

UNITED STATES INTERNATIONAL TRADE COMMISSION

In the Matter of:	)	Investigation No.
CERTAIN AUDIO PLAYERS AND	)	337-TA-1330
COMPONENTS THEREOF (II)	)	

REVISED AND CORRECTED TRANSCRIPT OPEN SESSIONS

Pages: 1 through 372 (with excerpts)
Place: Washington, D.C.
Date: June 20, 2023

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1 UNITED STATES INTERNATIONAL TRADE COMMISSION
2 Washington, D.C.
3 BEFORE THE HONORABLE CAMERON R. ELLIOT
4 Administrative Law Judge

5 _____
6 In the Matter of:) Investigation No.
7 CERTAIN AUDIO PLAYERS AND) 337-TA-1330
8 COMPONENTS THEREOF (II))

9 _____
10
11
12 International Trade Commission
13 500 E Street, S.W.
14 Washington, D.C.

15
16 Tuesday, June 20, 2023

17
18 EVIDENTIARY HEARING - VOLUME 1
19 Courtroom B

20
21 The Hearing commenced, pursuant to the notice of the
22 Judge, at 9:00 a.m.

23
24
25 Reported by: Marjorie Peters, FAPR, RMR, CRR

1 accused products or the DI products, and just treat it as
2 an actual claim construction dispute.

3 I found myself being puzzled by why the parties
4 were assuming that I would apply the same ruling in these
5 other patents as I would in the '615.

6 Anyway -- okay. That's enough for now.

7 All right. Sir, I need to swear you in.

8 ALEX GRUENSTEIN, PhD,
9 having been first duly sworn, was examined and testified as
10 follows:

11 MR. NELSON: May I proceed, Your Honor?

12 JUDGE ELLIOT: Go ahead.

13 DIRECT EXAMINATION

14 BY MR. NELSON:

15 Q. Good morning, sir. Could you state your name
16 for the record, please.

17 (Clarification requested by the Realtime Stenographer.)

18 Q. Could you please state your name for the record.

19 A. It's Alexander Houston Gruenstein.

20 Q. I think you might want to get a little closer in
21 there.

22 Sir, can you tell us where you live, please?

23 A. I live in Mountain View, California.

24 Q. And where do you work, currently?

25 A. At Google.

1 Q. So what's your current job position, your
2 current title at Google?

3 A. I'm a senior director of engineering.

4 Q. Just tell us generally where that fits in the
5 organization, what a senior director of engineering is.

6 A. Well, specifically, I work on the Speech Team at
7 Google.

8 Q. So let's go back. Can you tell us a little bit
9 about your background. Where are you raised, sir?

10 A. I was raised in California.

11 Q. All right. And how about college, did you
12 attend college?

13 A. Yeah. I went to Stanford, and I got a
14 bachelor's and a master's at Stanford.

15 Q. Okay, so can you tell us what those -- the
16 bachelor's degree -- let's start there. What was the
17 subject matter of that?

18 A. Both the bachelor's and the master's were in
19 something called symbolic systems.

20 Q. Can you just tell us generally what symbolic
21 systems are?

22 A. It's an interdisciplinary major of computer
23 science, psychology, linguistics, philosophy, and I focused
24 on artificial intelligence for both of those degrees.

25 Q. So did the work at Stanford, the educational

1 work that you talked about, did that include anything with
2 speech recognition technology?

3 A. Yes. It was included in some of the classes,
4 and I worked as an undergraduate in a research lab on
5 speech recognition.

6 Q. So beyond your master's degree -- your
7 bachelor's and master's degree you told us about, do you
8 have any additional educational degrees?

9 A. Yes. I have a PhD from MIT in computer science.

10 Q. Now, did you have any particular focus in your
11 PhD studies?

12 A. I studied speech recognition.

13 Q. Did you do a PhD, I think it's dissertation,
14 they call it?

15 A. I did, yes.

16 Q. Can you tell us what the -- not necessarily the
17 title, but the subject matter of that PhD dissertation was?

18 A. Yeah. It was about building conversational
19 systems, multimodal conversational systems, similar to, you
20 know, what's evolved into things like the Google Assistant
21 today.

22 Q. When you say multimodal, can you just tell us
23 what you mean by that?

24 A. Yeah, you could both speak to them. You could
25 also, like, tap on a screen or draw on a screen, and they

1 would speak back to you and also show you graphical
2 information.

3 Q. So what year was the PhD that you received?

4 A. I finished in 2009.

5 Q. And did you do any work, any internship during
6 the time you were getting your PhD?

7 A. I did several internships; one was at Google in
8 2008.

9 Q. The internship, did you have any particular area
10 where you were working in that internship?

11 A. I worked on Voice Search, speech recognition for
12 Voice Search.

13 Q. Where did you go to work after receiving your
14 PhD in 2009?

15 A. I went to Google.

16 Q. You told us a little bit earlier you're on the
17 Speech Team now. Where did you start when you were at
18 Google?

19 A. I started on the Speech Team, so I've been there
20 almost 14 years now.

21 Q. So then, can you tell us a little bit about
22 what -- when you refer to the Speech Team, what the Speech
23 Team is at Google?

24 A. Yeah, the Speech Team works on different speech
25 processing tasks, so things like speech recognition,

1 text-to-speech synthesis, hotword detection, speaker
2 identification.

3 Q. So you've mentioned you were a senior director.
4 As a senior director, how many folks do you manage at
5 Google?

6 A. My team is currently about 150 people.

7 Q. And by -- the team that you talked about, what
8 kind of technologies does that team work on at Google?

9 A. We work on a few different technologies; one is
10 hotword detection, another is on-device speech recognition.
11 We also work on things like speaker identification, and a
12 few other areas.

13 Q. So you mentioned Google Assistant. Can you just
14 tell us generally what Google Assistant is, please?

15 A. Yeah. It's a voice forward conversational agent
16 that can help people do tasks. It's built into -- or
17 accessible via different hardware devices like Nest
18 speakers and smart displays, Android phones, watches,
19 headphones, TVs, a lot of different devices.

20 Q. Now, does Google Assistant run on or can it be
21 used with any Google products, hardware products?

22 A. Yes, various Google hardware products.

23 Q. So what are some examples of those?

24 A. So like Nest speakers and smart displays, for
25 example, Android phones, Google TV. Those are a few

1 examples.

2 Q. So you mentioned Nest speakers. Are you
3 familiar generally with the Google Nest speakers?

4 A. Yes.

5 Q. So do you know whether the Google Nest Hub, the
6 Hub Max, the Audio, Mini and WiFi point support the Google
7 Assistant software that you talked about?

8 A. Yes, they support Google Assistant.

9 Q. So can you give us an example of a kind of voice
10 command that a user might make using the Google Assistant
11 and the speaker?

12 A. Sure.

13 They might say, "Hey Google, what's the weather
14 today?" And then the system would respond verbally with
15 today's forecast, or on a smart display it might, you know,
16 show an image of today's forecast, as well.

17 Q. So are the speech technologies that -- the team
18 you talked about that you manage works on, are those
19 incorporated into Google Assistant to allow that function
20 of that example you just gave?

21 A. Yes.

22 Q. Now, the Speech Team you talked about, is that
23 part of the Google Assistant Team at Google?

24 A. It is currently part of the Google Assistant
25 Team, yes.

1 Q. And so, do the Google Nest products that I
2 talked about a moment ago, do they use the speech
3 technologies that your team works on?

4 A. Yes.

5 Q. Okay. And -- so you talked about an example of
6 "Hey Google, what's the weather?" So what would be some of
7 the technologies that your team works on that would be used
8 to respond to a query like that?

9 A. Hotword detection, speaker identification. On
10 some devices, on-device speech recognition. We also do,
11 like, multi-microphone signal processing enhancement to
12 improve the accuracy and noise.

13 Those would be some of the technologies.

14 Q. So you mentioned hotword detection; can you just
15 tell us generally what you mean by that and how that fits
16 into this process?

17 A. Sure.

18 That's the process by which the devices will
19 process audio. And then when somebody says "Okay Google"
20 or "Hey Google" to trigger the device, that will initiate
21 an interaction with the device.

22 Q. Another thing you mentioned was the on-device
23 speech recognition. Can you tell us how that fits into the
24 process?

25 A. Sure.

1 So after you say the hotword, on some of those
2 devices, audio will be sent to on-device speech recognition
3 on the Nest devices. It can also be sent to the server for
4 speech recognition to then transcribe the query. So like
5 in the example "what's the weather," it will then
6 transcribe the words "what's the weather."

7 Q. So I'd like to go to your binder and talk about
8 a few documents here.

9 MR. NELSON: And here, Your Honor, I'd need to
10 go on the confidential record.

11 JUDGE ELLIOT: Very well.

12 MR. NELSON: And this will be for Google.

13 JUDGE ELLIOT: Very well.

14 (Whereupon, the trial proceeded in confidential
15 session.)

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1 O P E N S E S S I O N

2 BY MR. NELSON:

3 Q. So do you have JX-1 there in your binder?

4 A. Yes.

5 Q. Can you tell us what JX-1 is.

6 A. It's a patent.

7 Q. So if you go -- do you see the Patent Number US
8 11,024,311, do you see that?

9 A. Yes.

10 Q. Oftentimes we lawyers refer to those by the last
11 three numbers, '311 Patent. Is that all right?

12 A. Okay.

13 Q. So if you look at the top left, you will see
14 there up -- well, it's marked Field 72. There's a list of
15 inventors.

16 Do you see that?

17 A. Yes.

18 Q. Are you listed as one of the inventors?

19 A. Yes.

20 Q. Now, can you tell us what you and the other
21 inventors were working on when you came up with the
22 technology that's described in the '311 Patent.

23 A. We were working on the first Google Home smart
24 speaker.

25 Q. The Google Home smart speaker; is that right?

1 A. Yes.

2 Q. Okay.

3 Do you recall when that Google Home smart
4 speaker was first released?

5 A. 2016.

6 Q. If you go to page 12 of the '311 Patent, and you
7 will see Figures A and B -- 8A and 8B there.

8 Do you see that?

9 A. Yes.

10 Q. Can you tell us what those figures show.

11 A. A Google Home device.

12 Q. Now, did that original Google Home speaker
13 that's depicted here released in 2016, did that support
14 Google Assistant?

15 A. Yes.

16 Q. So can you just tell us what the problems that
17 you and your co-inventors encountered that led to the
18 '311 Patent.

19 A. Yes.

20 So the problems we encountered were if you had
21 more than one of these devices in your home, when you would
22 say the hotword, they would each respond to that hotword,
23 transcribe the audio, and then respond to you.

24 Also, if you had like an Android phone that also
25 had hotword detection, it might also respond to you.

1 So you could end up with several devices
2 responding to you maybe in slightly different ways at
3 approximately the same time.

4 Q. Why would that be a problem?

5 A. It's annoying and confusing.

6 Q. Is that a problem that you actually encountered
7 during testing for that original Google Home smart speaker?

8 A. Yes.

9 Q. So how did you and the other -- your
10 co-inventors go about solving that problem?

11 A. We tried to create an algorithm that would look
12 at different signals from hotword detection, and figure out
13 which device was the best device to respond, and then try
14 to only have that device respond.

15 Q. Now, did you have a term by which you reference
16 internally that algorithm?

17 A. We usually call that multi-device arbitration.

18 Q. Did the original 2016 Google Home smart speaker,
19 did it use that multi-device arbitration functionality?

20 A. Yes.

21 Q. Can you describe for us at a high level what
22 that functionality was in the -- that initial Google Home
23 smart speaker.

24 A. Yeah.

25 So what would happen was we would try to measure

1 the background noise from before the hotword was detected,
2 and then we would try to measure the volume level of the
3 hotword itself, and we would try to compute -- sort of
4 subtract out the background noise to isolate the volume
5 level of just the hotword.

6 We would send that information from each device
7 to the server, and then the server, based on that
8 information, would try to determine basically which device
9 the user was closest to, and then that device would
10 respond.

11 We'd also use some additional information, for
12 example, the contents of the query, so if you said "stop"
13 and a device was playing music, we might take that into
14 account in our decision.

15 We also had special rules to treat phones
16 differently from these smart speakers.

17 Q. You mentioned that information was passed up to
18 a server to do the arbitration.

19 Did you also consider doing the multi-device
20 arbitration locally on the devices?

21 A. We did.

22 Q. Do you know if the current Google Nest speakers
23 that we talked about earlier that support Google Assistant,
24 they implement this multi-device arbitration locally?

25 A. I believe there's a local component to it, yes.

1 CERTIFICATE OF REPORTER

2 TITLE: Certain Audio Players and Components Thereof

3 INVESTIGATION NO: 137-TA-1330

4 HEARING DATE: Tuesday, June 20, 2023

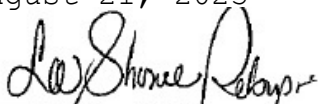
5 LOCATION: Courtroom B

6 NATURE OF HEARING: Evidentiary Hearing

7 I hereby certify that the foregoing/attached
8 transcript is a true, correct and complete record of the
9 above-referenced proceedings of the U.S. International
Trade Commission.

Date: August 21, 2023

10 SIGNED:

11 Signature of the Contractor of the
12 Authorized Contractor's Representative
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13

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