

**UNITED STATES TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD**

META PLATFORMS, INC.,

Petitioner,

vs.

JAWBONE INNOVATIONS, LLC,

Patent Owner.

CERTIFIED COPY

**Case No. : IPR2023-01127
US PATENT NO: 8,019,091**

**DEPOSITION OF
AKBAR M. SAYEED, PH.D.
REMOTELY HELD VIA VIDEOCONFERENCE TECHNOLOGY
JULY 12, 2024**

**REPORTED BY:
LYNETTE MARIE NELSON,
CA CSR No. 11585, OR CSR No. 250121,
TN LCR No. 896, RPR, CRR, CCRR, CRG,
REALTIME SYSTEMS ADMIN.
JOB NO. 24-137974**

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**Meta Platforms, Inc. - Ex. 1020
Meta Platforms, Inc. v. Jawbone Innovations, LLC
IPR2023-01127, Cover**

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	)	
Patent Owner.	)	

DEPOSITION OF AKBAR M. SAYEED, PH.D.,
taken by the Petitioner, commencing at the hour of
10:01 a.m. on Friday, July 12, 2024, held remotely via
videoconference, before Lynette Marie Nelson, Certified
Shorthand Reporter in and for the State of California,
Oregon, and Tennessee.

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I N D E X

WITNESS: AKBAR M. SAYEED, PH.D.	PAGE
EXAMINATION	
BY MS. WANG	5
BY MR. COWELL	53

1 REMOTE DEPOSITION; FRIDAY, JULY 12, 2024, 10:01 A.M.

2 -o0o-

3 MS. WANG: Grace Wang from Paul Hastings
4 representing petitioner, Meta, and with me is summer
5 associate, Alia Basar.

6 MR. COWELL: Richard Cowell of Fabricant, LLP,
7 representing patent owner and the witness.

8 (Witness sworn.)

9 THE WITNESS: Yes, I do.

10 THE STENOGRAPHER: Thank you.

11

12 AKBAR M. SAYEED, Ph.D.,

13 HAVING BEEN DULY SWORN BY THE CERTIFIED SHORTHAND
14 REPORTER, WAS EXAMINED AND TESTIFIED AS FOLLOWS:

15 EXAMINATION

16 BY MS. WANG:

17 Q. Good morning. My name is Grace Wang. I'm an
18 attorney representing Meta in this matter.

19 Can you please state and spell your full name
20 for the record.

21 A. Yes. My first name is Akbar, A-K-B-A-R; my
22 middle name is Muhammad, M-U-H-A-M-M-A-D; my last name
23 is Sayeed, S, as in "Sam," A-Y-E-E-D as in "David."

24 Q. And so Dr. Sayeed, where are you sitting today?

25 A. I'm sitting in my home office.

1 Q. And where is that?

2 A. It's in Madison, Wisconsin.

3 Q. Have you ever been deposed before?

4 A. Have I -- no, this is my first deposition.

5 Q. Have you ever testified before?

6 A. No.

7 Q. Have you ever provided expert testimony before?

8 A. Not in this context or in this setting.

9 Q. Do you have any papers in front of you?

10 A. Yes, I do have some hard copies of my

11 declaration and the table of contents for the petition,

12 and Dr. Stern's declaration, just a table of contents,

13 and '091 patent, the entirety, and the figures of Ikeda

14 and the LCR patent in its entirety. That's all of the

15 hard copies I have.

16 Q. Did you say you just have the figures of Ikeda

17 and not the text?

18 A. Yes, yes, just the figures.

19 Q. For any of the papers that you have in front of

20 you, are there any markings, tabs, notes on any of the

21 pages?

22 A. No. No.

23 Q. On the computer or device that you are using to

24 do this deposition, do you have any other applications

25 or programs open?

1 A. Yes, I just have the, you know, three micro --
2 three PDF windows open. On one I have my declaration;
3 on the second one, I have the petition, Dr. Stern's
4 declaration, and transcript of Dr. Stern's deposition;
5 and then a third one, I have PDFs of the patents
6 Exhibit 101, 103, 104, 105, 106, 108, 107 right now.
7 And I have access to and I have a directory with the
8 files, none of them are annotated in case I need to
9 access any other files related to this deposition.

10 Q. So none of the PDFs that you have open are
11 annotated; is that correct?

12 A. No, no annotations.

13 Q. And other than PDFs, do you have any other
14 applications or programs open?

15 A. No, other than the Zoom.

16 Let me see, no, actually, there was my Google
17 mailer tab, but I can shut that. And that's it. Just
18 this Zoom. Yep.

19 Q. Thank you.

20 So at any point during today's deposition, if
21 you do end up having another program open up or
22 application open or if you do end up having another
23 piece of paper with you, just let me know. If that's
24 okay.

25 A. Okay.

1 Q. And so given that this is your first
2 deposition, I will go over some ground rules now if
3 that's okay with you.

4 A. Yes.

5 Q. So we have a court reporter who is transcribing
6 the deposition. So it's important that you wait for me
7 to complete my question before you provide an answer.
8 So let's try not to talk over each other. Is that okay?

9 A. Yes.

10 Q. And if you don't understand a question, please
11 do ask for clarification and I will do my best to
12 clarify. Okay?

13 A. Okay.

14 Q. And this way, if you do answer a question, then
15 everyone knows that you understood that question. Is
16 that fair?

17 A. Yes.

18 Q. If you need a break at any time, just let me
19 know, okay?

20 A. Okay.

21 Q. I just ask that if there is a pending question
22 that you provide an answer to that question and we can
23 do a break after you have answered. Is that okay?

24 A. Okay.

25 Q. Is there anything that would prevent you from

1 testifying completely, truthfully, and accurately today?

2 A. No.

3 Q. Are you on any medications that would prevent
4 you from providing complete, accurate, truthful
5 testimony today?

6 A. No.

7 Q. You said you're in your home office. Is there
8 anyone else in the room with you right now?

9 A. No.

10 Q. You've been retained by Jawbone; correct?

11 A. Correct.

12 Q. And when were you first retained by Jawbone?

13 A. Oh, that's a good question. I have to look
14 back.

15 2020 -- end of 2022 or early -- yeah, 2022 and
16 around that time. But really started working in early
17 2023, I think.

18 Q. And who first contacted you about this case?

19 A. In terms of the folks at Jawbone?

20 Q. In terms of your retainer with Jawbone.

21 A. Oh. I'm trying to remember. I think it might
22 have been Jacob Ostling, I talked to him first.

23 Q. And so when you said that you were first
24 retained around late 2022, early 2023, but you really
25 started working in early 2023, was that in context to

1 the IPR that we are talking about today?

2 A. No, other IPRs, you know, generally related to,
3 yeah, not this particular one.

4 Q. Okay. Did you prepare for today's deposition?

5 A. Yes.

6 Q. How much time did you spend preparing for
7 today's deposition?

8 A. I would say maybe around 15 -- 10, 15 hours.

9 Q. And what did you do to prepare?

10 A. Well, I basically reviewed the relevant
11 material including my own declaration and petition and
12 Dr. Stern's declaration and the related patents and
13 documents.

14 Q. Did you talk to anyone while preparing for the
15 deposition?

16 A. Yes, I --

17 MR. COWELL: Sorry, one second.

18 I'm just going to caution the witness not to
19 divulge the contents of any discussions with any
20 attorneys. But you can otherwise answer.

21 THE WITNESS: Yes, I did have some discussions
22 with one of my attorneys. One of the attorneys.

23 BY MS. WANG:

24 Q. Who did you speak to while preparing for this
25 deposition?

1 A. Mr. Rich Cowell.

2 Q. Anybody else?

3 A. No.

4 Q. Dr. Sayeed, have you heard of the term "voice

5 activity detection"?

6 A. Yes.

7 Q. Is it okay with you if I use the term "VAD" to

8 refer to voice activity detection?

9 A. Yes, that would be okay.

10 Q. In what context have you heard of the term

11 "VAD"?

12 A. Well, in the context of detecting when actual

13 voicing, voice activity is occurring, where someone is

14 speaking, for example. When actual speech is occurring

15 as opposed to, you know, other external ambient signals

16 or noise or sounds.

17 Q. What's the purpose of a VAD?

18 MR. COWELL: Objection to form.

19 THE WITNESS: Well, it's for detecting voice

20 activity typically, you know, when there's an actual

21 speech occurring in, you know, most -- in most cases,

22 human speech. So that's the objective of a VAD in most

23 cases.

24 BY MS. WANG:

25 Q. Do you have any experience working with VAD?

1 A. In what context?

2 Q. Whether it's -- do you have any teaching
3 experience working with VAD?

4 A. No, I haven't explicitly taught on VADs. But I
5 do understand the physical basic principles behind it.
6 And -- yeah.

7 Q. Have you done any research involving VAD?

8 A. Not, you know, in the context of, you know,
9 looking at, you know, in these -- in this case, for
10 example, and relevant prior art and so on, yes. But
11 nothing -- not in my direct -- you know, otherwise in my
12 work outside of that, I haven't.

13 Q. So you haven't written any papers on any VADs?

14 A. No. No.

15 Q. Is it fair to say that a VAD is used to detect
16 whether voicing activity is present or absent?

17 MR. COWELL: Objection to form.

18 THE WITNESS: Can you repeat the question,
19 please?

20 BY MS. WANG:

21 Q. Sure.

22 Is it fair to say that a VAD is used to detect
23 whether voicing activity is present or absent?

24 MR. COWELL: Objection to form.

25 THE WITNESS: Whether voicing is present or

1 absent, VAD detects, to some extent, yes, which it
2 could, yes, partly.

3 BY MS. WANG:

4 Q. What's missing?

5 A. Well, sometimes they can be voice or unvoice
6 speech, which VAD may not detect. So I think that's one
7 subtlety that can come into play.

8 Q. So a VAD can detect -- oh, sorry, strike that.

9 A VAD may not detect unvoiced speech; is that
10 right?

11 A. Yeah, that's my understanding.

12 Q. And that's because unvoiced speech does not
13 result in voicing activity?

14 A. Not -- it's not -- the physiological vibrations
15 are not -- either not occurring or they are weak.
16 That's the extent that I understand.

17 Q. Can you explain the difference between voicing
18 activity and speech?

19 MR. COWELL: Objection to form.

20 THE WITNESS: Well, there's -- you know, I will
21 have to -- I will look at the specific -- you know,
22 there are certain sounds which are classified as voiced
23 and unvoiced. And I can't recount them off the top of
24 my head right now, but that's the difference between
25 voiced and unvoiced speech. And VAD can detect, my

1 understanding, voiced speech but not unvoiced speech.

2 So I think that's the extent to which my answer
3 to your question would be, I think. That's all I can
4 provide at this time unless you want me to research or
5 refresh my memory a little more.

6 BY MS. WANG:

7 Q. In your answer just now, you mentioned certain
8 sounds are classified as voiced and unvoiced. When you
9 refer to certain sounds, was that certain speech sounds?

10 A. Yes. Like, you know, consonant and, you know,
11 vowels and things like that.

12 Q. So is it fair to say that there are certain
13 consonant sounds that refer to unvoiced speech?

14 A. I don't know if it's consonant or some sounds
15 would correspond to unvoiced speech, yes.

16 Q. So then is it fair to say there are certain
17 consonant or vowel sounds that refer to unvoiced speech?

18 MR. COWELL: Objection to form.

19 THE WITNESS: I have to -- I think so, but I
20 have to review. I have to make sure. I don't know if
21 this is -- let's just look at -- I was looking at
22 Burnett.

23 I see, I think I have to take partly my
24 distinction back. I think in the context -- at least in
25 the context of one and one, the VAD is supposed to be

1 detecting both voiced and unvoiced speech. So -- and so
2 I stand corrected on that aspect.

3 BY MS. WANG:

4 Q. So if the VAD is detecting both voiced and
5 unvoiced speech, can you explain how the VAD is able to
6 detect unvoiced speech?

7 MR. COWELL: Objection to form.

8 THE WITNESS: Well, I will have to -- well, you
9 know, as described in '091, for example, around in
10 Column 8, I'm going to read:

11 "Since there is much less energy
12 in unvoiced speech, its detection
13 accuracy is not as critical to good
14 noise suppression performance as is
15 voiced speech."

16 So as -- you know, that's what I originally
17 said that even though the accelerometer is -- you know,
18 the VAD is supposed to be detecting both, unvoiced
19 speech may not be fully detected because there's less
20 energy in there.

21 BY MS. WANG:

22 Q. Sorry, can you give the line number for where
23 you were reading from Column 8?

24 A. Column 8, you know, I'm reading the last
25 paragraph from 52 to 67. It's saying:

1 "VAD for an embodiment use" --

2 (Stenographer interruption.)

3 THE WITNESS: I'm sorry. I'm sorry.

4 "The VAD of an embodiment uses a
5 radio frequency vibration detector

6 interferometer to detect tissue
7 motion associated with human speech
8 production but is not so limited.

9 The signal from the RF device is
10 completely acoustic-noise free and is
11 able to function in any acoustic
12 noise environment. A simple energy
13 measurement of the RF signal can be
14 used to determine if voice speech is
15 occurring. Unvoiced speech can be
16 determined using conventional
17 acoustic-based methods, by proximity
18 to voice sections determined using
19 the RF sensor or similar voicing
20 sensors or through a combination of
21 the above. Since there is much less
22 energy in unvoiced speech, its
23 detection accuracy is not as critical
24 to good noise-suppression performance
25 as is voiced speech."

1 BY MS. WANG:

2 Q. So I'm going to go back and ask some of the
3 questions again if that's okay with you.

4 Is it fair to say that a VAD is used to detect
5 whether voicing activity is present or absent?

6 MR. COWELL: Objection to form.

7 THE WITNESS: I think it's fair to say.

8 BY MS. WANG:

9 Q. And so it's your testimony today that a VAD can
10 detect unvoiced speech?

11 MR. COWELL: Objection to form.

12 THE WITNESS: Well, as I read the relevant
13 description or from '091, there is less energy in
14 unvoiced speech. Regular acoustic methods are a little
15 better than VADs for detecting them. And yet, since
16 there is less energy in unvoiced speech, it's not as
17 critical in terms of noise cancelation or to really make
18 sure that, you know, the speech is intelligible and
19 understandable.

20 So, you know, acoustic -- more regular acoustic
21 methods may be better at detecting unvoiced speech than
22 VADs, per se, but again, the big -- big picture of the
23 problem at hand, noise cancelation, it's not as
24 significant because unvoiced speech carries less energy,
25 much less energy. And so it will be softer. You won't

1 even hear it necessarily sometimes.

2 BY MS. WANG:

3 Q. In your answer just now, you refer to regular
4 acoustic methods may be better at detecting unvoiced
5 speech than VADs. Can you explain how regular acoustic
6 methods are different from VADs?

7 A. Well --

8 MR. COWELL: Objection. One minute, Akbar.
9 Objection to form and well outside the scope of
10 direct.

11 Go ahead, Akbar.

12 THE WITNESS: Yes. You know, I think we -- I
13 feel like we are getting stuck on some tangentials.

14 But the basic -- VADs are aimed at detecting
15 physiological, you know, activity related to speech
16 production like actual vibration of tissue, for example.
17 Whereas, other, when I say regular acoustic methods is
18 when they're detecting speech through sound waves,
19 detecting sound waves that regular microphones which are
20 based on diaphragms and things like that.

21 So rather than measuring the vibrations in
22 physiological activity and vibrations, you're measuring
23 pressure in sound waves generated from those vibrations.
24 That's what more regular methods detect as opposed to
25 VADs, which detect the actual physiological tissue

1 movement, for example.

2 BY MS. WANG:

3 Q. In the context of the '091 patent, what is
4 "noise"?

5 MR. COWELL: Objection to form.

6 THE WITNESS: Anything that's not speech or the
7 desired signal of interest.

8 BY MS. WANG:

9 Q. So voicing activity is different from noise?

10 MR. COWELL: Objection to form.

11 THE WITNESS: Well, someone could be -- I think
12 someone could be speaking in the -- or screaming in the
13 background from far afield, for example, or somewhere
14 not close to the desired signal and that would be noise
15 as well, if that's what you're getting at. But it's
16 primarily interested in, you know, the desired signal of
17 whoever is using that device and the objective is to
18 convey faithfully the speech produced by the user.

19 BY MS. WANG:

20 Q. Can you have a signal that includes both speech
21 and noise?

22 A. Yes, of course. That's usually the case in
23 practice.

24 Q. Can you have a signal that includes only speech
25 but in the absence of noise?

1 MR. COWELL: Objection the form.

2 THE WITNESS: In principle, that's possible,
3 too. But again, in reality, there's always some noise.

4 BY MS. WANG:

5 Q. Can you have a signal that includes only noise
6 but in the absence of speech?

7 MR. COWELL: Objection to form.

8 THE WITNESS: Yes, again, that is also
9 possible, but it really depends on what you -- how you
10 are defining signal and noise. But yes. Strictly
11 speaking.

12 BY MS. WANG:

13 Q. Does a VAD detect when noise is present?

14 MR. COWELL: Objection to form.

15 THE WITNESS: VAD is aimed at detecting
16 physiological information, you know, information related
17 to speech generation. That's what it is.

18 Now, if you classify it as signal or noise is
19 up to you. Depends on how you label it. That's what
20 VAD is detecting. So if it's -- yeah.

21 BY MS. WANG:

22 Q. Does the '091 classify signal and noise in a
23 specific way that would help you answer the previous
24 question?

25 A. Well, VAD, yeah. So -- well, I think -- you

1 know, if you think of a, you know, headset or something,
2 you know, like I'm using right now and, you know,
3 your -- and the objective is to faithfully convey what
4 I'm speaking, then a VAD would be detecting
5 physiological information related to me when I speak;
6 whereas, you know, if someone else, if there was
7 someone, you know, speaking from outside, that voice
8 would be considered noise and that would not be detected
9 by the VAD that is, you know, supposedly in our --
10 detecting the information, physiological information
11 related to my body or my larynx or my skin.

12 Q. And so in that same context, does a VAD detect
13 when noise is absent?

14 MR. COWELL: Objection to form.

15 THE WITNESS: That does -- can you -- that
16 question doesn't quite -- noise is absent, no, VAD is
17 not detecting when noise is absent. It's hard to detect
18 generally, absence of -- well, I won't say anything.
19 It's not detecting when noise is absent, no.

20 BY MS. WANG:

21 Q. Is it fair to -- sorry, strike that.

22 Is it fair to categorize VADs as acoustic-based
23 VADs and nonacoustic-based VADs?

24 MR. COWELL: Objection to form.

25 THE WITNESS: Well, I think that's a subtle

1 distinction. You know, the -- and it's the context
2 where it comes into play.

3 So in '091 patent, for example, VAD is
4 specifically referring to a method or related devices
5 which are measuring the physiological information
6 related to speech. However, there could be, you know,
7 processing algorithms based on acoustic signals which
8 are aimed at doing the same function, which, you know,
9 is to -- are in detecting voicing activity occurring and
10 that, for example, is happening in Ikeda. So in that
11 regard, you could -- we could make that distinction, but
12 we have to be careful.

13 BY MS. WANG:

14 Q. Are you drawing a distinction between a VAD
15 that measures physiological information related to
16 speech versus a VAD that uses processing algorithms
17 based on acoustic signals?

18 A. Yes.

19 MR. COWELL: Objection to form in the last
20 question.

21 THE WITNESS: I'm just saying that, you know,
22 you could interpret both of them in terms of, you know,
23 the final objective that the goal is to detect whether
24 voicing activity is happening or not.

25

1 BY MS. WANG:

2 Q. Can a VAD be an acoustic microphone?

3 MR. COWELL: Objection to form.

4 THE WITNESS: Not in the normal sense if it's
5 measuring pressures. But in some cases, acoustic
6 microphones can be modified, my understanding, where
7 they are directly measuring movement of the skin, for
8 example. So not in the normal sense where an acoustic
9 microphone is at a distance and just measuring the sound
10 waves. Unless it's modified for direct contact, for
11 example.

12 BY MS. WANG:

13 Q. So a VAD can be an acoustic microphone but only
14 if that acoustic microphone is directly touching the
15 skin?

16 A. There could be modifications of that. Again,
17 it's -- you know, where it's trying to measure directly
18 the physiological information not indirectly through
19 sound, you know, air pressure, that's what sound waves
20 are. Changes in air pressure. So . . .

21 Q. So do I have it right if I say that a VAD can
22 be an acoustic microphone as long as it's not measuring
23 the changes in air pressure in sound waves?

24 MR. COWELL: Objection to form.

25 THE WITNESS: I -- you can, but I think, again,

1 it won't really necessarily convey what I'm trying to
2 say without the context. I think we are getting lost in
3 some technicalities. I don't even know where we are
4 going with this.

5 But the best way I would say is that, you know,
6 it could be any device which -- you know, it could be an
7 acoustic microphone, for example, which had been
8 modified to measure directly the physiological
9 information or vibration of tissue or skin rather than
10 measuring sound waves. And that's best I can provide.

11 BY MS. WANG:

12 Q. Are there ways to modify an acoustic microphone
13 to measure directly the physiological information or
14 vibration of tissue or skin other than -- oh, sorry.

15 A. Yeah. Sorry. Sorry. Sorry, sorry.

16 Q. That's okay.

17 A. I broke the rule.

18 Q. I'll start over.

19 Are there ways to modify an acoustic microphone
20 to measure directly the physiological information or
21 vibration of tissue or skin other than via direct
22 contact with the skin or tissue?

23 MR. COWELL: Objection to form.

24 THE WITNESS: That's a very broad question.

25 It could be. I haven't really researched that

1 topic. I could come back to you and tell you, you know,
2 how many different ways acoustic microphones have been
3 modified. But I haven't really looked at it. I --
4 yeah. It's conceivable, but -- yeah. It's very broad
5 question. I can't really answer it.

6 BY MS. WANG:

7 Q. Have you heard of general electromagnetic
8 motion sensor or GEMS?

9 A. Yes.

10 Q. In what context have you heard of GEMS?

11 A. Well, for example, in '091 patent, I believe
12 GEMS is one example of the VAD sensor.

13 Q. Have you heard of GEMS in any other context
14 outside of the '091 patent?

15 A. Yes, electromagnetic -- well, I've heard of
16 electromagnetic sensors, but they -- yeah. And -- in
17 the context of some other possibly patents and
18 inventions.

19 Q. What is your understanding of GEMS?

20 A. Well, GEMS is, you know -- basically this is --
21 it's kind of like to -- it's electromagnetic signals and
22 it's listening to the reflections of electromagnetic
23 signals kind of similar to radar but at a very short
24 range and those electromagnetic signals are measuring or
25 they're changing in response to movement of actual

1 tissue. That's my understanding.

2 Q. Would you agree that VADs using GEMS was known
3 as of the priority date of the '091 patent?

4 MR. COWELL: Objection to form.

5 THE WITNESS: Could you repeat the question
6 again?

7 BY MS. WANG:

8 Q. Would you agree that VADs using GEMS was known
9 as of the date -- as of the priority date of the '091
10 patent?

11 MR. COWELL: Objection to form.

12 THE WITNESS: I think the use of VADs was --
13 I'm not entirely sure if GEMS, per se, were at that time
14 or not. I will have to research that a little more. I
15 didn't -- I didn't really look at that, prepare for that
16 particular aspect.

17 BY MS. WANG:

18 Q. In the context of a VAD, is it fair to say that
19 GEMS can be used to detect whether voicing activity is
20 present or absent?

21 A. That --

22 MR. COWELL: Objection to form.

23 THE WITNESS: Can you repeat the question
24 again? I'm sorry.

25

1 BY MS. WANG:

2 Q. In the context of a VAD, is it fair to say that
3 GEMS can be used to detect whether voicing activity is
4 present or absent?

5 MR. COWELL: Objection to form.

6 THE WITNESS: I'm missing -- you know, I think
7 they can be. They can be used as VADs in the context
8 of, you know, the way they're, for example, used in the
9 '091 patent for voice activity detection.

10 BY MS. WANG:

11 Q. Can GEMS detect when noise is present?

12 MR. COWELL: Objection to form.

13 THE WITNESS: That's -- well, you know, I think
14 the -- again, that question is kind of going -- I don't
15 know what's the -- GEMS, just like a VAD, is aimed at
16 detecting, you know, the physiological aspects of voice
17 production. So noise is -- I don't know what you mean
18 by "noise" there. Or absence or presence so I'm not
19 entirely sure of that question, what you mean by that.

20 BY MS. WANG:

21 Q. Well, earlier, we were talking about whether a
22 VAD can detect when noise is present. And you gave an
23 answer to that question. Do you recall that?

24 A. Yeah, I -- a VAD -- again, that question was
25 also not entirely clear to me. You know, VAD is more --

1 if anything, VAD is trying to get at the detect speech
2 production more accurately without being influenced by a
3 noise. So I think that's why when you -- when the
4 question is about whether VAD can detect noise or not
5 is, to me, kind of a misplaced question. And doesn't
6 quite make sense to me. That's the same in this
7 question.

8 Q. So it doesn't make sense to ask whether VAD can
9 detect noise?

10 A. Well, what's the -- what's the -- I'm wondering
11 what's the -- what's the objective here? What kind of
12 noise? And what do you mean by "noise"? You know . . .

13 Q. Do you recall your earlier testimony when you
14 said the noise is any signal other than the desired
15 signal?

16 A. Yes. Yes. So we can -- so if you work with
17 that definition, then, yes. So in the -- again, in the
18 specific context, if you go from there and suppose the
19 voicing -- my voicing activity is the desired signal,
20 then VAD is aimed at just detecting when I am speaking
21 and not the noise. So if there's some noise in the
22 background, VAD is not going to detect that.

23 Unless there was a -- you know, there's a
24 caveat there. There's a huge, you know, explosion or
25 something and which could make my skin vibrate or

1 something, you know, it could create an -- you know, a
2 trigger. But that's -- that's way -- you know, that
3 would be an unusual situation.

4 So naturally, if there is an induced
5 physiological vibration depending on the modality in
6 which the VAD is working, it could detect external
7 noise. But that would be a rare situation. I'm just
8 taking physically how it could happen.

9 Q. In that instance, it would still be detected
10 via detection of the physiological or sensing of the
11 physiological vibration?

12 A. Well, yes. That's what I'm saying, you know.
13 I think to the extent that VAD can detect noise if
14 there's something other than speech is causing the
15 motion, the physiological motion that a VAD typically
16 detects. So that would be rare. But I see it would be
17 possible.

18 Q. Is it fair to say that in normal circumstances,
19 that in the absence of something large that causes a
20 physiological motion in the background, in the absence
21 of that, that the VAD does not detect noise?

22 MR. COWELL: Objection to form.

23 THE WITNESS: Well, I think you're -- it's a
24 little nuance. I think I can -- you know, in some
25 cases, you know, you could be clearing your throat or

1 something, some other thing, and -- in which case VAD
2 could be detected as well or could be activated
3 potentially, too, in some scenarios. So that would be
4 noise. So there may still be some cases other than VAD.

5 It could be, you know, potentially many other
6 cases where it could, but I don't think that's going to
7 be happening too often or there would be other ways of
8 cleaning that up in the context of denoising speech.

9 BY MS. WANG:

10 Q. Have you heard of a radiovibrometer?

11 A. A radiovibrometer. I think I've heard that
12 term. But . . .

13 Q. Do you know what a radiovibrometer is?

14 A. I can look it up. I don't exactly. To me, it
15 seems like in the -- the term seems to suggest that it's
16 a radio-based or electromagnetic-based vibration sensor,
17 but I can't give you any more details other than . . .

18 Q. Can I ask what you're looking at?

19 A. I'm looking at, you know, the patent, Burnett
20 patent. But I don't see anything. Yeah.

21 Q. Have you heard of a vibration sensor?

22 A. Yes.

23 Q. In what context have you heard of a vibration
24 sensor?

25 A. Well, you know, in the context of a sensor

1 which are measuring or detecting vibrations.

2 Q. Can a VAD be a vibration sensor?

3 MR. COWELL: Objection to form.

4 THE WITNESS: Can a VAD be a vibration sensor?

5 Well, you know, if it's sensing maybe in a restricted
6 context of sensing, you know, the relevant vibrations
7 in -- relevant physiological vibrations, whether it's
8 your vocal tract or skin. So in that regard, in a
9 limited context.

10 BY MS. WANG:

11 Q. So if a vibration sensor is in contact with the
12 vocal tract or skin and sensing the relevant vibrations,
13 physiologically, then, is it fair to say that that
14 vibration sensor is a VAD?

15 MR. COWELL: Objection to form.

16 THE WITNESS: Well, can you repeat your
17 question again?

18 BY MS. WANG:

19 Q. For a vibration sensor that is in contact with
20 the vocal tract or skin and sensing relevant
21 physiological vibrations, is it fair to say that
22 vibration sensor is a VAD?

23 MR. COWELL: Objection to form.

24 THE WITNESS: Well, the -- you know, okay, so
25 maybe I am getting the gist of these questions.

1 I think that that's a -- you know, to some
2 extent that is a sensor. It's sensing that
3 physiological vibration. But if that signal has still
4 got to be used in some ways to do the detection. So --
5 you know, so -- for our purposes. So, you know, to the
6 extent that a vibration sensor can sense physiological
7 vibrations, it could be part or it could be part of a
8 VAD or it could be used to make a VAD if you will.

9 So, you know, I do see, you know -- yeah, I
10 think just going back to your other radio frequency
11 vibrometer, again, similar to the electromagnetic
12 vibration sensor, it's in '091 patent as well on
13 Column 10, line 6 -- 18.

14 BY MS. WANG:

15 Q. So let me rephrase my question.

16 For a vibration sensor that is in contact with
17 the vocal tract or skin and sensing relevant
18 physiological vibrations, is it fair to say that the
19 vibration sensor can be part of a VAD?

20 MR. COWELL: Objection to form.

21 THE WITNESS: Well, as long as the vibration
22 it's measuring sensing is relevant to, you know, the
23 voicing activity that we are interested in. Not any
24 vibrations arbitrary vibrations.

25

1 BY MS. WANG:

2 Q. So as long as?

3 A. Then -- yes, I think, yes, it could be part of.
4 Am I missing something here?

5 Q. Have you heard of vibration transducers?

6 A. Vibration transducer. I've heard of the term
7 "transducers," yeah. Well, I don't know if I've
8 directly, maybe I have. Transducer is sometimes used as
9 a term for sensors.

10 Q. So would your answers today for vibration
11 sensor also apply for vibration transducer?

12 A. Not necessarily. I haven't -- I can't -- I'm
13 just generally saying that I don't -- I'm just -- no.
14 Vibration transducer, yeah, I can't -- if you could give
15 me some more specific pointer, where you are referring
16 to, I could refresh my memory on the material and give
17 you more an answer. But I can't really provide any more
18 information.

19 Q. What about an accelerometer, have you heard of
20 an accelerometer?

21 A. Yes.

22 Q. In the context of VADs, have you heard of
23 accelerometers?

24 A. Yes.

25 Q. Is it fair to say that an accelerometer that

1 senses the relevant physiological vibrations, is it fair
2 to say that that accelerometer can be part of a VAD?

3 A. Yes.

4 Q. Have you heard of the term "tissue conduction
5 microphone"?

6 A. I think I may have in the context of this
7 particular -- again, I'm searching. Is there any
8 specific place you are referring to?

9 Q. So this is the Alcivar reference. I think you
10 have -- you mentioned you have a PDF of it?

11 A. Yes, yes, yes.

12 Q. We may need to pull up the site for it.

13 A. Yeah, yes.

14 Q. Yeah, the title, for example?

15 A. Tissue conduction microphone utilize -- yes.

16 Q. So if -- if this tissue conduction microphone
17 in Alcivar was sensing the relevant physiological
18 vibrations, is it fair to say that the tissue conduction
19 microphone would be part of a VAD?

20 MR. COWELL: Objection to form.

21 THE WITNESS: Could be used -- could be used
22 as -- as part of a VAD, yes. It could be. But not in
23 the way -- yeah. It could be.

24 BY MS. WANG:

25 Q. Okay.

1 A. But it has to be how it's being incorporated.

2 As I stated in the declaration, the way it's
3 being combined with Ikeda, for example, in the petition
4 does not -- would not serve the function that it has
5 claimed to. So . . .

6 Q. Did Jawbone invent VAD?

7 MR. COWELL: Objection to form.

8 THE WITNESS: Did Jawbone invent VAD? No, as
9 far as I know, Jawbone did not invent VAD.

10 BY MS. WANG:

11 Q. Have you heard of noise cancelation?

12 A. Yes.

13 Q. In what context have you heard of noise
14 cancelation?

15 A. Well, in many different contexts. You know,
16 that's a big part of signal processing, which is part of
17 my technical background. So, yeah, in many, many
18 different contexts I've seen noise cancelation. That's
19 bread and butter of what signal processing is all about.

20 Q. In the context of removing noise from acoustic
21 signals --

22 A. Yes.

23 Q. Let me strike that.

24 Can you explain what noise cancelation means in
25 the context of removing noise from acoustic signals?

1 A. Well, so typically, you know, whenever we are
2 measuring, you know, acoustic signal, there will be a
3 desired signals. For example, if I'm speaking in a
4 microphone, that's my speech, and then there will be
5 background signals which are not related to -- you know,
6 which are not my speech. And those are, you know, for
7 our purposes or if we are interested in my speech as the
8 desired signal, that is noise. And so noise cancelation
9 is about suppressing or removing all of those other
10 components, picked-up signals picked up by microphones
11 which are not the desired signal. In this case would be
12 my speech.

13 Q. You used the phrase "suppressing or removing"
14 in your previous answer. Are those the same or are
15 there differences between noise suppression and noise
16 removal?

17 A. Well, I think they can sometimes be used
18 interchangeably, you know, and -- but -- you know, and
19 also technically, they can be somewhat different as
20 well.

21 For example, suppression would be that, you
22 know, you reduce the filter of that, you reduce the
23 amplitude of the noise. So that is it comes out as
24 weaker, not as strong.

25 Whereas, cancelation, strictly speaking,

1 mathematically would be if you literally subtract, you
2 exactly figure out what it is and you subtract it from
3 the signal and remove it. Which you cannot do exactly
4 in all situations.

5 But the end result, the end goal is the same
6 that, you know, your -- the noise in your signal should
7 be after you have processed the signal should be less
8 compared to what it was before you did the processing.
9 So that you can hear your desired signal more clearly.

10 Q. So is it fair to say that the ultimate goal of
11 noise suppression and noise cancelation is the same?

12 A. Yes, the goal -- I mean, I think, yes, for the
13 purpose of this discussion.

14 Q. And is it also fair to say that both noise
15 cancellation and noise suppression operate to reduce the
16 amount of noise from the output signal?

17 A. Yes.

18 MR. COWELL: Objection to form.

19 THE WITNESS: Yes, generally speaking. Output
20 signal, you know, which contains a desired signal and
21 noise and so the ultimate goal is so that you have more
22 of the desired signal and less of the noise.

23 BY MS. WANG:

24 Q. Have you heard of an adaptive filter?

25 A. Yes.

1 Q. In the context of removing noise from acoustic
2 signals, what is an adaptive filter?

3 A. Well, I think I can show through illustration.
4 For example, the best one would be, you know, if you
5 look at Ikeda there, you see, you know, Figure --
6 Figure 1, you see two adaptive filters and Adaptive
7 Filter 3 and Adaptive Filter 6.

8 And so Adaptive Filter 3 is aimed at reducing
9 or suppressing noise from the signal in the top branch
10 of XA signal, Microphone A, the signal coming from
11 Microphone 1, by processing the Microphone 2 XB signal.

12 And the -- what makes it adaptive is that its
13 coefficients are what defines the filter is adapted over
14 time by other measurements, in this case, the -- you
15 know, the -- through the signal noise ratio estimator
16 and step size output circuit, for example.

17 Q. Is XB the output from Microphone 2 the only
18 input to Adaptive Filter 3?

19 MR. COWELL: Objection to form.

20 THE WITNESS: Well, it depends on what you mean
21 by "input." So in some -- it's not the XB if you look
22 at it, it's actually more complicated. There's a
23 subtracter in front of XB, and it's the output of that
24 subtracter that's the input. And that's what the filter
25 processes.

1 However, since it's an adaptive filter, there's
2 another input going in which is the step size output
3 u 1, which is changing the filter coefficients and so
4 that determines how the filter is going to alter the
5 actual input signal.

6 But this is getting a little technical, but
7 that's -- so there are two inputs going in, as you can
8 see, into -- actually three inputs if you will. And --
9 but some of them are just changing the coefficients
10 and -- and then only one input is actually processed by
11 the filter which is the E2 signal occurring at the
12 output subtracter 7. W1 and E1 signals are used to do
13 the adaptation of the filter.

14 BY MS. WANG:

15 Q. If we focus in on the input E2 that is
16 processed by Adaptive Filter 3.

17 A. Yes.

18 Q. Are you with me so far?

19 You mentioned that that signal E2 is the output
20 of the subtracter 7; do I have that right?

21 A. Yes.

22 Q. And that subtracter 7 -- what are the two
23 inputs to that subtracter 7?

24 A. Well, the one is the Adapter Filter Output 6 as
25 you can see. The output of that which is F2. And the

1 other one is the delayed version of XB, the Microphone 2
2 signal.

3 Q. And is it fair to say that the Adaptive
4 Filter 6 is processing the signal XA?

5 A. No. It's -- it's processing XA delayed and
6 then going through the subtracter 4, which takes the
7 output of that Adapter Filter 3 and then that output of
8 the Subtractor 4 is E1. And that is the input to
9 Adaptive Filter 6.

10 Q. So is it fair to say that the input to Adaptive
11 Filter 6, which is E1, is based on the signal XA?

12 A. Partly.

13 MR. COWELL: Object to form.

14 BY MS. WANG:

15 Q. Sorry, did you say "partly"?

16 A. Yes.

17 Q. So is it fair to say, then, that the Adaptive
18 Filter 3, because it is processing the Signal E2, that
19 the adaptive filter is processing the signal that is
20 formed of a combination of XA and XB after additional
21 processing?

22 MR. COWELL: Objection to form.

23 THE WITNESS: Can you repeat? Can you repeat
24 the question again?

25

1 BY MS. WANG:

2 Q. Yeah, I will rephrase it.

3 Is it fair to say that Adaptive Filter 3, which
4 is processing the Signal E2, is processing a signal that
5 is formed as a combination of XA and XB after additional
6 processing?

7 MR. COWELL: Objection to form.

8 THE WITNESS: Yes, I think it's fair to say.

9 BY MS. WANG:

10 Q. Is the same true for Adaptive Filter 6?

11 And I will just ask the full question so that
12 the record is clean.

13 Is it fair to say that Adaptive Filter 6, which
14 is processing the Signal E1 is also processing the
15 signal that is formed as a combination of XA and XB
16 after additional processing?

17 MR. COWELL: Objection to form.

18 THE WITNESS: Yes, it is.

19 MS. WANG: Dr. Sayeed, would you like to take a
20 quick break?

21 THE WITNESS: Sure. Yes, that's not a bad
22 idea.

23 MS. WANG: Okay. We've been going about an
24 hour, so I figured.

25 Let's go off the record.

1 (A recess was taken.)

2 BY MS. WANG:

3 Q. Dr. Sayeed, do you recall the portion of Ikeda
4 that describes the outside?

5 MR. COWELL: Objection. Form.

6 THE WITNESS: Yes. "The outside," can you be
7 more specific?

8 BY MS. WANG:

9 Q. Yeah, specifically I'm looking at in Ikeda
10 Column 3 starting at line 44 down to line 50.

11 Ikeda here refers to -- there's two sentences
12 that refer to the outside. And Ikeda describing
13 learning in such sections from the outside.

14 A. Yes.

15 Q. Do you see?

16 A. Yes, I do see those.

17 Q. Does Ikeda -- strike that.

18 Do you see in Column 3, line 49, the phrase
19 "depending on the situation"?

20 A. Yes. I do see that.

21 Q. Do you understand this sentence, paragraph, of
22 Ikeda to be describing that it is difficult to perform
23 learning from the outside depending on the situation?

24 MR. COWELL: Objection to form.

25 THE WITNESS: Let me just -- I think I refer to

1 this in my -- I discussed this in my declaration as
2 well. And I think you're in 43, for example, it's
3 identification, Ikeda is phrasing this as a drawback of
4 the prior art. This is 3, 46 to 54. That's the section
5 you're referring to.

6 "It is, in many cases, difficult
7 to command the adaptive filters to
8 perform the learning from the outside
9 in accordance with the level of the
10 desired signal and that of the noise
11 signal depending on the situation in
12 which the noise canceler is located.
13 With the conventional noise canceler,
14 a sufficient noise canceling ability
15 and a sufficient distortion
16 correction characteristic are not
17 achievable unless adequate learning
18 sections are indicated to reach
19 adaptive filter for the learning
20 purpose."

21 And this is Ikeda, Column 3, lines 46 to 54.

22 Thus, Ikeda contends that prior art which uses
23 outside sensors, outside in quotes, for obtaining
24 information needed to adjust the adaptive filters for
25 added -- good noise cancelation is insufficient.

1 Yes. So can you repeat the question again?

2 BY MS. WANG:

3 Q. I will rephrase the question.

4 So in Ikeda, because -- okay. Sorry. Strike
5 that.

6 Would you agree that because Ikeda refers to
7 depending on the situation that there will be certain
8 situations where the outside can adjust the adaptive
9 filters for adequate noise cancelation?

10 MR. COWELL: Objection to form.

11 THE WITNESS: You know, you could argue that
12 way. You know, I think the big gist of what Ikeda is
13 trying to say, my -- my understanding is that it is
14 difficult, that is a problem. That is what you
15 typically need, you know, and you cannot do -- that's
16 one of the problems with prior art, that it's difficult
17 to do it from the outside. And so -- and while, you
18 know -- and so he's actually proposing a method for
19 using the acoustic signals from the two microphones to
20 enable that, you know, control of the adaptive filters
21 using the signal noise, ratio circuits, and the step
22 size circuits.

23 So he's repeatedly, in many places, teaching
24 away from using the outside command or out -- you know,
25 from the outside to commander adaptive filters.

1 BY MS. WANG:

2 Q. Do you have an understanding of what type of
3 situation occurs when it is difficult to perform
4 learning from the outside?

5 MR. COWELL: Objection to form.

6 THE WITNESS: Well, you know, I think not, you
7 know, as much as what could be many things and here, you
8 know, it would be speculation more, could be
9 technological factors.

10 But the point is that, you know, Ikeda is
11 saying that, look, this is at the time of -- you know,
12 this was a prior art that is referred to and Ikeda
13 explicitly saying, well, this is generally challenging
14 so we need -- or is not sufficient and so we need to --
15 we need to find a method, as I stated in paragraph 44,
16 to solve this problem.

17 Ikeda discloses that:

18 "An object of the present
19 invention to provide a noise canceler
20 capable of achieving a sufficient
21 noise canceling ability and reducing
22 signal distortion even when adequate
23 learning sections cannot be indicated
24 from the outside."

25 Column 3, lines 57 through 61.

1 To do so, Ikeda uses a signaled noise ratio
2 estimator as noted in the abstract and also in Column 3,
3 line 62 through Column 4, line 25. And on Column 7,
4 line 18 through Column 9, line 10, and Figure 1.

5 BY MS. WANG:

6 Q. Is it your understanding that Ikeda's
7 description of learning from the outside is tied to what
8 Ikeda describes is a conventional noise canceler?

9 MR. COWELL: Objection to form.

10 THE WITNESS: Conventional noise canceler? I'm
11 trying to -- can you refer to -- can you point me to a
12 specific place what you're referring to?
13 Conventionally?

14 BY MS. WANG:

15 Q. So at Column 3, line 32, this is the paragraph
16 that ends with a statement "about difficulty of learning
17 from the outside." And at line 32, the paragraph opens
18 by describing the conventional noise canceler.

19 A. Yeah, I think, you know, when I read that
20 section and that's -- that, I discuss in, you know,
21 paragraph 42 of my declaration as well is basically, you
22 know, Column 3, lines 32 to 45. And this is -- you
23 know, explains the adaptive -- you know, as I state
24 there, Ikeda explains that the adaptive filters of the
25 prior art system are updated when the desired signal

1 component $S(z)$ and the noise component $N(z)$ respectively
2 are absent or negligible. I'm not going to read the
3 whole thing.

4 But what it is basically summarizing is that,
5 you know, you want to adapt the conditions under which
6 one of the adaptive filters, Adaptive Filter 3, is
7 updated when there is more noise than signal, and
8 Adaptive Filter 6, which he incorrectly states as 4, is
9 updated when there's more signal than noise. So he's
10 just basically stating the conditions under which the
11 adaptation should occur.

12 And -- and then he's proposing -- and then what
13 he is saying is that it's difficult to get it -- to get
14 the, you know, commands from the outside, meaning, you
15 know, in which the petitioner, which we -- you know,
16 where the petitioner also agrees that anything other
17 than the microphone signals is outside, you know, that
18 it's hard to do it from the outside. And so he's
19 proposing a method, and that is really what he claims to
20 be the key invention here, to actually use the signal
21 noise ratio estimators and step size calculators to --
22 you know, boxes -- let me see, just to make sure that
23 I'm not -- 10 and 11 in Ikeda Figure 1, that's a key
24 innovation as to how to update the filters without
25 signal from the outside, information from the outside,

1 to command them and adaptation should occur.

2 Q. Is it your testimony that there are no
3 instances that adequate learning sections can be
4 indicated from the outside?

5 MR. COWELL: Objection to form.

6 THE WITNESS: No, that is not my testimony.

7 You know, patent owner in one is doing -- you
8 know, proposing something which is using the VAD to --
9 which is, you know, in this context from the outside and
10 doing the adaptation. And so that's not my testimony at
11 all.

12 What I'm saying is that Ikeda is teaching away
13 from it for -- and actually proposing an alternative
14 which is the key innovation in Ikeda. And, you know,
15 the document -- I would just add, you know, that is the
16 key invention.

17 Even Dr. Stern agreed to it that, you know, as
18 I note in 73 of my paragraph 70, I note that Dr. Stern
19 agrees with me as to Ikeda's goal. That's the
20 invention. I'm just reading part of it.

21 And in paragraph 72, that is more clearly
22 articulated, a POSITA reading Ikeda would therefore
23 understand that Ikeda's role is to avoid using outside
24 sensors and that its advance over the prior art is
25 achieving that goal through its unique configuration

1 which includes the signal-to-noise estimator and step
2 size circuit.

3 BY MS. WANG:

4 Q. Is it your testimony that the type of -- sorry,
5 strike that.

6 Is it your testimony that in order to describe
7 the type of situation that occurs when it is difficult
8 to perform learning from the outside would require
9 speculation?

10 MR. COWELL: Objection to form.

11 THE WITNESS: Well, it -- not speculation, not
12 really. I think it's -- you know, Ikeda -- we have to
13 take it on what the prior art is saying on face value.

14 Ikeda is saying, well, it's -- it's -- it's not
15 possible or it's not adequate in a situation and that's
16 why -- and that's a problem with, you know, the state of
17 the art at the time that he filed his invention and he
18 is proposing this innovation. So -- and he's actually
19 teaching away from -- he thinks that it's going to work
20 and he's teaching away from using any external or
21 commands from the outside.

22 BY MS. WANG:

23 Q. Does Ikeda say that when the outside is
24 available, that you should not use it?

25 MR. COWELL: Objection to form.

1 THE WITNESS: Ikeda is saying, hey, it's -- it
2 may not work. It may be challenging. And I have a
3 better solution regardless. So use the solution that I
4 have. That's what Ikeda is saying the way I read it.

5 BY MS. WANG:

6 Q. So sitting here today, you cannot describe the
7 situation in which learning from the outside is
8 difficult?

9 MR. COWELL: Objection to form.

10 THE WITNESS: Yeah, I don't know. I'm not
11 entirely sure what you mean by that, by the question or
12 the statement.

13 But I think we have to -- I mean, I can only
14 take, you know, what Ikeda is stating in its patent
15 and -- and that's very clear that he's teaching away
16 from using outside control for the adaptive filters for
17 a number of reasons. And more importantly, he thinks
18 that he has a solution that addresses -- that obviates
19 the need for using any signals from the outside.

20 BY MS. WANG:

21 Q. Can you -- do you have an understanding of
22 far-field noise?

23 A. Yes.

24 Q. Can you explain what far-field noise in the
25 context of what we are talking about today?

1 MR. COWELL: Objection to form.

2 THE WITNESS: It's a very broad -- sorry.

3 Broad question. That's a very broad question,
4 far field.

5 I'm just going to state that far field versus
6 near field is more about how distance, on the distance
7 of the source, of the source of noise from the
8 microphones or the devices that are picking up the
9 signals.

10 Perhaps you can be more specific about what
11 is -- what you -- what you would like me to answer in
12 that regard.

13 BY MS. WANG:

14 Q. Is it fair to say that both far-field noise and
15 near-field noise are different from the desired signal?

16 MR. COWELL: Objection to form.

17 THE WITNESS: I still don't -- I don't
18 understand really the context of the question. Is it --
19 can you repeat the question again?

20 BY MS. WANG:

21 Q. I can try to rephrase.

22 A. Yes. That would be better.

23 Q. Is it fair to say that both far-field noise and
24 near-field noise are noise signals that are separate
25 from the desired signal?

1 MR. COWELL: Objection to form.

2 THE WITNESS: Yes, it's fair to say in a broad
3 sense; yet, here I think -- yeah. But near-field noise
4 signals could be created by, you know, if it was
5 someone's speaker, you know, for example, in, you know,
6 Alcivar, you know, there's breathing and stuff can
7 accidentally activate things so that, you know, the
8 source of those noise signals could be the same person
9 who is generating the desired signals.

10 BY MS. WANG:

11 Q. But the near-field noise signals, those
12 describe undesired signals; correct?

13 A. The far-field noise is also undesired so they
14 are both undesired.

15 Again, it's a question of what is our
16 objective, what are we -- you know, it's -- yeah, you
17 know, whether it's speech or it's some other, for
18 example, breathing that Alcivar mentions by a diver, you
19 know, that could be -- that's not speech signals and yet
20 that's in the near field and it's noise.

21 Q. Dr. Sayeed, you reviewed Dr. Stern's
22 declaration in this proceeding?

23 A. Yes.

24 Q. And before this proceeding, were you familiar
25 with Dr. Stern?

1 A. No.

2 MS. WANG: Let's go off the record. We will
3 take a quick break.

4 MR. COWELL: Okay.

5 (A recess was taken.)

6 MS. WANG: So at this point, I have no further
7 questions so I will pass the witness. Thank you,
8 Dr. Sayeed, for your time.

9 THE WITNESS: Thank you very much.

10 MR. COWELL: If you can just give me like
11 five minutes just to quickly go through my notes and
12 I'll see if I have any redirect.

13 MS. WANG: Okay.

14 MR. COWELL: Let's just go back off the record.
15 (A recess was taken.)

16 MR. COWELL: So I just have a few questions for
17 you, Dr. Sayeed, before we end for the day.

18 THE WITNESS: All right.

19 EXAMINATION

20 BY MR. COWELL:

21 Q. And you recall earlier today Ms. Wang asked you
22 a lot of questions about VADs; do you recall that?

23 A. Yes.

24 Q. If you were to include a VAD with Ikeda in the
25 manner Dr. Stern suggests, would that VAD be able to

1 provide any information about the level of signal
2 compared to the level of noise?

3 MS. WANG: Objection to form.

4 THE WITNESS: No, it won't be the way it's
5 combined and, you know, I can refer to the two different
6 combinations that Dr. Stern suggests, which are
7 summarized in paragraph 64 and 65 of my declaration.

8 And the first combination essentially, you
9 know, the -- you just replace the signal to noise ratio
10 circuits and the step size circuits with the
11 accelerometer signal, you know, this is for Puthuff, for
12 example. That is a combination of Puthuff Exhibit 1004,
13 that's on paragraph 64 of my declaration. And that is
14 Dr. Stern suggests two combinations, first one, the
15 accelerometer is basically replacing the VAD in Ikeda,
16 which is the signal noise ratio calculators and the step
17 size calculators.

18 And they're -- clearly, the accelerometer
19 signal cannot -- there's just one signal that cannot
20 give you information while the signal and noise and the
21 relative strengths that's needed.

22 And then in the second combination, which is in
23 paragraph 65 of my declaration, again, this is with
24 Puthuff, you know, the whole circuit of Puthuff is kind
25 of inserted into Ikeda after the microphone XA. And in

1 this case, there will be mixed signals, you know, so it
2 won't know whether it's the signal is coming from the
3 microphone or the accelerometer. So all of the
4 calculations of SNR and step size calculations that
5 Ikeda's circuit is supposed to do would be thrown off
6 balance, if you will, because it won't know whether it's
7 the accelerometer signal coming in or the -- the
8 microphone signal coming in.

9 And the same way we know in this proposed
10 combination with Alcivar, which is Exhibit 1005, which
11 is very similar to the combination with Puthuff for the
12 same reason that it would not be able to distinguish
13 between signal and noise and, more importantly, the
14 relative levels between them to be able to do the
15 adaptations when needed for the two adaptive filters.

16 BY MR. COWELL:

17 Q. So with Dr. Stern's combinations, any of them,
18 is it even possible to command the adaptive filter to
19 perform learning from the outside?

20 MS. WANG: Objection to form.

21 THE WITNESS: Well, not -- it does have an
22 outside -- these combinations do have an outside sensor.
23 However, the way they are combined, it would not be able
24 to do the adaptations from the outside as Ikeda has in
25 mind and what he is trying to accomplish with his

1 circuits or VAD from the inside if that makes sense.
2 So even though it does have the -- the, you
3 know, outside sensor, the way the combinations are
4 proposed by Dr. Stern would not function.
5 That's my testimony as I have explained in my
6 declaration as well.
7 MR. COWELL: I have no further questions.
8 THE STENOGRAPHER: Anything further for the
9 record?
10 MS. WANG: Nope.
11 THE STENOGRAPHER: All right. We are off.

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13 - - -

14 (Deposition was concluded at 12:01 p.m.)

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DEPOSITION OF: AKBAR M. SAYEED, Ph.D.

CASE: META PLATFORMS V JAWBONE INNOVATIONS

DATE OF DEPOSITION: JULY 12, 2024

[illegible]

Deponent's Signature

Date_____

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Declaration Under Penalty of Perjury

I, AKBAR M. SAYEED, Ph.D., the witness herein,
declare under penalty of perjury that I have read the
foregoing in its entirety; and that the testimony
contained therein, as corrected by me, is a true and
accurate transcription of my testimony elicited at said
time and place.

Executed this _____ day of _____ 20____, at
_____, _____.
(city) (state)

AKBAR M. SAYEED, Ph.D.

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REPORTER'S CERTIFICATE

-000-

I, LYNETTE M. NELSON, CA CSR No. 11585, OR CSR No. 250121, TN LCR No. 896, RPR, CRR, CCRR, CRG, duly licensed and qualified in and for the State of California, Oregon, and Tennessee, do hereby certify that there came before me on the 12TH day of JULY, 2024, via web videoconference, the following named person, to-wit AKBAR M. SAYEED, Ph.D., who was duly sworn to testify the truth, the whole truth, and nothing but the truth of knowledge touching and concerning the matters in controversy in this case; and that he was thereupon examined under oath and his examination reduced to typewriting under my supervision; that the deposition is a true record of the testimony given by the witness.

I further certify that pursuant to FRCP Rule 30(e)(1) that the signature of the deponent:

() Was requested by the deponent or a party before the completion of the deposition;

(X) was not requested by the deponent of a party before the completion of the deposition.

I further certify that I am neither attorney or counsel for, nor related to or employed by any of the parties to the action in which this deposition is taken, and further that I am not a relative, employee of any

1 attorney or counsel employed by the parties hereto, or
2 financially interested in the action.

3 CERTIFIED TO BY ME on this 17TH day of JULY, 2024.

4 
5

6 LYNETTE M. NELSON,
7 CA CSR No. 11585, OR CSR No. 250121,
8 TN LCR No. 896, RPR, CRR, CCRR, CRG,
9 REALTIME SYSTEMS ADMIN.
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-	2020 9:15	6	21:13,16,17,19 26:20 27:4 47:2
-o0o- 5:2	2022 9:15,24	6 32:13 38:7 39:24 40:4, 9,11 41:10,13 47:8	abstract 46:2
0	2023 9:17,24,25	61 45:25	accelerometer 15:17 33:19,20,25 34:2
091 6:13 15:9 17:13 19:3 20:22 22:3 25:11,14 26:3,9 27:9 32:12	2024 5:1	62 46:3	accelerometers 33:23
1	25 46:3	67 15:25	access 7:7,9
1 38:6,11 39:3 46:4 47:23	3 38:7,8,18 39:16 40:7,18 41:3 42:10,18 43:4,21 45:25 46:2,15,22 47:6	7 39:12,20,22,23 46:3	accidentally 52:7
10 10:8 32:13 46:4 47:23	32 46:15,17,22	70 48:18	accordance 43:9
101 7:6	4 40:6,8 46:3 47:8	72 48:21	accuracy 15:13 16:23
103 7:6	42 46:21	73 48:18	accurate 9:4
104 7:6	43 43:2	8 15:10,23,24	accurately 9:1 28:2
105 7:6	44 42:10 45:15	9 46:4	achievable 43:17
106 7:6	45 46:22	A	achieving 45:20 48:25
107 7:6	46 43:4,21	A-K-B-A-R 5:21	acoustic 16:11 17:14,20 18:4,5, 17 22:7,17 23:2,5,8,13, 14,22 24:7,12,19 25:2 35:20,25 36:2 38:1 44:19
108 7:6	49 42:18	A-Y-E-E-D 5:23	acoustic-based 16:17 21:22
10:01 5:1	5 50 42:10	A.M. 5:1	acoustic-noise 16:10
11 47:23	52 15:25	ability 43:14 45:21	activate 52:7
12 5:1	54 43:4,21	absence 19:25 20:6 21:18 27:18 29:19,20	activated 30:2
15 10:8	57 45:25	absent 12:16,23 13:1 17:5	activity 11:5,8,13,20 12:16,23 13:13,18 17:5 18:15,22 19:9 22:9,24 26:19 27:3,9 28:19 32:23
18 32:13 46:4			actual 11:12,14,20 18:16,25 25:25 39:5
2 38:11,17 40:1			

adapt 47:5	5:12,21 18:8,11	5:5	broke 24:17
adaptation 39:13 47:11 48:1,10	Alcivar 34:9,17 52:6,18	attorney 5:18	Burnett 14:22 30:19
adapted 38:13	algorithms 22:7,16	attorneys 10:20,22	butter 35:19
Adapter 39:24 40:7	Alia 5:5	avoid 48:23	
adaptive 37:24 38:2,6,7,8,12,18 39:1,16 40:3,9,10,17,19 41:3,10,13 43:7,19,24 44:8,20,25 46:23,24 47:6,8 50:16	alter 39:4	B	C
add 48:15	alternative 48:13	back 9:14 14:24 17:2 25:1 32:10 53:14	calculators 47:21
added 43:25	ambient 11:15	background 19:13 28:22 29:20 35:17 36:5	cancellation 17:17,23 35:11,14,18, 24 36:8,25 37:11 43:25 44:9
additional 40:20 41:5,16	amount 37:16	bad 41:21	canceler 43:12,13 45:19 46:8,10, 18
addresses 50:18	amplitude 36:23	Basar 5:5	canceled 43:14 45:21
adequate 43:17 44:9 45:22 48:3 49:15	annotated 7:8,11	based 18:20 22:7,17 40:11	cancellation 37:15
adjust 43:24 44:8	annotations 7:12	basic 12:5 18:14	capable 45:20
advance 48:24	answers 33:10	basically 10:10 25:20 46:21 47:4, 10	careful 22:12
afield 19:13	application 7:22	BEED 5:13	carries 17:24
agree 26:2,8 44:6	applications 6:24 7:14	big 17:22 35:16 44:12	case 7:8 9:18 12:9 19:22 30:1 36:11 38:14
agreed 48:17	apply 33:11	body 21:11	cases 11:21,23 23:5 29:25 30:4,6 43:6
agrees 47:16 48:19	arbitrary 32:24	boxes 47:22	categorize 21:22
ahead 18:11	argue 44:11	branch 38:9	causing 29:14
aimed 18:14 20:15 22:8 27:15 28:20 38:8	art 12:10 43:4,22 44:16 45:12 46:25 48:24 49:13,17	bread 35:19	caution 10:18
air 23:19,20,23	articulated 48:22	break 8:18,23 41:20 53:3	caveat 28:24
Akbar	aspect 15:2 26:16	breathing 52:6,18	CERTIFIED 5:13
	aspects 27:16	broad 24:24 25:4 51:2,3 52:2	challenging 45:13 50:2
	associate		

changing 25:25 39:3,9	commander 44:25	34:6 35:13,20,25 38:1 48:9 50:25 51:18	26:3,9
characteristic 43:16	commands 47:14 49:21	contexts 35:15,18	David 5:23
circuit 38:16 49:2	compared 37:8	control 44:20 50:16	day 53:17
circuits 44:21,22	complete 8:7 9:4	conventional 16:16 43:13 46:8,10,18	declaration 6:11,12 7:2,4 10:11,12 35:2 43:1 46:21 52:22
circumstances 29:18	completely 9:1 16:10	Conventionally 46:13	defines 38:13
claimed 35:5	complicated 38:22	convey 19:18 21:3 24:1	defining 20:10
claims 47:19	component 47:1	copies 6:10,15	definition 28:17
clarification 8:11	components 36:10	correct 7:11 9:10,11 52:12	delayed 40:1,5
clarify 8:12	computer 6:23	corrected 15:2	denoising 30:8
classified 13:22 14:8	conceivable 25:4	correction 43:16	depending 29:5 42:19,23 43:11 44:7
classify 20:18,22	conditions 47:5,10	correspond 14:15	depends 20:9,19 38:20
clean 41:12	conduction 34:4,15,16,18	court 8:5	deposed 6:3
cleaning 30:8	configuration 48:25	Cowell 5:6 10:17 11:1,18 12:17,24 13:19 14:18 15:7 17:6,11 18:8 19:5, 10 20:1,7,14 21:14,24 22:19 23:3,24 24:23 26:4,11,22 27:5,12 29:22 31:3,15,23 32:20 34:20 35:7 37:18 38:19 40:13,22 41:7,17 42:5, 24 44:10 45:5 46:9 48:5 49:10,25 50:9 51:1,16 52:1 53:4,10,14,16,20	deposition 5:1 6:4,24 7:4,9,20 8:2, 6 10:4,7,15,25
clear 27:25 50:15	considered 21:8		describe 49:6 50:6 52:12
clearing 29:25	consonant 14:10,13,14,17		describes 42:4 46:8
close 19:14	contact 23:10 24:22 31:11,19 32:16		describing 42:12,22 46:18
coefficients 38:13 39:3,9	contacted 9:18		description 17:13 46:7
Column 15:10,23,24 32:13 42:10,18 43:21 45:25 46:2,3,4,15,22	contends 43:22	create 29:1	desired 19:7,14,16 28:14,19 36:3,8,11 37:9,20,22 43:10 46:25 51:15,25 52:9
combination 16:20 40:20 41:5,15	contents 6:11,12 10:19	created 52:4	
combined 35:3	context 6:8 9:25 11:10,12 12:1, 8 14:24,25 19:3 21:12 22:1 24:2 25:10,13,17 26:18 27:2,7 28:18 30:8,23,25 31:6,9 33:22	critical 15:13 16:23 17:17	details 30:17
command 43:7 44:24 48:1		D	detect 12:15,22 13:6,8,9,25
		date	

15:6 16:6 17:4,10 18:24,25 20:13 21:12, 17 22:23 26:19 27:3,11, 22 28:1,4,9,22 29:6,13, 21 detected 15:19 21:8 29:9 30:2 detecting 11:12,19 15:1,4,18 17:15,21 18:4,14,18,19 20:15,20 21:4,10,17,19 22:9 27:16 28:20 31:1 detection 11:5,8 15:12 16:23 27:9 29:10 32:4 detector 16:5 detects 13:1 29:16 determine 16:14 determined 16:16,18 determines 39:4 device 6:23 16:9 19:17 24:6 devices 22:4 51:8 diaphragms 18:20 difference 13:17,24 differences 36:15 difficult 42:22 43:6 44:14,16 45:3 47:13 49:7 50:8 difficulty 46:16 direct 12:11 18:10 23:10 24:21 directly 23:7,14,17 24:8,13,20 33:8	directory 7:7 discloses 45:17 discuss 46:20 discussed 43:1 discussion 37:13 discussions 10:19,21 distance 23:9 51:6 distinction 14:24 22:1,11,14 distortion 43:15 45:22 diver 52:18 divulge 10:19 document 48:15 documents 10:13 drawback 43:3 drawing 22:14 DULY 5:13 E E1 39:12 40:8,11 41:14 E2 39:11,15,19 40:18 41:4 earlier 27:21 28:13 53:21 early 9:15,16,24,25 electromagnetic 25:7,15,16,21,22,24	32:11 electromagnetic-based 30:16 embodiment 16:1,4 enable 44:20 end 7:21,22 9:15 37:5 53:17 ends 46:16 energy 15:11,20 16:12,22 17:13,16,24,25 entirety 6:13,14 environment 16:12 estimator 38:15 46:2 49:1 estimators 47:21 EXAMINATION 5:15 53:19 EXAMINED 5:14 Exhibit 7:6 experience 11:25 12:3 expert 6:7 explain 13:17 15:5 18:5 35:24 50:24 explains 46:23,24 explicitly 12:4 45:13 explosion 28:24 extent 13:1,16 14:2 29:13 32:2,6	external 11:15 29:6 49:20 F F2 39:25 Fabricant 5:6 face 49:13 factors 45:9 fair 8:16 12:15,22 14:12,16 17:4,7 21:21,22 26:18 27:2 29:18 31:13,21 32:18 33:25 34:1,18 37:10,14 40:3,10,17 41:3,8,13 51:14,23 52:2 faithfully 19:18 21:3 familiar 52:24 far-field 50:22,24 51:14,23 52:13 feel 18:13 field 51:4,5,6 52:20 figure 37:2 38:5,6 46:4 47:23 figured 41:24 figures 6:13,16,18 filed 49:17 files 7:8,9 filter 36:22 37:24 38:2,7,8, 13,18,24 39:1,3,4,11, 13,16,24 40:4,7,9,11, 18,19 41:3,10,13 43:19 47:6,8
---	---	---	---

filters 38:6 43:7,24 44:9,20,25 46:24 47:6,24 50:16 final 22:23 find 45:15 focus 39:15 folks 9:19 form 11:18 12:17,24 13:19 14:18 15:7 17:6,11 18:9 19:5,10 20:1,7,14 21:14,24 22:19 23:3,24 24:23 26:4,11,22 27:5, 12 29:22 31:3,15,23 32:20 34:20 35:7 37:18 38:19 40:13,22 41:7,17 42:5,24 44:10 45:5 46:9 48:5 49:10,25 50:9 51:1,16 52:1 formed 40:20 41:5,15 free 16:10 frequency 16:5 32:10 FRIDAY 5:1 front 6:9,19 38:23 full 5:19 41:11 fully 15:19 function 16:11 22:8 35:4 G gave 27:22 GEMS 25:8,10,12,13,19,20 26:2,8,13,19 27:3,11,15	general 25:7 generally 10:2 21:18 33:13 37:19 45:13 generated 18:23 generating 52:9 generation 20:17 gist 31:25 44:12 give 15:22 30:17 33:14,16 53:10 goal 22:23 37:5,10,12,21 48:19,25 good 5:17 9:13 15:13 16:24 43:25 Google 7:16 Grace 5:3,17 ground 8:2 H hand 17:23 happen 29:8 happening 22:10,24 30:7 hard 6:10,15 21:17 47:18 Hastings 5:3 head 13:24 headset 21:1	hear 18:1 37:9 heard 11:4,10 25:7,10,13,15 30:10,11,21,23 33:5,6, 19,22 34:4 35:11,13 37:24 hey 50:1 home 5:25 9:7 hour 41:24 hours 10:8 huge 28:24 human 11:22 16:7 I idea 41:22 identification 43:3 Ikeda 6:13,16 22:10 35:3 38:5 42:3,9,11,12,17,22 43:3,21,22 44:4,6,12 45:10,12,17 46:1,8,24 47:23 48:12,14,22 49:12,14,23 50:1,4,14 53:24 Ikeda's 46:6 48:19,23 illustration 38:3 important 8:6 importantly 50:17 include 53:24 includes 19:20,24 20:5 49:1	including 10:11 incorporated 35:1 incorrectly 47:8 indirectly 23:18 induced 29:4 influenced 28:2 information 20:16 21:5,10 22:5,15 23:18 24:9,13,20 33:18 43:24 47:25 innovation 47:24 48:14 49:18 input 38:18,21,24 39:2,5,10, 15 40:8,10 inputs 39:7,8,23 instance 29:9 instances 48:3 insufficient 43:25 intelligible 17:18 interchangeably 36:18 interest 19:7 interested 19:16 32:23 36:7 interferometer 16:6 interpret 22:22 interruption 16:2 invent 35:6,8,9
--	---	--	---

invention 45:19 47:20 48:16,20 49:17	16:8 31:9	means 35:24	misplaced 28:5
inventions 25:18	lines 43:21 45:25 46:22	measure 23:17 24:8,13,20	missing 13:4 27:6 33:4
involving 12:7	listening 25:22	measurement 16:13	modality 29:5
IPR 10:1	literally 37:1	measurements 38:14	modifications 23:16
IPRS 10:2	LLP 5:6	measures 22:15	modified 23:6,10 24:8 25:3
	located 43:12	measuring 18:21,22 22:5 23:5,7,9, 22 24:10 25:24 31:1 32:22 36:2	modify 24:12,19
J	long 23:22 32:21 33:2	medications 9:3	morning 5:17
Jacob 9:22	looked 25:3	memory 14:5 33:16	motion 16:7 25:8 29:15,20
Jawbone 9:10,12,19,20 35:6,8,9	lost 24:2	mentioned 14:7 34:10 39:19	movement 19:1 23:7 25:25
JULY 5:1	lot 53:22	mentions 52:18	Muhammad 5:22
K	M	Meta 5:4,18	N
key 47:20,23 48:14,16	M-U-H-A-M-M-A-D 5:22	method 22:4 44:18 45:15 47:19	N(z) 47:1
kind 25:21,23 27:14 28:5,11	Madison 6:2	methods 16:17 17:14,21 18:4,6, 17,24	naturally 29:4
L	mailer 7:17	micro 7:1	near-field 51:15,24 52:3,11
label 20:19	make 14:20 17:17 22:11 28:6, 8,25 32:8 47:22	microphone 23:2,9,13,14,22 24:7, 12,19 34:5,15,16,19 36:4 38:10,11,17 40:1 47:17	necessarily 18:1 24:1 33:12
large 29:19	makes 38:12	microphones 18:19 23:6 25:2 36:10 44:19 51:8	needed 43:24
larynx 21:11	manner 53:25	middle 5:22	negligible 47:2
late 9:24	markings 6:20	minute 18:8	noise 11:16 15:14 16:12 17:17,23 19:4,9,14,21, 25 20:3,5,10,13,18,22 21:8,13,16,17,19 27:11, 17,18,22 28:3,4,9,12, 14,21 29:7,13,21 30:4 35:11,13,18,20,24,25 36:8,15,23 37:6,11,14, 15,16,21,22 38:1,9,15 43:10,12,13,14,25 44:9, 21 45:19,21 46:1,8,10,
LCR 6:14	material 10:11 33:16	minutes 53:11	
learning 42:13,23 43:8,17,19 45:4,23 46:7,16 48:3 49:8 50:7	mathematically 37:1		
level 43:9	matter 5:18		
limited	meaning 47:14		

18 47:1,7,9,21 50:22,24 51:7,14,15,23,24 52:3, 8,11,13,20 noise-suppression 16:24 nonacoustic-based 21:23 normal 23:4,8 29:18 note 48:18 noted 46:2 notes 6:20 53:11 nuance 29:24 number 15:22 50:17	occurs 45:3 49:7 office 5:25 9:7 open 6:25 7:2,10,14,21,22 opens 46:17 operate 37:15 opposed 11:15 18:24 order 49:6 originally 15:16 Ostling 9:22 output 37:16,19 38:16,17,23 39:2,12,19,24,25 40:7 owner 5:7 48:7	50:14 patents 7:5 10:12 25:17 Paul 5:3 PDF 7:2 34:10 PDFS 7:5,10,13 pending 8:21 perform 42:22 43:8 45:3 49:8 performance 15:14 16:24 person 52:8 petition 6:11 7:3 10:11 35:3 petitioner 5:4 47:15,16 Ph.d. 5:12 phrase 36:13 42:18 phrasing 43:3 physical 12:5 physically 29:8 physiological 13:14 18:15,22,25 20:16 21:5,10 22:5,15 23:18 24:8,13,20 27:16 29:5,10,11,15,20 31:7, 21 32:3,6,18 34:1,17 physiologically 31:13 picked 36:10 picked-up 36:10 picking 51:8	picture 17:22 piece 7:23 place 34:8 46:12 places 44:23 play 13:7 22:2 point 7:20 45:10 46:11 53:6 pointer 33:15 portion 42:3 POSITA 48:22 possibly 25:17 potentially 30:3,5 practice 19:23 prepare 10:4,9 26:15 preparing 10:6,14,24 presence 27:18 present 12:16,23,25 17:5 20:13 26:20 27:4,11,22 45:18 pressure 18:23 23:19,20,23 pressures 23:5 prevent 8:25 9:3 previous 20:23 36:14 primarily 19:16 principle
O object 40:13 45:18 Objection 11:18 12:17,24 13:19 14:18 15:7 17:6,11 18:8,9 19:5,10 20:1,7, 14 21:14,24 22:19 23:3, 24 24:23 26:4,11,22 27:5,12 29:22 31:3,15, 23 32:20 34:20 35:7 37:18 38:19 40:22 41:7, 17 42:5,24 44:10 45:5 46:9 48:5 49:10,25 50:9 51:1,16 52:1 objective 11:22 19:17 21:3 22:23 28:11 52:16 obtaining 43:23 obviates 50:18 occur 47:11 48:1 occurring 11:13,14,21 13:15 16:15 22:9 39:11	P pages 6:21 paper 7:23 papers 6:9,19 12:13 paragraph 15:25 42:21 45:15 46:15,17,21 48:18,21 part 32:7,19 33:3 34:2,19,22 35:16 48:20 partly 13:2 14:23 40:12,15 pass 53:7 patent 5:7 6:13,14 19:3 22:3 25:11,14 26:3,10 27:9 30:19,20 32:12 48:7		

20:2 principles 12:5 prior 12:10 43:4,22 44:16 45:12 46:25 48:24 49:13 priority 26:3,9 problem 17:23 44:14 45:16 49:16 problems 44:16 proceeding 52:22,24 processed 37:7 39:10,16 processes 38:25 processing 22:7,16 35:16,19 37:8 38:11 40:4,5,18,19,21 41:4,6,14,16 produced 19:18 production 16:8 18:16 27:17 28:2 program 7:21 programs 6:25 7:14 proposing 44:18 47:12,19 48:8,13 49:18 provide 8:7,22 14:4 24:10 33:17 45:19 provided 6:7 providing 9:4 proximity 16:17 pull	34:12 purpose 11:17 37:13 43:20 purposes 32:5 36:7 Q question 8:7,10,14,15,21,22 9:13 12:18 14:3 20:24 21:16 22:20 24:24 25:5 26:5, 23 27:14,19,23,24 28:4, 5,7 31:17 32:15 40:24 41:11 44:1,3 50:11 51:3,18,19 52:15 questions 17:3 31:25 53:7,16,22 quick 41:20 53:3 quickly 53:11 quotes 43:23 R radar 25:23 radio 16:5 32:10 radio-based 30:16 radiovibrometer 30:10,11,13 range 25:24 rare 29:7,16 ratio 38:15 44:21 46:1 47:21 reach 43:18 read 15:10 17:12 46:19 47:2 50:4	reading 15:23,24 48:20,22 reality 20:3 reasons 50:17 recall 27:23 28:13 42:3 53:21, 22 recess 42:1 53:5,15 record 5:20 41:12,25 53:2,14 recount 13:23 redirect 53:12 reduce 36:22 37:15 reducing 38:8 45:21 refer 11:8 14:9,13,17 18:3 42:12,25 46:11 reference 34:9 referred 45:12 referring 22:4 33:15 34:8 43:5 46:12 refers 42:11 44:6 reflections 25:22 refresh 14:5 33:16 regard 22:11 31:8 51:12 regular 17:14,20 18:3,5,17,19, 24 related 7:9 10:2,12 18:15 20:16 21:5,11 22:4,6,15 36:5	relevant 10:10 12:10 17:12 31:6, 7,12,20 32:17,22 34:1, 17 remember 9:21 REMOTE 5:1 removal 36:16 remove 37:3 removing 35:20,25 36:9,13 38:1 repeat 12:18 26:5,23 31:16 40:23 44:1 51:19 repeatedly 44:23 rephrase 32:15 41:2 44:3 51:21 reporter 5:14 8:5 representing 5:4,7,18 require 49:8 research 12:7 14:4 26:14 researched 24:25 response 25:25 restricted 31:5 result 13:13 37:5 retained 9:10,12,24 retainer 9:20 review 14:20 reviewed 10:10 52:21
---	--	--	--

RF 16:9,13,19	24,25 31:2,4,11,14,19, 22 32:2,6,12,16,19 33:11	similar 16:19 25:23 32:11	51:10
Rich 11:1	sensors 16:20 25:16 33:9 43:23 48:24	simple 16:12	specifically 22:4 42:9
Richard 5:6	sentence 42:21	site 34:12	speculation 45:8 49:9,11
role 48:23	sentences 42:11	sitting 5:24,25 50:6	speech 11:14,21,22 13:6,9,12, 18,25 14:1,9,13,15,17 15:1,5,6,12,15,19 16:7, 14,15,22,25 17:10,14, 16,18,21,24 18:5,15,18 19:6,18,20,24 20:6,17 22:6,16 28:1 29:14 30:8 36:4,6,7,12 52:17,19
room 9:8	separate 51:24	situation 29:3,7 42:19,23 43:11 44:7 45:3 49:7,15 50:7	spell 5:19
rule 24:17	serve 35:4	situations 37:4 44:8	spend 10:6
rules 8:2	setting 6:8	size 38:16 39:2 44:22 47:21 49:2	stand 15:2
S	short 25:23	skin 21:11 23:7,15 24:9,14, 21,22 28:25 31:8,12,20 32:17	start 24:18
S(z) 47:1	SHORTHAND 5:13	softer 17:25	started 9:16,25
Sam 5:23	show 38:3	solution 50:3,18	starting 42:10
Sayeed 5:12,23,24 11:4 41:19 42:3 52:21 53:8,17	shut 7:17	solve 45:16	state 5:19 46:23 49:16 51:5
scenarios 30:3	signal 16:9,13 19:7,14,16,20, 24 20:5,10,18,22 28:14, 15,19 32:3 35:16,19 36:2,8,11 37:3,6,7,9,16, 20,22 38:9,10,11,15 39:5,11,19 40:2,4,11, 18,19 41:4,14,15 43:10, 11 44:21 45:22 46:25 47:7,9,20,25 51:15,25	someone's 52:5	stated 35:2 45:15
scope 18:9	signal-to-noise 49:1	sound 18:18,19,23 23:9,19,23 24:10	statement 46:16 50:12
screaming 19:12	signaled 46:1	sounds 11:16 13:22 14:8,9,13, 14,17	states 47:8
searching 34:7	signals 11:15 22:7,17 25:21,23, 24 35:21,25 36:3,5,10 38:2 39:12 44:19 47:17 50:19 51:9,24 52:4,8,9, 11,12,19	source 51:7 52:8	stating 47:10 50:14
section 43:4 46:20	significant 17:24	speak 10:24 21:5	stenographer 5:10 16:2
sections 16:18 42:13 43:18 45:23 48:3		speaker 52:5	step 38:16 39:2 44:21 47:21 49:1
sense 23:4,8 28:6,8 32:6 52:3		speaking 11:14 19:12 20:11 21:4, 7 28:20 36:3,25 37:19	Stern 48:17,18 52:25 53:25
senses 34:1		specific 13:21 20:23 28:18 33:15 34:8 42:7 46:12	Stern's 6:12 7:3,4 10:12 52:21
sensing 29:10 31:5,6,12,20 32:2,17,22 34:17			
sensor 16:19 25:8,12 30:16,21,			

strictly 20:10 36:25 strike 13:8 21:21 35:23 42:17 44:4 49:5 strong 36:24 stuck 18:13 stuff 52:6 subtle 21:25 subtlety 13:7 subtract 37:1,2 subtractor 38:23,24 39:12,20,22, 23 40:6,8 sufficient 43:14,15 45:14,20 suggest 30:15 suggests 53:25 summarizing 47:4 summer 5:4 suppose 28:18 supposed 14:25 15:18 supposedly 21:9 suppressing 36:9,13 38:9 suppression 15:14 36:15,21 37:11, 15 sworn 5:8,13 system 46:25	T tab 7:17 table 6:11,12 tabs 6:20 takes 40:6 taking 29:8 talk 8:8 10:14 talked 9:22 talking 10:1 27:21 50:25 tangentials 18:13 taught 12:4 teaching 12:2 44:23 48:12 49:19, 20 50:15 technical 35:17 39:6 technicalities 24:3 technically 36:19 technological 45:9 term 11:4,7,10 30:12,15 33:6,9 34:4 terms 9:19,20 17:17 22:22 testified 5:14 6:5 testifying 9:1 testimony 6:7 9:5 17:9 28:13 48:2, 6,10 49:4,6	text 6:17 thing 30:1 47:3 things 14:11 18:20 45:7 52:7 thinks 49:19 50:17 throat 29:25 tied 46:7 time 8:18 9:16 10:6 14:4 26:13 38:14 45:11 49:17 53:8 tissue 16:6 18:16,25 24:9,14, 21,22 26:1 34:4,15,16, 18 title 34:14 today 5:24 9:1,5 10:1 17:9 33:10 50:6,25 53:21 today's 7:20 10:4,7 top 13:23 38:9 topic 25:1 touching 23:14 tract 31:8,12,20 32:17 transcribing 8:5 transcript 7:4 transducer 33:6,8,11,14 transducers 33:5,7 trigger 29:2	true 41:10 truthful 9:4 truthfully 9:1 type 45:2 49:4,7 typically 11:20 29:15 36:1 44:15 U ultimate 37:10,21 understand 8:10 12:5 13:16 42:21 48:23 51:18 understandable 17:19 understanding 13:11 14:1 23:6 25:19 26:1 44:13 45:2 46:6 50:21 understood 8:15 undesired 52:12,13,14 unique 48:25 unusual 29:3 unvoice 13:5 unvoiced 13:9,12,23,25 14:1,8, 13,15,17 15:1,5,6,12,18 16:15,22 17:10,14,16, 21,24 18:4 update 47:24 updated 46:25 47:7,9 user 19:18 utilize
--	--	---	--

34:15	19:9 22:9,24 26:19 27:3 28:19 32:23	
V	vowel 14:17	X
VAD 11:7,11,17,22,25 12:3, 7,15,22 13:1,6,8,9,25 14:25 15:4,5,18 16:1,4 17:4,9 20:13,15,20,25 21:4,9,12,16 22:3,14,16 23:2,13,21 25:12 26:18 27:2,15,22,24,25 28:1, 4,8,20,22 29:6,13,15,21 30:1,4 31:2,4,14,22 32:8,19 34:2,19,22 35:6,8,9 48:8 53:24,25	vowels 14:11	XA 38:10 40:4,5,11,20 41:5,15
VADS 12:4,13 17:15,22 18:5, 6,14,25 21:22,23 26:2, 8,12 27:7 33:22 53:22	W	XB 38:11,17,21,23 40:1,20 41:5,15
version 40:1	W1 39:12	Z
versus 22:16 51:5	wait 8:6	Zoom 7:15,18
vibrate 28:25	Wang 5:3,16,17 10:23 11:24 12:20 13:3 14:6 15:3,21 17:1,8 18:2 19:2,8,19 20:4,12,21 21:20 22:13 23:1,12 24:11 25:6 26:7,17 27:1,10,20 30:9 31:10,18 32:14 33:1 34:24 35:10 37:23 39:14 40:14 41:1,9,19, 23 42:2,8 44:2 45:1 46:5,14 49:3,22 50:5,20 51:13,20 52:10 53:2,6, 13,21	
vibration 16:5 18:16 24:9,14,21 29:5,11 30:16,21,23 31:2,4,11,14,19,22 32:3,6,12,16,19,21 33:5,6,10,11,14	waves 18:18,19,23 23:10,19, 23 24:10	
vibrations 13:14 18:21,22,23 31:1, 6,7,12,21 32:7,18,24 34:1,18	ways 24:12,19 25:2 30:7 32:4	
vibrometer 32:11	weak 13:15	
vocal 31:8,12,20 32:17	weaker 36:24	
voice 11:4,8,13,19 13:5 16:14,18 21:7 27:9,16	windows 7:2	
voiced 13:22,25 14:1,8 15:1,4, 15 16:25	Wisconsin 6:2	
voicing 11:13 12:16,23,25 13:13,17 16:19 17:5	wondering 28:10	
	work 12:12 28:16 49:19 50:2	
	working 9:16,25 11:25 12:3 29:6	
	written 12:13	