim 7 recites "by a varying linear transfer function between the plurality of combinations of signals, wherein the denoised output signals include less acoustic noise than acoustic signals received at the first and second physical microphones." Ex. 1001, 34:16–54.

Petitioner contends Ikeda discloses this limitation. Pet. 56–58 (citing Ex. 1003 ¶¶ 131–132). Petitioner specifically contends Ikeda's adaptive noise cancellation system discloses a varying transfer function between the plurality of combinations of signals because Ikeda discloses that adaptive filter 7's characteristics "are varied in real time" by "a tap coefficient updating operation for updating the tap coefficient based on an error signal obtained as the difference between the filter output and a signal from the target system to return the filter output," which is successively repeated to rewrite the tap coefficient. *Id.* at 56–57 (citing Ex. 1006 ¶¶ 27–29; Ex. 1003 ¶ 131). According to Petitioner, this "error signal is defined as the output of the digital adder 8," i.e., where the plurality of combinations of signals are



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summed. *Id.* at 57 (citing Ex. 1006 ¶ 28; Ex. 1003 ¶ 131). Petitioner argues that Ikeda discloses performing this tap coefficient updating operation when "the microphone units M1 and M2 do not pick up the target sound," which "is the time period in which the output of digital adder 8 should be zero (because there is no speech)." *Id.* (citing Ex. 1006 ¶ 28; Ex. 1003 ¶ 131). Petitioner then argues that by updating the tap coefficient over time to minimize this error signal, the adaptive filter calculates and applies a varying transfer function between the plurality of combinations of signals that results in the output of adaptive filter 7 equaling the digital signal from main signal Vm at a time when there is no speech. *Id.* (citing Ex. 1006 ¶ 28; Ex. 1003 ¶ 131).

Petitioner also contends Ikeda discloses that this transfer function is linear because it discloses that adaptive filter 7 is "a transversal filter" and "perform[s] an output operation for obtaining filter output by multiplying the input signal Dr by a tap coefficient and adding the value in multiple tap units." *Id.* at 57–58 (citing Ex. 1006, ¶¶ 27–29; Ex. 1003 ¶ 132). According to Dr. Vipperman, a person of ordinary skill in the art at the critical time would have understood that this disclosure in Ikeda teaches a linear filter. Ex. 1003 ¶ 132 (citing Ex. 1020, 16–17, Fig. 2.2 ("Adaptive linear combiner in the form of single-input adaptive transversal filter"); Ex. 1028, 366–367 ("Because of the chain of delay elements across the top of the diagram [of Figure 6.31], this structure is also referred to as a tapped delay line structure or a transversal filter structure. As seen from Figure 6.31, the signal at each tap along this chain is weighted by the appropriate coefficient (impulse response value), and the resulting products are summed to form the output"), Fig. 6.31).

Patent Owner contends Petitioner has failed to meet its burden in demonstrating that Ikeda's "transversal filter" is either "linear" or a "transfer function." Prelim. Resp. 13. According to Patent Owner, Petitioner consistently asserts throughout the Petition that "linear" limitations are satisfied because an output is "linearly proportional to its input." *Id.* (citing Pet. 44). But Patent Owner notes that, here, Petitioner asserts that a transversal filter "perform[s] an output operation for obtaining filter output by multiplying the input signal Dr by a tap coefficient and adding the value in multiple tap units." *Id.* (citing Pet. 57–58). Patent Owner argues that Petitioner fails to show that the output of such a multiplication and addition operation is "linearly proportional to its input" and its assertions that a "transversal filter" is linear or it would have been obvious to make linear is insufficient, particularly in light of Petitioner's earlier arguments regarding proportionality. *Id.*

Based on the current record, we are persuaded by Petitioner's position. Ikeda discloses that

> The adaptive filter 7 is a filter that adaptively varies its characteristics with respect to changes in the input signal over time. That is, the filter characteristics are varied in real time by performing an output operation for obtaining filter output by multiplying the input signal Dr by a tap coefficient and adding the value in multiple tap units, and a tap coefficient updating operation for updating the tap coefficient based on an error signal obtained as the difference between the filter output and a signal from the target system to return the filter output, and successively rewriting the tap coefficient using the updating operation. The error signal is defined as the output of the digital adder 8 at a training sequence timing for determining the filter response characteristics. The training sequence timing is defined as a timing at which the microphone units M1 and M2 do not pick up the target sound. Therefore, the filter response characteristics of



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> the adaptive filter 7 are determined so as to cancel the respective noise components contained in the main signal data Dm and the reference signal data Dr at the training sequence timing.

Ex. 1006 ¶ 28. This appears to be consistent with the '080 patent's disclosure regarding transfer functions $H_1(z)$ and $H_2(z)$. *See* Ex. 1001, 4:52–7:16.

The '080 patent discloses that transfer function $H_1(z)$ "can be calculated using any of the available system identification algorithms and the microphone outputs when the system is certain that only noise is being received." *Id.* at 5:40–43. The '080 patent explains that the "calculation can be done adaptively, so that the system can react to changes in the noise." *Id.* at 5:43–44. The '080 patent then explains that the final unknown, function $H_2(z)$, "can be determined by using the instances where speech is being produced and the VAD equals one." *Id.* at 5:46–48. According the '080 patent, "[i]f the transfer functions $H_1(z)$ and $H_2(z)$ can be described with sufficient accuracy, then the noise can be completely removed and the original signal recovered," and "[t]his remains true without respect to the amplitude or spectral characteristics of the noise." *Id.* at 6:22–26. Based on this teaching, we understand that Ikeda is calculating its adaptive filter characteristics in the same manner and for the same reasons the '080 patent calculates transfer functions $H_1(z)$ and $H_2(z)$.

Our understanding is supported by the testimony of Dr. Vipperman, who testifies that "[b]y updating the tap coefficient over time to minimize this error signal, such as by using well known techniques like least mean squares, the adaptive filter calculates and applies a varying transfer function between the plurality of combinations of signals that results in the output of



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adaptive filter 7 equaling the digital signal from main signal Vm at a time when there is no speech." *See* Ex. 1003 ¶ 131 (citing Ex. 1006 ¶ 28).

Additionally, we credit Dr. Vipperman's testimony that a person of ordinary skill in the art at the critical time would have understood that this disclosure in Ikeda teaches a linear filter. *See id.* ¶ 132 (citing Ex. 1020, 16–17, Fig. 2.2; Ex. 1028, 366–367). Dr. Vipperman citation to Ex. 1028 is particularly instructive because the reference explains that a tapped delay line structure, such as that used in Ikeda, is a type of a linear filter. *See* Ex. 1028, 367. Thus, we are persuaded that Ikeda teaches a linear filter, which results in linear proportionality.

Accordingly, at this stage of the proceeding, based on Ikeda itself and the supporting testimony of Dr. Vipperman, we are satisfied Petitioner has shown sufficiently that Ikeda teaches "by a varying linear transfer function between the plurality of combinations of signals, wherein the denoised output signals include less acoustic noise than acoustic signals received at the first and second physical microphones."

*d) Rationale to Combine the Teachings of Ikeda, McCowan, and Kanamori*

Petitioner provides numerous other reasons why a person of ordinary skill in the art could and would have combined the teachings of Ikeda and Kanamori with the teachings of McCowan. Pet. 19–34 (citing Ex. 1003 ¶¶ 61–78). Petitioner specifically contends that although "Ikeda assumes far-field speech and noise," it nonetheless would have been obvious to a person of ordinary skill in the art at the critical time "to implement Ikeda's system in a device intended to receive near-field speech, such as a headset." *Id.* at 19 (citing Ex. 1003 ¶ 61).

Petitioner argues that Ikeda discloses applying its invention "to a wide range of devices," including "a voice input microphone of a hands-free telephone unit." *Id.* at 19–20 (citing Ex. 1003 ¶ 61). According to Petitioner, "[i]t was well-known that a headset was such 'a voice input microphone of a hands-free telephone unit.'" *Id.* at 20 (citing Ex. 1006 ¶ 36; Ex. 1011 ¶ 4; Ex. 1012 ¶¶ 8–9; Ex. 1013 ¶¶ 48, 71, 126, Abstract; Ex. 1003 ¶ 61). Petitioner asserts that "[s]uch a headset was commonly located 3–5" (approximately 0.08–0.13 meters) away from the user's mouth" and that "the speech source is in the near-field and one or more noise sources are in the far-field." *Id.* (citing Ex. 1012 ¶¶ 9, 78; Ex. 1003 ¶ 61; Ex. 1007; Ex. 1011 ¶¶ 6, 35).

Petitioner further argues that when "Ikeda's system is implemented in a device intended for environments where the speech source is in the near-field and one or more noise sources are in the far-field, such as a headset, a [person of ordinary skill in the art] would have been motivated to improve Ikeda's system in view of McCowan." *Id.* at 20–21 (citing Ex. 1003 ¶¶ 62–66). Petitioner specifically asserts that a person of ordinary skill in the art "would have been motivated to modify the Ikeda reference microphone to add the gain β1 in view of McCowan" resulting in a signal system where "the gain and the delay minimizes leakage of a desired signal of a near-field source into the noise reference signal." *Id.* at 23 (citing Ex. 1003 ¶¶ 62–66), 23 (citing Ex. 1007, 87–91, 93–96, Fig. 3; Ex. 1003 ¶ 64).

Petitioner then argues that a person of ordinary skill in the art would have had a reasonable expectation of success to make modifications and combine the teachings of Ikeda and McCowan with that of Kanamori due to the similarities between Ikeda and Kanamori. *Id.* at 33 (citing Ex. 1003

¶ 78). Additionally, Petitioner asserts that "both Ikeda and Kanamori use signals from two microphones to form a signal system for generating a main signal having directional characteristics, and this similarity would reinforce the reasonable expectation of success to make the modification." *Id.* (citing Ex. 1006 ¶¶ 18–22, Figs. 1–3; Ex. 1008 ¶¶ 163–176, Figs. 17A–17C; Ex. 1003 ¶ 78). According to Petitioner, "[m]odifying the signal path with a delay and a gain would have been within the knowledge and skill of a [person of ordinary skill in the art]." *Id.* at 34 (citing Ex. 1003 ¶ 78; Ex. 1007, 90, 93–95; Ex. 1008 ¶ 163–176). Petitioner, therefore, concludes that such modifications "would have resulted in predictable results that the reference microphone outputs a noise reference signal where leakage of a desired signal of the near-field speech source into the noise reference signal is minimized." *Id.* at 25–26 (citing Ex. 1006 ¶¶ 18–20, 23–24, Figs. 1, 4–5; Ex. 1007, 87–91, 93–96, Fig. 3; Ex. 1003 ¶ 66).

Patent Owner contends that Petitioner basically cherry picks information from Ikeda, McCowan, and Kanamori "to construct entirely new algorithms not found in any of the three references." Prelim. Resp. 13. Yet, according to Patent Owner, Petitioner fails to identify a legitimate motivation to combine the teachings of the proffered references. *Id.* Patent Owner argues that in order to establish obviousness, there must be plausible rationale as to why the cited prior-art references would have worked together. *Id.* at 14 (citing *Broadcom Corp. v. Emulex Corp.*, 732 F.3d 1325, 1335 (Fed. Cir. 2013)).

Patent Owner specifically contends that the Petition is deficient for failing to show that a person of ordinary skill in the art would have had any motivation to combine the far-field based disclosure of Ikeda with the near-



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field based disclosures of McCowan. *Id.* at 15 According to Patent Owner, Petitioner's only rationale to combine Ikeda's far-field system with McCowan's near-field system is based on a misreading of Ikeda's "a voice input microphone of a hands-free telephone unit" to mean a "headset." *Id.* at 15–16 (citing Pet. 19–20; Ex. 1006 ¶ 36).

Patent Owner asserts that the term "hands-free telephone unit" in Ikeda "clearly refers to a speakerphone or conference phone, particularly given its discussion in proximity to a similar 'car navigation system,' and given that, as [Petitioner] acknowledges, Ikeda exclusively 'assumes far-field speech and noise.'" *Id.* at 15–16 (citing Pet. 19; Ex. 1006 ¶ 36). Patent Owner argues that Petitioner fails to reconcile its misreading of "hands-free telephone unit" with the fact that Ikeda exclusively assumes far-field conditions, which are irrelevant to headsets, and does not address the discussion in proximity to a "car navigation system" at all. *Id.* at 16.

Patent Owner also contends that Petitioner ignores McCowan's specific teaching that it employs "a spherical propagation model in its formulation, rather than assuming a far-field model." *Id.* (citing Ex. 1007, 88). Per Patent Owner, "[e]ven if Ikeda referred to a headset (it does not), [Petitioner] does not articulate any reason that a [person of ordinary skill in the art] would rewrite the algorithms of Ikeda and McCowan based on entirely different models." *Id.* at 16–17. Patent Owner asserts that McCowan explicitly decides against assuming a far-field model, which would discourage any attempt of combining with a far-field system. *Id.* at 17. Patent Owner also contends that the Petition is deficient because it relies on multiple distinct embodiments within Kanamori but fails to identify any motivation to combine the different embodiments. *Id.* at 17–18.

We have reviewed the parties' arguments, the prior art of record, and the cited testimony from Dr. Vipperman regarding Petitioner's alleged rationale to combine the teachings of Ikeda, McCowan, and Kanamori. At this stage of the proceeding and based on the current record, we are persuaded that Petitioner's showing is adequate to support institution. We understand that Ikeda and Kanamori are directed to far-field systems, while McCowan employs a near-field model. In one instance, McCowan discloses having a speaker situated 60 cm from a center microphone, directly in front of an array with a localized noise source at a distance of 270 cm from the array. *See* Ex. 1007, 96. These distances appear to overlap with the far-field distances taught in Ikeda, and the location of the array appears to fall within the scope of Ikeda's "hands-free telephone unit" that is expected to receive noise from every direction. *See* Ex. 1006 ¶ 36. Therefore, at this stage of the proceeding, we are persuaded that Petitioner's showing is sufficient.

Neither party, however, explains sufficiently the difference between far-field and near-field, nor do the parties sufficiently explain the impact on using these models. Additionally, if there are wavelength, frequency, and/or attenuation differences between Ikeda and McCowan, these differences are not addressed adequately by the parties. *See e.g.*, Ex. 1012 ¶ 80.

Accordingly, we invite the parties to explain the significance of far-field versus near-field and to further address whether a person of ordinary skill in the art would have had reason to combine the teachings of Ikeda, McCowan, and Kanamori. It is incumbent upon Petitioner to articulate a *reason why* a person of ordinary skill in the art would have combined the teachings of Ikeda, McCowan, and Kanamori, and not merely that the skilled artisan could have combined the teachings. *See In re NuVasive*, 842 F.3d



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1376, 1382 (Fed. 2016); *Metalcraft of Mayville, Inc. v. The Toro Co.*, 848 F.3d 1358, 1366 (Fed. Cir. 2017) ("[I]t is insufficient to simply conclude the [prior art] combination would have been obvious without identifying any reason why a person of skill in the art would have made the combination."); *see Belden Inc. v. Berk-Tek LLC*, 805 F.3d 1064, 1073 (Fed. Cir. 2015) ("obviousness concerns whether a skilled artisan not only *could have made* but *would have been motivated to make* the combinations or modifications of prior art to arrive at the claimed invention"). Moreover, Petitioner bears the burden to demonstrate that a person of ordinary skill in the art at the critical time would have used the specific formulas from each reference to create the systems claimed in the '080 patent.

*2. Analysis of Claims 1–3, 5, 6, 8, 9, 11–14, and 16–20*

Claims 1 and 14 are independent claims having similar limitations to claim 7, while claims 2, 3, 5, 6, 8, 9, 11–14, and 16–19 depend directly or indirectly from independent claims 1, 7, or 14. Ex. 1001, 33:39–36:36. Petitioner has provided additional explanation for the manner by which the combination of Ikeda, McCowan, and Kanamori is asserted to disclose each limitation not found in claim 7. Pet. 59–79 (citing Ex. 1003 ¶¶ 136–199). Patent Owner has not provided any arguments regarding Ikeda, McCowan, and Kanamori in regards to these challenged claims. *See generally* Prelim. Resp. Nonetheless, the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

Having reviewed Petitioner's arguments and supporting evidence in this present record, including the arguments summarized above for claim 1, we determine Petitioner has established adequately for purposes of this Decision that the Ikeda discloses the limitations of claims 1–3, 5, 6, 8, 9, 11–

14, and 16–20. Accordingly, we determine Petitioner has demonstrated a reasonable likelihood that these claims would have been rendered obvious to a person of ordinary skill in the art by the combined teachings of Ikeda, McCowan, and Kanamori.

*B. Alleged Obviousness of Claims 4, 10, and 15 in view of Ikeda, McCowan, Kanamori, and Yang*

Petitioner contends claims 4, 10, and 15 would have been obvious to person of ordinary skill in the art in view of the combined teachings of Ikeda, McCowan, Kanamori, and Yang. Pet. 2, 79–82 (citing Ex. 1003 ¶¶ 202–210). Claims 4, 10, and 15 recite limitations directed to voice activity signals. Ex. 1001, 34:6–8, 34:63–65, 36:12–14. Petitioner argues that Yang discloses using a voice activity detector. Pet. 79–82 (citing Ex. 1009 ¶¶ 58–62). According to Petitioner, it would have been obvious to modify the teachings of Ikeda, McCowan, and Kanamori to include use of a voice activity detector to determine the timing of when microphone do or do not pick up human speech signals because such modifications would have been within the knowledge and skill of a person of ordinary skill in the art at the critical time. *Id.* at 81 (citing Ex. 1003 ¶ 205).

Patent Owner disputes Petitioner's contentions for the same reason it disputes Petitioner's challenged based on Ikeda, McCowan, and Kanamori. Prelim. Resp. 18–19. Based on the reasons discussed previously, at this stage of the proceeding, we are persuaded that Petitioner has established a reasonable likelihood of success on this challenge.

## V. CONCLUSION

For the foregoing reasons, we determine Petitioner has demonstrated there is a reasonable likelihood it would prevail in establishing the



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unpatentability of all claims challenged in the Petition. Additionally, we decline to exercise our discretion under 35 U.S.C. § 314 to deny the Petition.

Our factual findings, conclusions of law, and determinations at this stage of the proceeding are preliminary and based on the evidentiary record developed thus far. At this stage of the proceeding, the Board has not made a final determination as to the patentability of any challenged claim. Our final decision will be based on the record as fully developed during trial.

## VI. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review is hereby instituted as to claims 1–20 of the '080 patent on all challenges presented in the Petition, namely:

(1) Claims 1–3, 5–9, 11–14, and 16–20 under 35 U.S.C. § 103 as unpatentable over Ikeda, McCowan, and Kanamori;

(2) Claims 4, 10, and 15 under 35 U.S.C. § 103 as unpatentable over Ikeda, McCowan, Kanamori, and Yang;

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

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Paper 18
Entered: January 11, 2023

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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APPLE INC.,
SAMSUNG ELECTRONICS CO., LTD., AND
SAMSUNG ELECTRONICS AMERICA, INC.,
Petitioners,

v.

JAWBONE INNOVATIONS, LLC,
Patent Owner.

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IPR2022-01320
Patent 10,779,080 B2

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Before GEORGIANNA W. BRADEN, STEVEN M. AMUNDSON, and, JASON M. REPKO *Administrative Patent Judges*.

BRADEN, *Administrative Patent Judge*.

DECISION
Settlement Prior to Institution of Trial
*37 C.F.R. § 42.74*

On January 9, 2023, with our authorization, Apple Inc. ("Apple"), Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc. ("Samsung"), and Jawbone Innovations, LLC ("Jawbone") (collectively, "the Parties") filed a Joint Motion to Terminate the Proceeding. Paper 15 ("Mot."). In the Motion, the Parties represent that they have settled all disputes relating to U.S. Patent 10,779,080B2, and they jointly request termination of this proceeding. *Id.* at 2. The Parties specifically state that Samsung and Jawbone reached agreement to resolve their disputes (*see* Ex. 1045) and that Apple and Jawbone reached agreement to resolve their disputes (*see* Ex. 1046; Ex. 1047). Mot. 1. The Parties represent that, pursuant to 37 C.F.R. § 42.74(b), these agreements are in writing and that true and correct copies are filed as Exhibits 1045, 1046, and 1047 ("the Agreements"). Mot. 1; *see id.* at 2–3.

This proceeding is in a preliminary stage, and we have not yet issued a decision on institution. In view of the Parties' settlements and representations, we determine that good cause exists to terminate the proceeding. Accordingly, we grant the Motion.

In addition, the Parties filed joint requests to treat the Agreements as business confidential information under 35 U.S.C. § 317(b) and 37 C.F.R. § 42.74(c). Paper 16 ("Apple-Jawbone Req."); Paper 17 ("Samsung-Jawbone Req."). We have reviewed the Agreements, which contain confidential business information regarding the settlement terms, and we determine that good cause exists to treat the Agreements as business confidential information pursuant to 35 U.S.C. § 317(b) and 37 C.F.R. § 42.74(c). Accordingly, we grant this aspect of the parties' joint requests.

The parties also "request that they be notified if and when the Board receives and/or considers a request for access to the Agreements, and be offered an opportunity to respond to any such request." Apple-Jawbone Req. 2; Samsung-Jawbone Req. 2. However, neither the statute nor the regulation provides for any such notification or opportunity to respond, and the parties have not provided any reason or special circumstance that would justify issuing an order that purports to impose additional requirements. Accordingly, we deny that portion of the parties' joint requests.

This is not a final written decision pursuant to 35 U.S.C. § 318(a).

It is:

ORDERED that the Joint Motion to Terminate (Paper 15) is granted;

FURTHER ORDERED that the Joint Requests (Papers 16, 17) are granted-in-part, and the Agreements (Exhibits 1045, 1046, 1047) shall be treated as business confidential information, kept separate from the file of U.S. Patent 10,779,080 B2, and made available only to Federal Government agencies on written request, or to any person on a showing of good cause on written request, pursuant to 35 U.S.C. § 317(b) and 37 C.F.R. § 42.74(c); and

FURTHER ORDERED that this proceeding is terminated.

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Paper 16
Entered: August 9, 2023

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

---

AMAZON.COM, INC.,
Petitioner,

v.

JAWBONE INNOVATIONS, LLC,
Patent Owner.

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IPR2023-00222 (Patent 7,246,058 B2)
IPR2023-00284 (Patent 10,779,080 B2)[1]

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Before GEORGIANNA W. BRADEN, NORMAN H. BEAMER, SHEILA F. McSHANE, and JASON M. REPKO, *Administrative Patent Judges*.[2]

BRADEN, *Administrative Patent Judge*.

TERMINATION
Due to Settlement After Institution of Trial
*35 U.S.C. § 317; 37 C.F.R. § 42.74*

[1] This Order addresses issues that are the same in both proceedings.
[2] This is not an expanded panel. A three-judge panel is assigned to each proceeding.

With the Board's authorization, Petitioner and Patent Owner filed, in each of the captioned proceedings, a Joint Motion to Terminate. Paper 11.[3] The parties also filed their confidential agreements (IPR2023-00222, Exs. 2002, 2003; IPR2023-00284, Exs. 2004, 2005) and a Joint Motion to File the Agreement as Business Confidential Information (Paper 10).

The parties represent that they have settled their dispute in these proceedings and in the related district-court litigation and they filed true copies of their agreement in its entirety. Paper 11, 1. The parties also represent that there are no other agreements between them made in connection with or in contemplation of the termination of these proceedings. *Id.* at 1–2, 6. According to the parties, the agreements that they filed contain confidential information under the Board's rules. Paper 10, 1 (citing 37 C.F.R. § 42.54).

The parties assert that these proceedings should be terminated because (1) oral argument has not been held, (2) the Board has not decided the merits, (3) the parties have settled their dispute, and (4) the parties jointly request termination. Paper 11, 3. We agree that termination is appropriate for all those reasons. *See* Consolidated Trial Practice Guide, 86 (Nov. 2019) ("The Board expects that a proceeding will terminate after the filing of a

[3] Similar motions were filed in both proceedings. *See* IPR2023-00222 Paper 10 (Joint Motion to File Agreement as Business Confidential), Paper 11 (Joint Motion to Terminate); IPR2023-00284, Paper 14 (Joint Motion to File Agreement as Business Confidential Information), Paper 15 (Joint Motion to Terminate). For brevity, citations in this order are to the papers in IPR2023-00222.

settlement agreement, unless the Board has already decided the merits of the proceeding.").[4]

Although there are multiple pending motions to join this proceeding, we see no reason here to postpone ruling on the Joint Motion to Terminate until ruling on the joinder motions. "[F]iling a petition accompanied by a request for joinder does not guarantee that the petition will be instituted, or that joinder will be granted," and "there is no guarantee that such filings will be considered prior to a termination of the proceeding sought to be joined." *See Mylan Techs., Inc. v. MonoSol Rx, LLC*, IPR2017-00200, Paper 22 at 2–3 (PTAB Oct. 5, 2017).

We also agree that the agreements filed in each proceeding contain confidential information under the Board's rules. *See* IPR2023-00222, Exs. 2002, 2003; IPR2023-00284, Exs. 2004, 2005. So they should be treated as business confidential information under 35 U.S.C. § 317(b) and 37 C.F.R. § 42.74(c).

This Order does not constitute a final written decision under 35 U.S.C. § 318(a).

ORDER

It is

ORDERED that the parties' Joint Motions to Terminate the Proceedings (IPR2023-00222, Paper 11; IPR2023-00284, Paper 15) are *granted*;

FURTHER ORDERED that the parties' Joint Motions to File the Agreement as Business Confidential Information (IPR2023-00222,

[4] *Available at* https://www.uspto.gov/TrialPracticeGuideConsolidated.

Paper 10; IPR2023-00284, Paper 14) are *granted* and the parties' confidential agreements (IPR2023-00222, Exs. 2002, 2003; IPR2023-00284, Exs. 2004, 2005) shall be treated as business confidential information and be kept separate from the files of the respective challenged patents, U.S. Patent No. 7,246,058 B2 and U.S. Patent No. 10,779,080 B2, and made available only under the provisions of 35 U.S.C. § 317(b) and 37 C.F.R. § 42.74(c); and

FURTHER ORDERED that these proceedings are terminated.

PETITIONER:

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Paper 16
Entered: August 9, 2023

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

---

AMAZON.COM, INC.,
Petitioner,

v.

JAWBONE INNOVATIONS, LLC,
Patent Owner.

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IPR2023-00222 (Patent 7,246,058 B2)
IPR2023-00284 (Patent 10,779,080 B2)[1]

---

Before GEORGIANNA W. BRADEN, NORMAN H. BEAMER, SHEILA F. McSHANE, and JASON M. REPKO, *Administrative Patent Judges*.[2]

BRADEN, *Administrative Patent Judge*.

TERMINATION
Due to Settlement After Institution of Trial
*35 U.S.C. § 317; 37 C.F.R. § 42.74*

[1] This Order addresses issues that are the same in both proceedings.
[2] This is not an expanded panel. A three-judge panel is assigned to each proceeding.

With the Board's authorization, Petitioner and Patent Owner filed, in each of the captioned proceedings, a Joint Motion to Terminate. Paper 11.[3] The parties also filed their confidential agreements (IPR2023-00222, Exs. 2002, 2003; IPR2023-00284, Exs. 2004, 2005) and a Joint Motion to File the Agreement as Business Confidential Information (Paper 10).

The parties represent that they have settled their dispute in these proceedings and in the related district-court litigation and they filed true copies of their agreement in its entirety. Paper 11, 1. The parties also represent that there are no other agreements between them made in connection with or in contemplation of the termination of these proceedings. *Id.* at 1–2, 6. According to the parties, the agreements that they filed contain confidential information under the Board's rules. Paper 10, 1 (citing 37 C.F.R. § 42.54).

The parties assert that these proceedings should be terminated because (1) oral argument has not been held, (2) the Board has not decided the merits, (3) the parties have settled their dispute, and (4) the parties jointly request termination. Paper 11, 3. We agree that termination is appropriate for all those reasons. *See* Consolidated Trial Practice Guide, 86 (Nov. 2019) ("The Board expects that a proceeding will terminate after the filing of a

[3] Similar motions were filed in both proceedings. *See* IPR2023-00222 Paper 10 (Joint Motion to File Agreement as Business Confidential), Paper 11 (Joint Motion to Terminate); IPR2023-00284, Paper 14 (Joint Motion to File Agreement as Business Confidential Information), Paper 15 (Joint Motion to Terminate). For brevity, citations in this order are to the papers in IPR2023-00222.

settlement agreement, unless the Board has already decided the merits of the proceeding.").[4]

Although there are multiple pending motions to join this proceeding, we see no reason here to postpone ruling on the Joint Motion to Terminate until ruling on the joinder motions. "[F]iling a petition accompanied by a request for joinder does not guarantee that the petition will be instituted, or that joinder will be granted," and "there is no guarantee that such filings will be considered prior to a termination of the proceeding sought to be joined." *See Mylan Techs., Inc. v. MonoSol Rx, LLC*, IPR2017-00200, Paper 22 at 2–3 (PTAB Oct. 5, 2017).

We also agree that the agreements filed in each proceeding contain confidential information under the Board's rules. *See* IPR2023-00222, Exs. 2002, 2003; IPR2023-00284, Exs. 2004, 2005. So they should be treated as business confidential information under 35 U.S.C. § 317(b) and 37 C.F.R. § 42.74(c).

This Order does not constitute a final written decision under 35 U.S.C. § 318(a).

ORDER

It is

ORDERED that the parties' Joint Motions to Terminate the Proceedings (IPR2023-00222, Paper 11; IPR2023-00284, Paper 15) are *granted*;

FURTHER ORDERED that the parties' Joint Motions to File the Agreement as Business Confidential Information (IPR2023-00222,

[4] *Available at* https://www.uspto.gov/TrialPracticeGuideConsolidated.

Paper 10; IPR2023-00284, Paper 14) are *granted* and the parties' confidential agreements (IPR2023-00222, Exs. 2002, 2003; IPR2023-00284, Exs. 2004, 2005) shall be treated as business confidential information and be kept separate from the files of the respective challenged patents, U.S. Patent No. 7,246,058 B2 and U.S. Patent No. 10,779,080 B2, and made available only under the provisions of 35 U.S.C. § 317(b) and 37 C.F.R. § 42.74(c); and

FURTHER ORDERED that these proceedings are terminated.

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Paper 26
Entered: August 9, 2023

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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GOOGLE LLC and AMAZON.COM, INC.,[1]
Petitioners,

v.

JAWBONE INNOVATIONS, LLC,
Patent Owner.

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IPR2022-01059
Patent 10,779,080 B2

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Before GEORGIANNA W. BRADEN, SHEILA F. McSHANE, and JASON M. REPKO, *Administrative Patent Judges*.

BRADEN, *Administrative Patent Judge*.

TERMINATION
Due to Settlement After Institution of Trial
*35 U.S.C. § 317; 37 C.F.R. § 42.74*

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[1] Amazon.com, Inc., which filed a petition in IPR2023-00284, has been joined as a party to this proceeding.

With the Board's authorization, Petitioners and Patent Owner filed a Joint Motions to Terminate. Papers 24, 25. The parties also filed their confidential agreements (IPR2022-01059, Exs. 2011, 2012; IPR2023-00284, Exs. 2004, 2005) and a Joint Motion to File the Agreement as Business Confidential Information (IPR2022-01059, Paper 23 as to Petitioner Google LLC and Patent Owner; IPR2023-00284, Paper 14 as to Petitioner Amazon.com, Inc.).[2]

Petitioner Google LLC and Patent Owner represent that they have settled their dispute in these proceedings and in the related district-court litigation and they filed true copies of their agreement in its entirety. Paper 24, 1. These parties also represent that there are no other agreements between them made in connection with or in contemplation of the termination of this proceeding. *Id.* at 1–2, 6. According to these parties, the agreements that they filed contain confidential information under the Board's rules. Paper 23, 1 (citing 37 C.F.R. § 42.54).

Petitioner Google LLC and Patent Owner assert that these proceedings should be terminated because (1) oral argument has not been held, (2) the Board has not decided the merits, (3) the parties have settled their dispute, and (4) the parties jointly request termination. Paper 24, 3. We agree that termination is appropriate for all those reasons. *See* Consolidated Trial Practice Guide, 86 (Nov. 2019) ("The Board expects that

[2] The proceedings with regards to Petitioner Amazon.com, Inc. and IPR2023-00284 is terminated in a separate order. *See* IPR2023-00284, Paper 16.



**Meta Platforms, Inc. - Exhibit 1002**
**439 of 450**

a proceeding will terminate after the filing of a settlement agreement, unless the Board has already decided the merits of the proceeding."). [3]

Although there are multiple pending motions to join this proceeding, we see no reason here to postpone ruling on the Joint Motion to Terminate until ruling on the joinder motions. "[F]iling a petition accompanied by a request for joinder does not guarantee that the petition will be instituted, or that joinder will be granted," and "there is no guarantee that such filings will be considered prior to a termination of the proceeding sought to be joined." *See Mylan Techs., Inc. v. MonoSol Rx, LLC*, IPR2017-00200, Paper 22 at 2–3 (PTAB Oct. 5, 2017).

We also agree that the agreements filed in this proceeding regarding Petitioner Google LLC and Patent Owner contain confidential information under the Board's rules. *See* IPR2022-01059, Exs. 2011, 2012. So they should be treated as business confidential information under 35 U.S.C. § 317(b) and 37 C.F.R. § 42.74(c).

This Order does not constitute a final written decision under 35 U.S.C. § 318(a).

ORDER

It is

ORDERED that Petitioner Google LLC and Patent Owner's Joint Motion to Terminate the Proceeding (IPR2022-01059, Papers 24) is *granted*;

FURTHER ORDERED that the Petitioner Google LLC and Patent Owner Joint Motion to File the Agreement as Business Confidential Information (IPR2022-01059, Paper 23) is *granted* and the parties'

[3] *Available at* https://www.uspto.gov/TrialPracticeGuideConsolidated.

confidential agreements (IPR2022-01059, Exs. 2011, 2012) shall be treated as business confidential information and be kept separate from the file of the challenged patent, U.S. Patent No. 10,779,080 B2, and made available only under the provisions of 35 U.S.C. § 317(b) and 37 C.F.R. § 42.74(c); and

FURTHER ORDERED that this proceeding is terminated.



**Meta Platforms, Inc. - Exhibit 1002**
**441 of 450**

For PETITIONER (Google):

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Tel: 571-272-7822

Paper 26
Entered: August 9, 2023

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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GOOGLE LLC and AMAZON.COM, INC.,[1]
Petitioners,

v.

JAWBONE INNOVATIONS, LLC,
Patent Owner.

---

IPR2022-01059
Patent 10,779,080 B2

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Before GEORGIANNA W. BRADEN, SHEILA F. McSHANE, and JASON M. REPKO, *Administrative Patent Judges*.

BRADEN, *Administrative Patent Judge*.

TERMINATION
Due to Settlement After Institution of Trial
*35 U.S.C. § 317; 37 C.F.R. § 42.74*

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[1] Amazon.com, Inc., which filed a petition in IPR2023-00284, has been joined as a party to this proceeding.

With the Board's authorization, Petitioners and Patent Owner filed a Joint Motions to Terminate. Papers 24, 25. The parties also filed their confidential agreements (IPR2022-01059, Exs. 2011, 2012; IPR2023-00284, Exs. 2004, 2005) and a Joint Motion to File the Agreement as Business Confidential Information (IPR2022-01059, Paper 23 as to Petitioner Google LLC and Patent Owner; IPR2023-00284, Paper 14 as to Petitioner Amazon.com, Inc.).[2]

Petitioner Google LLC and Patent Owner represent that they have settled their dispute in these proceedings and in the related district-court litigation and they filed true copies of their agreement in its entirety. Paper 24, 1. These parties also represent that there are no other agreements between them made in connection with or in contemplation of the termination of this proceeding. *Id.* at 1–2, 6. According to these parties, the agreements that they filed contain confidential information under the Board's rules. Paper 23, 1 (citing 37 C.F.R. § 42.54).

Petitioner Google LLC and Patent Owner assert that these proceedings should be terminated because (1) oral argument has not been held, (2) the Board has not decided the merits, (3) the parties have settled their dispute, and (4) the parties jointly request termination. Paper 24, 3. We agree that termination is appropriate for all those reasons. *See* Consolidated Trial Practice Guide, 86 (Nov. 2019) ("The Board expects that

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a proceeding will terminate after the filing of a settlement agreement, unless the Board has already decided the merits of the proceeding."). [3]

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We also agree that the agreements filed in this proceeding regarding Petitioner Google LLC and Patent Owner contain confidential information under the Board's rules. *See* IPR2022-01059, Exs. 2011, 2012. So they should be treated as business confidential information under 35 U.S.C. § 317(b) and 37 C.F.R. § 42.74(c).

This Order does not constitute a final written decision under 35 U.S.C. § 318(a).

ORDER

It is

ORDERED that Petitioner Google LLC and Patent Owner's Joint Motion to Terminate the Proceeding (IPR2022-01059, Papers 24) is *granted*;

FURTHER ORDERED that the Petitioner Google LLC and Patent Owner Joint Motion to File the Agreement as Business Confidential Information (IPR2022-01059, Paper 23) is *granted* and the parties'

[3] *Available at* https://www.uspto.gov/TrialPracticeGuideConsolidated.

confidential agreements (IPR2022-01059, Exs. 2011, 2012) shall be treated as business confidential information and be kept separate from the file of the challenged patent, U.S. Patent No. 10,779,080 B2, and made available only under the provisions of 35 U.S.C. § 317(b) and 37 C.F.R. § 42.74(c); and

FURTHER ORDERED that this proceeding is terminated.



**Meta Platforms, Inc. - Exhibit 1002**
**446 of 450**

For PETITIONER (Google):

Erika Arner
Daniel Cooley
Kevin Rodkey
Robert High
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AO 120 (Rev. 08/10)

| TO: | REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK |
|---|---|
| **Mail Stop 8<br>Director of the U.S. Patent and Trademark Office<br>P.O. Box 1450<br>Alexandria, VA 22313-1450** | |

In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court Western District of Texas - Waco Division on the following

☐ Trademarks or ☒ Patents. ( ☐ the patent action involves 35 U.S.C. § 292.):

| DOCKET NO. | DATE FILED | U.S. DISTRICT COURT |
|---|---|---|
| 6:23-cv-00158 | February 28, 2023 | Western District of Texas - Waco Division |

| PLAINTIFF | DEFENDANT |
|---|---|
| Jawbone Innovations, LLC | Meta Platforms, Inc., D/B/A Meta |

| | PATENT OR TRADEMARK NO. | DATE OF PATENT OR TRADEMARK | HOLDER OF PATENT OR TRADEMARK |
|---|---|---|---|
| 1 | 8,019,091 | 9/13/2011 | Jawbone Innovations, LLC |
| 2 | 7,246,058 | 7/17/2007 | Jawbone Innovations, LLC |
| 3 | 10,779,080 | 9/15/2020 | Jawbone Innovations, LLC |
| 4 | 11,122,357 | 9/14/2021 | Jawbone Innovations, LLC |
| 5 | 8,467,543 | 6/18/2013 | Jawbone Innovations, LLC |

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

| DATE INCLUDED | INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading | |
|---|---|---|
| PATENT OR TRADEMARK NO. | DATE OF PATENT OR TRADEMARK | HOLDER OF PATENT OR TRADEMARK |
| 1 8,503,691 | 8/6/2013 | Jawbone Innovations, LLC |
| 2 8,321,213 | 11/27/2012 | Jawbone Innovations, LLC |
| 3 8,326,611 | 12/4/2012 | Jawbone Innovations, LLC |
| 4 | | |
| 5 | | |

In the above—entitled case, the following decision has been rendered or judgement issued:

| DECISION/JUDGEMENT |
|---|
| |

| CLERK | (BY) DEPUTY CLERK | DATE |
|---|---|---|
| | | |

**Copy 1—Upon initiation of action, mail this copy to Director** **Copy 3—Upon termination of action, mail this copy to Director**
**Copy 2—Upon filing document adding patent(s), mail this copy to Director** **Copy 4—Case file copy**

AO 120 (Rev. 08/10)

| TO: | REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK |
|---|---|
| **Mail Stop 8**<br>**Director of the U.S. Patent and Trademark Office**<br>**P.O. Box 1450**<br>**Alexandria, VA 22313-1450** | |

In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court for the Eastern District of Texas, Marshall Division on the following

☐ Trademarks or ☒ Patents. ( ☐ the patent action involves 35 U.S.C. § 292.):

| DOCKET NO. | DATE FILED | U.S. DISTRICT COURT |
|---|---|---|
| 2:23-cv-00077 | February 28, 2023 | for the Eastern District of Texas, Marshall Division |

| PLAINTIFF | DEFENDANT |
|---|---|
| Jawbone Innovations, LLC | HTC Corporation |

| | PATENT OR TRADEMARK NO. | DATE OF PATENT OR TRADEMARK | HOLDER OF PATENT OR TRADEMARK |
|---|---|---|---|
| 1 | 8,503,691 | 8/6/2013 | Jawbone Innovations, LLC |
| 2 | 8,321,213 | 11/27/2012 | Jawbone Innovations, LLC |
| 3 | 8,326,611 | 12/4/2012 | Jawbone Innovations, LLC |
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| 5 | | | |

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|---|---|---|
| PATENT OR TRADEMARK NO. | DATE OF PATENT OR TRADEMARK | HOLDER OF PATENT OR TRADEMARK |
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| 5 | | |

In the above—entitled case, the following decision has been rendered or judgement issued:

| DECISION/JUDGEMENT |
|---|
| |

| CLERK | (BY) DEPUTY CLERK | DATE |
|---|---|---|
| | | |

**Copy 1—Upon initiation of action, mail this copy to Director** **Copy 3—Upon termination of action, mail this copy to Director**
**Copy 2—Upon filing document adding patent(s), mail this copy to Director** **Copy 4—Case file copy**

AO 120 (Rev. 08/10)

| TO: | REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK |
|---|---|
| **Mail Stop 8**<br>**Director of the U.S. Patent and Trademark Office**<br>**P.O. Box 1450**<br>**Alexandria, VA 22313-1450** | |

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|---|---|---|
| 2:23-cv-00077 | February 28, 2023 | for the Eastern District of Texas, Marshall Division |

| PLAINTIFF | DEFENDANT |
|---|---|
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| 2 | 7,246,058 | 7/17/2007 | Jawbone Innovations, LLC |
| 3 | 10,779,080 | 9/15/2020 | Jawbone Innovations, LLC |
| 4 | 11,122357 | 9/14/2021 | Jawbone Innovations, LLC |
| 5 | 8,467,543 | 6/18/2013 | Jawbone Innovations, LLC |

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

| DATE INCLUDED | INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading | |
|---|---|---|
| PATENT OR TRADEMARK NO. | DATE OF PATENT OR TRADEMARK | HOLDER OF PATENT OR TRADEMARK |
| 1 | | |
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In the above—entitled case, the following decision has been rendered or judgement issued:

| DECISION/JUDGEMENT |
|---|
| |

| CLERK | (BY) DEPUTY CLERK | DATE |
|---|---|---|
| | | |

**Copy 1—Upon initiation of action, mail this copy to Director** **Copy 3—Upon termination of action, mail this copy to Director**
**Copy 2—Upon filing document adding patent(s), mail this copy to Director** **Copy 4—Case file copy**