

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

		)	
LULULEMON ATHLETICA CANADA,		)	
INC., and LULULEMON USA,		)	
INC.,		)	
		)	
Petitioners,		)	Case IPR2023-00424
		)	Patent 10,923,225
vs.		)	
		)	
NIKE, INC.,		)	
		)	
Patent Owner.		)	
		)	

Videotaped deposition of HENRY H. HOUEH, Ph.D.,
Volume I, taken on behalf of Patent Owner, at 777 South
Figueroa Street, Los Angeles, California, beginning at
9:23 a.m. and ending at 3:41 p.m. on Thursday,
October 5, 2023, before ALEXIS KAGAY, Certified
Shorthand Reporter No. 13795.

1 APPEARANCES:

2
3 For Petitioner:

4 MORRISON & FOERSTER, LLP

5 BY: JEAN NGUYEN

6 BY: MEHRAN ARJOMAND

7 Attorneys at Law

8 707 Wilshire Boulevard

9 60th Floor

10 Los Angeles, California 90017

11 213.892.5295

12 Jnguyen@mofo.com

13 MArjomand@mofo.com

14
15 For Patent Owner:

16 ARNOLD & PORTER KAYE SCHOLER

17 BY: AARON P. BOWLING

18 Attorney at Law

19 70 West Madison Street

20 Suite 4200

21 Chicago, Illinois 60602-4231

22 312.583.2300

23 Aaron.Bowling@arnoldporter.com

1 APPEARANCES (Continued):

2

3 For Patent Owner:

4 ARNOLD & PORTER KAYE SCHOLER

5 BY: DAVE C. MCMULLEN

6 Attorney at Law

7 601 Massachusetts Avenue

8 NW

9 Washington, DC 20001

10 202.942.5000

11 David.McMullen@arnoldporter.com

12

13

14

15 Videographer:

16 STEVEN TOGAMI

17

18

19

20

21

22

23

24

25

INDEX

WITNESS

EXAMINATION

Ph.D. HENRY H. HOUH

Volume I

BY MR. BOWLING

8

EXHIBITS

NUMBER

DESCRIPTION

PAGE

Exhibit 1

Patent Owner's Notice of
Deposition of Dr. Henry H. Houh

10

Exhibit 2

Declaration of Dr. Henry H. Houh,
Ph.D.

11

Exhibit 3

United States Patent Riley et
al., Patent No. US 10,923,225 B2

19

Exhibit 4

United States Patent Application
Publication Acres, Pub. No. US
2005/0070809 A1

19

Exhibit 5

United States Patent Abbondanza,
Patent Number 5,527,239

20

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

Exhibit 6	United States Patent Application Publication Pyles, et al., Pub. No.: US 2005/0272564 A1	102
Exhibit 7	A Dictionary of Computing sixth Edition	119
Exhibit 8	United States Patent Houh, et al., Patent No.: US 7,801,910 B2	138
Exhibit 9	A Dictionary of Computing Sixth Edition	151
Exhibit 10	Wiley Electrical and Electronics Engineering Dictionary	161

1 Los Angeles, California, Thursday, October 5, 2023

2 9:23 a.m.

3
4 THE VIDEOGRAPHER: We are on the record at
5 9:23 a.m. on October 5th, 2023.

6 Please note that the microphones are
7 sensitive and may pick up whispers, private
8 conversations and cellular interference.

9 Audio and video recording will continue to
10 take place unless all parties agree to go off the
11 record.

12 This is media unit number 1 of the
13 video-recorded deposition of Henry H. Houh, Ph.D.,
14 taken by counsel for patent owner Nike, Inc., in the
15 matter of Lululemon Athletica Canada Inc. and
16 Lululemon USA Inc. versus Nike, Inc., filed before
17 the Patent Trial and Appeal Board of the United
18 States Patent and Trademark Office, IPR2023-00424.

19 This deposition is being held at
20 Arnold & Porter, located at 777 South Figueroa
21 Street, Los Angeles, California 90017.

22 My name is Steven Togami from the firm
23 Veritext Legal Solutions, and I am the videographer.

24 The court reporter is Alexis Kagay from the
25 firm Veritext Legal Solutions.

1 I am not related to any party in this action,
2 nor am I financially interested in the outcome.

3 If there are any objections to proceeding,
4 please state them at the time of your appearance.

5 At this time, will counsel and all present
6 please state their appearances and affiliations for
7 the record, starting with the noticing party.

8 MR. BOWLING: My name is Aaron Bowling of
9 Arnold & Porter appearing today on behalf of Nike
10 and with me is Dave McMullen, also of Arnold &
11 Porter.

12 MS. NGUYEN: And Jean Nguyen of
13 Morrison & Foerster appearing today on behalf of
14 Lululemon and here I'm with my colleague
15 Mehran Arjomand.

16 THE VIDEOGRAPHER: Thank you.
17 Could we please have the oath.
18 (Witness sworn.)

19 THE VIDEOGRAPHER: Thank you.

20 Ph.D. HENRY H. HOUH,
21 having been administered an oath, was examined and
22 testified as follows:

23
24 EXAMINATION

25 BY MR. BOWLING:

1 Q Okay. All right. Good morning, Mr. Houh.

2 Is that right, "Houh"?

3 A I say "Houh."

4 Q "Houh?"

5 A Yeah.

6 Q Mr. Hough. No problem.

7 Good morning, Mr. Houh. We just saw you
8 about a month ago, so we'll do a quick flyover. You
9 may remember this and -- and already know it, but
10 we'll do it just to be thorough.

11 Today, I'm going to be asking you a series of
12 questions. If there's anything you don't hear,
13 please let me know. I'm happy to repeat myself. If
14 there's anything you don't understand, also just let
15 me know. I'm happy to work with you to figure it
16 out what it is you don't understand.

17 But if you answer my question, I'm going to
18 assume that you heard me and you understood me and
19 that you're answering to the best of your ability.

20 Does that sound okay?

21 A Sure. I'll do my best.

22 Q Okay. Today's deposition is being
23 transcribed. So, if you could, please give verbal
24 answers. We'll both try and talk slowly and not
25 talk over each other. And if you can provide your

1 answer verbally, as I mentioned, instead of nodding,
2 that would be appreciated.

3 Sound good?

4 A I'll do my best thereto, yes.

5 Q Okay. We can take breaks whenever you'd
6 like. The only exception is that if I have a
7 question pending, I'll ask that you answer the
8 question and then we can go ahead and take a break
9 right after.

10 Does that sound all right?

11 A Yes.

12 (Exhibit 1 was marked for identification
13 by the court reporter and is attached hereto.)

14 MR. BOWLING: Okay. I'm handing you what
15 we've marked as Houh Exhibit 1. This is Paper No.
16 17 in the IPR proceeding.

17 Do you have a sticker?

18 THE VIDEOGRAPHER: Dr. Houh, I'm sorry, could
19 I ask you to move just a few inches to your left.

20 THE WITNESS: To my left?

21 THE VIDEOGRAPHER: Yeah. Thank you.

22 BY MR. BOWLING:

23 Q And Dr. Houh. I'm sorry, I think I said
24 "Mr. Houh" earlier. Apologies.

25 Do you recognize this document, Houh

1 Exhibit 1?

2 A Yes.

3 Q And what is it?

4 A It's a Notice of Deposition.

5 Q And you understand that you're testifying
6 today under oath?

7 A Yes.

8 Q And it's the same oath you would be under if
9 you were testifying in a courtroom?

10 A Yes.

11 Q Is there any reason that you can't testify
12 truthfully today?

13 A No.

14 (Exhibit 2 was marked for identification
15 by the court reporter and is attached hereto.)

16 MR. BOWLING: I'm handing you what we've
17 marked as Houh Exhibit 2.

18 THE WITNESS: Thank you.

19 BY MR. BOWLING:

20 Q Do you recognize this document?

21 A Yes, I do.

22 Q And what is it?

23 A This is a copy of the declaration I've
24 submitted in this case.

25 Q I'm going to ask you to flip to page 38 of

1 Houh Exhibit 2.

2 You can let me know when you're there.

3 A I'm there.

4 Q Okay. About halfway down page 38, you'll see
5 a -- a signature. Is that your signature?

6 A Yes, it is.

7 Q And it's -- there's a date, January 3rd,
8 2023.

9 Do you see that?

10 A Yes.

11 Q And you -- you finalized and submitted this
12 declaration on January 3rd, 2023; is that right?

13 A Yes.

14 Q As you sit here today, are you aware of any
15 inaccuracies in your declaration?

16 A There are actually a few typos I found.

17 Q Okay. Can you point me to those?

18 A Yeah. Page 36, at the bottom.

19 Q Okay.

20 A The -- the second and third from last lines
21 where it says "Acres" really should have said
22 "Abbondanza."

23 Q Okay. That's in the -- the second line from
24 the bottom, three words over?

25 A Yes.

1 Q Okay.

2 A And the third line from the bottom, like, the
3 fifth -- fifth word.

4 Q Okay. Got it. Any other typos you're aware
5 of?

6 A Not that I can recall right now, but
7 sometimes they turn up as I'm looking at it.

8 Q Okay.

9 A Or -- or I notice them. They don't --

10 Q Yeah, sure.

11 A -- actually appear at that time but --

12 Q If you notice anything today, will you let me
13 know?

14 A Yes, I'll do my best.

15 Q Okay. Thanks. Between January 3rd, 2023,
16 and today, have your opinions, as disclosed in Houh
17 Exhibit 2, changed in any way?

18 A No, they haven't.

19 Q Okay. And that -- that includes your -- your
20 ultimate conclusions and all the other subsidiary
21 opinions you provide in this declaration, none of
22 them have changed?

23 A No, they haven't changed.

24 Q Okay. I'm going to ask you now to turn to
25 page 12 of Houh Exhibit 2.

1 A Okay.

2 Q Do you see paragraph 30, the second paragraph
3 down from the top?

4 A Yes.

5 Q Do you see there's a header there that says
6 "Materials Considered"?

7 A Yes.

8 Q In that paragraph, you state, quote,
9 (as read):

10 "In performing my analysis and
11 forming the opinions below, I
12 considered the '225 patent
13 (Exhibit 1001), its prosecution
14 history, and other materials listed
15 as exhibits to the petition in this
16 IPR."

17 Do you see that?

18 A Yes.

19 Q Does that paragraph accurately describe all
20 of the materials you considered when forming the
21 opinions in Houh Exhibit 2?

22 A It should, especially when you consider
23 the -- the materials in the exhibits and all the
24 materials I cite within here as well.

25 Q Okay. Is there anything, as you're -- you

1 sit here today, that you're aware of, that you
2 considered as part of performing your analysis that
3 isn't listed in paragraph 30?

4 A Not that I can think of right now.

5 Q Okay. Between January 3rd, 2023, and today,
6 have you considered any additional materials related
7 to your opinions in Houh Exhibit 2?

8 A I -- I have reviewed additional materials
9 that have been filed in this case.

10 Q Okay. And what are those?

11 A I reviewed the patent owner's preliminary
12 response and the institution decision.

13 Q Having reviewed the patent owner's
14 preliminary response and the institution decision,
15 did your opinions, as expressed in Houh Exhibit 2,
16 change in any way?

17 A Not with respect to what I originally wrote
18 in this report.

19 Q Okay. Are there any opinions you have that
20 aren't included in this report?

21 A I -- I have thoughts about some of the --
22 what I've reviewed in the preliminary response and
23 institution decision.

24 Q Okay. We can go through those in a bit.
25 We'll come back to that.

1 Aside from the preliminary response and the
2 institution decision, are there any other materials
3 you reviewed between January 3rd, 2023, and today
4 that are related to the opinions you express in Houh
5 Exhibit 2?

6 A Yeah. I reviewed at least some of the
7 exhibits that were attached to the patent owner
8 preliminary response.

9 Q Okay. Do you remember specifically any of
10 those exhibits?

11 A At least one was a dictionary definition.

12 Q Okay.

13 A Or definitions.

14 Q Do you remember what dictionary?

15 A I think it was a Wiley, Wiley dictionary.
16 That's -- that's what I -- it may have been a very
17 specific type.

18 Q Okay.

19 A Like, electronics. I don't remember the
20 exact type of it.

21 Q Okay. Anything else?

22 A Not that comes to mind right now.

23 Q Okay. Dr. Houh, how did you prepare for
24 today's deposition?

25 A I reviewed a number of documents, and I met

1 with the attorneys.

2 Q Okay. When you say that you reviewed a
3 number of documents, are those the documents we just
4 discussed?

5 A Yes.

6 Q Anything that you reviewed that we haven't
7 discussed already?

8 A I did look at my deposition transcript from
9 our last deposition.

10 Q Okay. Anything else?

11 A That's all I can think of at the moment.

12 Q When you say the -- the dep- -- the
13 deposition transcript from the last deposition,
14 you're referring to the deposition in a different
15 IPR proceeding; correct?

16 A It's a -- it's related to the parties here,
17 at issue.

18 Q Sure.

19 A But that's what I'm referring to. It's maybe
20 the 220 patent.

21 Q Okay.

22 A I think that's the right number.

23 Q Okay. So you reviewed documents, which
24 included your deposition transcript and some of the
25 materials we talked about earlier, when we talked

1 about the materials you considered, and then you
2 said you also met with the attorneys.

3 How many times did you meet with your
4 attorneys?

5 A I think it was five times.

6 Q And which attorneys did you meet with?

7 A With Jean and Mehran.

8 Q Anyone else?

9 A No, I don't think so. I think briefly
10 with -- with Forrest.

11 Q Okay. When did those meetings take place?

12 A I think last Thursday. Sunday, Monday,
13 Tuesday and Wednesday of this week.

14 Q Okay. How long would you say each of those
15 meetings lasted?

16 A You want a combined number or -- or try to
17 think --

18 Q Either way.

19 A Probably somewhere in the order of 15 to
20 20 hours total.

21 Q Okay. And did you discuss today's deposition
22 with anyone else other than Jean, Mehran and
23 Forrest?

24 A No, I didn't.

25 MR. BOWLING: Okay. I'm going to introduce

1 just a handful of exhibits. We can get them all out
2 of the way.

3 (Exhibit 3 was marked for identification
4 by the court reporter and is attached hereto.)

5 MR. BOWLING: We're handing you what we've
6 marked as Houh Exhibit 3. This is also Exhibit 1001
7 in the IPR proceeding.

8 I have a fourth one. It's interesting stuff.

9 BY MR. BOWLING:

10 Q Do you recognize this document?

11 A Yes, I do.

12 Q And what is it?

13 A This is the challenged patent in this case.

14 Q And this patent -- can we call it the 225
15 patent?

16 A Sure.

17 Q This 225 patent is the patent that you
18 analyzed and rendered opinions on in your
19 declaration, Houh Exhibit 2; is that right?

20 A Yes.

21 (Exhibit 4 was marked for identification
22 by the court reporter and is attached hereto.)

23 MR. BOWLING: Okay. We're handing you next
24 what we've marked as Houh Exhibit 4. This is
25 Exhibit 1002 in the IPR proceeding.

1 THE WITNESS: Thank you.

2 BY MR. BOWLING:

3 Q Do you recognize this document, Dr. Houh?

4 A Yes, I do.

5 Q Okay. And what is it?

6 A This is the Acres PAM application publication
7 that I discuss in my declaration.

8 Q Okay. And for purposes of today, if I just
9 say the Acres reference, you'll understand that I'm
10 referring to Houh Exhibit 4?

11 A Yes, sure.

12 Q Okay.

13 (Exhibit 5 was marked for identification
14 by the court reporter and is attached hereto.)

15 MR. BOWLING: And we're handing you now what
16 we've marked as Houh Exhibit 5. This is also
17 Exhibit 1003 in the IPR proceeding.

18 BY MR. BOWLING:

19 Q Do you recognize this document, Dr. Houh?

20 A Yes, I do.

21 Q And what is it?

22 A This is a copy of the Abbondanza patent that
23 I also discuss in my declaration.

24 Q And for purposes of today, if I refer to the
25 Abbondanza reference, you'll understand that I'm

1 referring to Houh Exhibit 5?

2 A Sure.

3 Q Okay. Let's start with the Abbondanza
4 reference. I'm going to ask you to flip to page 4
5 of the Abbondanza reference. You'll see a figure 3
6 depicted there.

7 You can let me know when you're there.

8 A Okay. I'm there.

9 Q Okay. If you wouldn't mind, can you walk me
10 through your understanding of how the Abbondanza
11 invention works, at least as it's depicted in
12 figure 3.

13 A So figure 3 is -- is one -- one of the
14 embodiments. It's an example of one of the
15 embodiments that -- that is discussed here. And
16 they're all alternatives to what's in figure 3.

17 Q Okay.

18 A So if you want me to stick with figure 3,
19 I'll -- I'll do that.

20 Q Yeah, let's start with figure 3, and then we
21 can move on from there.

22 A Okay. So figure 3 is described in a
23 specification starting around column 10, line 44,
24 or -- and then there's another paragraph starting
25 line 55 or 56.

1 So it's describing figure 3 as showing a
2 pulse-controlled exercise system, and that's the
3 label 200, which is basically pointing to the -- the
4 whole thing in -- in figure 3.

5 In figure 3, there's a user of the system
6 that's running on a treadmill. And the user's
7 labeled 110, in figure 3, and the treadmill is
8 labeled 230. The treadmill is -- you know, has a
9 revolving belt, like -- like -- like treadmills do.

10 Q Sure.

11 A And the user is walking on that.

12 And the user is wearing a chest belt, which
13 is equipped with a pulse rate sensor device and an
14 infrared pulse rate transmitter. And that belt is
15 labeled 220. The pulse rate sensor device in
16 figure 3, in this example, is labeled 225. And an
17 infrared pulse rate transmitter is labeled 227.

18 And the pulse rate sensor senses the user's
19 pulse rate, and then the infrared pulse rate
20 transmitter transmits the -- the pulse rate to
21 what's depicted in figure 3 as a base unit 250,
22 which, in this particular embodiment, is depicted as
23 a -- a box that's sitting on top of a -- a monitor
24 or a -- a screen.

25 Q Okay.

1 A The base unit is labeled 250 in figure 3.

2 There's a control center that's mounted on
3 the treadmill device. And the control center is
4 labeled 240, in figure 3.

5 Q Okay.

6 A It's described as having -- the control
7 center has a controller for controlling a user
8 interface and for controlling the motor resistance
9 unit of the treadmill, but those particular items
10 aren't actually depicted in figure 3, but they're
11 described here.

12 It talks about the transmitter of -- in this
13 paragraph, of the -- of the control center that's
14 part of the treadmill being able to transmit signals
15 about the various states in which the treadmill
16 device is operating, which it describes, you know,
17 means which are known in the art for detecting these
18 various states, such as speed sensors.

19 And the states can include machine speed, the
20 incline degree of the treadmill, the time of the
21 workout and the time remaining in the workout.

22 And the receiver in the control center
23 receives the motor and -- and/or resistance control
24 instructions from the base unit 250.

25 Q Okay. So it sounds like, in this disclosure,

1 starting on column 10, 44, through 11, 9, it's
2 describing, I believe, two sensors or groups of
3 sensors.

4 So we have the first pulse rate sensor
5 device. That's 225; right?

6 MS. NGUYEN: Objection; form.

7 THE WITNESS: Well, I mean, it's describing
8 the sen- -- different sensors. It doesn't really
9 actually use the term "group" to --

10 BY MR. BOWLING:

11 Q Okay.

12 A -- to group them in any way.

13 Q So there's the -- the pulse rate sensor 225.
14 That's being worn by the user; right?

15 A There's a chest belt equipped with a sensor
16 as part of the chest belt.

17 Q Okay.

18 A And that's -- that chest belt is -- is shown
19 to be around the -- the user's chest.

20 Q Okay. So the chest belt includes pulse rate
21 sensor 225, and the chest belt's being worn by the
22 user; is that right?

23 A Yeah, in this example in figure 3, that's --
24 that's where the -- the sensor device --

25 Q Okay.

1 A -- happens to be.

2 Q And you can assume that, you know, these next
3 questions, we're talking about figure 3 here.

4 A Rather, more specifically, the pulse rate
5 sensor 225 is -- is what I meant in my previous
6 answer.

7 Q Okay. So the chest belt includes a pulse
8 rate sensor 225, and the chest belt's being worn by
9 the user in figure 3; correct?

10 A That's part of what figure 3 is -- is
11 described as.

12 Q Okay. But that's correct?

13 A Yes.

14 Q Okay. And then it sounds like there's
15 another sensor or multiple sensors that are on the
16 treadmill device itself.

17 I think the example we just read was speed
18 sensors; correct?

19 A Yeah, in column 11, at the top, around
20 lines 5 or 6, it's talking about a sensor that
21 determines the various -- some of the operating
22 state information.

23 Q Okay. So there's the user-worn pulse rate
24 sensor, which is collecting the user's pulse rate,
25 and then other sensors on the treadmill, which are

1 collecting operating state information, such as the
2 machine speed, machine incline degree, time of the
3 workout, time remaining in the workout, et cetera;
4 is that right?

5 A In this embodiment of -- depicted in
6 figure 3, that's -- that's -- that's correct.

7 Q Okay. Okay. So I'm just trying to
8 understand kind of the -- the order of operations
9 here.

10 So the pulse rate sensor collects pulse rate
11 information. And then what happens next?

12 A So if you go on to look at column 11,
13 starting at line about 11, it describes part of
14 what's happening next, which is -- there's that base
15 unit we talked about. It's shown to be resting on
16 the monitor in figure 3.

17 But in this description section of figure 3,
18 if you look down at lines 25 to 32, which is the
19 next paragraph after the one I'm looking at right
20 now, but it talks about alternative locations for
21 the base unit 250, such as -- in the exercise device
22 directly. So that's lines, like, 27, 28, around
23 there.

24 So this base station is being described in
25 column 11, 11, and there's a controller that resides

1 in the base unit -- sorry, I said "base station"
2 before. I meant base unit 250. It processes the
3 machine states received from the control center and
4 the user's pulse rate received by infrared pulse
5 rate transmitter 227.

6 So, I mean, once -- I mean, that -- that --
7 that might be the -- one of the next things that
8 does occur, after -- so that -- that -- there's
9 signals being received by the controller, and the
10 base unit controller processes those received data.

11 Q Okay. So I think I follow you.

12 So pulse rate information is collected by
13 the pulse rate sensor 225, and then there is an
14 infrared pulse rate transmitter 227 that transmits
15 that pulse rate information to base unit 250, is
16 that right, as far as figure 3?

17 MS. NGUYEN: Objection; form.

18 THE WITNESS: In this embodiment, where the
19 base unit 250 is the standalone unit, it transmits
20 it to the base unit 250.

21 But the very next paragraph after this one is
22 talking about alternative locations of base unit
23 250, for example, in the exercise device directly.

24 But, yeah, that is, you know, what -- what
25 this is describing anyway.

1 BY MR. BOWLING:

2 Q Okay. So it sounds like -- and I understand
3 that the base unit can be located in different
4 places, but that infrared pulse rate transmitter 227
5 is always transmitting pulse rate information to
6 base unit 250, but I think what you're saying is
7 that base unit 250 can just be located in different
8 places.

9 MS. NGUYEN: Objection; form.

10 BY MR. BOWLING:

11 Q Is that right?

12 A Well, I mean, I think that the pulse rate
13 transmitter would be transmitting when the system is
14 being operated, as being described here; right? I
15 wouldn't say that it's --

16 Q Sure.

17 A Yeah. And then that -- that pulse rate
18 information is received and processed by the
19 controller in the base unit 250, where- --- wherever
20 it happens to be.

21 Q Okay. So I -- I think I understand you, and
22 I think I got that right.

23 Was there anything in the way I described it
24 that you disagree with?

25 MS. NGUYEN: Objection; form.

1 BY MR. BOWLING:

2 Q And I can go through it again, if you want.

3 A Okay. Yeah.

4 Q I know there's a lot of 220s going around.

5 A Sure, if you could go through them one at a
6 time.

7 Q Yeah, sure. Okay.

8 So in this embodiment that's depicted in
9 figure 3 and described in column 10, line 44,
10 through column 11, 67, in that specific embodiment,
11 I want to walk through the way the device is
12 operating.

13 Does that sound good?

14 A Sure.

15 Q Okay. So pulse rate information is collected
16 by the pulse rate sensor 225 and then the infrared
17 pulse rate transmitter 227 transmits that pulse rate
18 information to base unit 250, and that base unit 250
19 can be located in several different locations; is
20 that right?

21 MS. NGUYEN: Objection; form.

22 THE WITNESS: There is -- there is a pulse
23 rate sensor device that does transmit pulse rate
24 information, which is received by 250, wherever it
25 happens to be. I think that was that part of your

1 question.

2 So that is -- that's what's happening in this
3 first part.

4 BY MR. BOWLING:

5 Q I'm sorry, so was there something inaccurate
6 about the way I described it that you're clarifying?

7 MS. NGUYEN: Objection; form.

8 THE WITNESS: I mean, I think you used the
9 rate collecting sens- -- pulse rate information. I
10 mean, I'm not sure if that's -- that's not a word
11 that's being used in this section I'm looking at,
12 but it's -- it's -- it's -- it is -- it is
13 transmitting pult [sic] rate -- it is detecting or
14 sensing pulse rate and -- and transmitting
15 information to base unit 250.

16 BY MR. BOWLING:

17 Q Okay. So pulse rate information is sensed by
18 the pulse rate sensor 225 and then the infrared
19 pulse rate transmitter 227 transmits that sensed
20 pulse rate information to base unit 250. And as
21 we've discussed, base unit 250 can be located in one
22 of several locations; is that right?

23 MS. NGUYEN: Objection; form.

24 THE WITNESS: I -- I think that sounds right
25 to me.

1 BY MR. BOWLING:

2 Q Okay. Okay. So then once the pulse rate
3 information has been transmitted to base unit 250,
4 what happens next?

5 A So if you look around line 17 of column 11.

6 Q Okay.

7 A It's -- it's just described that the base
8 unit's controller has received this pulse rate.

9 And it -- so it says that the "controller is
10 equipped in such a way that it determines if the
11 user's pulse rate is within that user's target heart
12 rate range and instructs treadmill device 230 to
13 either speed up or slow down ultimately to cause the
14 user to either work harder, that is, run faster on
15 the treadmill device, or work softer, for example,
16 run slower on the treadmill device, respectively.
17 Additionally, base unit controller will cause the
18 user's pulse rate to be displayed on monitor 160."

19 So what it's doing with that pulse rate is
20 it -- it's -- it's -- there's this range of heart
21 rates that that particular user -- it is -- is the
22 target heart range for that user. And so if the
23 heart rate is below that target range, it will
24 instruct the treadmill to speed up so that the user
25 is working harder. And if that target -- if that

1 pulse rate received is higher than the target heart
2 range, it will -- one example that's given is to
3 slow down the treadmill so the user is not working
4 as hard.

5 And then also, the user's pulse rate will be
6 displayed on the monitor, 160.

7 Q Okay. And I think this is what you referred
8 to. There was a processing step that you mentioned
9 earlier that the base unit 250 does; is that right?

10 MS. NGUYEN: Objection; form.

11 BY MR. BOWLING:

12 Q And I'm just trying to link up what we talked
13 about earlier with what's happening here.

14 MS. NGUYEN: Same objection.

15 THE WITNESS: Well, I think we may have been
16 talking about what's at line 14 of column 11, that
17 the controller that resides in base unit 250
18 processes the machine states received from the
19 control center and the user's pulse rate received by
20 infrared --

21 BY MR. BOWLING:

22 Q Right.

23 A -- pulse rate. Yes.

24 Q And that's the calculations we're -- we're
25 talking about here?

1 A So with respect to the heart rate, this is
2 one -- one example of the processing that occurs
3 with the heart rate --

4 Q Okay.

5 A -- that's received.

6 Q Okay. So the base unit 250 receives the
7 pulse rate information, and then it processes that
8 information by running some calculations that
9 compare the user's pulse rate information to the
10 range of target heart rates for that user; is that
11 correct?

12 MS. NGUYEN: Objection; form.

13 THE WITNESS: I mean, I think that's what's
14 being described right here in this section, from
15 line -- column 11, line 16 or so till 24.

16 BY MR. BOWLING:

17 Q Okay. What would those calculations look
18 like? Can you help me understand how the pulse rate
19 information is being compared to the target heart
20 ranges?

21 MS. NGUYEN: Objection; form.

22 THE WITNESS: Well, I mean, this section is
23 talking generally about that the controller is
24 equipped to determine if the user's pulse rate is
25 within the user's target heart rate range, but --

1 but, you know, for example, though, if you're not
2 within the heart rate range, then what's being
3 described is to -- to get the -- the user to run
4 faster or run slower to either speed up the heart
5 rate or slow down a user's heart rate.

6 And so one example might be a simple
7 comparison as to whether the -- whether the heart
8 rate that's received is -- is below the lowest range
9 of the heart rate range, that's the target, or
10 whether it's above the highest part of the heart
11 rate range.

12 And -- and that's -- that's an example.

13 BY MR. BOWLING:

14 Q Does this calculation involve assessing how
15 far away the pulse rate is from that target heart
16 range?

17 So let me give you an example.

18 If I'm really close to the heart rate range,
19 the target range, is there a different instruction
20 that's sent to the treadmill that says speed it up a
21 little bit as opposed to if I'm essentially at a
22 resting heart rate, really far away from the target
23 heart range, and then there's a different
24 instruction that says this guy is basically sitting
25 there, let's pick it up a lot?

1 MS. NGUYEN: Objection; form.

2 THE WITNESS: Well, you know, as a -- a
3 treadmill user, I wouldn't -- I wouldn't expect huge
4 changes in speed to be contro- -- to -- you know, I
5 wouldn't want to -- to go from, say, rest- -- not
6 walking at all to the fastest speed of the machine.
7 I think that would be quite a shock to the user.

8 BY MR. BOWLING:

9 Q A little abrupt?

10 A Yeah.

11 Q Okay.

12 A So this section doesn't describe that
13 specifically. I -- I don't recall if there are
14 other sections that talk about that, but I -- I
15 just -- as -- as a -- as -- as a user of a
16 treadmill, I -- I -- I would expect, you know, some
17 sort of increment, but I wouldn't necessarily
18 expect -- and that could be over time; right?

19 Q Okay. So there may be different instructions
20 depending on how close the user's pulse rate is to
21 this target heart range, but if I understand you
22 right, you're saying they're probably not going to
23 instruct it to go to maximum speed?

24 A Yeah, if you're --

25 MS. NGUYEN: Objection; form.

1 THE WITNESS: I mean, it doesn't -- it
2 doesn't really -- it doesn't provide details in this
3 particular paragraph I'm looking at.

4 BY MR. BOWLING:

5 Q Okay. Is there -- I know you're focused on
6 this paragraph, and we've been focusing on figure 3,
7 but is there anywhere else you're aware of in
8 Abbondanza that discusses how these instructions are
9 calculated from the pulse rate information?

10 A I mean, I -- I don't have this all memorized,
11 but I can take -- try to take a look, if -- if you
12 want me to.

13 Q If you remember any offhand. I know --
14 you're certainly welcome to read through it. I was
15 just wondering if you're aware of any part of
16 Abbondanza that discusses that.

17 A I mean, nothing comes to mind right away.

18 Q Okay.

19 A But -- but I think, you know, you wouldn't
20 expect huge increments and certainly you could ramp
21 up slowly. There might be some maximum rate
22 increase, you know, per amount of time. So, you
23 know, ramp it up for five or ten seconds, ramp it up
24 some more if the -- if the sensor data is still
25 below, you know.

1 So -- so I think some sort of slow ramp-up,
2 with some cap on the -- on the rate of ramp-up,
3 would kind of -- you know, it would be something
4 that the users may -- may accept as opposed to
5 sudden huge ramp-ups --

6 Q Okay.

7 A -- or changes in the belt speed.

8 Q Okay. That makes sense.

9 So the -- the calculations, in your opinion,
10 that are being conducted as part of the processing
11 performed by base unit 250 of this pulse rate
12 information, those calculations, you believe, would
13 be assessing how close the pulse rate is to the
14 target range and then providing different
15 instructions, depending on how close the pulse rate
16 is, different increments, maybe different ramp-ups
17 over time; is that correct?

18 MS. NGUYEN: Objection; form.

19 THE WITNESS: I -- I wouldn't say that's
20 necessarily the way it would have to be done. I
21 mean, there are -- I think -- I think there could be
22 some increment applied with a maximum change, but
23 that -- but that the -- the command wouldn't nec- --
24 wouldn't necessarily have to include any difference.

25 A command could just be increment by a -- a

1 default or standard amount, and then that could be
2 done several times with the cap of, you know -- for
3 example, this is just one way to -- to -- to -- to
4 meet kind of -- like users like me, their
5 expectations of, you know, an automatically
6 controlled treadmill device.

7 BY MR. BOWLING:

8 Q Let's say I'm -- my heart rate is a couple of
9 beats per minute below the target. Do you think the
10 calculation would evaluate that as the same as if
11 I'm 50 beats per minute below the target heart rate
12 zone?

13 MS. NGUYEN: Objection; form.

14 THE WITNESS: I mean, that's one way to do
15 it, but with the other -- but that -- with you're --
16 very far below, you might do -- you know, you might
17 have, again, some -- some controlled rate maximum
18 change over some period of time, but you might be
19 able to do it over a longer duration of time if
20 you're further below.

21 So you wouldn't necessarily have to have a
22 command that included -- you -- you could.
23 That's -- I think that's one way it could -- could
24 be done.

25 But, again, that's -- I think what Abbondanza

1 is describing is -- is some processing that doesn't
2 have a particular algorithm, but I don't think
3 that's beyond the capabilities of a person
4 understanding Abbondanza to -- to come up with an
5 algorithm.

6 BY MR. BOWLING:

7 Q Okay. So if I understand you right,
8 Abbondanza doesn't describe the calculations that
9 are run as part of the processing performed by the
10 base unit for pulse rate information, but a skilled
11 artisan would be able to come up with those
12 calculations in a way that would make sense for a --
13 a treadmill user; is that right?

14 MS. NGUYEN: Objection; form.

15 THE WITNESS: Again, this section, as we're
16 looking at it, doesn't -- doesn't really say that.

17 BY MR. BOWLING:

18 Q Okay.

19 A And also -- I don't also -- I don't actually
20 recall the -- you know, that there were any specific
21 algorithms list- -- shown in the 225 patent. Again,
22 I don't have it memorized, but nothing comes --

23 Q Yeah.

24 A -- to mind as I'm sitting here.

25 So, you know -- and if that's the case, then,

1 you know, the automatic control of the workout
2 routines in the 225 I don't think has any more
3 disclosure than what I see here in the Abbondanza
4 reference.

5 Q Okay. And we can set aside the 225. We'll
6 talk about that in the a little bit. I just want to
7 focus on Abbondanza for now.

8 Was there something about the way I described
9 your opinion that was incorrect?

10 A Well, I mean, to the extent it requires some
11 person of ordinary skill to kind of come up with the
12 algorithm, and -- and it's got a similar disclosure
13 in -- in Riley, then I think that same person of
14 ordinary skill would be able to do the same -- come
15 up with the same algorithm -- you know, of similar
16 algorithms, if -- if the -- the specification of the
17 225 also requires that person of ordinary skill to
18 come up with these types of algorithms we're talking
19 about.

20 Q Okay. So was there something incorrect about
21 the way I tried to read back your opinion?

22 MS. NGUYEN: Objection; form.

23 BY MR. BOWLING:

24 Q And I'm happy to repeat it, if that -- I'm
25 just trying to make sure we're on the same page so

1 we can move to the next step of the process.

2 Would you like me to repeat it again?

3 A Yeah, could you, please.

4 Q Okay. So we're talking about the embodiment
5 shown in figure 3 and described in columns 10, line
6 44, through 11, 67; right?

7 A Yeah, we're talking about this example,
8 embodiment.

9 Q Okay. And in that embodiment, as we
10 discussed, base unit 250 receives pulse rate
11 information that was sensed by the pulse rate sensor
12 and then transmitted by the infrared pulse rate
13 transmitter; correct?

14 A I think that was -- you said that. I
15 wouldn't disagree with that, the way you said it.

16 Q Okay. And so then base unit 250 performed
17 certain processing of that pulse rate information
18 that was sensed by the pulse rate sensor and
19 transmitted by the pulse rate transmitter; correct?

20 A Sure, that sounds okay.

21 Q And part of that processing is assessing
22 where the user's pulse rate is with respect to a
23 target heart rate range; correct?

24 A Yes.

25 Q Okay. And as part of that calculation, base

1 unit 250 would need to perform some type of
2 comparative calculations. They could be different.
3 They're not disclosed, as far as you know, in the
4 Abbondanza reference, but your opinion is that a
5 skilled artisan would be able to come up with those
6 calculations in a way that was effective for the
7 purposes of the invention, is that correct, more or
8 less?

9 MS. NGUYEN: Objection; form.

10 THE WITNESS: So it -- so it -- it -- a
11 person of ordinary skill in the art is -- is -- what
12 we're talking about here is -- is the one reviewing
13 this at the time of the invention of the 225. And
14 it's the -- it's the person of ordinary skill that
15 I've laid out, and that's the person that's --
16 that's also reviewing the 225. And so that person's
17 knowledge, with respect to the 225, is the -- the
18 knowledge that's used to -- when they're looking at
19 Abbondanza.

20 BY MR. BOWLING:

21 Q Sure.

22 A And I -- and I think Abbondanza actually
23 provides more than what I -- what I'm looking at
24 within the 225 about how to change ex- -- parameters
25 of exercise equipment.

1 For example, if you look at column 19 of the
2 225, at line 61, it says (as read):

3 "Data collected as a workout
4 progresses (via module 502, etc.)
5 may also be used, if desired, to
6 control the exercise equipment or
7 other workout or athletic
8 performance devices (for example, to
9 set or change intensity or
10 resistance levels, to shorten or
11 lengthen workout times, etc.)."

12 And I -- I took a quick scan. I didn't -- I
13 don't recall any further details about algorithms
14 you're asking about that may be used to change
15 the -- the parameters, and I didn't see any- --
16 anything, just taking a quick look now.

17 But to the extent that that's -- that's the
18 kind of -- of -- of -- what the 225 is teaching,
19 the -- the Abbondanza is actually teaching it a
20 little more. It's saying, well, you have a target
21 for a parameter and -- and you can increase when
22 it's -- increase or decrease the speed, you know,
23 depending on whether you want the user to work
24 harder or -- or not as hard.

25 So the same knowledge of -- of a person -- a

1 person of ordinary skill kind of to come up with the
2 algorithms as -- you know, with what's described in
3 the 225 would be applied to that same person looking
4 at Abbondanza.

5 And I think because they at least provide the
6 same level, I'd argue Abbondanza, at least in this
7 section, provides a little more detail than the
8 section 225 that I just pointed you to.

9 I think that they are capable of -- of doing
10 that if they're expected to be able to come up with
11 those same algorithms when they're looking at the
12 225 patent.

13 Q Okay. So with all of that said, do you agree
14 with the way that I summarized your opinions in my
15 last question?

16 MS. NGUYEN: Objection; form.

17 THE WITNESS: Could you repeat --

18 MR. BOWLING: Sure.

19 THE WITNESS: -- that, please.

20 BY MR. BOWLING:

21 Q So base unit 250 is processing the pulse rate
22 information that it received from the pulse rate
23 transmitter; correct?

24 A That's some of what it processes. It's not
25 everything it processes.

1 Q Sure.

2 A Yeah.

3 Q But it is processing that?

4 A Yeah.

5 Q Okay. And that processing involves base unit
6 250 performing certain calculations to compare
7 the -- the user's pulse rate and where that is
8 relative to a target heart range; correct?

9 MS. NGUYEN: Objection; form.

10 THE WITNESS: So Abbondanza does talk about
11 a -- a target heart range and -- in instructing the
12 treadmill to speed up or slow down accordingly. And
13 it does describe that.

14 BY MR. BOWLING:

15 Q So is that a correct --

16 MS. NGUYEN: Same objection.

17 BY MR. BOWLING:

18 Q -- statement, or is there something incorrect
19 about what I said?

20 A I don't think I disagree with that you said
21 there, but I do note that that -- that level of
22 detail isn't even provided in that section of the
23 225.

24 Q And I'm -- I understand your opinion on that.
25 We can get to the 225. I understand you're saying

1 that Abbondanza provides more detail about these
2 algorithms in the 225 patent. So I hear you on
3 that.

4 I'm just trying to walk through Abbondanza
5 separate from the 225 patent and make sure I
6 understand your opinions on how the process works.
7 Is that fair?

8 A Sure.

9 MS. NGUYEN: Objection --

10 MR. BOWLING: Okay.

11 MS. NGUYEN: -- form.

12 BY MR. BOWLING:

13 Q So base unit 250 is performing some
14 calculations that compare where the user's heart
15 rate information is relative to a target heart
16 range; is that right?

17 A I mean, that's -- that's one way it could be
18 done. The Abbondanza doesn't provide the detailed
19 algorithm, nor does what I was looking at in the
20 225.

21 Q Okay.

22 A But -- but that -- that is an example in --
23 in this exemplary embodiment of what -- how POSITA
24 might -- might do that.

25 Q Okay. So is it true that Abbondanza

1 discloses base unit 250 performing some calculations
2 that compare the user's heart rate information to a
3 target heart range?

4 A I mean, that's an examp- -- a comparison
5 is -- is an example of some processing that could be
6 done.

7 Q Okay. Are there other types of processing
8 you're aware of that Abbondanza discloses?

9 MS. NGUYEN: Objection; form.

10 THE WITNESS: Well, it would require
11 processing by the base unit to -- to -- to put the
12 pulse rate onto the monitor. So that -- that
13 requires pulse processing as well.

14 MR. BOWLING: Okay.

15 MS. NGUYEN: Counsel, can we take a break
16 soon?

17 MR. BOWLING: Sure. Do you mind if we just
18 get through this --

19 MS. NGUYEN: Go for it.

20 MR. BOWLING: -- this step of the process and
21 then we can pick it up?

22 BY MR. BOWLING:

23 Q Okay. So base unit 250 is performing
24 processing of the pulse rate information, and it may
25 perform several types of processing, but one thing

1 that Abbondanza discloses, as far as processing, is
2 performing calculations that compare where the
3 user's heart rate is relative to a target heart
4 range; is that correct?

5 MS. NGUYEN: Objection; form.

6 THE WITNESS: I mean, what Abbondanza is
7 describing, it's doing processing, and a result
8 would be if the processing decides that they want
9 the -- deter- -- the determin- -- I mean, it
10 determines that the -- that the -- the user should
11 work harder, it would actually cause the exercise
12 device to speed up a little.

13 BY MR. BOWLING:

14 Q And I think that's the next step in what
15 we're talking about. I'm just asking you whether
16 it's performing that initial comparative calculation
17 as one of the types of processing that base unit 250
18 is performing.

19 A That -- that's an example, but it's not
20 explicitly discussed as to -- to whether it's -- you
21 know, that it's doing a comparison. It -- it's
22 disclosing that there's a heart range, that -- that
23 -- and based on the received heart pulse rate and
24 the target range of that parameter, a result could
25 either be speeding up the treadmill or slowing down

1 the treadmill.

2 And so -- but a -- a person of ordinary skill
3 would -- because it's the same person of ordinary
4 skill reviewing the 225 -- would be able to fill in
5 the algorithm here because there's -- there's -- I
6 think here, there's arguably, in this section, more
7 disclosure about the -- the -- the inputs in an --
8 actually a target heart range and what the output
9 should be than -- than -- than what we're looking --
10 we were looking at the bottom of column 19 in the
11 225.

12 And I don't recall anywhere else where they
13 had any more detail. I could be wrong about that.
14 I don't have the whole thing memorized, but that --
15 I don't recall that being in the 225.

16 Q Sure. Okay. So -- and I think if we can
17 make sure that I understand you here, we can go
18 ahead and take a break.

19 So Abbondanza does not disclose the specific
20 algorithms or types of calculations that it's
21 performing as it compares the pulse rate information
22 to the target heart range zones, but we do know that
23 it's performing some kind of processing and some
24 kind of calculations in order to determine what
25 instructions it's going to send to the exercise

1 machine.

2 Did I get that right?

3 MS. NGUYEN: Objection; form.

4 THE WITNESS: I mean, Abbondanza teaches that
5 there is a target heart range, that there's a -- a
6 current pulse rate that it's received and -- and
7 some -- some -- and -- and -- and that the -- the --
8 it would either speed up or slow down the treadmill
9 or -- or do nothing, you know, keep it the same.
10 That -- that's implied there. And, thus, getting
11 the user to run faster or run slower on the
12 treadmill.

13 And -- and I -- I think that's a little more
14 disclosure than -- than what the 225 discusses about
15 changing the parameters based on data collecting --
16 collected as the workout progresses.

17 BY MR. BOWLING:

18 Q Okay.

19 A Controlling the exercise equipment.

20 So the point here is, is that -- is that, you
21 know, the person of ordinary skill in this case,
22 they're able to -- you know, they're able --
23 there -- there -- there's a similar or -- or less
24 detailed disclosure, especially in those portions we
25 looked at in the 225, compared to the Abbondanza,

1 and to the extent they -- they would need to
2 understand how to come up with the algorithms when
3 they're looking at that disclosure in the 225. It's
4 that same knowledge that allows them to come up with
5 the -- the specific algorithms for the Abbondanza.

6 Q Okay. So I think I'm going to get this right
7 this time.

8 Your opinion is that a skilled artisan,
9 reviewing Abbondanza and the 225 patent, would be
10 able to come up with the algorithms that are being
11 performed by base unit 250 as it's assessing the
12 pulse rate information that it's received from the
13 sensor and looking at the target heart rate zones
14 for that user; is that right?

15 MS. NGUYEN: Objection; form.

16 THE WITNESS: Well, the POSITA -- to be more
17 accurate and precise is -- is the POSITA, as I've
18 laid out in my declaration, who -- who can really
19 make and -- they're able to make and use the
20 invention of the 225, and it's at the time of the
21 invention, in the context of the specification and
22 file history of the 225 at the time of the invention
23 of the 225.

24 BY MR. BOWLING:

25 Q Sure.

1 A So that's the POSITA.

2 Q Got you. Understood.

3 A And -- and that -- that POSITA, looking at
4 the 225, needs to be able to make and use the
5 invention -- they -- they can make and use the
6 invention based on what's disclosed in the 225.

7 Q Okay.

8 A So if they can do that with a similar or
9 arguably less disclosure, such as in column 19 of
10 the 225, they're provided a little more detail here,
11 and they certainly would be able to -- in
12 Abbondanza, that is -- and they would be able to
13 apply their same knowledge that they used in making
14 and using the invention of -- as described in this
15 part of the -- in -- in the 225, especially, you
16 know, at the bottom of column 19.

17 They apply the same knowledge to come up with
18 algorithms in the Abbondanza -- for the Abbondanza
19 reference.

20 Q Okay. That all makes sense to me. Just help
21 me understand what that skilled artisan, who we've
22 discussed -- and I understand you have the
23 definition of that -- what are they coming up with,
24 when you say that they're coming up with algorithms?
25 What are those algorithms doing?

1 MS. NGUYEN: Objection; form.

2 THE WITNESS: So -- so to the 225 down at
3 column 19, 61, talks about collecting data as the
4 workout progresses and using --

5 BY MR. BOWLING:

6 Q Well, and I'm sorry, I'm asking you about
7 Abbondanza.

8 A Yeah. And these are very similar
9 disclosures; right?

10 So, you know, Abbondanza describes collecting
11 heart rate data as the workout is progressing. The
12 225 describes collecting workout data of a work- --
13 as a workout progresses.

14 Abbondanza is describing using that data to
15 make decisions about how to control the equipment.
16 And -- and in the 225, it talks about using that
17 data to control the exer- -- this is line 63 -- 62,
18 63, of column 19 of the 225 -- (as read):

19 "...to control the exercise
20 equipment or other workout or
21 athletic performance devices (e.g.,
22 to set or change intensity or
23 resistance levels, to shorten or
24 lengthen workout times, etc.)."

25 So, you know, in the Abbondanza, it's talking

1 about running faster or slower or speeding up or
2 slowing down the treadmill. That's a very similar
3 disclosure, if not the -- really the same, as -- as
4 the 225 is discussing and changing the intensity of
5 the workout.

6 And so, again, I don't have this memorized,
7 the 225, but I don't recall any other more specific
8 algorithms disclosed in the 225.

9 So my point is, if that's the case, then the
10 same knowledge of a person of ordinary skill, able
11 to kind of come up with an algorithm for using data
12 collected as the workout progresses, like as
13 disclosed in Abbondanza, the heart rate, and
14 controlling the exercise equipment, like is
15 described in Abbondanza, that's that same person
16 that would be able to -- to come up with the
17 algorithm because the -- the 225 patent is
18 similarly -- has a similar or even less detailed
19 disclosure of -- of -- of -- of how -- how to -- the
20 algorithm for controlling the exercise equipment.

21 Q Okay. So in Abbondanza, what are the
22 algorithms being performed by base unit 250? What
23 are they doing?

24 MS. NGUYEN: Objection; form.

25 THE WITNESS: Well, they would do the same

1 thing as -- as the person of ordinary skill would
2 come up with for -- for doing the same thing in the
3 225.

4 BY MR. BOWLING:

5 Q Can you --

6 A So --

7 Q -- help me under- -- just without reference
8 to the 225. I -- I understand you think those two
9 are -- are doing the same thing. I'm just trying to
10 understand what it -- what's the goal of those
11 algorithms? What are they trying to accomplish?

12 MS. NGUYEN: Same objection.

13 THE WITNESS: Well, they both talk about
14 changing the intensity of the workout by -- by, for
15 example -- and controlling the exercise equipment to
16 change the intensity of the workout.

17 So I think the same algorithm that the POSITA
18 would use in applying their knowledge to -- to -- to
19 make and use the invention of the 225 would be the
20 same knowledge that they would use to -- to go from
21 the heart rate, pul- -- current workout data,
22 current workout information from the sensor and use
23 that -- and now they have a target range for the
24 heart rate in the Abbondanza, which -- which is not
25 really disclosed about in the 225, to -- to -- to

1 change the parameters of the machine, either speed
2 it up or slow it down.

3 And that's similar to, you know, changing the
4 intensity, as disclosed in the 225, using that --
5 using that data collected as the workout is
6 progressing. In -- in the case of Abbondanza, that
7 is the heart rate information.

8 MS. NGUYEN: Counsel, can we take a break?

9 MR. BOWLING: Yeah, sorry. I'm sorry.

10 THE VIDEOGRAPHER: All right. This marks the
11 end of media number 1. Going off the record at
12 10:43 a.m.

13 (Recess.)

14 THE VIDEOGRAPHER: This marks the beginning
15 of media number 2. Going back on the record at
16 10:56 a.m.

17 BY MR. BOWLING:

18 Q Okay. Dr. Houh, during the break, did you
19 discuss the substance of your testimony with
20 counsel?

21 A No.

22 Q Okay. So we were talking about the
23 embodiment shown in figure 3 of Abbondanza and
24 described in columns 10, lines 44, through 11, 67.

25 Do you remember that?

1 A Yes.

2 Q Okay. We were talking about the algorithms
3 that are performed by base unit 250.

4 Do you remember that?

5 A Yes.

6 Q Okay. I'm trying to understand, in your
7 opinion, what those algorithms are doing. And so
8 maybe it's easiest to think about it as input and
9 output.

10 Does that make sense to you?

11 A Sure.

12 Q So I think we agree the input is the pulse
13 rate information that's collected by the pulse rate
14 sensor, 225, and then transmitted to the base unit
15 by the pulse rate transmitter, 227; is that correct?

16 MS. NGUYEN: Objection; form.

17 THE WITNESS: In this example of what --
18 figure 3, the description of figure 3, that's what
19 it's talking about.

20 BY MR. BOWLING:

21 Q Okay. Now help me understand what the output
22 is, on the other side of the algorithm.

23 MS. NGUYEN: Objection; form.

24 THE WITNESS: The output includes instructing
25 the treadmill to either speed up or slow down. Or

1 the output also includes or -- and/or displaying the
2 pulse rate on the monitor.

3 BY MR. BOWLING:

4 Q Okay. And those are the two types of
5 processing we discussed. One was processing the
6 pulse rate information to generate instructions, and
7 the other was processing the pulse rate information
8 so that it could be displayed on the monitor;
9 correct?

10 MS. NGUYEN: Objection; form.

11 THE WITNESS: I think those were the -- the
12 two examples of processing we were talking about.

13 BY MR. BOWLING:

14 Q Yes?

15 A Those were the two we were talking about.

16 Q Okay. Was there anything incorrect about
17 what I said?

18 MS. NGUYEN: Same objection.

19 THE WITNESS: I -- I -- I mean, I don't think
20 there -- I disagree with what you're asking in that
21 question.

22 BY MR. BOWLING:

23 Q Okay.

24 A I mean, those are just examples of what's --
25 what's in this --

1 Q Okay.

2 A -- part describing figure 3 --

3 Q Sure.

4 A -- of this example.

5 Q So there may be other processing that's
6 performed by basing the 250 on the pulse rate
7 information? That's the distinction you're drawing,
8 if I understand you right?

9 A I think it's -- there are -- there are other
10 types of processing, for example -- that's described
11 in -- in this section, which involves receiving the
12 machine state information.

13 Q Got ya. Okay. Okay. So let's continue, if
14 you're okay with it, walking through this whole
15 process disclosed in Abbondanza. Does that sound
16 good?

17 A Sure, we can continue walking through this
18 example.

19 Q Okay. So base unit 250 receives the pulse
20 information that was collected by the pulse rate
21 sensor and transmitted by the pulse rate
22 transmitter, and then it performs certain processing
23 steps, and the two examples of processing that we
24 discussed being performed by base unit 250 are
25 generating the instructions and making the pulse

1 rate information so that it can be displayed on a
2 monitor; is that right?

3 MS. NGUYEN: Objection; form.

4 THE WITNESS: I mean, this is all getting
5 really long now.

6 Are you going to continue to add on to this?

7 BY MR. BOWLING:

8 Q Yeah.

9 (Simultaneous speaking.)

10 Q I'm just trying to understand the whole
11 process as it's disclosed in just figure 3, this
12 embodiment.

13 A You know, with the -- with the same caveats
14 with respect to my answers previously, where you
15 asked me about parts of that, I mean, there was a
16 question -- you use the word "collect." I said
17 something in response. If I could just refer to
18 that same thing I said there.

19 Q I can do it again. I'm sorry, I'm not trying
20 to play gotcha or switch up the words.

21 I think you said the information was sensed
22 or detected by the pulse rate sensor. So I'll try
23 again with that.

24 A Okay.

25 Q If that's okay with you.

1 Okay. So base unit 250, in Abbondanza,
2 receives the pulse information that's sensed by the
3 pulse rate sensor and transmitted by the pulse rate
4 transmitter to base unit 250. Base unit 250 then
5 performs certain processing steps.

6 And the two examples of processing that we
7 discussed are, one, generating instructions based on
8 an algorithm and then, two, converting the pulse
9 information into something that can be displayed on
10 a monitor?

11 Is that accurate?

12 MS. NGUYEN: Objection; form.

13 THE WITNESS: So far, I don't -- I don't
14 see -- I -- I -- I -- that seems fair to me.

15 BY MR. BOWLING:

16 Q Okay. So what do those instructions look
17 like?

18 MS. NGUYEN: Objection; form.

19 THE WITNESS: I mean, you really can't see
20 them. They're not something that's visible.

21 BY MR. BOWLING:

22 Q That's a fair point. "Look" was probably the
23 wrong word.

24 I'm -- I have about zero experience in
25 computer science. So help -- just help me

1 understand. Are those instructions -- is that,
2 like, computer code? Is that programming? Is
3 it some- -- you know, what exactly is being sent to
4 the exercise machine?

5 A Sure. So --

6 MS. NGUYEN: Objection; form.

7 THE WITNESS: If you look at figure 4,
8 figure 4 is some of the components from figure 3.

9 540 is the infrared transmitter and pulse
10 rate sensor. 310 is -- is -- corresponds to base
11 unit 250.

12 And you can look at column 12 of the
13 Abbondanza, line 62, to see that. 62, 63.

14 And then 140 is described as the control
15 center, which is the same as -- where does it say
16 it's -- it's the control center.

17 It would -- it would -- it's the same word
18 that's used to describe, I think, 240, in figure 3,
19 same phrase.

20 So if you look at -- between how information
21 or -- gets from the base unit gets to the
22 controller, you can see that there's microprocessors
23 on either side of -- like, 420 and 480, in figure 4.

24 So this is all digital -- digital data.
25 Everything is digitized because they're processed by

1 a mic- -- microprocessor. So they're digital
2 signals. And there are signals being transmitted
3 between -- between the -- and received between 420
4 and 480 with these IR receivers and IR transmitters.
5 3- -- the transmitters are 380 and 500, and
6 receivers are 390 and 510.

7 And so there's -- there's digital information
8 being transmitted.

9 So because it's -- it describes how the base
10 unit describes -- is described as doing the
11 processing that instructs the treadmill device to
12 speed up or slow down. All these commands take the
13 form of digital data that are transmitted between,
14 you know, the base unit and the control unit.

15 And if you look at figure 4, it shows that --
16 that communications path between the
17 microprocessors.

18 So the commands -- the instructions to -- to
19 change the -- speed up or slow down are digitized
20 data transmitted between -- in this -- in this
21 example, in figure 4, using another set of infrared
22 transmitters and receivers to the microprocessor,
23 which then interprets that data, to perform the --
24 the required -- or requested function on the -- on
25 the treadmill.

1 BY MR. BOWLING:

2 Q So where does Abbondanza disclose or describe
3 the interpreting that is being performed by
4 receivers 510 and 390?

5 MS. NGUYEN: Objection; form.

6 THE WITNESS: Well, if you look in column 12,
7 kind of lines 27 down to line 44, it talks about the
8 kinds of instructions that are received over that
9 link, and there -- they would be interpreted as --
10 as what -- what they say.

11 So, for example, down at line 40- -- 39, we
12 can start there, (as read):

13 "Infrared transmitter transmits
14 exercise device state information to
15 infrared receiver 390."

16 BY MR. BOWLING:

17 Q Okay.

18 A So that -- and, really, what's interpreting
19 the -- what's transmitted over -- I mean, the
20 receivers and transmitters don't know what they're
21 transmitting. They're just transmitting 1s and 0s.
22 They're transmitting digital data.

23 It's -- it's the processor that -- that would
24 be interpreting what's received.

25 And you can see that the transmitters are

1 connected into the processor by serial ports. You
2 can see it better -- you can see it better labeled
3 on processor 420 because there's two serial ports,
4 an input and output serial port, 430 and 440.

5 And there -- there's only one label for
6 serial port, but the -- the trend -- on 480, but --
7 but there -- there's just -- it's because
8 probably -- the microprocessor is in the space where
9 that serial port would be for the transmitter.

10 But you're receiving data, digital data
11 transmitted over this link into the serial port.
12 Serial ports are ports that received a stream of --
13 of bits -- that's -- that's why they're serial
14 ports, as opposed to parallel ports -- just -- just
15 as you could transmit them using an infrared
16 transmitter, using pulses of light, and it would be
17 the processor that would be, in this case, 480,
18 interpreting the digital data that's received by
19 infrared receiver 510.

20 And if you look in column 12, it said -- it
21 says, at line 40 or 41, (as read):

22 "Infrared receiver 510 receives
23 motor control instructions from
24 infrared transmitter 380..."

25 And -- and so it's receiving digitized data

1 that's interpreted by the microprocessor at 480 as
2 an instruction.

3 And in this example, it's -- it's to control
4 the motor control interface for operation thereof.

5 So -- so that example, if you were to speed
6 up, that -- that instruction or command would be
7 sent out the serial port of the microprocessor 420
8 through the infrared transmitter as a series of
9 digital bits that are received on the other side,
10 into the serial port of the microprocessor.

11 And, again, you know, the -- the -- the
12 infrared transmitters and receivers are really just
13 sending out pulses of 0s or 1s, for example, and
14 those are then interpreted and -- and repackaged
15 into the -- into the -- the byte data that's used
16 by -- typically by microprocessors.

17 And so it's the microprocessor that would
18 actually be interpreting the digital data that's
19 sent as a command or an instruction.

20 Q So is the microprocessor changing what it's
21 receiving, or is it just making sense of it? Is
22 that what you mean by "interpreting"?

23 MS. NGUYEN: Objection; form.

24 THE WITNESS: I mean, it wouldn't change what
25 the input is before it processed the input, but

1 based on receiving a particular command or
2 instruction that -- that took the form of 1s and 0s
3 over this link -- you know, the -- the serial ports
4 do things like framing bytes and things like that.
5 Those are kind of built into the protocol. So you
6 can actually recover the -- the data that's sent
7 correctly.

8 But then the -- the computer -- I mean,
9 computers really don't know what they're doing.
10 They're just doing what they're told to do by the
11 instructions that they're programmed with.

12 So, you know, it might wait for data to come
13 in on a serial port. If it's a specific command, it
14 might execute a series of instructions, and those
15 series of instructions may cause other signals to be
16 sent throughout the system, for example, to -- to go
17 out to control the motor control interface.

18 So if you're asking does it change the
19 information received, well, I mean, it doesn't have
20 to forward the same information that it received
21 elsewhere. It could. It doesn't have to. But it
22 could also construct new data to put in places and
23 memory and -- and -- and -- and send as outputs to
24 other devices.

25 So it -- or it could just simply pass them

1 on.

2 It just depends what the computer
3 instructions are for the microprocessor.

4 BY MR. BOWLING:

5 Q Now you've really gone over my head with the
6 computer science stuff, but I think I follow you.

7 Okay. So is there any disclosure in
8 Abbondanza of the base unit sending -- well, strike
9 that.

10 Okay. So, Dr. Houh, everything we've talked
11 about so far is with respect to figure 3; correct?
12 And figure 4, I guess, as well?

13 A Figure 3 and 4 and variance thereof that
14 are -- that are expressly disclosed within the
15 bounds of the discussion of figure 3, for example.
16 For example, where the -- where the base unit 250 is
17 actually part of the exercise equipment itself, for
18 example.

19 Q So are there any embodiments disclosed in
20 Abbondanza that work differently, with respect to
21 how the pulse rate information is transferred to the
22 base unit, processed and then instructions are sent
23 to the exercise machine?

24 MS. NGUYEN: Objection; form.

25 THE WITNESS: Well, I mean, where the base

1 unit 250 is part of the exercise machine, then, in
2 effect, the sensor data and what's transmitted from
3 the -- the -- you know, by 227 is -- is received by
4 the exercise machine itself.

5 So that, perhaps, is a variant on that
6 process that you described.

7 BY MR. BOWLING:

8 Q And that's your opinion about figure 3 in the
9 embodiment described in columns 10 and 11; right?

10 A As you see in column 11, at line 25, that --
11 that is now describing a -- a variant on figure 3,
12 where the base unit is actually within the exercise
13 device directly.

14 And it says that, really, right on lines 27,
15 28, 29ish.

16 It's -- it's always hard to tell the lines.
17 I don't know why they don't line up with the text,
18 but this -- they're like a half a line off. So it's
19 hard to know --

20 Q Yeah, no, I hear you.

21 A -- what lines they are.

22 So in that case, where the circuitry of base
23 unit 250 is, in the exercise device, then the sensor
24 data and what's being transmitted by 227 is being
25 received by the exercise device directly.

1 Q Okay. So let's set aside what we've talked
2 about for figure 3 and 4. I just want to understand
3 if there's any embodiments in the rest of the
4 specification that operate differently than what
5 we've already discussed today or if our discussion
6 of how this process works is the way that all the
7 embodiments work.

8 MS. NGUYEN: Objection; form.

9 THE WITNESS: Well, I mean, Abbondanza does
10 include statements that -- you know, if you look at
11 column 18, line 43 to -- to -- to 49, (as read):

12 "It will be understood that the
13 embodiments described herein are
14 merely exemplary and that a person
15 skilled in the art may make many
16 variations and modifications without
17 departing from the spirit or scope
18 of the invention. All such
19 modifications are intended to be
20 included within the scope of the
21 invention as defined by the appended
22 claims."

23 So it is open to other ways of doing things
24 that are within -- within the skill of a person of
25 ordinary --

1 BY MR. BOWLING:

2 Q Sure.

3 A -- a person skilled in the art.

4 And so I don't -- I don't think the
5 specifications is limiting any of these descriptions
6 to be the only way possible of doing things.

7 Q Understood.

8 A And it's provided variance within the
9 description of figure 3, as we saw. And now it's
10 also saying that, you know, hey, there's a lot of
11 ways to do things, you know, known to a person of
12 ordinary skill, and the variance that are still
13 within the scope are intended to be covered by the
14 claims.

15 Q Are there any embodiments expressly disclosed
16 in Abbondanza that are different or that operate
17 differently than what we've discussed with respect
18 to figures 3 and 4?

19 A Yeah, so one of these -- these things that I
20 think would -- would be covered by what a person of
21 ordinary skill in the art would -- would know is --
22 is to also take the monitor -- and I discuss this in
23 my declaration -- and put it in -- into the device
24 itself because -- I mean, the user might not put the
25 exercise equipment in the same room as the monitor

1 and they'd have to get a separate monitor, in that
2 case.

3 And -- and -- and, you know, it's also --
4 since the base unit could also be the exercise
5 equipment. You know, it seems that a POSITA would
6 understand that, that -- so could a display to
7 display the -- the pulse rate, for example.

8 Q Any other embodiments that are expressly
9 disclosed in Abbondanza that operate differently
10 than what we've discussed with respect to figures 3
11 and 4?

12 MS. NGUYEN: Objection; form.

13 THE WITNESS: So if you look in column 7, one
14 example of this is, if you look at -- it discusses
15 "chestbelt equipped with the heart rate sensor," but
16 it also talks about (as read):

17 "Other forms of well-known heart
18 rate sensors/monitors may be used.
19 Such other forms of heart rate
20 monitors include, but are not
21 limited to, fingertip sensors, ear
22 clip sensors, and headband sensors."

23 So I think that's disclosing that. Instead
24 of a chest band, you would use -- you could use
25 these other sensors as well. And that's one example

1 of -- of something in a spec that describes
2 something a little differently than figure --
3 figures 3 and 4 describe.

4 BY MR. BOWLING:

5 Q Okay. Are there any embodiments expressly
6 disclosed in Abbondanza that operate differently
7 from what we discussed in figures 3 and 4, as far as
8 how the pulse rate information is transferred to the
9 base unit 250 and then instructions are generated
10 and sent to the exercise machine?

11 MS. NGUYEN: Objection; form.

12 THE WITNESS: Yeah, at the bottom of column
13 7, instead of talking about infrared transmitters
14 which tran- -- would transmit the heart rate signal
15 from the pulse rate transmitter, column 7, line 63,
16 talks about how it would be a radio broadcast from
17 the pulse rate transmitter to transmit the pulse
18 rate.

19 And so, you know, figure 3 -- figure 3 and
20 figure 4 depict an infrared transmitter.

21 BY MR. BOWLING:

22 Q Okay.

23 A And so this is a -- a difference from the way
24 it operates because this would use radio signals.
25 And it goes -- that description goes to the top of

1 column 8, line 3.

2 Q Anything else?

3 A If you look at column 8, in the paragraph
4 starting at line 39, it talks about how infrared
5 transmitter 500 transmits pult [sic] rate -- pulse
6 rate information about user 110 to infrared receiver
7 390.

8 And so if you look at figure 4, 500 is in the
9 control unit, and receiver 390 is in -- in the base
10 unit. And so, you know, if that's where the base
11 unit is receiving the heart rate, as opposed to
12 directly from the -- the transmitter in this
13 particular setup that's described in column 8,
14 then -- then the -- then -- then the -- then the
15 pulse rate transmitter would be sending the -- the
16 data to the control unit.

17 So that's describing a slightly different
18 mode of operation than described in figure 3 and 4.

19 Q Anything else?

20 A And I would add that that control unit is --
21 is, you know, also part of the -- of the exercise
22 equipment, as depicted in figure -- at least as
23 depicted in figure 3.

24 Q So that column in 8 that you're referring to,
25 isn't that discussing figure 2?

1 MS. NGUYEN: Objection; form.

2 THE WITNESS: It is, but it's using the same
3 labels for those devices as in figure 3, but that's
4 consistent. If you look at figure 2, that's where
5 the -- the -- now it's a radio frequency
6 transmitter, but it's transmitting to the control
7 unit 140. And now 140 is transmitting the data
8 to -- the pulse rate data to base unit 150, in
9 figure 2.

10 BY MR. BOWLING:

11 Q Right.

12 A So I agree, but I think the -- the same
13 labels -- and this -- so this -- this does show
14 operation differently than -- than as described in
15 figure 3.

16 Q In figure 2, the pulse rate information makes
17 two stops before going to the exercise machine. It
18 first goes through this control unit 140 and then
19 base unit, which is labeled here as 150; right?

20 MS. NGUYEN: Objection; form.

21 THE WITNESS: Well, I would say that because
22 the controller equipment -- control unit 140 is, in
23 figure 1, also part of -- of the exercise equipment,
24 it's -- it's not making two stops before going to
25 the exercise equipment. It's -- it's going from the

1 transmitter to the exercise equipment. 1- --
2 because 140 is part of the exercise equipment in
3 this case.

4 BY MR. BOWLING:

5 Q Okay. Any other variance you're aware of?

6 A If you look at figure -- column 10, around
7 line 17, that paragraph talks about an alternative
8 to using either radio frequency or infrared. You
9 could just have a wire from the pulse rate.

10 Q Okay. Anything else?

11 A A wire instead.

12 Yeah, if you look at column 10, line 29, it
13 also talks about, with respect to what's in figures
14 1 and 2, that the -- that the two microprocessors
15 that are shown in -- in figure 2, which have the
16 same labels as the one shown in figure 3, 420 and
17 then 480 or 470, they say that it could possi- -- it
18 could be -- (as read):

19 "It would be possible" --

20 Or (as read):

21 "It would be quite possible to have
22 a single 'system' controller device
23 which would perform the
24 functionality of
25 microprocessor/microcontroller 470

1 (e.g. user interface and motor
2 control) and of microprocessor/
3 microcontroller 420 (e.g. logic
4 control and communications). Such a
5 system controller could be housed in
6 a section of an exercise device.
7 Moreover..."

8 Well, that -- that -- the rest is -- is not
9 as important, but this is saying that you could
10 perform the functions of the two microprocessors,
11 basically getting rid of this infrared transmitter
12 or -- or transceiver between the two
13 microprocessors, as shown in figures 2 and 4, and --
14 and just put everything in the exercise device and
15 use one -- one microprocessor, microcontroller
16 instead of two.

17 Q Okay. Anything else?

18 A Column 12, around line 46, also talks about
19 other kinds of exercise devices other than a
20 treadmill.

21 So if the exercise device that is chosen is a
22 stepper, the motor control interface may be
23 different. (As read):

24 "...may respond to instructions to
25 change speed, stepping resistance.

1 Stepper like instructions may be
2 transmitted and received over
3 infrared transmitter 505" -- 30 --
4 sorry -- "500 and 380 and receivers
5 510 and 390 in a similar fashion to
6 the transmissions of treadmill
7 device motor control instructions."

8 Q Right. So they're talking about the
9 transmission being in a similar fashion; right?

10 A Right.

11 MS. NGUYEN: Objection; form.

12 BY MR. BOWLING:

13 Q So we're trying to understand if there's any
14 other explicit embodiments where the transmission
15 that we talked about is happening in a different
16 fashion.

17 A Well, the -- the instructions for a -- a
18 treadmill motor would be -- would be different than
19 instructions for the stepper, so...

20 Q How so?

21 A Well, I mean, the device you're controlling
22 is -- is now different. And -- and, similarly,
23 like, not all -- all exercise devices would have
24 only the controls, you know, that a treadmill, for
25 example, might have.

1 Q So how would the instructions be different?

2 MS. NGUYEN: Objection; form.

3 THE WITNESS: They would be specific to
4 the -- the kind of motor inter- -- control
5 interfaces and the capabilities of different
6 exercise equipment.

7 BY MR. BOWLING:

8 Q Can you give me an example of that?

9 I'm not following you. I'm sorry.

10 MS. NGUYEN: Objection; form.

11 THE WITNESS: So it's saying here that the --
12 the motor control interface may respond to
13 instructions to change speed and stepping
14 resistance, but the -- the -- the -- and there may
15 be -- and a treadmill has things like incline and --
16 and speed.

17 So while some things correspond, in terms of
18 what they're for, like speed, they don't necessarily
19 get controlled in the same way, with the same
20 parameters.

21 So the software would need to understand the
22 specific type of -- of -- of exercise equipment to
23 issue the -- the proper commands because not all the
24 interfaces to different subparts of -- of this
25 exercise equipment would necessarily be the same.

1 BY MR. BOWLING:

2 Q What software are you referring to?

3 MS. NGUYEN: Objection; form.

4 THE WITNESS: These are under -- these
5 devices are under microprocessor control. So
6 microprocessors run software, and there would be a
7 different software to control different types of --
8 of control interfaces.

9 MS. NGUYEN: Counsel, shall we take a break?

10 MR. BOWLING: Yeah. Do you guys want to do
11 lunch? I think we catered something in.

12 THE VIDEOGRAPHER: This marks the end of
13 media number 2. Going off the record at 11:51 a.m.

14 (Lunch recess.)

15 THE VIDEOGRAPHER: This marks the beginning
16 of media number 3. Going back on the record at
17 12:38 p.m.

18 BY MR. BOWLING:

19 Q Okay. Dr. Houh, I'm going to ask you to
20 change gears here, and we're going to look at the
21 Acres reference for a little bit.

22 And if you could flip to figure 1 for me.

23 A Okay.

24 Q And kind of similar to what we did with
25 Abbondanza, I'd like you to walk me through how the

1 system in Acres works, specifically the embodiment
2 that's depicted in figure 1.

3 A If you look at Acres, starting at
4 paragraph 31, it's talking about figure 1, and it's
5 saying that -- it's "an example exercise network
6 according to embodiments of the invention."

7 That's how paragraph 31 starts out.

8 So the exercise network includes a central
9 site. That's labeled 110 in the Acres figure 1. A
10 configuration device. That's labeled 120 in
11 figure 1.

12 Q Okay.

13 A And there's a bridge. That's labeled 130 in
14 figure 1. A bug. That's labeled 140. And a piece
15 of configurable exercise equipment, 150.

16 It also says that there's communications --
17 communication network 160 that couples the central
18 site, the configuration device and the bridge, while
19 extensions of the communication network or a
20 separate communication network couples the bridge
21 130 to the bug -- to the bug and to the exercise
22 equipment.

23 And there are also exercise and environment
24 sensors, 170 -- labeled in figure 1 -- "provide
25 input about the exerciser, the exertion level of the

1 exerciser, and factors about the exercise
2 environment to the Bug 140."

3 It says that "not all pieces illustrated in
4 figure 1 are required for all embodiments of the
5 invention."

6 Q Okay. So the environment and exercise sensor
7 in 170, is that similar to the heart rate sensor we
8 looked at in Abbondanza?

9 A So if you look at paragraph 67 of Acres, it
10 says (as read):

11 "Such components can include (As
12 illustrated in figure 1)..."

13 And it goes on to say (as read):

14 "...sensors 170, which may include a
15 heart rate monitor 610."

16 And if you look at figure 12, I think, you
17 can see a label 610 that has a simple drawing of
18 something that -- that goes around a -- someone's
19 chest.

20 And 610 is also in figure 13.

21 Q Okay. So is it accurate to say that similar
22 to Abbondanza, the sensors shown in 170 of figure 1
23 transmit the sensed information to the bug the same
24 way that Abbondanza's pulse rate sensor sense data
25 and then use the pulse rate transmitter to send that

1 information to base unit 250?

2 MS. NGUYEN: Objection; form.

3 THE WITNESS: So one example of what it's
4 describing the heart rate sensor 610 is doing is if
5 you look in figure -- paragraph 69, in the middle,
6 it says that (as read):

7 "A heart rate sensor 610 is a
8 standard chest strap and emits a 5
9 kilohertz signal pulse with each
10 heartbeat. The Bug receives these
11 signals through inductive -- through
12 inductive coupling counting each
13 pulse as one heartbeat. The
14 implementation represented in figure
15 12 and discussed herein is but one
16 example of Bug implementation.
17 Other structures, including those
18 earlier described, can also be used
19 without deviating from the inventive
20 spirit herein."

21 So in this case, the heart rate sensor 610 is
22 emitting a 5 kilohertz signal pulse and the bug
23 receives that signal that counts each pulse as one
24 heartbeat.

25 So that's what's described in -- one way of

1 doing it in -- in Acres.

2 BY MR. BOWLING:

3 Q Okay. So the sensors, 170, sense exercise
4 information, and then they transmit that to the bug;
5 is that right?

6 A Here, what's being described is it's -- it's
7 just a signal pulse when -- when the heart beats.
8 So I -- I don't know if I'd describe it exactly the
9 way you're describing it, that it -- what the sensor
10 here is -- this particular example of a sensor is
11 just sending a pulse when the heart beats.

12 Q Okay. How is that different from sending
13 pulse rate information, for example?

14 A Well, when you send a 5 kilohertz signal
15 pulse with each heartbeat, you're not actually
16 sending a rate. You're sending pulses. Then --
17 then the -- the bug is, you know, interpreting those
18 pulses.

19 Q Got it. Okay. So it's sending pulse, pulse,
20 pulse, one after the other, and the bug is then
21 determining the rate of those pulses and creating
22 the pulse rate as a result; is that right?

23 MS. NGUYEN: Objection; form.

24 THE WITNESS: That would be one way to -- to
25 do, is that the -- because the sensor -- all it's

1 doing is emitting a pulse, when the heart beats.
2 The bug, it's not described here in paragraph 69,
3 but as long as the bug has a sense of time, which it
4 would -- in order to -- it would -- it would need
5 that in order to compute a heart rate.

6 And the -- it does talk, I think in Acres,
7 about heart rates.

8 So you would have to convert the pulses, know
9 the timing there between to convert it into a -- a
10 rate, such as how many beats per minute.

11 BY MR. BOWLING:

12 Q Okay. Are there other embodiments in Acres
13 that disclose an exercise sensor sending exercise
14 information to the bug in a different way?

15 A So if you look at paragraphs 59 and 60, it
16 talks about other types of heart rate sensors, other
17 ways of sensing heart rate.

18 So, for example, paragraph 59 talks about
19 a -- a heart rate sensor, at the very bottom of the
20 left-hand column on page -- of paragraph 59.

21 (As read):

22 "Such a heart rate sensor 530 could
23 monitor the heart's electrical
24 signals, whether mounted on a chest
25 strap 520 or located elsewhere in

1 the exercise network 100. An
2 alternative technology is to detect
3 heart rate by sensing the flow of
4 blood through capillary or artery
5 within the body.

6 Such detection means are generally
7 implemented through optical
8 technology in which infrared,
9 visible light or other radiation is
10 emitted into the body and reflected
11 or blocked by blood pulsating
12 through a blood vessel. A photo
13 sensor detects the light that is
14 reflected or passes through the
15 skin, depending on configuration of
16 sensors, in such a manner that the
17 light signal pulses on and off in
18 response to blood flowing in said
19 blood vessels."

20 And then -- then paragraph 60 talks about
21 (as read):

22 "Other heart rate sensors are
23 constructed of pressure sensors that
24 detect the physical pressure of
25 blood flowing through the body.

1 Such technology is well known to
2 those skilled in the art.

3 Embodiments of the invention can
4 utilize any method of heart rate
5 detection whether sensed by
6 electrical, optical, mechanical
7 pressure or other means."

8 So I think that is describing other ways of
9 sensing -- you know, a few ways of sensing the heart
10 beating that's described in Acres.

11 Q Okay. Anything else?

12 A I mean, Acres does talk about other sensor
13 types, such as pedometers, I saw somewhere. I --
14 I -- I don't recall which paragraph, but I just saw
15 that.

16 And -- and, furthermore, I did see -- maybe
17 to -- to -- more directed to a previous question, if
18 you look at paragraph 84, it talks about the bug
19 determining the exercises cur- -- "exerciser's
20 current heart rate, as determined by counting pulses
21 received from the Heart Rate Sensor. The pulses --
22 these pulses are filtered for noise, averaged and
23 converted to a number representing beats per minute
24 of the heart."

25 So that's how you actually get to the heart

1 rate from those 5 kilohertz pulses that were
2 described earlier.

3 Q Got it. Okay. Thank you for that.

4 Okay. So once this information is
5 transmitted from the exercise sensors to the bug,
6 what does the bug do?

7 A Well, one of the things it does is just what
8 I was describing now in paragraph 84, and that's
9 when the bug is placed into the coaching mode, and
10 it's going to be computing the heart rate.

11 But if you go on to paragraph 85, it says
12 that (as read):

13 "The current beats per minute
14 measure is compared to the target
15 rate of the exercise profile copied
16 from the central system 110. Based
17 upon how the current heart rate
18 compares to the target rate, the
19 exerciser is instructed to increase,
20 maintain or decrease exercise
21 intensity to keep the current heart
22 rate equal to the target rate, as
23 described above.

24 In practice, a range of beats is
25 created around the target rate to

1 make coaching instructions more
2 consistent. For example, if the
3 target rate were 140 beats per
4 minute, the exerciser would be told
5 to maintain the current exercise
6 intensity for so long as the current
7 heart rate was between approximately
8 135 and 140 [sic] beats per minute.
9 When the exercise period has
10 expired, the exerciser is told to
11 stop the exercise."

12 And that's what it's describing here in -- in
13 85. So that's -- so once the bug -- the bug
14 receives the pulses, computes a heart rate, then
15 it's compared to this target, again, using a range
16 around the target.

17 Q Okay. And that sounds a lot like what we
18 discussed in Abbondanza; is that right? Are they
19 analogous in that way?

20 MS. NGUYEN: Objection; form.

21 THE WITNESS: Well, both have a target heart
22 rate and use that -- the -- have a target to keep
23 the -- that the exerciser should be keeping their
24 heart rate in a target range.

25 And then there are -- at least in this

1 paragraph -- I think there's other discussion I have
2 in my declaration here about -- about the -- the
3 instructions, but that the -- in this -- this
4 example -- in this paragraph, the exerciser is told
5 to maintain intensity to keep that -- the heart rate
6 in that range.

7 BY MR. BOWLING:

8 Q So the -- the two are analogous, or are there
9 differences that you're pointing to?

10 I'm not sure I understand your answer.

11 MS. NGUYEN: Same objection.

12 THE WITNESS: So I -- I do discuss this in my
13 declaration a little, around paragraphs 50 and 51,
14 but I'll point you to the sections in Acres that I'm
15 citing for part of that.

16 So if you look down from that paragraph we
17 were just looking at, to paragraph 89, it says
18 (as read):

19 "At the most elementary level, the
20 Bug 601 takes control of compatible
21 exercise machine parameters that
22 determine exertion level. When the
23 Bug 601 is used with a compatible
24 treadmill 150, the treadmill speed
25 is controlled by the Bug's own

1 processor 420. If the Bug 601
2 senses, based upon the exerciser's
3 heart rate, that the exertion level
4 should increase because the
5 exerciser's heart rate is below the
6 target, the Bug 601 sends a command
7 to the treadmill 150 telling it to
8 increase speed by a specific amount.
9 After a time, for example
10 30 seconds, the Bug 601 again tests
11 the exerciser's heart rate against
12 the target. If the heart rate is
13 still below the target, the
14 treadmill 150 is again instructed to
15 increase speed by another amount."
16 And then in paragraph 90 (as read):
17 "If heart rate is within the target
18 zone, the treadmill 150 is
19 instructed to maintain speed. If
20 the heart rate is above the target,
21 the treadmill 150 is instructed to
22 slow by a given amount. When the
23 exercise period ends, the treadmill
24 150 is instructed to slow and stop."
25 So I think -- this describes the bug

1 automatically controlling the speed for compatible
2 treadmills.

3 And so with -- now with the addition of this,
4 it actually -- it actually provides more detail than
5 Abbondanza or the 225 patent with respect to how to
6 control the -- the speed to achieve a target heart
7 rate in this case.

8 So there is -- is more of an algorithm here
9 that's being described.

10 BY MR. BOWLING:

11 Q And what's that algorithm?

12 A Well, the algorithm is (as read):

13 "If the Bug senses, based on the
14 exerciser's heart rate, that
15 exertion level should increase
16 because the exerciser's heart rate
17 is below the target, the Bug 601
18 sends a command to the treadmill,
19 telling it to increase speed by a
20 specific amount. After a time, for
21 example 30 seconds, the Bug again
22 tests the exerciser's heart rate
23 against the target. If the heart
24 rate is still below target, the
25 treadmill 150 is again instructed to

1 increase speed by another amount."

2 Q Yeah, and for --

3 A And then it continues, when it -- right, when
4 it --

5 Q Yeah, you -- I think you --

6 A Yeah.

7 Q -- just read this in its entirety once;
8 right?

9 A Yeah, but that's -- that's describing --

10 Q Sure, sure.

11 A -- the algorithm.

12 Q I'm just trying to help out our court
13 reporter.

14 MS. NGUYEN: Counsel, please let the witness
15 finish completing how -- his answer and also please
16 let the witness testify as he wishes.

17 BY MR. BOWLING:

18 Q Are you -- were you finished, Dr. Houh?

19 A Well, I was going to -- there's more parts of
20 the algorithm, so -- you know, if you look at
21 paragraph 90 --

22 Q Okay.

23 A -- that also talks about when the heart rate
24 gets to the target zone. So if the heart rate is
25 within the target zone, the treadmill is instructed

1 to maintain speed.

2 And then it goes on to say if the heart rate
3 goes above the target, the treadmill 150 is
4 instructed to slow by a given amount.

5 And then when the exercise period is over, or
6 ends, the treadmill is instructed to slow and stop.

7 So this is giving more of an algorithm than,
8 I would say, the Abbondanza had, but, regardless,
9 Abbondanza, along with the knowledge or a person of
10 ordinary skill, particularly one that's looking at
11 the 225 to implement, the same kind of control
12 features based on the sens- -- sensor information
13 that -- that we looked at the bottom of column 19,
14 in the 225 patent, this is much more detail than is
15 provided by the 225 patent with -- in particular, at
16 the bottom of 19.

17 And I did -- I did scan through. I didn't
18 see any other algorithms in the 225. I hope I
19 didn't miss anything, but I didn't see them. And I
20 don't recall reading them previously either.

21 Q Okay.

22 A But this algorithm here, in 89 and 90, does
23 provide a framework for how the bug, based on the
24 heart rate, would -- would control the treadmill --
25 the compatible treadmills and then how to loop, for

1 example, using a 30 second example of a -- of a --
2 of a time period in which it would test again.

3 Q Okay. So if I understand you right, the
4 input to the algorithms of the bug is the heart rate
5 information; is that right?

6 A Well, there are other inputs to generate the
7 heart rate, for example. The -- the --

8 Q Okay.

9 A The pulses from the sensor.

10 Q Okay.

11 A So --

12 Q Got ya. So the -- the inputs can be one of
13 two things into this algorithm. One is heart rate
14 information. One is the -- the pulses that we
15 talked about, which the bug then turns into heart
16 rate information; is that right?

17 MS. NGUYEN: Objection; form.

18 THE WITNESS: So we looked at paragraph 84,
19 which describes counting pulses received from the
20 heart rate sensor. And then the pulses are also
21 filtered in spe- -- for -- for noise, averaged and
22 converted to a number representing beats per minute.
23 So that's one example of an input to a function.

24 In this case, it's specifically the pulses
25 that are received and the -- and the -- counting the

1 pulses with respect to a certain time period.

2 BY MR. BOWLING:

3 Q Got it.

4 A And then that in turn is another input to
5 a -- a function, which -- which is described a
6 little -- in a little more detail in paragraphs 89
7 and 90, which we looked at.

8 Q Okay. So 84 is talking about the individual
9 pulses that are sent to the bug. Paragraph 89 and
10 90 are talking about pulse rate information being
11 sent to the bug; right?

12 A 80- --

13 MS. NGUYEN: Objection; form.

14 THE WITNESS: 89 and 90 are talking about the
15 pulse rate information that's -- that's computed.
16 And 84 is talking about when the pulses are received
17 by the bug, turning them into beat per minute
18 information.

19 And I might add that this -- this patent, as
20 well, has the -- the -- what -- what you'll see in
21 many patents. The last paragraph of 109 of -- of
22 the specification says --

23 BY MR. BOWLING:

24 Q Yeah.

25 A (As read):

1 "The invention herein described with
2 reference to its particular
3 preferred embodiments is not limited
4 to such embodiments, but rather is
5 defined by the following claims and
6 their equivalents."

7 So it allows a lot of flexibility with
8 respect to what's explicitly exposed so long as they
9 still fall within the claims.

10 Q So you pointed out a similar paragraph in
11 Abbondanza; right?

12 A Yes. It was also, I think, the last or
13 second to last paragraph in Abbondanza's
14 specification.

15 Q Okay. How did those two paragraphs in
16 Abbondanza and Acres, respectively, affect the
17 analysis that you performed in this case?

18 MS. NGUYEN: Objection; form.

19 THE WITNESS: Well, it allowed -- you know,
20 there are lots of things that persons of ordinary
21 skill would know how to do. They could combine
22 components together. They could move, you know,
23 functional blocks around.

24 So that -- that's the kind of thing that
25 persons of ordinary skill might do.

1 BY MR. BOWLING:

2 Q What do you mean by "combine components
3 together"?

4 A Well, if you look at what's explicitly
5 disclosed in Abbondanza, you know, it -- it said,
6 well, there's two processors here. Let's put the
7 boards together and have all the stuff done with one
8 processor.

9 But it had to, to start with, connected by
10 links.

11 But those are the -- that's the kind of
12 alternative that's described expressly within
13 Abbondanza, but those are the kinds of things that
14 persons of ordinary skill, you know -- you know,
15 they might be motivated to put two things together
16 because it would save some costs, for example, but
17 they might also be motivated to break up things
18 apart because the -- the components might need a
19 distance between them and need to -- you know, if
20 the application calls for it.

21 So there are many things that -- that that
22 person of ordinary skill may do based on -- on
23 specific circumstances.

24 Q And you said a skilled artisan may be
25 motivated to put two things together.

1 So would an example of that be they see
2 something they like in one embodiment, they see
3 something else they like in a different embodiment,
4 and they can piece those together in a way that they
5 think would work maybe more effectively?

6 A Sure, that's one reason, is if they thought
7 maybe it would make something better, cheaper or
8 faster, they might be motivated to -- to combine
9 things from two different embodiments of -- in the
10 same patent description together.

11 They may be -- may be motivated to take what
12 they already know and -- and -- and -- and add it --
13 or -- or -- you know, or move something to --
14 within, you know, where the function appears or
15 where -- where things are.

16 And -- and those are the -- the types of
17 things that persons of ordinary skill, at -- at the
18 level, as I described in the 225, could do.

19 Q Did you do that at all when you were
20 comparing the 225 patent to either Acres or
21 Abbondanza?

22 MS. NGUYEN: Objection; form.

23 THE WITNESS: I do have a couple of sections
24 in my declaration that talk about the motivation to
25 combine a couple of references together, I think.

1 BY MR. BOWLING:

2 Q Yeah.

3 A For specific claims, I think Acres and
4 Pyle [sic].

5 Q And I'm not asking --

6 A And --

7 Q -- about different references. I mean within
8 one reference.

9 MS. NGUYEN: Sorry, again, please counsel let
10 him finish answering.

11 THE WITNESS: And I thought I -- Abbondanza
12 and Pyle [sic] I think I was discussing in my
13 declaration as well.

14 I -- I -- I -- I'm not sure what you're
15 referring to with this question. I -- I'm -- did --
16 are you saying -- because I don't think I did that
17 with respect to -- to Acres.

18 BY MR. BOWLING:

19 Q What about Abbondanza?

20 MS. NGUYEN: Objection; form.

21 THE WITNESS: So I think there are some --
22 some obvious things the POSITA would do. For
23 example, I talk about that in paragraph 75, with
24 respect to Abbondanza, which is (as read):

25 "To the extent that Abbondanza does

1 not teach that the user's pulse rate
2 is displayed on the exercise
3 system's display, a POSITA would
4 find it obvious to incorporate
5 monitor 160" -- oh, sorry. Yeah,
6 yeah, we're talking about Abbon- --
7 you asked about Abbondanza, yeah --
8 "into the treadmill." Abbondanza
9 discloses that 'monitor 160 may be a
10 television set of any number of
11 varieties or may even be a
12 projection television set.'"

13 But the reasons I give, if you go to the end
14 of that paragraph, is that, you know, many people
15 would want -- would not want to locate their
16 exercise equipment in the room they normally use to
17 watch television and that -- that "a POSITA would
18 have understood that incorporating a display onto
19 the treadmill would be less expensive than
20 purchasing a separate television or projector
21 television, which have components such as tuners,
22 multiple inputs, connectors, and speakers that add
23 unnecessary expense."

24 So that's a reason that would -- would
25 motivate a POSITA to incorporate a display into the

1 treadmill of -- of Abbondanza, to the extent that it
2 already is not disclosed as that, as having a
3 display.

4 In this section, starting on page 32, going
5 through page 34, generally discloses the issues with
6 respect to -- some iss- -- some issues with respect
7 to obviousness in Abbondanza.

8 (Exhibit 6 was marked for identification
9 by the court reporter and is attached hereto.)

10 MR. BOWLING: Dr. Houh, we're handing you
11 what we've marked as Exhibit -- Houh Exhibit 6.
12 This is Paper No. 11 in the IPR proceeding.

13 THE WITNESS: Thank you.

14 MS. NGUYEN: Counsel, do you have a copy for
15 us as well?

16 MR. BOWLING: Yes. Sorry.

17 Here you go.

18 MS. NGUYEN: Thank you.

19 BY MR. BOWLING:

20 Q Okay. You said you reviewed this document as
21 part of your preparation for today; is that right?

22 A Yes.

23 Q Did you read the whole thing?

24 A Yes, I did.

25 Q I think earlier you mentioned that there may

1 have been things that you disagreed with.

2 Did I understand that right?

3 A With respect to the patent owner's
4 preliminary response.

5 Q Okay. But not the institution decision?

6 A I -- I can't think of something I disagreed
7 with, with respect to their -- their ruling in
8 the --

9 Q Okay.

10 A -- institution decision.

11 Q You may remember just a couple of minutes ago
12 we were talking about Acres and the system in
13 figure 1, and I was asking you the extent to which
14 you thought it was analogous to the system we talked
15 about from Abbondanza.

16 Do you remember that?

17 A Well, I think you were asking me specifically
18 about the -- the similarities between the bug and
19 the way it controlled the exercise equipment and --
20 and the paragraph we looked to, Abbondanza, that was
21 similar.

22 Q Okay. But you remember that?

23 A Yes.

24 Q Okay. I'm going to ask you to flip to page
25 21 of the board's institution decision, and you'll

1 see there's a section header that says "4.
2 Discussion."

3 Do you see that?

4 A Yes.

5 Q And then the second sentence says (as read):
6 "To that end, in our view,
7 Abbondanza's 'instructions'
8 transmitted by its base unit 250 to
9 treadmill 230 for controlling the
10 treadmill are analogous to Acres's
11 'commands' sent for controlling a
12 treadmill."

13 I'm sorry, "commands" was in quote there.

14 A I think you -- I think that's what it says
15 here.

16 Q Do you disagree with that?

17 A I mean, I'm not -- sorry, that was
18 incomplete, so I -- I don't want to leave that on
19 the record as standing by itself.

20 I mean, that's what it says. I don't think
21 I -- I -- I don't think I focused too much on that,
22 but I did -- I did review this, this statement, and,
23 at -- at first glance, I don't see why I would have
24 cause to disagree here.

25 But, you know, I might -- I might be -- there

1 might be a reason to look further at -- at this
2 statement here, but, as I'm sitting here, I don't
3 say why I would have cause to disagree with it.

4 Q Okay. Looking back at figure 1 of Acres, the
5 bug there, labeled 140, do you see that?

6 A By the way, I'm -- I'm not sure that the --
7 in the institution decision, that statement is
8 really analogous to the way we're -- we're talking
9 about the way the heart rate gets processed to
10 generate instructions, but...

11 Sorry, what paragraph did you want me to look
12 at again, please?

13 Q We can go back to that.

14 What do you mean by what you just said?

15 A This is just saying that the instructions
16 transmitted by the base unit 250 treadmill are
17 analogous to Acres' commands sent for controlling
18 the treadmill. It's not really saying anything
19 about the processing steps involved to generate the
20 instructions transmitted by the base unit.

21 Q Okay. In your opinion, are the instructions
22 that are generated by the base unit in Abbondanza
23 different in some way from the commands that are
24 generated by the bug in Acres?

25 MS. NGUYEN: Objection; form.

1 THE WITNESS: I mean, as we saw in
2 Abbondanza, we saw that the -- the commands
3 generated by the base unit were in digital form and
4 transmitted over a link, as -- as data over the
5 link.

6 And -- and in Acres, it talks about the bug
7 being able to control the -- you know, in paragraph
8 89 and 90, control the speed of compatible
9 treadmills by the bug's processor.

10 So in many senses, there are -- there are a
11 lot of similarities.

12 So, again, I don't have, at first glance, a
13 basis to disagree with -- nothing comes to mind as
14 to why I would disagree with the board's -- of the
15 PTAB's statement in -- on page 21.

16 BY MR. BOWLING:

17 Q In your opinion, is the manner in which the
18 instructions are generated by the base unit in
19 Abbondanza different from the manner in which the
20 commands are generated by the bug in Acres?

21 MS. NGUYEN: Objection; form.

22 THE WITNESS: Well, I mean, we looked at that
23 paragraph in Abbondanza where it talked about
24 changing the speed of the -- if the target -- if the
25 heart rate were outside of the target range, to

1 increase the exertion level or decrease it. And
2 there was a very similar section in Acres we were
3 just looking at but -- but, you know, actually
4 giving a little more detail as to the algorithm as
5 to how to do that.

6 So, I mean, though they're -- they're similar
7 in that respect, as that -- they're both -- they
8 both describe a range or a target range for the
9 heart rate.

10 And Abbondanza didn't give us as much detail
11 about the specific algorithm as -- as Acres did, but
12 with respect to the 225, that didn't give even as
13 much detail as the Abbondanza reference gave
14 about -- about how to control exercise equipment
15 parameters based on received sensor data.

16 MS. NGUYEN: Counsel, can we take a break?

17 MR. BOWLING: Sure.

18 THE VIDEOGRAPHER: This marks the end of
19 media number 3. Going off the record at 1:28 p.m.

20 (Recess.)

21 THE VIDEOGRAPHER: This marks the beginning
22 of media number 4. Going back on the record at
23 1:43 p.m.

24 BY MR. BOWLING:

25 Q Dr. Houh, during the break, did you talk

1 about the substance of your testimony with counsel?

2 A No.

3 Q So, Dr. Houh, earlier, we were talking about
4 the -- the algorithms that the bug uses to process
5 information. Do you remember that?

6 A Yes.

7 Q And we talked a little bit earlier about --
8 for Abbondanza, looking at the algorithms in terms
9 of input and output. Do you remember that?

10 A I mean, I think we looked at what's input and
11 what's output from Abbondanza.

12 Q Right. Okay. Can you help me understand the
13 difference between the exercise information that's
14 input into the bug, on the one hand, and the
15 commands that are sent from the bug to the exercise
16 machine, on the other hand?

17 A Well, in the -- in the example that we are
18 looking at in Acres -- you're asking about Acres;
19 right?

20 Q Yes.

21 A Some of the -- one example of what's input
22 into the -- the bug is -- is -- is described in 84
23 where the input are these pulses received from the
24 heart rate sensor 610, of Acres, in this particular
25 example.

1 And then -- and then we saw that the pulses
2 are counted, filtered for noise, averaged and
3 converted to a number representing beats per minute
4 of the heart.

5 And then talks about -- in 89 and 90 -- about
6 the algorithm it's using to take that heart rate,
7 with respect to a target range of heart rate.

8 And -- and it's actually describing, 89 and 90, how
9 it does that and how it measures the -- the -- how
10 it tests the exerciser's heart rate at intervals,
11 for example, 30 -- every 30 seconds and then
12 comparing the heart rate, as a result of those tests
13 at regular intervals, against the target range, and
14 then what it instructs the -- what it commands the
15 treadmill to do.

16 And in this case, in the middle of 89, one
17 example is that the bug sends a command to the
18 treadmill, telling it to increase speed by a
19 specific amount, so -- and, of course, there's a
20 condition under which it does that, which is
21 described earlier.

22 So that's -- that's the input to the bug.
23 That -- that -- and the output of the bug commanding
24 the exercise device, in this case, the treadmill, to
25 increase the speed by a specific amount.

1 Q Okay. So I think we agree that those two
2 things are different. I'm just understand- --
3 trying to understand what the difference is between
4 the input and the output from a computer science
5 standpoint.

6 MS. NGUYEN: Objection; form.

7 THE WITNESS: Well, one of the most basic
8 differences is one's an input and one's an output.

9 BY MR. BOWLING:

10 Q Okay.

11 A Those are different.

12 Q Okay. Anything else?

13 A Well, the input is used to count pulses,
14 count the pulse inputs, and are -- their filtered
15 and -- and whatnot is described.

16 And the output is generated -- different
17 outputs are generated, you know, commanding the
18 treadmill to increase speed by a specific amount or
19 maintain speed or to slow by a given amount.

20 And there's some processing involved to
21 determine which of those commands to issue.

22 Q So if -- let's say the exercise information
23 comes into the bug and goes straight to the exercise
24 equipment without being converted into a command.
25 Would the exercise information be able to -- I'm

1 sorry, I think I misspoke there. I'll start over
2 there, if that's all right with you.

3 Is that okay?

4 A Sure.

5 Q Okay. If the bug never converted the
6 exercise information or processed it into
7 instructions, would a piece of exercise equipment be
8 able to change its speed or some of the other
9 changes in the exercise command that we talk about?

10 MS. NGUYEN: Objection; form.

11 THE WITNESS: Well, in what's described in --
12 in these paragraphs, 84 to -- to kind of 89, with
13 the components it's describing, if you took away one
14 of the components, like the bug -- I think that's
15 what you're asking about. And you're saying, well,
16 what if the pulses went right to the exercise
17 equipment.

18 Well, in that particular example, the bug is
19 counting the pulses and -- and going through,
20 figuring out the heart -- and computing a heart rate
21 and then sending a command to the exercise equipment
22 according to what it computed.

23 So if you took away all that, that -- this
24 section is talking about being on the bug --
25 you're -- you're now -- I think you're -- what

1 you're asking is, now, if you sent those -- those
2 pulses directly to the exercise equipment, what
3 would happen.

4 Is that what you're asking?

5 Well, in this example, it's -- it is
6 describing that the bug does these things in
7 commanding it, but if it may have been -- if a
8 POSITA may have a reason to say, we're going to
9 eliminate a piece of equipment and put a -- put
10 the -- the -- the computation steps in the -- the
11 part that does that in the exercise equipment,
12 then -- then certain configurations of pulses that
13 come off of the sensor may then -- you would see
14 some difference depending on whether the pulse rate
15 coming out of the sensors were low or high compared
16 to any particular targets.

17 BY MR. BOWLING:

18 Q But there would have to be something that
19 takes the raw sensor data that's sensed or collected
20 by a sensor and changes it into an instruction or
21 command that the exercise equipment could
22 understand; is that right?

23 A Well --

24 MS. NGUYEN: Objection; form.

25 THE WITNESS: I mean, if you took the -- if

1 you took what's described as being in the bug and
2 put it into the exercise equipment and -- and -- so
3 that it could process the pulses in -- in a similar
4 way, then a very low heart rate or pulses that --
5 say the heart rate is 0 or it's your real heart
6 rate, but -- that is a different set of pulses than
7 pulses where you're -- it's a different set of pulse
8 train than the -- the same pulse train where it's a
9 very high heart rate or within the target range.
10 And so the data for a low heart rate would, in
11 effect, cause it, because the exercise equipment
12 having that processing capability now embedded
13 within it, to increase the speed.

14 A pulse train that was, you know, within the
15 target range would -- would cause the exercise
16 equipment to maintain its speed.

17 And the pulse rate that -- a pulse train that
18 was at a very high rate, matching the user's high
19 heart rate, would similarly -- well, in -- in a way
20 cause instructions within the exercise equipment,
21 because it has that capability that was in the bug
22 now, to decrease or slow down the -- the speed.

23 BY MR. BOWLING:

24 Q Okay. And -- so even in that embodiment,
25 though, there's something that's converting raw

1 sensor data into these different instructions;
2 right?

3 A Well, I mean, raw sensor data is -- is still
4 data. And so --

5 Q Right.

6 A -- the data is in a different form.

7 So the form of -- of the raw sensor output,
8 interpreted by the -- the exercise equipment having
9 the capability to count and to compare a heart rate
10 against the target range, that low sensor output,
11 even if it's raw data, raw data, is, in effect,
12 causing the exercise equipment to slow down.

13 Q But that's not what's disclosed here; right?
14 We're just talking in hypotheticals. That's not
15 what's disclosed in Acres or Abbondanza?

16 MS. NGUYEN: Objection; form.

17 THE WITNESS: Well, what -- what's disclosed
18 in -- in Acres is that there's a -- a separate bug
19 that is -- is converting the pulses, counting them,
20 converting them into a pulse -- a heart rate and
21 then using that comparison to instruct the -- the
22 exercise equipment to change its -- its speed.

23 But you're really looking at -- you know, if
24 the pro- -- if you -- if the processing includes the
25 heart rate coun- -- the counting pulses and -- and

1 conversion to a heart rate and then using that heart
2 rate information to control the -- the speed, in
3 effect -- it's really the same thing.

4 A low set of -- a pulse rate that's low,
5 coming from the raw data from the sensors, is what
6 would trigger the -- the software, as programmed, or
7 the device -- the bug, as programmed, to cause the
8 device to speed up a little bit.

9 A pulse train from the raw sensor that is --
10 has a high rate does cause the -- the -- the
11 treadmill to slow down a little bit.

12 And so -- so all that taken together, I mean,
13 is -- is -- really, that the raw data -- in effect,
14 it does cause things to occur.

15 Whether you say where it's converted into an
16 actual command is just a matter of, like, where
17 you're looking.

18 In fact, a low pulse train coming from the
19 sensor, is, in itself -- could be considered the
20 command because that's what triggers the action of
21 the treadmill to speed up.

22 But, certainly, Acres is disclosing that the
23 command is sent to control the exercise equipment in
24 this algorithmic step.

25 But if the algorithm gets included to back up

1 into the heart rate counting and whatnot, then the
2 raw data of the heart sensor being at a particular
3 rate is, in effect, what triggers the -- the
4 exercise machine to -- to -- triggers the system to
5 have the exercise machine change its speed.

6 BY MR. BOWLING:

7 Q Right. At -- at some point, the heart rate
8 sensor is changing something. It's just a chain of
9 steps?

10 MS. NGUYEN: Objection; form.

11 THE WITNESS: It -- it is a chain of steps in
12 the sense that -- you know, we have these steps
13 separately described, you know, in paragraph 84, 89
14 and 90 of Acres. It happens to use the word
15 "command" in a later step, but taken altogether, you
16 know, the data of the low -- of the sensor coming
17 out at a low rate, as compared to a target rate, is
18 what actually causes the system to have the heart --
19 the -- the rate increase.

20 So the command can be looked at at different
21 locations; right? Is it a command -- the command
22 that is issued by the bug itself to cause the heart
23 rate sensor to increase? That can be taken as a
24 command. But it's all software steps to the --
25 to -- to the bug.

1 So that even a -- the right set of raw data
2 input into the system is what causes outputs to
3 change.

4 BY MR. BOWLING:

5 Q Right.

6 A You know, so if you change the raw inputs to
7 the system, the -- the outputs of the system can
8 change.

9 And where you say the command is, Acres
10 clearly says there is a command in the middle, but
11 the raw data itself can also act as a command
12 because it is, in effect, what causes the output to
13 change.

14 Q And when you say the command is in the middle
15 in Acres, you're referring to the bug?

16 A Well, I'm -- I'm specifically referring to, I
17 think, in paragraph 89 of Acres where they actually
18 use the phrase "sends a command."

19 Q Right.

20 A Right. But what caused that command to be
21 sent was the specific low set of pulse rate of -- of
22 5 kilohertz pulses coming from the sensor that were
23 below a target rate.

24 So it's -- it's that data, combined with the
25 programming and the configuration of the bug, that

1 causes the output change to occur.

2 Q Got it. In the computer science field, are
3 instructions considered to be different from data?

4 A I think many people in the field look -- look
5 at instructions as just another form of data.

6 They're data that are interpreted by a processor.

7 They're all encoded the -- they're encoded the same
8 way as -- as arguments.

9 So the operands and the operations are all
10 digital -- digitally encoded. And when you look at
11 a program, if you just look at it, you can't tell
12 the difference between -- you can't necessarily tell
13 the difference between what are instructions and
14 what might not be instructions because it's all
15 digital data.

16 Q It's all 1s and 0s?

17 A It's all 1s and 0s.

18 I mean, I do understand this is a point of
19 contention that the patent owner has raised in the
20 preliminary response, and -- and I -- I disagree
21 with the position that the patent owner has taken
22 that somehow data excludes instructions or commands.

23 Thank you.

24 Q Dr. Houh, I'm going to ask you to look at
25 your declaration really quick.

1 A Okay.

2 Q Specifically page 17, the last sentence in
3 paragraph 44.

4 You can let me know when you're there.

5 A Okay.

6 Q Do you see where you say, "This is basic
7 computer science"?

8 A Yes.

9 Q What did you mean by that?

10 A What I mean is that the 225 patent's
11 describing a straightforward system in which sensor
12 data is collected, transmitted and processed to
13 generate outputs, that that kind of description, as
14 what's being described, is -- is -- is basic
15 computer science.

16 (Exhibit 7 was marked for identification
17 by the court reporter and is attached hereto.)

18 BY MR. BOWLING:

19 Q Okay. Now we've handed you what we've marked
20 as Houh Exhibit 7.

21 Do you recognize this document?

22 A I'm not so sure. Is this an exhibit to -- to
23 either of -- 1000 exhibit or 2000 exhibit to this
24 matter?

25 Q No, it's not marked as an exhibit in the IPR

1 proceeding.

2 Have you ever seen this document before?

3 A No, I don't think I have.

4 Q I'm going to ask you to turn to -- it's the
5 third page of Houh Exhibit 7.

6 Do you see there's a data -- a definition of
7 data at the top?

8 A I do.

9 Q Do you see the second sentence that says
10 (as read):

11 "The distinction between program
12 (instructions) and data is a
13 fundamental one in computing..."?

14 Do you see that?

15 A It refers to "von Neumann Machine" here. And
16 so could you provide that too so we can see what
17 it's referring to?

18 Q I'm not -- I don't think that's referring to
19 a -- a later part of the dictionary.

20 A Well, the sentence specifically ends with
21 parenthesized "see von Neumann machine," which I
22 don't see is part of this -- this -- what you
23 provided here.

24 Q Okay. So we can note that you think this is
25 a reference to the dictionary.

1 But do you disagree with the statement that
2 "the distinction between program (instructions) and
3 data is a fundamental one in computing"?

4 A Well, I would like to see the context of --
5 of what it says about von Neumann machine to
6 understand what -- what the context is because there
7 is a difference between an instruction and the data
8 upon which instructions operate, and that's because
9 the instruction, which is also in digital binary
10 form, tells -- instructs certain types of machines
11 as to what to do with respect to the following
12 operands.

13 So there is a distinction in the sense that
14 if you say -- if you assign the -- the value of --
15 of, say, a plus operand to be the value 2 and then
16 you -- you have an instruction, which is plus, which
17 is the value 2, and 3 and 4, and then maybe you have
18 the instruction times to be the value 3, and then
19 you have -- and you assign divide or minus to be
20 value 4.

21 If you're looking at a sequence of
22 instructions in digital memory, if you see 2, 3, 4,
23 5, 6, 7, you need some context to understand which
24 the instruction is and which are the operands of
25 that instruction.

1 So it does matter to the computer, but,
2 nevertheless, the instructions themselves are
3 encoded as data just like all the other data.

4 So I'd like to see the context.

5 And I think that this could be referring to
6 that sense, which if you see 2, 3, 4, 5 as part of a
7 program, it does matter which one the instruction
8 is, but the program interpreters know how to
9 understand the instructions and which are
10 instructions because they execute in sequence, and
11 the compilers know how to issue the right compiled
12 instructions, some of which are instructions, some
13 of which are operands, but they're all data to the
14 computer.

15 So the fundamental distinction, I think in
16 the context of a von Neumann machine, might -- might
17 be describing that difference and not the fact
18 that -- that I think what you're implying.

19 Because to a computer, data is data. Some
20 programs are interpreted -- the data of a program
21 can be interpreted, but you have to know which is
22 the first instruction to start out with, and if you
23 don't get the sequence right to know which
24 instruction to start with, it turns into garbage;
25 right?

1 Because if you had 2, 3, 4, 5, you saw in the
2 middle of a program, in this very simple example,
3 all of them, 2, 3, 4, 5, are assigned to potential
4 operations, yet you don't know if it's the operation
5 2 being applied to 3 and 4, the operation 3 being
6 applied to 4 and 5, or the operation 4 being applied
7 to the 5 and the data that comes after it. And it's
8 all data.

9 So there is a distinction in a -- in a
10 mach- -- in a computer because the operand and the
11 operator are -- are -- they are fundamentally
12 different, but it's still all data.

13 MS. NGUYEN: Counsel, for the record, we
14 would like the to object to this exhibit on a number
15 of bases, including relevance, authentication and
16 not providing a full copy.

17 BY MR. BOWLING:

18 Q So your opinion is that it's all data because
19 it's all 1s and 0s; is that right?

20 MS. NGUYEN: Objection; form.

21 THE WITNESS: There -- there -- there --
22 there -- there -- there is a distinction between an
23 operand and an operator. One tells you what to do,
24 and one is the thing that the operand -- the
25 operator operates upon. And --

1 BY MR. BOWLING:

2 Q So --

3 A And that's important -- it's important for
4 the computer because if you start -- if you
5 interpret a program starting at the wrong place
6 or -- or the exact sequence of data within a
7 program, including the sequence of instructions and
8 the -- the operands that -- that the -- that the
9 function is to operate on, if they -- if they get
10 out of the sequence, they crash, you get a crash,
11 because -- because they have to be executed in a
12 very specific way.

13 The sequence of data in a computer, if you
14 don't interpret the correct instruction as an
15 instruction, you won't be operating on the right
16 data or the right operands.

17 And so I see -- I see that, and I -- I see
18 that you -- that you haven't provided the entire
19 context.

20 Q What is the --

21 A -- of the von Neumann machine here.

22 Q Let's look back at Abbondanza for a minute.

23 What is the -- or how would you describe the
24 pulse rate information? Is that an operator or an
25 operand, in the terms you just described?

1 A I'm -- depending on the program. It could be
2 interpreted as -- I mean, the -- the program can be
3 written in a way that -- a value of a -- of a heart
4 rate can trigger a sequence of instructions.

5 The program can also be written in a way that
6 the command, as distinguished from other commands,
7 can trigger a sequence of instructions.

8 And so the computer, the computer is only
9 executing the code that it has.

10 The result is -- is -- particular inputs
11 generate particular outputs.

12 So the data of a heart rate, a particular
13 heart rate that's below another value, could itself
14 trigger the same sequence of events if -- if the
15 value of the heart rate were instead a particular
16 command value.

17 Because the program might say, well, what is
18 the command?

19 And one way of doing this is if you know that
20 the input is a command -- and, by the way, at that
21 point, the command might be an argument to -- or --
22 or an operand to a function that is to figuring out
23 what sequence of instructions to operate based on
24 the input command.

25 And so in -- in that example, you might have,

1 you know, due -- due paren command, and the first
2 step might be a switch case, switch case 1, case 2,
3 case 3, case 4, because the -- you have to figure
4 out what -- what that command might be.

5 And in that case, case 1 would trigger a
6 series of instructions that you might execute for
7 whatever the 1 command was.

8 Say the 1 in this example was increase --
9 increase the treadmill speed. So -- so if the
10 command which, as interpreted by this function,
11 would actually just be an operand, but by the -- to
12 the function that figures out what command
13 sequence -- what appropriate set of -- of -- of
14 computer instructions to run, that would be an
15 argument to a function that determines what command
16 the argument was matched up to and execute the
17 instructions for that match.

18 So case -- you could say case increase speed,
19 case decrease speed, and you could execute one
20 series of instructions different from -- in the --
21 in the case increase speed, then, from the case
22 decrease speed.

23 Similarly, you could have a function that
24 took as an input the heart rate, and you might have
25 a series of if-then statements.

1 If the heart rate is less than target value,
2 increase speed and have the same sequence of -- of
3 commands for increasing the speed as you had in the
4 other dispatching function which figured out -- or
5 which command was being executed, in -- in one case,
6 increase speed, and -- and executing those same
7 series -- series of commands that you might in this
8 alternative method of writing the -- a function that
9 takes an input heart rate value.

10 Q So are you saying --

11 A So --

12 Q -- it's not clear from Abbondanza whether the
13 heart rate information is an operand or an operator?

14 MS. NGUYEN: Objection; form.

15 THE WITNESS: I'm saying there's --
16 there's -- there's -- the commands are -- are our
17 data. I'm disagreeing with the -- the position that
18 the patent owner has taken in the preliminary
19 response about somehow data doesn't include
20 commands.

21 BY MR. BOWLING:

22 Q Well, I'm not asking you about the patent
23 owner response. I'm just asking you about the
24 difference between data and instructions as it
25 applies to Abbondanza.

1 Is -- is it your opinion that the heart rate
2 information that's collected by the sensor is the
3 same thing as the instructions that are sent to the
4 workout machine?

5 MS. NGUYEN: Objection; form.

6 THE WITNESS: What I'm saying is that, you
7 know, there is a step that might say let's send the
8 command to the workout -- the -- the exercise
9 device, but what causes that command to occur is a
10 heart rate of a specific value that happens, say,
11 below a target range.

12 But that -- that input, that value of the
13 heart rate, is -- is, in effect, what causes a
14 series of actions to occur, so --

15 BY MR. BOWLING:

16 Q Does that make it an operand?

17 A Well, in many senses, even commands that come
18 in are operands at some point. Because in order to
19 figure out what actual series of instructions to
20 execute, a program has to take that command and --
21 and figure out which command to execute, in which
22 case -- a command, in that case, would be an operand
23 to a dispatching function of -- of dispatching to
24 the right set of code.

25 And so, I mean, now there -- there is a

1 difference in -- if you're looking at it just the --
2 the binary data of a -- of a program, there -- it
3 does matter where -- which -- where you start and
4 where you jump to.

5 If you jump to -- if you jump to an
6 instruction that's not actually an instruction, that
7 might be an operand, that -- that's something that
8 the instruction would operate on, then -- then the
9 system there would crash.

10 So there -- there is a difference in -- in --
11 in machines with that -- with that respect. Because
12 data -- if you interpret operands as -- as
13 instructions and it wasn't really an instruction,
14 that's the kind of thing that causes computer
15 crashes.

16 If you interpret an instruction -- correctly
17 as an instruction, it may use operands that are --
18 are sequentially after the instruction or -- or
19 wherever, they may be used as pointers or, you know,
20 things like that.

21 But the program -- what code to execute for
22 executing the instruction, that instruction value,
23 along with its operands, causes certain parts of a
24 program to execute, and so -- so in that sense,
25 the -- the values given to a function determine

1 the -- the correct path through the code.

2 So it is executing the instruction, but the
3 data has an important role -- sorry, the operand has
4 an important role as to which path through the code
5 is taken.

6 And so, you know, we -- so that's part of
7 what I'm saying, is that the value of a heart rate
8 sensor is -- is -- for a particular set of code that
9 may be looking at heart rate sen- -- values,
10 comparing it to a threshold, the -- the in- -- that
11 input value is outcome determinative of which part
12 of the code actually gets executed.

13 And that's like if you issue a command, the
14 command itself may also -- with -- with no operands,
15 that may also be outcome determinative of which
16 section of the code gets executed.

17 Q What's the operator in Abbondanza?

18 A Well -- so, you know, at one level, you know,
19 Abbondanza is describing -- for example, in column
20 12, line 27, (as read):

21 "Microprocessor/microcontroller 470
22 controls both user interface 460 and
23 motor control interface 560."

24 So there would be functions written to
25 implement these, and -- and those functions can in

1 turn call other functions, which in turn call other
2 functions.

3 And so -- so the way the software are written
4 determines -- so a function is -- is the type of
5 thing -- an example of a thing that I'm calling an
6 operator, but at the -- at a way-down level, an
7 operator also might be like the function add or
8 subtract.

9 There might be other functions that are
10 things to open up a file on the file system or call
11 the network layer to send a piece of data.

12 So all those things are functions, but
13 computer programs are written in a way which
14 abstracts lots of lower-layer -- lower-level things
15 away from the upper level so users don't have to
16 think about what happens when you call the function
17 to add two numbers or to add two strings to create a
18 longer string.

19 A lot of the compilers take into account the
20 intent of the user when they're adding two things,
21 like two integers versus two strings, but those in
22 turn call other functions, and then if you want to
23 display those, other functions are called.

24 So when I'm saying "operator" in this case, I
25 mean in a broad sense any sort of computer function.

1 And when I'm saying "operand," I'm talking
2 about any argument that's passed into a function.

3 So if function is add, the op- -- and you --
4 and it can add two things together, the operands
5 would be the two arguments to the add function.

6 Q So I'm not -- did you understand my question,
7 Dr. Houh?

8 A Well, I -- I -- could you repeat your
9 question? I thought I did.

10 Q Do you remember the process we talked about
11 in Abbondanza earlier where data is sensed by the
12 pulse rate sensor, transmitted to the base unit,
13 instructions are generated, and then those
14 instructions are sent to the exercise machine? Do
15 you remember that?

16 MS. NGUYEN: Objection; form.

17 THE WITNESS: I mean, we -- we talked about
18 that earlier. Have you -- I think you asked me
19 about what the operator in Abbondanza is.

20 BY MR. BOWLING:

21 Q Do you remember that?

22 A I mean, we certainly talked about things
23 that -- sent to the base unit --

24 Q Okay.

25 A -- in Abbondanza earlier.

1 Q In that process, what is the operator and
2 what is the operand, in your opinion?

3 A So all throughout the code, whenever you
4 write code, there are all sorts of operands and
5 operators at all levels throughout the code. So
6 there's -- in any code it's -- it's like that.

7 Q Is the pulse rate information an operator or
8 an operand, in your opinion, or do you not know?

9 MS. NGUYEN: Objection; form.

10 THE WITNESS: Again, commands and -- and
11 values of sensor data, they're -- they're all data.
12 Data is treated -- when you get an input --
13 certainly when you send a command or a sensor value
14 over a communication channel, when you receive it,
15 you actually are receiving data, and then it's the
16 program -- it's up to the program to interpret what
17 you receive in a very specific way.

18 And -- and that's why people develop
19 protocols for transmission of data. You need to
20 know what you're sending, when you're sending data,
21 how you're sending data, and as long as you develop
22 these protocols and follow them, then -- then you
23 can understand the data that's transmitted over
24 wire, whether it is a command that is transmitted or
25 a value of a -- of a sensor.

1 So at that most basic level, whatever is
2 received over the communications channel is, at
3 first, treated like an argument to something else,
4 because you receive the data and then you have to
5 process the data, and the function you call to
6 process the data takes the data received as an
7 argument to the function that determines how to
8 process the data.

9 So there are many, many layers in a computer
10 program, and -- and the input -- the inputs drive
11 what code actually happens, which -- and if there
12 are outputs that occur, determine what outputs
13 occur.

14 MS. NGUYEN: Counsel, can we take a break?

15 MR. BOWLING: Sure.

16 THE VIDEOGRAPHER: This marks the end of
17 media number 4. Going off the record at 2:26 p.m.

18 (Recess.)

19 THE VIDEOGRAPHER: This marks the beginning
20 of media number 5. Going back on the record at 2.33
21 p.m.

22 BY MR. BOWLING:

23 Q Dr. Houh, what is a van [sic] Neumann
24 machine?

25 A I think it's a specific type of architecture

1 of a machine.

2 Q Is it a type of computer?

3 A I -- I -- I don't know how -- well, and
4 whether you say -- it's a type of -- it's a type of
5 architecture for a machine is my understanding.

6 And I don't know if you -- if you have a --
7 the definition here, we can take a look at that, but
8 to the -- to the best of my recollection right now,
9 it's -- it's a type of architecture. And could a
10 computer be implemented using the architecture,
11 sure.

12 Q Are a lot of modern computers built using a
13 von Neumann architecture?

14 MS. NGUYEN: Objection; form.

15 THE WITNESS: I think there are probably
16 many -- many forms that are, but I -- I don't know
17 the architecture of every type of modern computer.

18 BY MR. BOWLING:

19 Q What percentage of modern computers would you
20 say use a von Neumann architecture?

21 A I've always heard it said as "von Neumann,"
22 but -- I mean, I -- I don't -- I need to look at the
23 data for -- for that to understand.

24 Q You don't know?

25 A Oh, I wouldn't know offhand, to give you a

1 number like you're asking for.

2 Q Is my laptop built on a von Neumann
3 architecture?

4 MS. NGUYEN: Objection; form.

5 THE WITNESS: I mean, I think that it may be,
6 but I -- I -- again, I don't -- you know, I -- based
7 on what I would surmise, but -- but I'd -- I'd
8 actually want to sit down to review a little more
9 because this is the first time that this has come up
10 for me in a long time.

11 BY MR. BOWLING:

12 Q When you say this is the first time that
13 "this" has come up in a long time, what are you
14 referring to?

15 A Just thinking object what von Neumann
16 architecture is and trying to just recall the --
17 what -- the specifics.

18 Q In Houh Exhibit 7, you see the parenthetical,
19 in the definition we looked at, that says "see
20 von Neumann machine"; right?

21 A Yes.

22 Q Why do you think that that's there?

23 A Because I think it's providing some context
24 for this definition.

25 Q But what's the relationship, as you

1 understand it, to the -- the sentence that we
2 reviewed in the definition of data and von Neumann
3 machines?

4 A So I -- I think you said that this was not an
5 exhibit to this -- this -- this matter; is that
6 correct? Other than -- this deposition, but to
7 the -- to the IPR itself?

8 Q Did you understand the question, Dr. Houh?

9 A Yeah, I need some context. That's why I'm
10 trying to clarify.

11 Q So you're not able to answer the question?

12 MS. NGUYEN: Objection; form.

13 THE WITNESS: I said that I -- I don't think
14 I had seen this before.

15 BY MR. BOWLING:

16 Q Okay.

17 A So it looks like -- it -- it's telling --
18 it's instructing the reader here to see von Neumann
19 machine, and -- so that's what I would want to do to
20 consider the statement that you're -- that you read.

21 Q And why do you think that the definition is
22 pointing the reader to the von Neumann machine, in
23 your opinion?

24 A Because it literally, at the end of the
25 sentence, says "see von Neumann machine."

1 Q No, I mean, for what purpose do you think
2 von Neumann machines are relevant to this definition
3 of data?

4 A I think that it may provide some context.
5 So --

6 Q In what way?

7 A But I'm not -- I'm not sure because I -- you
8 haven't provided the definition of von Neumann
9 machine.

10 Q In what way do you think it provides context?

11 A Because within the sentence, defining --
12 or -- or stating what it's stating, at the end, it
13 basically says to see von Neumann machine.

14 (Exhibit 8 was marked for identification
15 by the court reporter and is attached hereto.)

16 BY MR. BOWLING:

17 Q I'm going to hand you what we've marked as
18 Houh Exhibit 8.

19 MR. BOWLING: Is that right?

20 BY MR. BOWLING:

21 Q Do you recognize this document, Dr. Houh?

22 A Yes.

23 Q And what is it?

24 A It's one of my patents.

25 Q Okay. So you're a named inventor on this

1 patent?

2 A Yes.

3 Q And when was this patent filed?

4 A It was filed June 1, 2006.

5 Q And you understand that 2006 is the -- the
6 relevant priority date here for the 225 patent?

7 A Yes, the 225 provisional was filed on
8 September 7, 2006.

9 Q What was the invention, if you can describe
10 it briefly for me, that you claimed in this patent,
11 in Houh Exhibit 8?

12 Is it okay if I refer to it as the 910
13 patent?

14 A Sure.

15 MS. NGUYEN: Objection; form.

16 THE WITNESS: I mean, the claimed invention
17 is laid out in the claims, on the last page, so I'll
18 just refer you to those. That's what this invention
19 is -- that's what this patent is claiming as an
20 invention.

21 BY MR. BOWLING:

22 Q Does this relate to computer science?

23 A Sure, a particular subarea, but, generally,
24 it's -- it's within the computer science umbrella.

25 Q What subarea are you referring to?

1 A It's -- it's related to kind of speech and
2 natural language processing. That's one of the
3 areas. It's not really confined to only that area,
4 but it's -- it's -- it's one that's related to.

5 Q Okay. I'm going to direct you to column 17.

6 A Okay.

7 Q I'm going to ask you to go down to line 55,
8 midway across. It begins with "the essential
9 elements."

10 Do you see that?

11 A Yes.

12 Q It says (as read):

13 "The essential elements of a
14 computer are a processor for
15 executing instructions and one or
16 more memory devices for storing
17 instructions and data."

18 Do you see that?

19 A Yes.

20 Q In the context of -- of this patent, are you
21 using the words "instructions and data" in the way
22 that skilled artisans in computer science would be
23 using those terms?

24 MS. NGUYEN: Objection; form.

25 THE WITNESS: Sure. So what I'm saying here

1 is -- is distinguishing some forms of data that are
2 instructions and then general forms of data here.

3 This is not excluding -- this is not saying
4 that instructions and data are two wholly mutually
5 exclusive things. I think you're misinterpreting it
6 here.

7 This is just saying, you know, we talk about
8 a processor for executing instructions and one or
9 more memory devices for storing instructions and
10 data, and that's consistent with everything,
11 which -- which is instructions are a form of data,
12 but they're a very specific type.

13 You know, and if -- if you said something for
14 storing images in data, it doesn't turn images into
15 things that are not data.

16 BY MR. BOWLING:

17 Q Did you understand my question, Dr. Houh?

18 A I did. And I explained my reasoning behind
19 that.

20 Q I'll repeat the question.

21 In the context of this patent, are you using
22 the words "instructions and data" in the same way a
23 skilled artisan in computer science would use those
24 terms?

25 A Generally, a person of skill in -- in the art

1 of computer science would understand instructions to
2 be a form of data, a subset of data. And I'm using
3 these consistently with -- with the way people talk
4 about instructions and data. That is, they're --
5 they're not mutually exclusive things.

6 Q But they're different?

7 MS. NGUYEN: Objection; relevance.

8 THE WITNESS: They are not mutually
9 exclusive, and they can be different because they're
10 not mutually exclusive. They can be -- instructions
11 are a form of data.

12 BY MR. BOWLING:

13 Q And images are a form of data?

14 A So if I --

15 MS. NGUYEN: Objection; form.

16 THE WITNESS: So if I said images in data,
17 it's the same thing. Images are a form of data.

18 BY MR. BOWLING:

19 Q Are images a form of data?

20 A Digitized images are a form of data.

21 Q What about digitized videos?

22 MS. NGUYEN: Objection; relevance.

23 THE WITNESS: I think people generally --
24 POSITAs would -- would understand that the -- the
25 video -- the -- the -- the bytes and -- bits and

1 bytes comprising a video are also data, but they're
2 understood in the context of the data being a video.

3 BY MR. BOWLING:

4 Q Is software data?

5 A All soft- -- all software is a form of data.

6 Q Is there anything digital, in your opinion,
7 that's not data?

8 A "Data" is a broad term. Data encompasses a
9 lot of different things, I think, generally
10 speaking.

11 These are all examples of -- of data.

12 Q Is there anything digital, in your opinion,
13 that's not data?

14 MS. NGUYEN: Objection; form.

15 THE WITNESS: I think things that can be
16 stored on a -- in a -- in a computer readable memory
17 or transmitted over a -- a digital communications
18 medium, those are examples of things that would be
19 considered data.

20 BY MR. BOWLING:

21 Q And instructions are a specific type of data;
22 correct?

23 A There happened to be a label for certain
24 types of instructions that are interpreted to be
25 instructions.

1 Q What's that label?

2 A Well, that would be instructions, one of the
3 labels, potentially, and that would be an example of
4 what is data.

5 Q What do you mean the label would be
6 instructions?

7 A Well, if you say an image, a JPEG image, for
8 example, the data is there, but you've now -- it has
9 the label of JPEG image. And if it is a properly
10 constructed JPEG image, then the data is structured
11 in a way that allows it to be interpreted as a JPEG
12 image.

13 Q Where is this label contained in the data?

14 A The -- the data -- well, some things like a
15 JPEG image actually start out with a label. I think
16 that just -- that -- that literally is -- are the
17 ASCII characters for JPEG.

18 Not all data is so structured. So an
19 instruction isn't necessarily labeled the same way a
20 JPEG image would be labeled.

21 There may be some other forms of -- of image
22 and coding that -- that don't have such a label, but
23 if it's properly structured and you're using the
24 right structure and the right program that knows how
25 to interpret that program, you can -- you can

1 convert that data into a visual image, if the data
2 were like some type of image representation.

3 Q Where is the label contained for
4 instructions?

5 A So data doesn't necessarily have to be an
6 instruction. Data can just be data.

7 But if -- if -- if the program counter is
8 pointing to a piece of -- of -- if the program
9 counter is pointing to a specific piece of data and
10 it's at the beginning of the cycle of -- of using
11 that machine to -- to execute -- that -- that
12 program counter treats the data that's pointed to by
13 the counter as an instruction, and so that -- in
14 that way, that's -- there's no explicit label, but
15 the -- the fact that a program counter in a specific
16 type of computer is pointing to a piece of data,
17 it's going to treat that piece of data as -- as an
18 instruction.

19 If you point the program counter to any
20 random location in a program, you may or may not
21 actually be pointing to an instruction or something
22 that's intended to be interpreted as an instruction.

23 So it's the program counter in a -- in a
24 computer pointing to an instruction that implicitly
25 renders that piece of data it's pointing to as an

1 instruction because -- what the program counter then
2 does is uses that value pointed to in some
3 architectures as an -- as an argument into a
4 dispatch function that then dispatches the
5 control -- the execution of the computer -- of the
6 processor to a specific set of instructions that --
7 that -- a specific set of sequence of other
8 instructions, that the initial instruction the
9 program counter was pointing to represents.

10 Q Would the heart rate information in
11 Abbondanza be labeled as an instruction?

12 MS. NGUYEN: Objection; form.

13 THE WITNESS: I -- I think there are ways
14 to -- to structure the data so that it could be.
15 There are ways that it isn't.

16 But Abbondanza doesn't say -- the -- the 225
17 has no details about how -- that I recall, sitting
18 here right now, about how any of the sensor data is
19 to be structured.

20 BY MR. BOWLING:

21 Q I didn't ask you about the 225 patent. I
22 asked you about Abbondanza.

23 A Right. So --

24 Q Does Abbondanza disclose that the heart rate
25 information is labeled as an instruction?

1 MS. NGUYEN: Counsel, please let hem finish
2 answering.

3 THE WITNESS: So what I'm saying is that
4 because the -- the 225 is also absent about this
5 issue, the person of ordinary skill is left to know
6 how -- the spec is depending on the knowledge of a
7 person of ordinary skill to come up with the kind of
8 way that data is transferred and how it's labeled.

9 So the same way that the POSITA would create
10 the data structures in the 225 could also be applied
11 to how the same POSITA, same level of skill, as we
12 defined earlier, would do so for the -- the sensor
13 data in Abbondanza.

14 BY MR. BOWLING:

15 Q So, in your opinion, neither the 225 patent
16 nor Abbondanza disclosed whether the heart rate
17 information would be labeled as an instruction; is
18 that right?

19 MS. NGUYEN: Objection; form.

20 THE WITNESS: I -- I mean, I don't recall the
21 225 saying anything about that or the Abbondanza
22 saying anything specific about what you're asking.

23 BY MR. BOWLING:

24 Q What about Acres?

25 A Again, I don't have all these memorized, but

1 sitting here right now, I don't recall any of the
2 references getting that specific about this aspect
3 of -- of the data or the instructions.

4 Q So in that case, is it impossible to know
5 what's data and what's an instruction in Abbondanza
6 and Acres?

7 MS. NGUYEN: Objection; form.

8 THE WITNESS: I mean, I think -- I -- I
9 understand the patents owner's preliminary response
10 is that commands are not data. That's -- I believe
11 that's incorrect. I disagree. My opinion is that I
12 think that's wrong.

13 There's no -- no reason any of these -- the
14 225 spec, I saw nothing in there that somehow
15 redefine data, from a broad term, to somehow exclude
16 commands or instructions.

17 BY MR. BOWLING:

18 Q You're not answering my question, Dr. Houh.
19 Is it possible for a skilled artisan to
20 understand which data disclosed in Abbondanza and
21 Acres is an instruction?

22 MS. NGUYEN: Same objection.

23 THE WITNESS: Well, both those references do
24 talk, at points, about, like, sending commands to --
25 to -- to the exercise equipment or -- I don't -- you

1 know, I don't remember if they both use the word
2 "command." I think Acre does. But they talk about
3 controlling the exercise equipment.

4 And so if you -- if you say, well, what --
5 what causes the command to be sent -- is the command
6 a command? Yeah, it's a -- it's a command. It's
7 sent -- we -- we saw, I think, in Abbondanza it's
8 sent between two microprocessors as digital
9 information over an infrared link. So that command
10 is data that is sent over the link. That's what
11 links do. They carry data.

12 Links don't -- if links didn't -- if links
13 carry digital data, if -- if -- if -- the link
14 doesn't know if the data is a command or not. So
15 it -- it somehow doesn't filter out and say, oh, I'm
16 transmitting data. This is a command. I'm not
17 going to transmit it because I don't know how
18 to tran- -- because the command is not data. I
19 don't know how to transmit something that's not
20 data.

21 That's -- that's pretty -- that's pretty
22 weird to say. But that's, in effect, the -- the
23 result of the argument that the patent owner is
24 making in the preliminary response.

25 So we know the bug is transmitting serial

1 data over an infrared link, and it's sending
2 commands. It's sending commands as data over that
3 link to control the exercise equipment.

4 It's sending the -- it's sending digital data
5 over that link, that infrared link, in -- in one of
6 those figures in Abbondanza, to control the exercise
7 equipment.

8 And so the link doesn't -- just carries the
9 data that it's -- it's designed to carry, and it's
10 all -- it's all digitized. It's -- it's -- it's --
11 it's data in digital form that's transmitted over a
12 link that's used by a computer.

13 And if you then back up from the actual
14 command that's sent, what causes that command to be
15 sent? Well, it's the fact that a heart rate might
16 be at a certain level that's outside the target
17 range or that a series of pulses is at a certain
18 frequency and that triggers that same series of
19 instructions with some additional processing
20 instructions before that.

21 So the notion that somehow command isn't data
22 is -- is -- is just not correct.

23 MR. BOWLING: Okay. Let's take a quick
24 five-minute break. I don't think we have much left.

25 THE WITNESS: Okay.

1 THE VIDEOGRAPHER: Going -- going off the
2 record at 2:58 p.m.

3 (Recess.)

4 THE VIDEOGRAPHER: Going back on the record
5 at 3:11 p.m.

6 BY MR. BOWLING:

7 Q Okay. Dr. Houh, we got the much-awaited
8 context that we've been talking about, the
9 van [sic] Neumann --

10 A Von Neumann.

11 Q -- von Neumann definition from the Oxford
12 computing dictionary.

13 (Exhibit 9 was marked for identification

14 by the court reporter and is attached hereto.)

15 BY MR. BOWLING:

16 Q We're going to hand you what we've marked as
17 Houh Exhibit 9.

18 A Thank you.

19 Q And you'll see, Dr. Houh, that Houh Exhibit 9
20 has the same cover page as Houh Exhibit 7, but in
21 this instance, the Houh Exhibit 9, we've included
22 the definition of von Neumann machine, which we
23 discuss as being cross-referenced in the definition
24 of data.

25 Do you see that?

1 A Yes, I do.

2 MS. NGUYEN: Sorry.

3 BY MR. BOWLING:

4 Q It's on page 549.

5 MS. NGUYEN: Counsel, can we have a copy of
6 it?

7 MR. BOWLING: I threw two over there. I'm
8 sorry. They're right underneath that binder, I
9 think.

10 MS. NGUYEN: Okay.

11 MR. BOWLING: The top one.

12 MS. NGUYEN: Thank you.

13 BY MR. BOWLING:

14 Q Okay. So, Dr. Houh, why don't you review the
15 definition of von Neumann machine, and then we can
16 go back to Houh Exhibit 7 and talk about data again.

17 Just let me know when you're finished
18 reviewing it.

19 A Okay. I've reviewed it.

20 Q Okay. Dr. Houh, do you disagree with the
21 second sentence in the first definition of data
22 that's provided in the sixth edition of Oxford's
23 dictionary of computing?

24 A So I think the von Neumann context does
25 provide some context. And so what we want to look

1 at here is the -- on the second column, in the
2 paragraph starting "it follows," in -- is it the
3 second full sentence? It says (as read):

4 "It also follows that the data on
5 which the program operates may
6 include variables: storage locations
7 can be named so that the stored
8 value may subsequently -- may be
9 subsequently referenced or changed
10 during execution of the program."

11 And so this is clarifying that the -- this --
12 the data is the data on which the program operates.

13 And so I agree there is a distinction between
14 an -- a data representing an instruction and data on
15 which the program operates. Because like I said --
16 actually earlier, in the second half of the first
17 sentence in that paragraph, (as read):

18 "...a program counter in the control
19 unit indicates the next location in
20 the memory from which an instruction
21 is to be taken."

22 So if that program counter is pointing to not
23 an instruction piece of data, but a piece of data
24 upon which the program would operate, then that's an
25 illegal -- or -- or it would be interpreted

1 incorrectly. There may be a corresponding
2 instruction, but -- but if you're pointing to data
3 upon which the program operates and the program
4 counter is interpreting that as an instruction,
5 that's the kind of thing that generates a crash in a
6 computer.

7 And so I think -- I think this does clarify
8 the context, that there's a fundamental -- it's
9 talking about a fundamental distinction between
10 instructions and the data upon which the program
11 operates, between the program and the -- and the
12 data upon which the program operates.

13 And I think in the context of a von Neumann
14 machine, where it's now clarifying that the data
15 it's talking about is the data on which the program
16 operates, I think there is a distinction. Because
17 the instruction in a von Neumann machine further
18 instructs the computer what specific other sequences
19 are to be done on -- on data whereas the data, if
20 you interpret it as an instruction, you'll crash the
21 computer. Or eventually crash the computer. If not
22 right there, at some other point probably shortly
23 thereafter.

24 And -- and that's distinguishing instructions
25 in a program from the data upon which the program

1 operates. So it's distinguishing the data of the
2 instructions of the program itself from the data
3 upon which a program would operate.

4 Q In Abbondanza and Acres, is the word "data"
5 used consistent with your second definition of data,
6 which is data on which a program operates?

7 MS. NGUYEN: Objection; form.

8 THE WITNESS: I mean, I'm not saying that's
9 my second definition. I'm saying that when, in this
10 definition provided in data on page 124 of this
11 Oxford dictionary of computing, when it says "see
12 von Neumann machine," the von Neumann machine
13 definition does provide clarification about the data
14 on which the program operates, and those are
15 different things.

16 BY MR. BOWLING:

17 Q Okay.

18 A The program instructions and the data upon
19 which the program operates are different.

20 And -- and as I said earlier, pointing to --
21 if -- if you're not properly pointing to an
22 instruction and you interpret an operand piece of
23 data as an instruction, the machine will crash very
24 soon.

25 Q And I'm not asking you about crashes,

1 Dr. Houh. I know you've said that numerous times at
2 this point. I -- I hear you. I understand that.
3 My question is a little bit different.

4 So you told us that there's a fundamental
5 distinction between data, which is an instruction,
6 and data on which a program operates; correct?

7 MS. NGUYEN: Objection; form.

8 THE WITNESS: I said it clarifies the --
9 the -- the context of -- of the use of the word
10 "data" in this first definition -- in the definition
11 on page 124 that you read in which there is a
12 distinction, and it's -- it is important in that if
13 you -- these machines have program counters, which I
14 discussed earlier, that you're pointing to what you
15 think is an instruction.

16 If we are pointing to what's -- the data
17 that's of an -- that represents an instruction and,
18 instead, that -- that data is not actually an
19 instruction, but is just an operand or a piece of
20 data that happens to be included there, that's not
21 an instruction, then the machine won't operate
22 properly.

23 So -- so the -- the -- and then the programs
24 themselves can update program counters, read values
25 out of them to use as arguments to an operand --

1 operator or function, that's called.

2 BY MR. BOWLING:

3 Q Dr. Houh, you're not answering my question.

4 A So I'm telling you the difference.

5 There -- I did say that there was a
6 difference because there was an instruction, and
7 the -- the data upon which a program operates, those
8 are -- those are not to be taken as instructions.
9 So I think that -- that's an important part of a
10 computer program. That is, if you jump into the
11 middle of a computer program and you're not at the
12 right instruc- -- an instruction, but you're
13 pointing to some data intended to be -- operate upon
14 by the program, that generates a crash.

15 So that's -- that is an important
16 distinction.

17 Q You're still not answering my question,
18 Dr. Houh. I'm not asking you about the consequences
19 of mistakes between these two things. I'm asking
20 you something really straightforward.

21 In your opinion, is there a fundamental
22 difference between data that is an instruction and
23 data on which a program operates?

24 MS. NGUYEN: Objection; form.

25 THE WITNESS: In -- in this type of machine,

1 there are program instructions and -- and data upon
2 which the program operates, and there is an
3 important difference between the two. Because
4 treating one as the other causes the machine not to
5 work correctly. It causes the computer not to work
6 correctly. So that's -- that's -- that's what an
7 important difference is.

8 It's not that instructions are not data. I
9 think that's how you're interpreting it. But
10 what -- what the difference is, is that data cannot
11 be treated as instructions. Data that's not -- the
12 data upon which a program operates cannot simply be
13 treated as an instruction.

14 BY MR. BOWLING:

15 Q Is the heart rate data in Abbondanza and
16 Acres data on which a program operates?

17 MS. NGUYEN: Objection; form.

18 THE WITNESS: So in Abbondanza, as I said
19 earlier, the -- the -- the commands sent over a -- a
20 link, at some level, will become data upon which
21 part of the program operates because it has to
22 figure out what the command is and what to do to
23 respond to the command.

24 And so at that level, any command sent as
25 data over the -- the data link would indeed, at some

1 point, be treated as an operand upon which some
2 other operator or function operates.

3 And you could substitute the words "function"
4 and "argument," function for operator and operand
5 for argument. In the realm of programming, it's a
6 little more specific, I think.

7 And -- and so, you know, if you get a
8 command, in Abbondanza, some -- some piece of
9 software has to decode what to do with that command
10 value, the command value being some digital piece of
11 data that's sent.

12 And in that context, the computer would have
13 to treat the -- the command that -- the command data
14 that got sent over as an -- an argument to a
15 function that figures out which command was
16 requested and then execute the proper instructions.
17 And that sometimes known as -- as dispatching.

18 So the dispatching process takes the command
19 as an argument to figure out how to -- what code to
20 dispatch to.

21 BY MR. BOWLING:

22 Q Did you understand my question, Dr. Houh?

23 A I think I did. I was giving you an example.

24 Q I didn't ask you about commands.

25 Do you understand that?

1 A I -- I think I answered -- I tried to answer
2 your question as -- as -- as I could with
3 explaining.

4 Q Is -- in Abbondanza and Acres, is the heart
5 rate data that's sensed by a sensor, in your
6 opinion, data on which the program operates?

7 MS. NGUYEN: Same objection.

8 THE WITNESS: I mean, it can be, at points,
9 just like a command -- the actual command data
10 that's sent can also be an argument to a function
11 upon which the function operates.

12 But the result of the data sensor values, for
13 example, you know, you -- you have inputs to a
14 program and you get outputs to a program. And, of
15 course, there are many levels at which you can look
16 at the inputs and the outputs.

17 If you look at the inputs as -- as the
18 command, you know, and -- and the heart rate sensor
19 data has already been processed to generate the
20 command, then at that point, the input might be just
21 the command.

22 But if you -- if you back up a little bit, a
23 raw heart rate value will cause program execution to
24 occur in a specific way, and that may differ when
25 the heart rate value is different. And so in that

1 sense, that's an input that causes an output to
2 occur, just as a command data input is -- is another
3 form of input that causes an output to occur. It's
4 just a matter of where you're looking at inputs to
5 the system.

6 But if the output is the same, depending on
7 where you're looking at the inputs, and the inputs
8 chan- -- can change the -- the output in -- in the
9 same way that issuing specific commands can change
10 the output, then the structure of the sensor data
11 itself can -- can -- can be considered what causes
12 the output to occur, which is the same as saying a
13 command -- issuing a command that can cause the
14 output to occur.

15 (Exhibit 10 was marked for identification
16 by the court reporter and is attached hereto.)

17 BY MR. BOWLING:

18 Q Okay. I'm handing you what we've marked as
19 Houh Exhibit 10.

20 A Thank you.

21 MS. NGUYEN: Counsel, before we do that, we
22 also wanted to, for the record, object to Exhibit 9
23 on the same bases as Exhibit 7, relevance,
24 authentication and not providing a full copy.

25 MR. BOWLING: Okay.

1 BY MR. BOWLING:

2 Q Do you recognize Exhibit 10 --

3 A Yes.

4 Q -- Dr. Houh?

5 A Yes.

6 Q And what is it?

7 A This is the Wiley dictionary I think I
8 referred to earlier, but it's specifically the Wiley
9 Electrical and Electronics Engineering Dictionary.
10 And it's also Exhibit 2002 to this matter.

11 Q Okay. I'm going to ask you to turn to the
12 last page. On the right-hand side, about two-thirds
13 of the way down, there's a definition of data.

14 A Okay.

15 Q Do you see that?

16 A I do. There are three items that sit under
17 that.

18 Q Okay. Number 1, it says (as read):
19 "Factual information, such as that
20 derived from observation,
21 experimentation, or calculation,
22 especially that which is used for
23 processing and/or further analysis."

24 Do you see that?

25 A I do.

1 Q Do you disagree with that definition of data?

2 A Well, I'm not disagreeing that that's what's
3 listed here as one possible definition of data, but
4 if you look at the second definition, it says
5 (as read):

6 "Information which is represented in
7 a manner suitable for digital
8 transmission or computer use."

9 And so I think the second definition is -- is
10 more applicable to this case.

11 The first definition I think of as -- you
12 know, I -- I have a physics degree, so I did -- I
13 took -- I did experiment -- you know,
14 experimental -- some experimental physics. So I
15 think of some of the experiments that I took where I
16 had a lab notebook and I recorded the results of
17 some observations from experiments in my lab
18 notebook, and I think of -- of the first definition
19 in that sense, that now the fact that I have a bunch
20 of numbers written in my lab notebook, which are
21 based on observations, I think that applies in that
22 sense.

23 Now, even so, I think a command that's
24 transmitted, you know, in -- in these -- in these
25 prior art systems, that's a fact. The fact is

1 the -- the issuing program generated a command, and
2 that -- that -- that's factual information as well.

3 And I understand patent owner is taking the
4 position that the commands are somehow not factual
5 information.

6 But even under the first definition, which I
7 think is -- is more about experimentation and
8 recording results and observations from experiments,
9 as I -- I took data from my -- my -- you know, I did
10 an experiment once in neutron scattering in a
11 nuclear reactor, and I took a bunch of data for
12 that, and I wrote it in my lab notebook, and I used
13 that data to perform analysis.

14 I think of one as -- as -- as being more
15 applicable in that type of context, but certainly in
16 the context of the 225 patent -- you know, we're
17 talking about computerized systems here and -- and
18 transmission media and, you know, things with
19 microprocessors.

20 So I do think that second definition listed
21 here, "information that is represented in a manner
22 suitable for digital transmission or computer use,"
23 is a better definition to use in this case.

24 In -- in that sense, you know, what is
25 transmitted over the link in -- that infrared link

1 in Abbondanza, it's a command that is digital
2 information and -- and -- and would be -- clearly
3 would be data under the second definition here.

4 Q Dr. Houh, do you understand my question?

5 A Yeah, I -- I did my best to explain my
6 answer.

7 Q Okay. I didn't ask you about the second
8 definition, about commands, about Abbondanza or
9 about what you think is most appropriate in this
10 case.

11 Do you understand that?

12 A I was explaining my answer.

13 Q I asked you if you disagree with the first
14 definition of data that's provided in Houh
15 Exhibit 10, the Wiley Electrical and Electronics
16 Engineering Dictionary.

17 A So I wouldn't disagree that that's what's
18 listed as -- as the first definition on this page.

19 Q I'm not asking you if you disagree with it
20 being listed. I'm asking you if you disagree, in
21 your opinion, with that definition of data.

22 MS. NGUYEN: Counsel, please stop
23 interrupting the witness.

24 THE WITNESS: So I told you what I think a
25 person of ordinary skill would understand from that

1 definition would be applied to the kind of things I
2 was just discussing.

3 This is about experimentation, about taking
4 down data from an experiment, maybe writing it in a
5 lab notebook. And that's -- that's number 1.

6 I don't disagree that it's one potential
7 definition, but my point here is that I think the
8 second definition is more apt to the -- the
9 particular prior art 22- -- sorry, the -- the -- the
10 context of the 225 patent. Because the 225 patent
11 is talking about -- it has microprocessors. It's --
12 it's got transmitting data from sensors to devices.
13 So the second definition is more applicable, in my
14 opinion, than the -- the -- the number 1, which --
15 which I understand the patent owner is relying on in
16 the preliminary response.

17 And even if 1 is the -- turns out to be the
18 correct definition, which I -- I wouldn't agree is
19 as good as number 2, commands sent, for example, in
20 Abbondanza, over a digital link is still factual
21 information. It's -- it's the fact that the command
22 was sent. There was a command issue.

23 There could be one of two or three different
24 commands, increase speed, decrease speed. Those are
25 facts. And when you're sending one of the commands

1 that the -- the -- the machine can properly respond
2 to, it's a fact that's one of the commands that's
3 being sent.

4 And so I'm not disagreeing that the words are
5 listed as the first definition. There are -- but
6 there are three definitions. I'm just saying that I
7 think 2 is more applicable in the context of the 225
8 patent.

9 MR. BOWLING: We don't have any further
10 questions.

11 MS. NGUYEN: Take a break.

12 THE VIDEOGRAPHER: Going off the record at
13 3:35 p.m.

14 (Recess.)

15 THE VIDEOGRAPHER: Going back on the record
16 at 3:41 p.m.

17 MS. NGUYEN: Dr. Houh, we have no questions.

18 THE WITNESS: Thank you.

19 MS. NGUYEN: Thank you.

20 MR. BOWLING: Thanks for your time today,
21 Dr. Houh.

22 THE WITNESS: Thanks, everyone.

23 THE VIDEOGRAPHER: Off the record, Counsel?
24 Anything else for the record?

25 MS. NGUYEN: No.

1 THE VIDEOGRAPHER: We are off the record at
2 3:41 p.m., and this concludes today's testimony
3 given by Dr. Henry Houh.

4 The total number of media used was five and
5 will be retained by Veritext Legal Solutions.

6 (TIME NOTED: 3:41 p.m.)
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

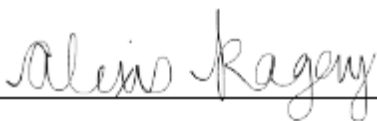
1
2
3 I, the undersigned, a Certified Shorthand
4 Reporter of the State of California, do hereby
5 certify:

6 That the foregoing proceedings were taken
7 before me at the time and place herein set forth;
8 that any witnesses in the foregoing proceedings,
9 prior to testifying, were placed under oath; that a
10 record of the proceedings was made by me using
11 machine shorthand which was thereafter transcribed
12 under my direction; further, that the foregoing is
13 an accurate transcription thereof.

14 I further certify that I am neither
15 financially interested in the action nor a relative
16 or employee of any attorney of any of the parties.

17 IN WITNESS WHEREOF, I have this date
18 subscribed my name.

19
20 Dated: October 6th, 2023
21

22 
23

ALEXIS KAGAY

24 CSR NO. 13795
25

1 October 6, 2023

2 To: JEAN NGUYEN

3
4 Case Name: Lululemon Athletica Canada Inc. v. Nike Inc.

5 Veritext Reference Number: 6086990

6 Witness: Henry H. Houh , Ph.D. Deposition Date: 10/5/2023

7 Dear Sir/Madam:

8
9 Enclosed please find a deposition transcript. Please have the witness
10 review the transcript and note any changes or corrections on the
11 included errata sheet, indicating the page, line number, change, and
12 the reason for the change. Have the witness' signature notarized and
13 forward the completed page(s) back to us at the Production address
14 shown
15 above, or email to production-midwest@veritext.com.

16 If the errata is not returned within 28 days of your receipt of
17 this letter, the reading and signing will be deemed waived.

18
19
20 Sincerely,

21
22 Production Department

23
24
25 NO NOTARY REQUIRED IN CA

DEPOSITION REVIEW
CERTIFICATION OF WITNESS

ASSIGNMENT REFERENCE NO: 6086990

CASE NAME: Lululemon Athletica Canada Inc. v. Nike Inc.

DATE OF DEPOSITION: 10/5/2023

WITNESS' NAME: Henry H. Houh , Ph.D.

In accordance with the Rules of Civil Procedure, I have read the entire transcript of my testimony or it has been read to me.

I have made no changes to the testimony as transcribed by the court reporter.

Date Henry H. Houh , Ph.D.

Sworn to and subscribed before me, a Notary Public in and for the State and County, the referenced witness did personally appear and acknowledge that:

They have read the transcript;
They signed the foregoing Sworn Statement; and
Their execution of this Statement is of their free act and deed.

I have affixed my name and official seal
this _____ day of _____, 20____.

Notary Public

Commission Expiration Date

DEPOSITION REVIEW
CERTIFICATION OF WITNESS

ASSIGNMENT REFERENCE NO: 6086990

CASE NAME: Lululemon Athletica Canada Inc. v. Nike Inc.

DATE OF DEPOSITION: 10/5/2023

WITNESS' NAME: Henry H. Houh , Ph.D.

In accordance with the Rules of Civil Procedure, I have read the entire transcript of my testimony or it has been read to me.

I have listed my changes on the attached Errata Sheet, listing page and line numbers as well as the reason(s) for the change(s).

I request that these changes be entered as part of the record of my testimony.

I have executed the Errata Sheet, as well as this Certificate, and request and authorize that both be appended to the transcript of my testimony and be incorporated therein.

Date

Henry H. Houh , Ph.D.

Sworn to and subscribed before me, a Notary Public in and for the State and County, the referenced witness did personally appear and acknowledge that:

They have read the transcript;
They have listed all of their corrections in the appended Errata Sheet;
They signed the foregoing Sworn Statement; and
Their execution of this Statement is of their free act and deed.

I have affixed my name and official seal
this _____ day of _____, 20____.

Notary Public

Commission Expiration Date

&	1000 119:23	138 6:9	2
& 3:4,16 4:4 7:20 8:9,10,13	1001 14:13 19:6	14 32:16 140 62:14 75:7	2 5:14 11:14,17 12:1 13:17,25
0	1002 19:25	75:7,18,22	14:21 15:7,15
0 113:5 0s 64:21 66:13 67:2 118:16,17 123:19	1003 20:17 102 6:2 109 96:21 10:43 56:12 10:56 56:16	76:2 81:14 82:2 89:3,8 105:5 15 18:19 150 75:8,19	16:5 19:19 56:15 74:25 75:4,9,16 76:14,15 77:13
1	11 5:14 24:1	81:15 90:24	80:13 121:15
1 1:25 5:11 7:12 10:12,15 11:1 56:11 75:23 76:1,14 80:22 81:2,4,9 81:11,14,24 82:4,12,22 103:13 105:4 126:2,5,7,8 139:4 162:18 166:5,14,17 10 5:11 6:15 21:23 24:1 29:9 41:5 56:24 69:9 76:6,12 161:15 161:19 162:2 165:15 10,923,225 1:7 2:7 5:18 10/5/2023 170:5 171:3 172:3 100 86:1	25:19 26:12,13 26:25,25 29:10 31:5 32:16 33:15 41:6 56:24 69:9,10 102:12 110 22:7 74:6 81:9 88:16 11776 169:23 119 6:6 11:51 80:13 12 13:25 62:12 64:6 65:20 77:18 82:16 83:15 130:20 120 81:10 124 155:10 156:11 12:38 80:17 13 82:20 130 81:13,21 135 89:8 13795 1:23 2:20 169:24	91:7,14,18,21 91:24 92:25 94:3 151 6:12 16 33:15 160 31:18 32:6 81:17 101:5,9 161 6:15 17 10:16 31:5 76:7 119:2 140:5 170 1:25 81:24 82:7,14,22 84:3 18 70:11 19 5:17,20 43:1 49:10 52:9,16 53:3,18 94:13 94:16 1:28 107:19 1:43 107:23 1s 64:21 66:13 67:2 118:16,17 123:19	121:17,22 122:6 123:1,3 123:5 126:2 166:19 167:7 2.33 134:20 20 5:24 18:20 171:16 172:22 173:22 200 22:3 2000 119:23 20001 4:9 2002 162:10 2005/0070809 5:22 2005/0272564 6:4 2006 139:4,5,8 202.942.5000 4:10 2023 1:18 2:19 7:1,5 12:8,12 13:15 15:5 16:3 169:20 170:1 21 103:25 106:15

213.892.5295 3:11 22 166:9 220 17:20 22:15 220s 29:4 225 14:12 19:14,17 22:16 24:5,13,21 25:5,8 27:13 29:16 30:18 39:21 40:2,5 40:17 42:13,16 42:17,24 43:2 43:18 44:3,8 44:12 45:23,25 46:2,5,20 49:4 49:11,15 50:14 50:25 51:3,9 51:20,22,23 52:4,6,10,15 53:2,12,16,18 54:4,7,8,17 55:3,8,19,25 56:4 57:14 92:5 94:11,14 94:15,18 99:18 99:20 107:12 119:10 139:6,7 146:16,21 147:4,10,15,21 148:14 164:16 166:10,10 167:7	227 22:17 27:5 27:14 28:4 29:17 30:19 57:15 69:3,24 230 22:8 31:12 104:9 24 33:15 240 23:4 62:18 25 26:18 69:10 250 22:21 23:1 23:24 26:21 27:2,15,19,20 27:23 28:6,7 28:19 29:18,18 29:24 30:15,20 30:21 31:3 32:9,17 33:6 37:11 41:10,16 42:1 44:21 45:6 46:13 47:1,23 48:17 51:11 54:22 57:3 59:6,19 59:24 61:1,4,4 62:11 68:16 69:1,23 73:9 83:1 104:8 105:16 27 26:22 64:7 69:14 130:20 28 26:22 69:15 170:15 29 76:12 29ish 69:15	2:26 134:17 2:58 151:2 3 3 5:17 19:3,6 21:5,12,13,16 21:18,20,22 22:1,4,5,7,16 22:21 23:1,4 23:10 24:23 25:3,9,10 26:6 26:16,17 27:16 29:9 36:6 41:5 56:23 57:18,18 59:2 60:11 62:8,18 63:5 68:11,13,15 69:8,11 70:2 71:9,18 72:10 73:3,7,19,19 74:1,18,23 75:3,15 76:16 80:16 107:19 121:17,18,22 122:6 123:1,3 123:5,5 126:3 30 14:2 15:3 78:3 91:10 92:21 95:1 109:11,11 31 81:4,7 310 62:10 312.583.2300 3:22 32 26:18 102:4	34 102:5 36 12:18 38 11:25 12:4 380 63:5 65:24 78:4 39 64:11 74:4 390 63:6 64:4 64:15 74:7,9 78:5 3:11 151:5 3:35 167:13 3:41 2:18 167:16 168:2,6 3rd 12:7,12 13:15 15:5 16:3
			4
			4 5:20 19:21,24 20:10 21:4 62:7,8,23 63:15,21 68:12 68:13 70:2 71:18 72:11 73:3,7,20 74:8 74:18 77:13 104:1 107:22 121:17,20,22 122:6 123:1,3 123:5,6,6 126:3 134:17 40 64:11 65:21 41 65:21 420 62:23 63:3 65:3 66:7 76:16 77:3

91:1	520 85:25	6th 169:20	90 91:16 93:21
4200 3:20	530 85:22	7	94:22 96:7,10
43 70:11	540 62:9	7 6:6 72:13	96:14 106:8
430 65:4	549 152:4	73:13,15	109:5,8 116:14
44 21:23 24:1	55 21:25 140:7	119:16,20	90017 3:10
29:9 41:6	56 21:25	120:5 121:23	7:21
56:24 64:7	560 130:23	136:18 139:8	910 139:12
119:3	59 85:15,18,20	151:20 152:16	9:23 2:18 7:2,5
440 65:4	5th 7:5	161:23	a
46 77:18	6	7,801,910 6:10	a.m. 2:18 7:2,5
460 130:22	6 6:2 25:20	70 3:19	56:12,16 80:13
470 76:17,25	102:8,11	707 3:8	a1 5:22 6:4
130:21	121:23 170:1	75 100:23	aaron 3:17 8:8
480 62:23 63:4	60 85:15 86:20	777 2:16 7:20	aaron.bowling
65:6,17 66:1	601 4:7 90:20	8	3:23
76:17	90:23 91:1,6	8 5:6 6:9 74:1,3	abbon 101:6
49 70:11	91:10 92:17	74:13,24	abbondanza
5	60602-4231	138:14,18	5:24 12:22
5 1:18 2:19	3:21	139:11	20:22,25 21:3
5:24 7:1 20:13	6086990 1:24	80 96:12	21:5,10 36:8
20:16 21:1	170:4 171:2	84 87:18 88:8	36:16 38:25
25:20 83:8,22	172:2 173:2	95:18 96:8,16	39:4,8 40:3,7
84:14 88:1	60th 3:9	108:22 111:12	42:4,19,22
117:22 121:23	61 43:2 53:3	116:13	43:19 44:4,6
122:6 123:1,3	610 82:15,17,20	85 88:11 89:13	45:10 46:1,4
123:6,7 134:20	83:4,7,21	89 90:17 94:22	46:18,25 47:8
5,527,239 5:25	108:24	96:6,9,14	48:1,6 49:19
50 38:11 90:13	62 53:17 62:13	106:8 109:5,8	50:4,25 51:5,9
500 63:5 74:5,8	62:13	109:16 111:12	52:12,18,18
78:4	63 53:17,18	116:13 117:17	53:7,10,14,25
502 43:4	62:13 73:15	9	54:13,15,21
505 78:3	67 29:10 41:6	9 6:12 24:1	55:24 56:6,23
51 90:13	56:24 82:9	151:13,17,19	59:15 61:1
510 63:6 64:4	69 83:5 85:2	151:21 161:22	62:13 64:2
65:19,22 78:5			68:8,20 70:9

71:16 72:9 73:6 80:25 82:8,22 89:18 92:5 94:8,9 97:11,16 98:5 98:13 99:21 100:11,19,24 100:25 101:7,8 102:1,7 103:15 103:20 105:22 106:2,19,23 107:10,13 108:8,11 114:15 124:22 127:12,25 130:17,19 132:11,19,25 146:11,16,22 146:24 147:13 147:16,21 148:5,20 149:7 150:6 155:4 158:15,18 159:8 160:4 165:1,8 166:20 abbondanza's 82:24 97:13 104:7 ability 9:19 able 23:14 38:19 39:11 40:14 42:5 44:10 49:4 50:22,22 51:10 51:19 52:4,11	52:12 54:10,16 106:7 110:25 111:8 137:11 above 34:10 88:23 91:20 94:3 170:14 abrupt 35:9 absent 147:4 abstracts 131:14 accept 37:4 accomplish 55:11 accordance 171:5 172:5 account 131:19 accurate 51:17 61:11 82:21 169:13 accurately 14:19 achieve 92:6 acknowledge 171:11 172:16 acre 149:2 acres 5:21 12:21 20:6,9 80:21 81:1,3,9 82:9 84:1 85:6 85:12 87:10,12 90:14 97:16 99:20 100:3,17 103:12 105:4 105:17,24 106:6,20 107:2	107:11 108:18 108:18,24 114:15,18 115:22 116:14 117:9,15,17 147:24 148:6 148:21 155:4 158:16 160:4 acres's 104:10 act 117:11 171:14 172:20 action 8:1 115:20 169:15 actions 128:14 actual 115:16 128:19 150:13 160:9 actually 12:16 13:11 23:10 24:9 39:19 42:22 43:19 48:11 49:8 66:18 67:6 68:17 69:12 84:15 87:25 92:4,4 107:3 109:8 116:18 117:17 126:11 129:6 130:12 133:15 134:11 136:8 144:15 145:21 153:16 156:18 add 60:6 74:20 96:19 99:12	101:22 131:7 131:17,17 132:3,4,5 adding 131:20 addition 92:3 additional 15:6 15:8 150:19 additionally 31:17 address 170:12 administered 8:21 affect 97:16 affiliations 8:6 affixed 171:15 172:21 ago 9:8 103:11 agree 7:10 44:13 57:12 75:12 110:1 153:13 166:18 ahead 10:8 49:18 al 5:18 6:3,10 alexis 1:22 2:19 7:24 169:23 algorithm 39:2 39:5 40:12,15 46:19 49:5 54:11,17,20 55:17 57:22 61:8 92:8,11 92:12 93:11,20 94:7,22 95:13 107:4,11 109:6
--	--	---	---

115:25 algorithmic 115:24 algorithms 39:21 40:16,18 43:13 44:2,11 46:2 49:20 51:2,5,10 52:18,24,25 54:8,22 55:11 57:2,7 94:18 95:4 108:4,8 allowed 97:19 allows 51:4 97:7 144:11 alternative 26:20 27:22 76:7 86:2 98:12 127:8 alternatives 21:16 altogether 116:15 amount 36:22 38:1 91:8,15 91:22 92:20 93:1 94:4 109:19,25 110:18,19 analogous 89:19 90:8 103:14 104:10 105:8,17 analysis 14:10 15:2 97:17	162:23 164:13 analyzed 19:18 angeles 1:17 2:17 3:10 7:1 7:21 answer 9:17 10:1,7 25:6 90:10 93:15 137:11 160:1 165:6,12 answered 160:1 answering 9:19 100:10 147:2 148:18 157:3 157:17 answers 9:24 60:14 anyway 27:25 apart 98:18 apologies 10:24 appeal 1:2 2:2 7:17 appear 13:11 171:11 172:15 appearance 8:4 appearances 3:1 4:1 8:6 appearing 8:9 8:13 appears 99:14 appended 70:21 172:11 172:18	applicable 163:10 164:15 166:13 167:7 application 5:20 6:2 20:6 98:20 applied 37:22 44:3 123:5,6,6 147:10 166:1 applies 127:25 163:21 apply 52:13,17 applying 55:18 appreciated 10:2 appropriate 126:13 165:9 approximately 89:7 apt 166:8 architecture 134:25 135:5,9 135:10,13,17 135:20 136:3 136:16 architectures 146:3 area 140:3 areas 140:3 arguably 49:6 52:9 argue 44:6 argument 125:21 126:15 126:16 132:2	134:3,7 146:3 149:23 159:4,5 159:14,19 160:10 arguments 118:8 132:5 156:25 arjomand 3:6 8:15 arnold 3:16 4:4 7:20 8:9,10 arnoldporter.... 3:23 4:11 art 23:17 42:11 70:15 71:3,21 87:2 141:25 163:25 166:9 artery 86:4 artisan 39:11 42:5 51:8 52:21 98:24 141:23 148:19 artisans 140:22 ascii 144:17 aside 16:1 40:5 70:1 asked 60:15 101:7 132:18 146:22 165:13 asking 9:11 43:14 48:15 53:6 58:20 67:18 100:5 103:13,17 108:18 111:15
---	--	---	--

112:1,4 127:22 127:23 136:1 147:22 155:25 157:18,19 165:19,20 aspect 148:2 assessing 34:14 37:13 41:21 51:11 assign 121:14 121:19 assigned 123:3 assignment 171:2 172:2 173:2 assume 9:18 25:2 athletic 43:7 53:21 athletica 1:5 2:5 7:15 170:3 171:3 172:3 attached 10:13 11:15 16:7 19:4,22 20:14 102:9 119:17 138:15 151:14 161:16 172:7 attorney 3:18 4:6 169:16 attorneys 3:7 17:1 18:2,4,6 audio 7:9 authentication 123:15 161:24	authorize 172:11 automatic 40:1 automatically 38:5 92:1 avenue 4:7 averaged 87:22 95:21 109:2 awaited 151:7 aware 12:14 13:4 15:1 36:7 36:15 47:8 76:5	44:21 45:5 46:13 47:1,11 47:23 48:17 51:11 54:22 57:3,14 59:19 59:24 61:1,4,4 62:10,21 63:9 63:14 68:8,16 68:22,25 69:12 69:22 72:4 73:9 74:9,10 75:8,19 83:1 104:8 105:16 105:20,22 106:3,18 132:12,23 based 48:23 50:15 52:6 61:7 67:1 88:16 91:2 92:13 94:12,23 98:22 107:15 125:23 136:6 163:21 bases 123:15 161:23 basic 110:7 119:6,14 134:1 basically 22:3 34:24 77:11 138:13 basing 59:6 basis 106:13 beat 96:17	beating 87:10 beats 38:9,11 84:7,11 85:1 85:10 87:23 88:13,24 89:3 89:8 95:22 109:3 beginning 2:17 56:14 80:15 107:21 134:19 145:10 begins 140:8 behalf 2:16 8:9 8:13 believe 24:2 37:12 148:10 belt 22:9,12,14 24:15,16,18,20 25:7 37:7 belt's 24:21 25:8 best 9:19,21 10:4 13:14 135:8 165:5 better 65:2,2 99:7 164:23 beyond 39:3 binary 121:9 129:2 binder 152:8 bit 15:24 34:21 40:6 80:21 108:7 115:8,11 156:3 160:22
	b		
	b2 5:18 6:10 back 15:25 40:21 56:15 80:16 105:4,13 107:22 115:25 124:22 134:20 150:13 151:4 152:16 160:22 167:15 170:12 band 72:24 base 22:21 23:1 23:24 26:14,21 26:24 27:1,1,2 27:10,15,19,20 27:22 28:3,6,7 28:19 29:18,18 30:15,20,21 31:3,7,17 32:9 32:17 33:6 37:11 39:10 41:10,16,25		

bits 65:13 66:9 142:25 blocked 86:11 blocks 97:23 blood 86:4,11 86:12,18,19,25 board 1:2 2:2 7:17 board's 103:25 106:14 boards 98:7 body 86:5,10 86:25 bottom 12:18 12:24 13:2 49:10 52:16 73:12 85:19 94:13,16 boulevard 3:8 bounds 68:15 bowling 3:17 5:6 8:8,8,25 10:14,22 11:16 11:19 18:25 19:5,9,23 20:2 20:15,18 24:10 28:1,10 29:1 30:4,16 31:1 32:11,21 33:16 34:13 35:8 36:4 38:7 39:6 39:17 40:23 42:20 44:18,20 45:14,17 46:10 46:12 47:14,17	47:20,22 48:13 50:17 51:24 53:5 55:4 56:9 56:17 57:20 58:3,13,22 60:7 61:15,21 64:1,16 68:4 69:7 71:1 73:4 73:21 75:10 76:4 78:12 79:7 80:1,10 80:18 84:2 85:11 90:7 92:10 93:17 96:2,23 98:1 100:1,18 102:10,16,19 106:16 107:17 107:24 110:9 112:17 113:23 116:6 117:4 119:18 123:17 124:1 127:21 128:15 132:20 134:15,22 135:18 136:11 137:15 138:16 138:19,20 139:21 141:16 142:12,18 143:3,20 146:20 147:14 147:23 148:17 150:23 151:6 151:15 152:3,7	152:11,13 155:16 157:2 158:14 159:21 161:17,25 162:1 167:9,20 box 22:23 break 10:8 47:15 49:18 56:8,18 80:9 98:17 107:16 107:25 134:14 150:24 167:11 breaks 10:5 bridge 81:13,18 81:20 briefly 18:9 139:10 broad 131:25 143:8 148:15 broadcast 73:16 bug 81:14,21 81:21 82:2,23 83:10,16,22 84:4,17,20 85:2,3,14 87:18 88:5,6,9 89:13,13 90:20 90:23 91:1,6 91:10,25 92:13 92:17,21 94:23 95:4,15 96:9 96:11,17 103:18 105:5 105:24 106:6	106:20 108:4 108:14,15,22 109:17,22,23 110:23 111:5 111:14,18,24 112:6 113:1,21 114:18 115:7 116:22,25 117:15,25 149:25 bug's 90:25 106:9 built 67:5 135:12 136:2 bunch 163:19 164:11 byte 66:15 bytes 67:4 142:25 143:1
			c
			c 4:5 ca 170:25 calculated 36:9 calculation 34:14 38:10 41:25 48:16 162:21 calculations 32:24 33:8,17 37:9,12 39:8 39:12 42:2,6 45:6 46:14 47:1 48:2 49:20,24

california 1:17 2:17 3:10 7:1 7:21 169:4 call 19:14 131:1,1,10,16 131:22 134:5 called 131:23 157:1 calling 131:5 calls 98:20 canada 1:5 2:5 7:15 170:3 171:3 172:3 cap 37:2 38:2 capabilities 39:3 79:5 capability 113:12,21 114:9 capable 44:9 capillary 86:4 carries 150:8 carry 149:11 149:13 150:9 case 1:7 2:7 11:24 15:9 19:13 39:25 50:21 54:9 56:6 65:17 69:22 72:2 76:3 83:21 92:7 95:24 97:17 109:16 109:24 126:2,2 126:2,3,3,5,5	126:18,18,19 126:21,21 127:5 128:22 128:22 131:24 148:4 163:10 164:23 165:10 170:3 171:3 172:3 catered 80:11 cause 31:13,17 48:11 67:15 104:24 105:3 113:11,15,20 115:7,10,14 116:22 160:23 161:13 caused 117:20 causes 116:18 117:2,12 118:1 128:9,13 129:14,23 149:5 150:14 158:4,5 161:1 161:3,11 causing 114:12 caveats 60:13 cellular 7:8 center 23:2,3,7 23:13,22 27:3 32:19 62:15,16 central 81:8,17 88:16 certain 41:17 45:6 59:22 61:5 96:1	112:12 121:10 129:23 143:23 150:16,17 certainly 36:14 36:20 52:11 115:22 132:22 133:13 164:15 certificate 172:11 certification 171:1 172:1 certified 2:19 169:3 certify 169:5,14 cetera 26:3 chain 116:8,11 challenged 19:13 chan 161:8 change 15:16 37:22 38:18 42:24 43:9,14 53:22 55:16 56:1 63:19 66:24 67:18 77:25 79:13 80:20 111:8 114:22 116:5 117:3,6,8,13 118:1 161:8,9 170:10,11 172:8 173:3 changed 13:17 13:22,23 153:9	changes 35:4 37:7 111:9 112:20 170:9 171:7 172:7,9 changing 50:15 54:4 55:14 56:3 66:20 106:24 116:8 channel 133:14 134:2 characters 144:17 cheaper 99:7 chest 22:12 24:15,16,18,19 24:20,21 25:7 25:8 72:24 82:19 83:8 85:24 chestbelt 72:15 chicago 3:21 chosen 77:21 circuitry 69:22 circumstances 98:23 cite 14:24 citing 90:15 civil 171:5 172:5 claimed 139:10 139:16 claiming 139:19 claims 70:22 71:14 97:5,9
---	--	--	--

100:3 139:17 clarification 155:13 clarifies 156:8 clarify 137:10 154:7 clarifying 30:6 153:11 154:14 clear 127:12 clearly 117:10 165:2 clip 72:22 close 34:18 35:20 37:13,15 coaching 88:9 89:1 code 62:2 125:9 128:24 129:21 130:1,4,8,12,16 133:3,4,5,6 134:11 159:19 coding 144:22 colleague 8:14 collect 60:16 collected 27:12 29:15 43:3 50:16 54:12 56:5 57:13 59:20 112:19 119:12 128:2 collecting 25:24 26:1 30:9 50:15 53:3,10,12	collects 26:10 column 21:23 24:1 25:19 26:12,25 29:9 29:10 31:5 32:16 33:15 43:1 49:10 52:9,16 53:3 53:18 62:12 64:6 65:20 69:10 70:11 72:13 73:12,15 74:1,3,13,24 76:6,12 77:18 85:20 94:13 130:19 140:5 153:1 columns 41:5 56:24 69:9 combine 97:21 98:2 99:8,25 combined 18:16 117:24 come 15:25 39:4,11 40:11 40:14,18 42:5 44:1,10 51:2,4 51:10 52:17 54:11,16 55:2 67:12 112:13 128:17 136:9 136:13 147:7 comes 16:22 36:17 39:22 106:13 110:23	123:7 coming 52:23 52:24 112:15 115:5,18 116:16 117:22 command 37:23,25 38:22 66:6,19 67:1 67:13 91:6 92:18 109:17 110:24 111:9 111:21 112:21 115:16,20,23 116:15,20,21 116:21,24 117:9,10,11,14 117:18,20 125:6,16,18,20 125:21,24 126:1,4,7,10,12 126:15 127:5 128:8,9,20,21 128:22 130:13 130:14 133:13 133:24 149:2,5 149:5,6,6,9,14 149:16,18 150:14,14,21 158:22,23,24 159:8,9,10,13 159:13,15,18 160:9,9,18,20 160:21 161:2 161:13,13 163:23 164:1	165:1 166:21 166:22 commanding 109:23 110:17 112:7 commands 63:12,18 79:23 104:11,13 105:17,23 106:2,20 108:15 109:14 110:21 118:22 125:6 127:3,7 127:16,20 128:17 133:10 148:10,16,24 150:2,2 158:19 159:24 161:9 164:4 165:8 166:19,24,25 167:2 commission 171:19 172:25 173:25 communication 81:17,19,20 133:14 communicati... 63:16 77:4 81:16 134:2 143:17 comparative 42:2 48:16 compare 33:9 45:6 46:14
--	--	---	---

47:2 48:2 114:9 compared 33:19 50:25 88:14 89:15 112:15 116:17 compares 49:21 88:18 comparing 99:20 109:12 130:10 comparison 34:7 47:4 48:21 114:21 compatible 90:20,23 92:1 94:25 106:8 compiled 122:11 compilers 122:11 131:19 completed 170:12 completing 93:15 components 62:8 82:11 97:22 98:2,18 101:21 111:13 111:14 comprising 143:1 computation 112:10	compute 85:5 computed 96:15 111:22 computer 61:25 62:2 67:8 68:2,6 110:4 118:2 119:7,15 122:1 122:14,19 123:10 124:4 124:13 125:8,8 126:14 129:14 131:13,25 134:9 135:2,10 135:17 139:22 139:24 140:14 140:22 141:23 142:1 143:16 145:16,24 146:5 150:12 154:6,18,21,21 157:10,11 158:5 159:12 163:8 164:22 computerized 164:17 computers 67:9 135:12,19 computes 89:14 computing 6:6 6:12 88:10 111:20 120:13 121:3 151:12 152:23 155:11	concludes 168:2 conclusions 13:20 condition 109:20 conducted 37:10 configurable 81:15 configuration 81:10,18 86:15 117:25 configurations 112:12 confined 140:3 connected 65:1 98:9 connectors 101:22 consequences 157:18 consider 14:22 137:20 considered 14:6,12,20 15:2,6 18:1 115:19 118:3 143:19 161:11 consistent 75:4 89:2 141:10 155:5 consistently 142:3	construct 67:22 constructed 86:23 144:10 contained 144:13 145:3 contention 118:19 context 51:21 121:4,6,23 122:4,16 124:19 136:23 137:9 138:4,10 140:20 141:21 143:2 151:8 152:24,25 154:8,13 156:9 159:12 164:15 164:16 166:10 167:7 continue 7:9 59:13,17 60:6 continued 4:1 continues 93:3 contro 35:4 control 23:2,3 23:6,13,22,23 27:3 32:19 40:1 43:6 53:15,17,19 62:14,16 63:14 65:23 66:3,4 67:17,17 74:9 74:16,20 75:6 75:18,22 77:2 77:4,22 78:7
--	--	--	--

79:4,12 80:5,7 80:8 90:20 92:6 94:11,24 106:7,8 107:14 115:2,23 130:23 146:5 150:3,6 153:18 controlled 22:2 38:6,17 79:19 90:25 103:19 controller 23:7 26:25 27:9,10 28:19 31:8,9 31:17 32:17 33:23 62:22 75:22 76:22 77:5 controlling 23:7,8 50:19 54:14,20 55:15 78:21 92:1 104:9,11 105:17 149:3 controls 78:24 130:22 conversations 7:8 conversion 115:1 convert 85:8,9 145:1 converted 87:23 95:22 109:3 110:24 111:5 115:15	converting 61:8 113:25 114:19,20 copied 88:15 copy 11:23 20:22 102:14 123:16 152:5 161:24 correct 17:15 25:9,12,18 26:6 33:11 37:17 41:13,19 41:23 42:7 44:23 45:8,15 48:4 57:15 58:9 68:11 124:14 130:1 137:6 143:22 150:22 156:6 166:18 corrections 170:9 172:17 correctly 67:7 129:16 158:5,6 correspond 79:17 corresponding 154:1 corresponds 62:10 costs 98:16 coun 114:25 counsel 7:14 8:5 47:15 56:8 56:20 80:9	93:14 100:9 102:14 107:16 108:1 123:13 134:14 147:1 152:5 161:21 165:22 167:23 count 110:13 110:14 114:9 counted 109:2 counter 145:7,9 145:12,13,15 145:19,23 146:1,9 153:18 153:22 154:4 counters 156:13,24 counting 83:12 87:20 95:19,25 111:19 114:19 114:25 116:1 counts 83:23 county 171:10 172:15 couple 38:8 99:23,25 103:11 couples 81:17 81:20 coupling 83:12 course 109:19 160:15 court 7:24 10:13 11:15 19:4,22 20:14 93:12 102:9	119:17 138:15 151:14 161:16 171:7 courtroom 11:9 cover 151:20 covered 71:13 71:20 crash 124:10 124:10 129:9 154:5,20,21 155:23 157:14 crashes 129:15 155:25 create 131:17 147:9 created 88:25 creating 84:21 cross 151:23 csr 1:23 169:24 cur 87:19 current 50:6 55:21,22 87:20 88:13,17,21 89:5,6 cycle 145:10 d data 27:10 36:24 43:3 50:15 53:3,11 53:12,14,17 54:11 55:21 56:5 62:24 63:13,20,23 64:22 65:10,10 65:18,25 66:15
---	--	--	---

66:18 67:6,12 67:22 69:2,24 74:16 75:7,8 82:24 106:4 107:15 112:19 113:10 114:1,3 114:4,6,11,11 115:5,13 116:2 116:16 117:1 117:11,24 118:3,5,6,15,22 119:12 120:6,7 120:12 121:3,7 122:3,3,13,19 122:19,20 123:7,8,12,18 124:6,13,16 125:12 127:17 127:19,24 129:2,12 130:3 131:11 132:11 133:11,11,12 133:15,19,20 133:21,23 134:4,5,6,6,8 135:23 137:2 138:3 140:17 140:21 141:1,2 141:4,10,11,14 141:15,22 142:2,2,4,11,13 142:16,17,19 142:20 143:1,2 143:4,5,7,8,8 143:11,13,19	143:21 144:4,8 144:10,13,14 144:18 145:1,1 145:5,6,6,9,12 145:16,17,25 146:14,18 147:8,10,13 148:3,5,10,15 148:20 149:10 149:11,13,14 149:16,18,20 150:1,2,4,9,11 150:21 151:24 152:16,21 153:4,12,12,14 153:14,23,23 154:2,10,12,14 154:15,19,19 154:25 155:1,2 155:4,5,6,10,13 155:18,23 156:5,6,10,16 156:18,20 157:7,13,22,23 158:1,8,10,11 158:12,15,16 158:20,25,25 159:11,13 160:5,6,9,12,19 161:2,10 162:13 163:1,3 164:9,11,13 165:3,14,21 166:4,12	date 12:7 139:6 169:17 170:5 171:3,9,19 172:3,13,25 173:20,25 dated 169:20 dave 4:5 8:10 david.mcmul... 4:11 day 171:16 172:22 173:22 days 170:15 dc 4:9 dear 170:7 decides 48:8 decision 15:12 15:14,23 16:2 103:5,10,25 105:7 decisions 53:15 declaration 5:14 11:23 12:12,15 13:21 19:19 20:7,23 51:18 71:23 90:2,13 99:24 100:13 118:25 decode 159:9 decrease 43:22 88:20 107:1 113:22 126:19 126:22 166:24 deed 171:14 172:20	deemed 170:17 default 38:1 defined 70:21 97:5 147:12 defining 138:11 definition 16:11 52:23 120:6 135:7 136:19,24 137:2,21 138:2 138:8 151:11 151:22,23 152:15,21 155:5,9,10,13 156:10,10 162:13 163:1,3 163:4,9,11,18 164:6,20,23 165:3,8,14,18 165:21 166:1,7 166:8,13,18 167:5 definitions 16:13 167:6 degree 23:20 26:2 163:12 dep 17:12 departing 70:17 department 170:22 depending 35:20 37:15 43:23 86:15 112:14 125:1
---	---	--	--

147:6 161:6 depends 68:2 depict 73:20 depicted 21:6 21:11 22:21,22 23:10 26:5 29:8 74:22,23 81:2 deposition 1:16 2:15 5:12 7:13 7:19 9:22 11:4 16:24 17:8,9 17:13,13,14,24 18:21 137:6 170:5,8 171:1 171:3 172:1,3 derived 162:20 describe 14:19 35:12 39:8 45:13 62:18 64:2 73:3 84:8 107:8 124:23 139:9 described 21:22 23:6,11 25:11 26:24 28:14,23 29:9 30:6 31:7 33:14 34:3 40:8 41:5 44:2 52:14 54:15 56:24 59:10 62:14 63:10 69:6,9 70:13 74:13,18 75:14	83:18,25 84:6 85:2 87:10 88:2,23 92:9 96:5 97:1 98:12 99:18 108:22 109:21 110:15 111:11 113:1 116:13 119:14 124:25 describes 23:16 26:13 53:10,12 63:9,10 73:1 91:25 95:19 describing 22:1 24:2,7 27:25 39:1 48:7 53:14 59:2 69:11 74:17 83:4 84:9 87:8 88:8 89:12 93:9 109:8 111:13 112:6 119:11 122:17 130:19 description 5:10 26:17 57:18 71:9 73:25 99:10 119:13 descriptions 71:5 designed 150:9 desired 43:5 detail 44:7 45:22 46:1	49:13 52:10 92:4 94:14 96:6 107:4,10 107:13 detailed 46:18 50:24 54:18 details 36:2 43:13 146:17 detect 86:2,24 detected 60:22 detecting 23:17 30:13 detection 86:6 87:5 detects 86:13 deter 48:9 determin 48:9 determinative 130:11,15 determine 33:24 49:24 90:22 110:21 129:25 134:12 determined 87:20 determines 25:21 31:10 48:10 126:15 131:4 134:7 determining 84:21 87:19 develop 133:18 133:21 deviating 83:19	device 22:13,15 23:3,16 24:5 24:24 25:16 26:21 27:23 29:11,23 31:12 31:15,16 38:6 48:12 63:11 64:14 69:13,23 69:25 71:23 76:22 77:6,14 77:21 78:7,21 81:10,18 109:24 115:7,8 128:9 devices 43:8 53:21 67:24 75:3 77:19 78:23 80:5 140:16 141:9 166:12 dictionary 6:6 6:12,16 16:11 16:14,15 120:19,25 151:12 152:23 155:11 162:7,9 165:16 differ 160:24 difference 37:24 73:23 108:13 110:3 112:14 118:12 118:13 121:7 122:17 127:24 129:1,10 157:4
--	--	--	--

157:6,22 158:3 158:7,10 differences 90:9 110:8 different 17:14 24:8 28:3,7 29:19 34:19,23 35:19 37:14,16 37:16 42:2 71:16 74:17 77:23 78:15,18 78:22 79:1,5 79:24 80:7,7 84:12 85:14 99:3,9 100:7 105:23 106:19 110:2,11,16 113:6,7 114:1 114:6 116:20 118:3 123:12 126:20 142:6,9 143:9 155:15 155:19 156:3 160:25 166:23 differently 68:20 70:4 71:17 72:9 73:2,6 75:14 digital 62:24,24 63:1,7,13 64:22 65:10,18 66:9,18 106:3 118:10,15 121:9,22 143:6 143:12,17	149:8,13 150:4 150:11 159:10 163:7 164:22 165:1 166:20 digitally 118:10 digitized 62:25 63:19 65:25 142:20,21 150:10 direct 140:5 directed 87:17 direction 169:12 directly 26:22 27:23 69:13,25 74:12 112:2 disagree 28:24 41:15 45:20 58:20 104:16 104:24 105:3 106:13,14 118:20 121:1 148:11 152:20 163:1 165:13 165:17,19,20 166:6 disagreed 103:1,6 disagreeing 127:17 163:2 167:4 disclose 49:19 64:2 85:13 146:24	disclosed 13:16 42:3 52:6 54:8 54:13 55:25 56:4 59:15 60:11 68:14,19 71:15 72:9 73:6 98:5 102:2 114:13 114:15,17 147:16 148:20 discloses 47:1,8 48:1 101:9 102:5 disclosing 48:22 72:23 115:22 disclosure 23:25 40:3,12 49:7 50:14,24 51:3 52:9 54:3 54:19 68:7 disclosures 53:9 discuss 18:21 20:7,23 56:19 71:22 90:12 151:23 discussed 17:4 17:7 21:15 30:21 41:10 48:20 52:22 58:5 59:24 61:7 70:5 71:17 72:10 73:7 83:15	89:18 156:14 discusses 36:8 36:16 50:14 72:14 discussing 54:4 74:25 100:12 166:2 discussion 68:15 70:5 90:1 104:2 dispatch 146:4 159:20 dispatches 146:4 dispatching 127:4 128:23 128:23 159:17 159:18 display 72:6,7 101:3,18,25 102:3 131:23 displayed 31:18 32:6 58:8 60:1 61:9 101:2 displaying 58:1 distance 98:19 distinction 59:7 120:11 121:2 121:13 122:15 123:9,22 153:13 154:9 154:16 156:5 156:12 157:16
--	--	--	--

distinguished 125:6	159:22 162:4 165:4 167:17	62:23 76:8 94:20 99:20 119:23	emitting 83:22 85:1
distinguishing 141:1 154:24 155:1	167:21 168:3	electrical 6:15 85:23 87:6 162:9 165:15	employee 169:16
divide 121:19	drawing 59:7 82:17	electronics 6:15 16:19 162:9 165:15	enclosed 170:8
document 10:25 11:20 19:10 20:3,19 102:20 119:21 120:2 138:21	drive 134:10	elementary 90:19	encoded 118:7 118:7,10 122:3
documents 16:25 17:3,3 17:23	due 126:1,1	elements 140:9 140:13	encompasses 143:8
doing 31:19 44:9 48:7,21 52:25 54:23 55:2,9 57:7 63:10 67:9,10 70:23 71:6 83:4 84:1 85:1 125:19	duration 38:19	eliminate 112:9	ends 91:23 94:6 120:20
dr 5:12,14 10:18,23 16:23 20:3,19 56:18 68:10 80:19 93:18 102:10 107:25 108:3 118:24 132:7 134:23 137:8 138:21 141:17 148:18 151:7 151:19 152:14 152:20 156:1 157:3,18	e	email 170:14	engineering 6:16 162:9 165:16
	e.g. 53:21 77:1 77:3	embedded 113:12	entered 172:9
	ear 72:21	embodiment 22:22 26:5 27:18 29:8,10 41:4,8,9 46:23 56:23 60:12 69:9 81:1 99:2 99:3 113:24	entire 124:18 171:5 172:5
	earlier 10:24 17:25 32:9,13 83:18 88:2 102:25 108:3,7 109:21 132:11 132:18,25 147:12 153:16 155:20 156:14 158:19 162:8	embodiments 21:14,15 68:19 70:3,7,13 71:15 72:8 73:5 78:14 81:6 82:4 85:12 87:3 97:3,4 99:9	entirely 93:7
	easiest 57:8	emits 83:8	environment 81:23 82:2,6
	edition 6:7,13 152:22	emitted 86:10	equal 88:22
	effect 69:2 113:11 114:11 115:3,13 116:3 117:12 128:13 149:22		equipment 42:25 43:6 50:19 53:15,20 54:14,20 55:15 68:17 71:25 72:5 74:22 75:22,23,25 76:1,2 79:6,22 79:25 81:15,22 101:16 103:19 107:14 110:24 111:7,17,21 112:2,9,11,21 113:2,11,16,20
	effective 42:6		
	effectively 99:5		
	either 18:18 31:13,14 34:4 48:25 50:8 56:1 57:25		

114:8,12,22 115:23 148:25 149:3 150:3,7 equipped 22:13 24:15 31:10 33:24 72:15 equivalents 97:6 errata 170:10 170:15 172:7 172:10,18 173:1 especially 14:22 50:24 52:15 162:22 essential 140:8 140:13 essentially 34:21 et 5:17 6:3,9 26:3 evaluate 38:10 events 125:14 eventually 154:21 ex 42:24 exact 16:20 124:6 exactly 62:3 84:8 examination 5:2 8:24 examined 8:21 examp 47:4	example 21:14 22:16 24:23 25:17 27:23 31:15 32:2 33:2 34:1,6,12 34:17 38:3 41:7 43:1,8 46:22 47:5 48:19 55:15 57:17 59:4,10 59:18 63:21 64:11 66:3,5 66:13 67:16 68:15,16,18 72:7,14,25 78:25 79:8 81:5 83:3,16 84:10,13 85:18 89:2 90:4 91:9 92:21 95:1,1,7 95:23 98:16 99:1 100:23 108:17,21,25 109:11,17 111:18 112:5 123:2 125:25 126:8 130:19 131:5 144:3,8 159:23 160:13 166:19 examples 58:12 58:24 59:23 61:6 143:11,18 exception 10:6	exclude 148:15 excludes 118:22 excluding 141:3 exclusive 141:5 142:5,9,10 execute 67:14 122:10 126:6 126:16,19 128:20,21 129:21,24 145:11 159:16 executed 124:11 127:5 130:12,16 172:10 executing 125:9 127:6 129:22 130:2 140:15 141:8 execution 146:5 153:10 160:23 171:14 172:19 exemplary 46:23 70:14 exer 53:17 exercise 22:2 26:21 27:23 42:25 43:6 48:11 49:25 50:19 53:19 54:14,20 55:15 62:4 64:14	68:17,23 69:1 69:4,12,23,25 71:25 72:4 73:10 74:21 75:17,23,25 76:1,2 77:6,14 77:19,21 78:23 79:6,22,25 81:5,8,15,21,23 82:1,6 84:3 85:13,13 86:1 88:5,15,20 89:5,9,11 90:21 91:23 94:5 101:2,16 103:19 107:14 108:13,15 109:24 110:22 110:23,25 111:6,7,9,16,21 112:2,11,21 113:2,11,15,20 114:8,12,22 115:23 116:4,5 128:8 132:14 148:25 149:3 150:3,6 exerciser 81:25 82:1 88:19 89:4,10,23 90:4 exerciser's 87:19 91:2,5 91:11 92:14,16 92:22 109:10
---	--	--	--

exercises 87:19 exertion 81:25 90:22 91:3 92:15 107:1 exhibit 5:11,14 5:17,20,24 6:2 6:6,9,12,15 10:12,15 11:1 11:14,17 12:1 13:17,25 14:13 14:21 15:7,15 16:5 19:3,6,6 19:19,21,24,25 20:10,13,16,17 21:1 102:8,11 102:11 119:16 119:20,22,23 119:23,25 120:5 123:14 136:18 137:5 138:14,18 139:11 151:13 151:17,19,20 151:21 152:16 161:15,19,22 161:23 162:2 162:10 165:15 exhibits 5:9 14:15,23 16:7 16:10 19:1 expect 35:3,16 35:18 36:20 expectations 38:5	expected 44:10 expense 101:23 expensive 101:19 experience 61:24 experiment 163:13 164:10 166:4 experimental 163:14,14 experimentat... 162:21 164:7 166:3 experiments 163:15,17 164:8 expiration 171:19 172:25 173:25 expired 89:10 explain 165:5 explained 141:18 explaining 160:3 165:12 explicit 78:14 145:14 explicitly 48:20 97:8 98:4 exposed 97:8 express 16:4 expressed 15:15	expressly 68:14 71:15 72:8 73:5 98:12 extensions 81:19 extent 40:10 43:17 51:1 100:25 102:1 103:13 f fact 115:18 122:17 145:15 150:15 163:19 163:25,25 166:21 167:2 factors 82:1 facts 166:25 factual 162:19 164:2,4 166:20 fair 46:7 61:14 61:22 fall 97:9 far 27:16 34:15 34:22 38:16 42:3 48:1 61:13 68:11 73:7 fashion 78:5,9 78:16 faster 31:14 34:4 50:11 54:1 99:8 fastest 35:6 features 94:12	field 118:2,4 fifth 13:3,3 figueroa 2:17 7:20 figure 9:15 21:5,12,13,16 21:18,20,22 22:1,4,5,7,16 22:21 23:1,4 23:10 24:23 25:3,9,10 26:6 26:16,17 27:16 29:9 36:6 41:5 56:23 57:18,18 59:2 60:11 62:7,8,8,18,23 63:15,21 68:11 68:12,13,15 69:8,11 70:2 71:9 73:2,19 73:19,20 74:8 74:18,22,23,25 75:3,4,9,15,16 75:23 76:6,15 76:16 80:22 81:2,4,9,11,14 81:24 82:4,12 82:16,20,22 83:5,14 103:13 105:4 126:3 128:19,21 158:22 159:19 figured 127:4 figures 71:18 72:10 73:3,7
---	---	---	--

76:13 77:13 126:12 150:6 159:15 figuring 111:20 125:22 file 51:22 131:10,10 filed 7:16 15:9 139:3,4,7 fill 49:4 filter 149:15 filtered 87:22 95:21 109:2 110:14 finalized 12:11 financially 8:2 169:15 find 101:4 170:8 fingertip 72:21 finish 93:15 100:10 147:1 finished 93:18 152:17 firm 7:22,25 first 24:4 30:3 75:18 104:23 106:12 122:22 126:1 134:3 136:9,12 152:21 153:16 156:10 163:11 163:18 164:6 165:13,18 167:5	five 18:5 36:23 150:24 168:4 flexibility 97:7 flip 11:25 21:4 80:22 103:24 floor 3:9 flow 86:3 flowing 86:18 86:25 flyover 9:8 focus 40:7 focused 36:5 104:21 focusing 36:6 foerster 3:4 8:13 follow 27:11 68:6 133:22 following 79:9 97:5 121:11 follows 8:22 153:2,4 foregoing 169:6,8,12 171:13 172:18 form 24:6 27:17 28:9,25 29:21 30:7,23 32:10 33:12,21 35:1,25 37:18 38:13 39:14 40:22 42:9 44:16 45:9 46:11 47:9 48:5 50:3	51:15 53:1 54:24 57:16,23 58:10 60:3 61:12,18 62:6 63:13 64:5 66:23 67:2 68:24 70:8 72:12 73:11 75:1,20 78:11 79:2,10 80:3 83:2 84:23 89:20 95:17 96:13 97:18 99:22 100:20 105:25 106:3 106:21 110:6 111:10 112:24 114:6,7,16 116:10 118:5 121:10 123:20 127:14 128:5 132:16 133:9 135:14 136:4 137:12 139:15 140:24 141:11 142:2,11,13,15 142:17,19,20 143:5,14 146:12 147:19 148:7 150:11 155:7 156:7 157:24 158:17 161:3 forming 14:11 14:20	forms 72:17,19 135:16 141:1,2 144:21 forrest 18:10 18:23 forth 169:7 forward 67:20 170:12 found 12:16 fourth 19:8 framework 94:23 framing 67:4 free 171:14 172:20 frequency 75:5 76:8 150:18 full 123:16 153:3 161:24 function 63:24 95:23 96:5 99:14 124:9 125:22 126:10 126:12,15,23 127:4,8 128:23 129:25 131:4,7 131:16,25 132:2,3,5 134:5,7 146:4 157:1 159:2,3 159:4,15 160:10,11 functional 97:23
---	---	--	--

functionality 76:24 functions 77:10 130:24,25 131:1,2,9,12,22 131:23 fundamental 120:13 121:3 122:15 154:8,9 156:4 157:21 fundamentally 123:11 further 38:20 43:13 105:1 154:17 162:23 167:9 169:12 169:14 furthermore 87:16	132:13 164:1 generates 154:5 157:14 generating 59:25 61:7 getting 50:10 60:4 77:11 148:2 give 9:23 34:17 79:8 101:13 107:10,12 135:25 given 32:2 91:22 94:4 110:19 129:25 168:3 giving 94:7 107:4 159:23 glance 104:23 106:12 go 7:10 10:8 15:24 26:12 29:2,5 35:5,23 47:19 49:17 55:20 67:16 88:11 101:13 102:17 105:13 140:7 152:16 goal 55:10 goes 73:25,25 75:18 82:13,18 94:2,3 110:23 going 9:11,17 11:25 13:24 18:25 21:4	29:4 35:22 49:25 51:6 56:11,15 60:6 75:17,24,25 80:13,16,19,20 88:10 93:19 102:4 103:24 107:19,22 111:19 112:8 118:24 120:4 134:17,20 138:17 140:5,7 145:17 149:17 151:1,1,4,16 162:11 167:12 167:15 good 9:1,7 10:3 29:13 59:16 166:19 gotcha 60:20 group 24:9,12 groups 24:2 guess 68:12 guy 34:24 guys 80:10	hand 85:20 108:14,16 138:17 151:16 162:12 handed 119:19 handful 19:1 handing 10:14 11:16 19:5,23 20:15 102:10 161:18 happen 112:3 happened 143:23 happening 26:14 30:2 32:13 78:15 happens 25:1 26:11 28:20 29:25 31:4 116:14 128:10 131:16 134:11 156:20 happy 9:13,15 40:24 hard 32:4 43:24 69:16,19 harder 31:14 31:25 43:24 48:11 head 68:5 headband 72:22 header 14:5 104:1
g		h	
garbage 122:24 gears 80:20 general 141:2 generally 33:23 86:6 102:5 139:23 141:25 142:23 143:9 generate 58:6 95:6 105:10,19 119:13 125:11 160:19 generated 73:9 105:22,24 106:3,18,20 110:16,17		h 1:16 2:15 5:3 5:12,14 7:13 8:20 170:5 171:4,9 172:4 172:13 173:20 half 69:18 153:16 halfway 12:4	

hear 9:12 46:2 69:20 156:2 heard 9:18 135:21 heart 31:11,20 31:22,23 32:1 33:1,3,10,19,25 34:2,4,5,7,9,10 34:15,18,22,23 35:21 38:8,11 41:23 45:8,11 46:14,15 47:2 47:3 48:3,3,22 48:23 49:8,22 50:5 51:13 53:11 54:13 55:21,24 56:7 72:15,17,19 73:14 74:11 82:7,15 83:4,7 83:21 84:7,11 85:1,5,7,16,17 85:19,22 86:3 86:22 87:4,9 87:20,21,24,25 88:10,17,21 89:7,14,21,24 90:5 91:3,5,11 91:12,17,20 92:6,14,16,22 92:23 93:23,24 94:2,24 95:4,7 95:13,15,20 105:9 106:25 107:9 108:24	109:4,6,7,10,12 111:20,20 113:4,5,5,9,10 113:19 114:9 114:20,25 115:1,1 116:1 116:2,7,18,22 125:3,12,13,15 126:24 127:1,9 127:13 128:1 128:10,13 130:7,9 146:10 146:24 147:16 150:15 158:15 160:4,18,23,25 heart's 85:23 heartbeat 83:10,13,24 84:15 held 7:19 help 33:18 52:20 55:7 57:21 61:25,25 93:12 108:12 hem 147:1 henry 1:16 2:15 5:3,12,14 7:13 8:20 168:3 170:5 171:4,9 172:4,13 173:20 hereto 10:13 11:15 19:4,22 20:14 102:9 119:17 138:15	151:14 161:16 hey 71:10 high 112:15 113:9,18,18 115:10 higher 32:1 highest 34:10 history 14:14 51:22 hope 94:18 hough 9:6 houh 1:16 2:15 5:3,12,14 6:9 7:13 8:20 9:1,2 9:3,4,7 10:15 10:18,23,24,25 11:17 12:1 13:16,25 14:21 15:7,15 16:4 16:23 19:6,19 19:24 20:3,10 20:16,19 21:1 56:18 68:10 80:19 93:18 102:10,11 107:25 108:3 118:24 119:20 120:5 132:7 134:23 136:18 137:8 138:18 138:21 139:11 141:17 148:18 151:7,17,19,19 151:20,21 152:14,16,20	156:1 157:3,18 159:22 161:19 162:4 165:4,14 167:17,21 168:3 170:5 171:4,9 172:4 172:13 173:20 hours 18:20 housed 77:5 huge 35:3 36:20 37:5 hypotheticals 114:14
i			
identification 10:12 11:14 19:3,21 20:13 102:8 119:16 138:14 151:13 161:15 illegal 153:25 illinois 3:21 illustrated 82:3 82:12 image 144:7,7 144:9,10,12,15 144:20,21 145:1,2 images 141:14 141:14 142:13 142:16,17,19 142:20 implement 94:11 130:25			

implementati... 83:14,16	including 83:17 123:15 124:7	indicating 170:10	147:17 149:9 162:19 163:6
implemented 86:7 135:10	incomplete 104:18	individual 96:8	164:2,5,21
implicitly 145:24	incorporate 101:4,25	inductive 83:11	165:2 166:21
implied 50:10	incorporated 172:12	information 25:22 26:1,11	infrared 22:14 22:17,19 27:4
implying 122:18	incorporating 101:18	27:12,15 28:5	27:14 28:4
important 77:9	incorrect 40:9	28:18 29:15,18	29:16 30:18
124:3,3 130:3	40:20 45:18	29:24 30:9,15	32:20 41:12
130:4 156:12	58:16 148:11	30:17,20 31:3	62:9 63:21
157:9,15 158:3	incorrectly 154:1	33:7,8,9,19	64:13,15 65:15
158:7	increase 36:22	36:9 37:12	65:19,22,24
impossible 148:4	43:21,22 88:19	39:10 41:11,17	66:8,12 73:13
inaccuracies 12:15	91:4,8,15	44:22 46:15	73:20 74:4,6
inaccurate 30:5	92:15,19 93:1	47:2,24 49:21	76:8 77:11
inches 10:19	107:1 109:18	51:12 55:22	78:3 86:8
incline 23:20	109:25 110:18	56:7 57:13	149:9 150:1,5
26:2 79:15	113:13 116:19	58:6,7 59:7,12	164:25
include 23:19	116:23 126:8,9	59:20 60:1,21	initial 48:16
37:24 70:10	126:18,21	61:2,9 62:20	146:8
72:20 82:11,14	127:2,6 166:24	63:7 64:14	input 57:8,12
127:19 153:6	increasing 127:3	67:19,20 68:21	65:4 66:25,25
included 15:20	increment 35:17 37:22,25	73:8 74:6	81:25 95:4,23
17:24 38:22	increments 36:20 37:16	75:16 82:23	96:4 108:9,10
70:20 115:25	index 5:1	83:1 84:4,13	108:14,21,23
151:21 156:20	indicates 153:19	85:14 88:4	109:22 110:4,8
170:10		94:12 95:5,14	110:13 117:2
includes 13:19		95:16 96:10,15	125:20,24
24:20 25:7		96:18 108:5,13	126:24 127:9
57:24 58:1		110:22,25	128:12 130:11
81:8 114:24		111:6 115:2	133:12 134:10
		124:24 127:13	160:20 161:1,2
		128:2 133:7	161:3
		146:10,25	inputs 49:7 95:6,12 101:22

110:14 117:6 125:10 134:10 160:13,16,17 161:4,7,7 instance 151:21 institution 15:12,14,23 16:2 103:5,10 103:25 105:7 instruc 157:12 instruct 31:24 35:23 114:21 instructed 88:19 91:14,19 91:21,24 92:25 93:25 94:4,6 instructing 45:11 57:24 137:18 instruction 34:19,24 66:2 66:6,19 67:2 112:20 121:7,9 121:16,18,24 121:25 122:7 122:22,24 124:14,15 129:6,6,8,13,16 129:17,18,22 129:22 130:2 144:19 145:6 145:13,18,21 145:22,24 146:1,8,11,25 147:17 148:5	148:21 153:14 153:20,23 154:2,4,17,20 155:22,23 156:5,15,17,19 156:21 157:6 157:12,22 158:13 instructions 23:24 35:19 36:8 37:15 49:25 58:6 59:25 61:7,16 62:1 63:18 64:8 65:23 67:11,14,15 68:3,22 73:9 77:24 78:1,7 78:17,19 79:1 79:13 89:1 90:3 104:7 105:10,15,20 105:21 106:18 111:7 113:20 114:1 118:3,5 118:13,14,22 120:12 121:2,8 121:22 122:2,9 122:10,12,12 124:7 125:4,7 125:23 126:6 126:14,17,20 127:24 128:3 128:19 129:13 132:13,14	140:15,17,21 141:2,4,8,9,11 141:22 142:1,4 142:10 143:21 143:24,25 144:2,6 145:4 146:6,8 148:3 148:16 150:19 150:20 154:10 154:24 155:2 155:18 157:8 158:1,8,11 159:16 instructs 31:12 63:11 109:14 121:10 154:18 integers 131:21 intended 70:19 71:13 145:22 157:13 intensity 43:9 53:22 54:4 55:14,16 56:4 88:21 89:6 90:5 intent 131:20 inter 79:4 interested 8:2 169:15 interesting 19:8 interface 23:8 66:4 67:17 77:1,22 79:12 130:22,23	interfaces 79:5 79:24 80:8 interference 7:8 interpret 124:5 124:14 129:12 129:16 133:16 144:25 154:20 155:22 interpreted 64:9 66:1,14 114:8 118:6 122:20,21 125:2 126:10 143:24 144:11 145:22 153:25 interpreters 122:8 interpreting 64:3,18,24 65:18 66:18,22 84:17 154:4 158:9 interprets 63:23 interrupting 165:23 intervals 109:10,13 introduce 18:25 invention 21:11 42:7,13 51:20 51:21,22 52:5 52:6,14 55:19
--	---	---	--

70:18,21 81:6 82:5 87:3 97:1 139:9,16,18,20 inventive 83:19 inventor 138:25 involve 34:14 involved 105:19 110:20 involves 45:5 59:11 ipr 10:16 14:16 17:15 19:7,25 20:17 102:12 119:25 137:7 ipr2023-00424 1:7 2:7 7:18 ir 63:4,4 iss 102:6 issue 17:17 79:23 110:21 122:11 130:13 147:5 166:22 issued 116:22 issues 102:5,6 issuing 161:9 161:13 164:1 items 23:9 162:16	jnguyen 3:12 job 1:24 jpeg 144:7,9,10 144:11,15,17 144:20 jump 129:4,5,5 157:10 june 139:4	23:16 25:2 27:24 29:4 34:1 35:2,4,16 36:5,13,19,22 36:23,25 37:3 38:2,5,16 39:20,25 40:1 40:15 42:3 43:22 44:2 48:21 49:22 50:9,21,22 52:16 53:10,25 56:3 60:13 62:3 63:14 64:20 66:11 67:3,9,12 69:3 69:17,19 70:10 71:10,11,21 72:3,5 73:19 74:10,21 78:24 84:8,17 85:8 87:9 93:20 97:19,21,22 98:5,14,14,19 99:12,13,14 101:14 104:25 106:7 107:3 110:17 113:14 114:23 116:12 116:13,16 117:6 119:4 122:8,11,21,23 123:4 125:19 126:1 128:7 129:19 130:6	130:18,18 133:8,20 135:3 135:6,16,24,25 136:6 141:7,13 147:5 148:4 149:1,14,17,19 149:25 152:17 156:1 159:7 160:13,18 163:12,13,24 164:9,16,18,24 knowledge 42:17,18 43:25 51:4 52:13,17 54:10 55:18,20 94:9 147:6 known 23:17 71:11 72:17 87:1 159:17 knows 144:24
j	k		l
january 12:7 12:12 13:15 15:5 16:3 jean 3:5 8:12 18:7,22 170:2	kagay 1:22 2:19 7:24 169:23 kaye 3:16 4:4 keep 50:9 88:21 89:22 90:5 keeping 89:23 kilohertz 83:9 83:22 84:14 88:1 117:22 kind 26:8 37:3 38:4 40:11 43:18 44:1 49:23,24 54:11 64:7 67:5 79:4 80:24 94:11 97:24 98:11 111:12 119:13 129:14 140:1 147:7 154:5 166:1 kinds 64:8 77:19 98:13 know 9:9,13,15 12:2 13:13 21:7 22:8		lab 163:16,17 163:20 164:12 166:5 label 22:3 65:5 82:17 143:23 144:1,5,9,13,15 144:22 145:3 145:14 labeled 22:7,8 22:15,16,17 23:1,4 65:2 75:19 81:9,10 81:13,14,24 105:5 144:19

144:20 146:11 146:25 147:8 147:17 labels 75:3,13 76:16 144:3 laid 42:15 51:18 139:17 language 140:2 laptop 136:2 lasted 18:15 law 3:7,18 4:6 layer 131:11,14 layers 134:9 leave 104:18 left 10:19,20 85:20 147:5 150:24 legal 7:23,25 168:5 173:1 lengthen 43:11 53:24 letter 170:17 level 44:6 45:21 81:25 90:19,22 91:3 92:15 99:18 107:1 130:18 131:6 131:14,15 134:1 147:11 150:16 158:20 158:24 levels 43:10 53:23 133:5 160:15	light 65:16 86:9 86:13,17 limited 72:21 97:3 limiting 71:5 line 12:23 13:2 21:23,25 26:13 29:9 31:5 32:16 33:15,15 41:5 43:2 53:17 62:13 64:7,11 65:21 69:10,17,18 70:11 73:15 74:1,4 76:7,12 77:18 130:20 140:7 170:10 172:7 173:3 lines 12:20 25:20 26:18,22 56:24 64:7 69:14,16,21 link 32:12 64:9 65:11 67:3 106:4,5 149:9 149:10,13 150:1,3,5,5,8 150:12 158:20 158:25 164:25 164:25 166:20 links 98:10 149:11,12,12 149:12 list 39:21	listed 14:14 15:3 163:3 164:20 165:18 165:20 167:5 172:7,17 listing 172:7 literally 137:24 144:16 little 34:21 35:9 40:6 43:20 44:7 48:12 50:13 52:10 73:2 80:21 90:13 96:6,6 107:4 108:7 115:8,11 136:8 156:3 159:6 160:22 llp 3:4 locate 101:15 located 7:20 28:3,7 29:19 30:21 85:25 location 145:20 153:19 locations 26:20 27:22 29:19 30:22 116:21 153:6 logic 77:3 long 18:14 60:5 85:3 89:6 97:8 133:21 136:10 136:13	longer 38:19 131:18 look 17:8 26:12 26:18 31:5 33:17 36:11 43:1,16 61:16 61:22 62:7,12 62:20 63:15 64:6 65:20 70:10 72:13,14 74:3,8 75:4 76:6,12 80:20 81:3 82:9,16 83:5 85:15 87:18 90:16 93:20 98:4 105:1,11 118:4 118:4,10,11,24 124:22 135:7 135:22 152:25 160:15,17 163:4 looked 50:25 82:8 94:13 95:18 96:7 103:20 106:22 108:10 116:20 136:19 looking 13:7 26:19 30:11 36:3 39:16 42:18,23 44:3 44:11 46:19 49:9,10 51:3 51:13 52:3
--	--	--	--

90:17 94:10 105:4 107:3 108:8,18 114:23 115:17 121:21 129:1 130:9 161:4,7 looks 137:17 loop 94:25 los 1:17 2:17 3:10 7:1,21 lot 29:4 34:25 71:10 89:17 97:7 106:11 131:19 135:12 143:9 lots 97:20 131:14 low 112:15 113:4,10 114:10 115:4,4 115:18 116:16 116:17 117:21 lower 131:14 131:14 lowest 34:8 lululemon 1:5,5 2:5,5 7:15,16 8:14 170:3 171:3 172:3 lunch 80:11,14	50:1 56:1 59:12 62:4 68:23 69:1,4 73:10 75:17 90:21 108:16 116:4,5 120:15 120:21 121:5 122:16 124:21 128:4 132:14 134:24 135:1,5 136:20 137:19 137:22,25 138:9,13 145:11 151:22 152:15 154:14 154:17 155:12 155:12,23 156:21 157:25 158:4 167:1 169:11 machines 121:10 129:11 137:3 138:2 156:13 madam 170:7 made 169:10 171:7 madison 3:19 maintain 88:20 89:5 90:5 91:19 94:1 110:19 113:16 make 39:12 40:25 46:5 49:17 51:19,19	52:4,5 53:15 55:19 57:10 70:15 89:1 99:7 128:16 makes 37:8 52:20 75:16 making 52:13 59:25 66:21 75:24 149:24 manner 86:16 106:17,19 163:7 164:21 marjomand 3:13 marked 10:12 10:15 11:14,17 19:3,6,21,24 20:13,16 102:8 102:11 119:16 119:19,25 138:14,17 151:13,16 161:15,18 marks 56:10,14 80:12,15 107:18,21 134:16,19 massachusetts 4:7 match 126:17 matched 126:16 matching 113:18	materials 14:6 14:14,20,23,24 15:6,8 16:2 17:25 18:1 matter 7:15 115:16 119:24 122:1,7 129:3 137:5 161:4 162:10 maximum 35:23 36:21 37:22 38:17 mcmullen 4:5 8:10 mean 24:7 27:6 27:6 28:12 30:8,10 33:13 33:22 36:1,10 36:17 37:21 38:14 40:10 46:17 47:4 48:6,9 50:4 58:19,24 60:4 60:15 61:19 64:19 66:22,24 67:8,19 68:25 70:9 71:24 78:21 87:12 98:2 100:7 104:17,20 105:14 106:1 106:22 107:6 108:10 112:25 114:3 115:12 118:18 119:9
m			
mach 123:10 machine 23:19 26:2,2 27:3 32:18 35:6			

119:10 125:2 128:25 131:25 132:17,22 135:22 136:5 138:1 139:16 144:5 147:20 148:8 155:8 160:8 means 23:17 86:6 87:7 meant 25:5 27:2 measure 88:14 measures 109:9 mechanical 87:6 media 7:12 56:11,15 80:13 80:16 107:19 107:22 134:17 134:20 164:18 168:4 medium 143:18 meet 18:3,6 38:4 meetings 18:11 18:15 mehran 3:6 8:15 18:7,22 memorized 36:10 39:22 49:14 54:6 147:25 memory 67:23 121:22 140:16	141:9 143:16 153:20 mentioned 10:1 32:8 102:25 merely 70:14 met 16:25 18:2 method 87:4 127:8 mic 63:1 microcontroll... 76:25 77:3,15 130:21 microphones 7:6 microprocessor 63:1,22 65:8 66:1,7,10,17,20 68:3 76:25 77:2,15 80:5 130:21 microprocess... 62:22 63:17 66:16 76:14 77:10,13 80:6 149:8 164:19 166:11 middle 83:5 109:16 117:10 117:14 123:2 157:11 midway 140:8 midwest 170:14 173:1 mind 16:22 21:9 36:17	39:24 47:17 106:13 minus 121:19 minute 38:9,11 85:10 87:23 88:13 89:4,8 95:22 96:17 109:3 124:22 150:24 minutes 103:11 misinterpreting 141:5 misspoke 111:1 mistakes 157:19 mode 74:18 88:9 modern 135:12 135:17,19 modifications 70:16,19 module 43:4 mofo.com 3:12 3:13 moment 17:11 monday 18:12 monitor 22:23 26:16 31:18 32:6 47:12 58:2,8 60:2 61:10 71:22,25 72:1 82:15 85:23 101:5,9 monitors 72:18 72:20	month 9:8 morning 9:1,7 morrison 3:4 8:13 motivate 101:25 motivated 98:15,17,25 99:8,11 motivation 99:24 motor 23:8,23 65:23 66:4 67:17 77:1,22 78:7,18 79:4 79:12 130:23 mounted 23:2 85:24 move 10:19 21:21 41:1 97:22 99:13 multiple 25:15 101:22 mutually 141:4 142:5,8,10
			n
			name 7:22 8:8 169:18 170:3 171:3,4,15 172:3,4,21 named 138:25 153:7 natural 140:2 nec 37:23

necessarily 35:17 37:20,24 38:21 79:18,25 118:12 144:19 145:5 need 42:1 51:1 79:21 85:4 98:18,19 121:23 133:19 135:22 137:9 needs 52:4 neither 147:15 169:14 network 81:5,8 81:17,19,20 86:1 131:11 neumann 120:15,21 121:5 122:16 124:21 134:23 135:13,20,21 136:2,15,20 137:2,18,22,25 138:2,8,13 151:9,10,11,22 152:15,24 154:13,17 155:12,12 neutron 164:10 never 111:5 nevertheless 122:2 new 67:22 nguyen 3:5 8:12,12 24:6	27:17 28:9,25 29:21 30:7,23 32:10,14 33:12 33:21 35:1,25 37:18 38:13 39:14 40:22 42:9 44:16 45:9,16 46:9 46:11 47:9,15 47:19 48:5 50:3 51:15 53:1 54:24 55:12 56:8 57:16,23 58:10 58:18 60:3 61:12,18 62:6 64:5 66:23 68:24 70:8 72:12 73:11 75:1,20 78:11 79:2,10 80:3,9 83:2 84:23 89:20 90:11 93:14 95:17 96:13 97:18 99:22 100:9,20 102:14,18 105:25 106:21 107:16 110:6 111:10 112:24 114:16 116:10 123:13,20 127:14 128:5 132:16 133:9 134:14 135:14	136:4 137:12 139:15 140:24 142:7,15,22 143:14 146:12 147:1,19 148:7 148:22 152:2,5 152:10,12 155:7 156:7 157:24 158:17 160:7 161:21 165:22 167:11 167:17,19,25 170:2 nike 1:9 2:9 7:14,16 8:9 170:3 171:3 172:3 nodding 10:1 noise 87:22 95:21 109:2 normally 101:16 notarized 170:11 notary 170:25 171:10,18 172:15,23 173:23 note 7:6 45:21 120:24 170:9 notebook 163:16,18,20 164:12 166:5 noted 168:6	notice 5:11 11:4 13:9,12 noticing 8:7 notion 150:21 nuclear 164:11 number 5:10 5:25 7:12 16:25 17:3,22 18:16 56:11,15 80:13,16 87:23 95:22 101:10 107:19,22 109:3 123:14 134:17,20 136:1 162:18 166:5,14,19 168:4 170:4,10 numbers 131:17 163:20 172:7 numerous 156:1 nw 4:8
o			
oath 8:17,21 11:6,8 169:9 object 123:14 136:15 161:22 objection 24:6 27:17 28:9,25 29:21 30:7,23 32:10,14 33:12 33:21 35:1,25 37:18 38:13 39:14 40:22			

42:9 44:16	observations	19:23 20:5,8	94:21 95:3,8
45:9,16 46:9	163:17,21	20:12 21:3,8,9	95:10 96:8
47:9 48:5 50:3	164:8	21:17,22 22:25	97:15 102:20
51:15 53:1	obvious 100:22	23:5,25 24:11	103:5,9,22,24
54:24 55:12	101:4	24:17,20,25	105:4,21
57:16,23 58:10	obviousness	25:7,12,14,23	108:12 110:1
58:18 60:3	102:7	26:7,7 27:11	110:10,12
61:12,18 62:6	occur 27:8	28:2,21 29:3,7	111:3,5 113:24
64:5 66:23	115:14 118:1	29:15 30:17	119:1,5,19
68:24 70:8	128:9,14	31:2,2,6 32:7	120:24 132:24
72:12 73:11	134:12,13	33:4,6,17	137:16 138:25
75:1,20 78:11	160:24 161:2,3	35:11,19 36:5	139:12 140:5,6
79:2,10 80:3	161:12,14	36:18 37:6,8	150:23,25
83:2 84:23	occurs 33:2	39:7,18 40:5	151:7 152:10
89:20 90:11	october 1:18	40:20 41:4,9	152:14,19,20
95:17 96:13	2:19 7:1,5	41:16,20,25	155:17 161:18
97:18 99:22	169:20 170:1	44:13 45:5	161:25 162:11
100:20 105:25	offhand 36:13	46:10,21,25	162:14,18
106:21 110:6	135:25	47:7,14,23	165:7
111:10 112:24	office 1:1 2:1	49:16 50:18	once 27:6 31:2
114:16 116:10	7:18	51:6 52:7,20	88:4 89:13
123:20 127:14	official 171:15	54:21 56:18,22	93:7 164:10
128:5 132:16	172:21	57:2,6,21 58:4	one's 110:8,8
133:9 135:14	oh 101:5	58:16,23 59:1	op 132:3
136:4 137:12	135:25 149:15	59:13,13,14,19	open 70:23
139:15 140:24	okay 9:1,20,22	60:24,25 61:1	131:10
142:7,15,22	10:5,14 12:4	61:16 64:17	operand
143:14 146:12	12:17,19,23	68:7,10 70:1	121:15 123:10
147:19 148:7	13:1,4,8,15,19	73:5,22 76:5	123:23,24
148:22 155:7	13:24 14:1,25	76:10 77:17	124:25 125:22
156:7 157:24	15:5,10,19,24	80:19,23 81:12	126:11 127:13
158:17 160:7	16:9,12,18,21	82:6,21 84:3	128:16,22
objections 8:3	16:23 17:2,10	84:12,19 85:12	129:7 130:3
observation	17:21,23 18:11	87:11 88:3,4	132:1 133:2,8
162:20	18:14,21,25	89:17 93:22	155:22 156:19

156:25 159:1,4 operands 118:9 121:12,24 122:13 124:8 124:16 128:18 129:12,17,23 130:14 132:4 133:4 operate 70:4 71:16 72:9 73:6 121:8 124:9 125:23 129:8 153:24 155:3 156:21 157:13 operated 28:14 operates 73:24 123:25 153:5 153:12,15 154:3,11,12,16 155:1,6,14,19 156:6 157:7,23 158:2,12,16,21 159:2 160:6,11 operating 23:16 25:21 26:1 29:12 124:15 operation 66:4 74:18 75:14 123:4,5,6 operations 26:8 118:9 123:4 operator 123:11,23,25	124:24 127:13 130:17 131:6,7 131:24 132:19 133:1,7 157:1 159:2,4 operators 133:5 opinion 37:9 40:9,21 42:4 45:24 51:8 57:7 69:8 105:21 106:17 123:18 128:1 133:2,8 137:23 143:6,12 147:15 148:11 157:21 160:6 165:21 166:14 opinions 13:16 13:21 14:11,21 15:7,15,19 16:4 19:18 44:14 46:6 opposed 34:21 37:4 65:14 74:11 optical 86:7 87:6 order 18:19 26:8 49:24 85:4,5 128:18 ordinary 40:11 40:14,17 42:11 42:14 44:1 49:2,3 50:21	54:10 55:1 70:25 71:12,21 94:10 97:20,25 98:14,22 99:17 147:5,7 165:25 originally 15:17 outcome 8:2 130:11,15 output 49:8 57:9,21,24 58:1 65:4 108:9,11 109:23 110:4,8 110:16 114:7 114:10 117:12 118:1 161:1,3 161:6,8,10,12 161:14 outputs 67:23 110:17 117:2,7 119:13 125:11 134:12,12 160:14,16 outside 106:25 150:16 own 90:25 owner 1:10 2:10,16 3:15 4:3 7:14 16:7 118:19,21 127:18,23 149:23 164:3 166:15	owner's 5:11 15:11,13 103:3 148:9 oxford 151:11 155:11 oxford's 152:22 p p 3:17 p.m. 2:18 80:17 107:19,23 134:17,21 151:2,5 167:13 167:16 168:2,6 page 5:10 11:25 12:4,18 13:25 21:4 40:25 85:20 102:4,5 103:24 106:15 119:2 120:5 139:17 151:20 152:4 155:10 156:11 162:12 165:18 170:10,12 172:7 173:3 pages 1:25 pam 20:6 paper 10:15 102:12 paragraph 14:2,2,8,19 15:3 21:24 23:13 26:19 27:21 36:3,6 74:3 76:7 81:4
---	---	---	---

81:7 82:9 83:5 85:2,18,20 86:20 87:14,18 88:8,11 90:1,4 90:16,17 91:16 93:21 95:18 96:9,21 97:10 97:13 100:23 101:14 103:20 105:11 106:7 106:23 116:13 117:17 119:3 153:2,17 paragraphs 85:15 90:13 96:6 97:15 111:12 parallel 65:14 parameter 43:21 48:24 parameters 42:24 43:15 50:15 56:1 79:20 90:21 107:15 paren 126:1 parenthesized 120:21 parenthetical 136:18 part 15:2 23:14 24:16 25:10 26:13 29:25 30:3 34:10 36:15 37:10	39:9 41:21,25 52:15 59:2 68:17 69:1 74:21 75:23 76:2 90:15 102:21 112:11 120:19,22 122:6 130:6,11 157:9 158:21 172:9 particular 22:22 23:9 31:21 36:3 39:2 67:1 74:13 84:10 94:15 97:2 108:24 111:18 112:16 116:2 125:10,11,12 125:15 130:8 139:23 166:9 particularly 94:10 parties 7:10 17:16 169:16 parts 60:15 93:19 129:23 party 8:1,7 pass 67:25 passed 132:2 passes 86:14 patent 1:1,2,7 1:10 2:1,2,7,10 2:16 3:15 4:3 5:11,17,18,20	5:24,25 6:2,9 6:10 7:14,17 7:18 14:12 15:11,13 16:7 17:20 19:13,14 19:15,17,17 20:22 39:21 44:12 46:2,5 51:9 54:17 92:5 94:14,15 96:19 99:10,20 103:3 118:19 118:21 127:18 127:22 139:1,3 139:6,10,13,19 140:20 141:21 146:21 147:15 149:23 164:3 164:16 166:10 166:10,15 167:8 patent's 119:10 patents 96:21 138:24 148:9 path 63:16 130:1,4 pedometers 87:13 pending 10:7 people 101:14 118:4 133:18 142:3,23 percentage 135:19	perform 42:1 47:25 63:23 76:23 77:10 164:13 performance 43:8 53:21 performed 37:11 39:9 41:16 51:11 54:22 57:3 59:6,24 64:3 97:17 performing 14:10 15:2 45:6 46:13 47:1,23 48:2 48:16,18 49:21 49:23 performs 59:22 61:5 period 38:18 89:9 91:23 94:5 95:2 96:1 person 39:3 40:11,13,17 42:11,14,15 43:25 44:1,3 49:2,3 50:21 54:10,15 55:1 70:14,24 71:3 71:11,20 94:9 98:22 141:25 147:5,7 165:25 person's 42:16
--	---	---	---

personally 171:11 172:15 persons 97:20 97:25 98:14 99:17 petition 14:15 petitioner 3:3 petitioners 1:7 2:7 ph.d. 1:16 2:15 5:3,15 7:13 8:20 170:5 171:4,9 172:4 172:13 173:20 photo 86:12 phrase 62:19 117:18 physical 86:24 physics 163:12 163:14 pick 7:7 34:25 47:21 piece 81:14 99:4 111:7 112:9 131:11 145:8,9,16,17 145:25 153:23 153:23 155:22 156:19 159:8 159:10 pieces 82:3 place 7:10 18:11 124:5 169:7	placed 88:9 169:9 places 28:4,8 67:22 play 60:20 please 7:6 8:4,6 8:17 9:13,23 41:3 44:19 93:14,15 100:9 105:12 147:1 165:22 170:8,8 plus 121:15,16 point 12:17 50:20 54:9 61:22 90:14 116:7 118:18 125:21 128:18 145:19 154:22 156:2 159:1 160:20 166:7 pointed 44:8 97:10 145:12 146:2 pointers 129:19 pointing 22:3 90:9 137:22 145:8,9,16,21 145:24,25 146:9 153:22 154:2 155:20 155:21 156:14 156:16 157:13 points 148:24 160:8	port 65:4,6,9 65:11 66:7,10 67:13 porter 3:16 4:4 7:20 8:9,11 portions 50:24 ports 65:1,3,12 65:12,14,14 67:3 posita 46:23 51:16,17 52:1 52:3 55:17 72:5 100:22 101:3,17,25 112:8 147:9,11 positas 142:24 position 118:21 127:17 164:4 possi 76:17 possible 71:6 76:19,21 148:19 163:3 potential 123:3 166:6 potentially 144:3 practice 88:24 precise 51:17 preferred 97:3 preliminary 15:11,14,22 16:1,8 103:4 118:20 127:18 148:9 149:24 166:16	preparation 102:21 prepare 16:23 present 8:5 pressure 86:23 86:24 87:7 pretty 149:21 149:21 previous 25:5 87:17 previously 60:14 94:20 prior 163:25 166:9 169:9 priority 139:6 private 7:7 pro 114:24 probably 18:19 35:22 61:22 65:8 135:15 154:22 problem 9:6 procedure 171:5 172:5 proceeding 8:3 10:16 17:15 19:7,25 20:17 102:12 120:1 proceedings 169:6,8,10 process 41:1 46:6 47:20 59:15 60:11 69:6 70:6 108:4 113:3
---	---	--	---

132:10 133:1 134:5,6,8 159:18 processed 28:18 62:25 66:25 68:22 105:9 111:6 119:12 160:19 processes 27:2 27:10 32:18 33:7 44:24,25 processing 32:8 33:2 37:10 39:1,9 41:17 41:21 44:21 45:3,5 47:5,7 47:11,13,24,25 48:1,7,8,17 49:23 58:5,5,7 58:12 59:5,10 59:22,23 61:5 61:6 63:11 105:19 110:20 113:12 114:24 140:2 150:19 162:23 processor 64:23 65:1,3 65:17 91:1 98:8 106:9 118:6 140:14 141:8 146:6 processors 98:6 production 170:12,14,22	profile 88:15 program 118:11 120:11 121:2 122:7,8 122:20 123:2 124:5,7 125:1 125:2,5,17 128:20 129:2 129:21,24 133:16,16 134:10 144:24 144:25 145:7,8 145:12,15,19 145:20,23 146:1,9 153:5 153:10,12,15 153:18,22,24 154:3,3,10,11 154:12,15,25 154:25 155:2,3 155:6,14,18,19 156:6,13,24 157:7,10,11,14 157:23 158:1,2 158:12,16,21 160:6,14,14,23 164:1 programmed 67:11 115:6,7 programming 62:2 117:25 159:5 programs 122:20 131:13 156:23	progresses 43:4 50:16 53:4,13 54:12 progressing 53:11 56:6 projection 101:12 projector 101:20 proper 79:23 159:16 properly 144:9 144:23 155:21 156:22 167:1 prosecution 14:13 protocol 67:5 protocols 133:19,22 provide 9:25 13:21 36:2 44:5 46:18 81:24 94:23 120:16 138:4 152:25 155:13 provided 45:22 52:10 71:8 94:15 120:23 124:18 138:8 152:22 155:10 165:14 provides 42:23 44:7 46:1 92:4 138:10	providing 37:14 123:16 136:23 161:24 provisional 139:7 ptab's 106:15 pub 5:21 6:3 public 171:10 171:18 172:15 172:23 173:23 publication 5:21 6:3 20:6 pul 55:21 pulsating 86:11 pulse 22:2,13 22:14,15,17,18 22:19,19,20 24:4,13,20 25:4,7,23,24 26:10,10 27:4 27:4,12,13,14 27:15 28:4,5 28:12,17 29:15 29:16,17,17,22 29:23 30:9,14 30:17,18,19,20 31:2,8,11,18,19 32:1,5,19,23 33:7,9,18,24 34:15 35:20 36:9 37:11,13 37:15 39:10 41:10,11,12,17 41:18,19,22 44:21,22 45:7
---	---	--	--

47:12,13,24 48:23 49:21 50:6 51:12 57:12,13,15 58:2,6,7 59:6 59:19,20,21,25 60:22 61:2,3,3 61:8 62:9 68:21 72:7 73:8,15,17,17 74:5,15 75:8 75:16 76:9 82:24,25 83:9 83:13,22,23 84:7,11,13,15 84:19,19,20,22 85:1 96:10,15 101:1 110:14 112:14 113:7,8 113:14,17,17 114:20 115:4,9 115:18 117:21 124:24 132:12 133:7 pulses 65:16 66:13 84:16,18 84:21 85:8 86:17 87:20,21 87:22 88:1 89:14 95:9,14 95:19,20,24 96:1,9,16 108:23 109:1 110:13 111:16 111:19 112:2	112:12 113:3,4 113:6,7 114:19 114:25 117:22 150:17 pult 30:13 74:5 purchasing 101:20 purpose 138:1 purposes 20:8 20:24 42:7 put 47:11 67:22 71:23,24 77:14 98:6,15,25 112:9,9 113:2 pyle 100:4,12 pyles 6:3	quote 14:8 104:13	27:15 28:4,5 28:12,17 29:15 29:16,17,17,23 29:23 30:9,9 30:13,14,17,18 30:19,20 31:2 31:8,11,12,18 31:19,23 32:1 32:5,19,23 33:1,3,7,9,18 33:24,25 34:2 34:5,5,8,9,11 34:15,18,22 35:20 36:9,21 37:2,11,13,15 38:8,11,17 39:10 41:10,11 41:12,17,18,19 41:22,23 44:21 44:22 45:7 46:15 47:2,12 47:24 48:3,23 49:21 50:6 51:12,13 53:11 54:13 55:21,24 56:7 57:13,13 57:15 58:2,6,7 59:6,20,21 60:1,22 61:3,3 62:10 68:21 72:7,15,18,19 73:8,14,15,17 73:18 74:5,6 74:11,15 75:8 75:16 76:9
	q	r	
	question 9:17 10:7,8 30:1 44:15 58:21 60:16 87:17 100:15 132:6,9 137:8,11 141:17,20 148:18 156:3 157:3,17 159:22 160:2 165:4 questions 9:12 25:3 167:10,17 quick 9:8 43:12 43:16 118:25 150:23 quite 35:7 76:21	radiation 86:9 radio 73:16,24 75:5 76:8 raised 118:19 ramp 36:20,23 36:23 37:1,2,5 37:16 random 145:20 range 31:12,20 31:22,23 32:2 33:10,25 34:2 34:8,9,11,16,18 34:19,23 35:21 37:14 41:23 45:8,11 46:16 47:3 48:4,22 48:24 49:8,22 50:5 55:23 88:24 89:15,24 90:6 106:25 107:8,8 109:7 109:13 113:9 113:15 114:10 128:11 150:17 ranges 33:20 rate 22:13,14 22:15,17,18,19 22:19,20 24:4 24:13,20 25:4 25:8,23,24 26:10,10 27:4 27:5,12,13,14	

82:7,15,24,25	146:24 147:16	readable	148:1
83:4,7,21	150:15 158:15	143:16	receipt 170:15
84:13,16,21,22	160:5,18,23,25	reader 137:18	receive 133:14
85:5,10,16,17	rates 31:21	137:22	133:17 134:4
85:19,22 86:3	33:10 85:7	reading 94:20	received 27:3,4
86:22 87:4,20	rather 25:4	170:17	27:9,10 28:18
87:21 88:1,10	97:4	real 113:5	29:24 31:8
88:15,17,18,22	raw 112:19	really 12:21	32:1,18,19
88:22,25 89:3	113:25 114:3,7	24:8 34:18,22	33:5 34:8
89:7,14,22,24	114:11,11	36:2 39:16	44:22 48:23
90:5 91:3,5,11	115:5,9,13	51:18 54:3	50:6 51:12
91:12,17,20	116:2 117:1,6	55:25 60:5	63:3 64:8,24
92:7,14,16,22	117:11 160:23	61:19 64:18	65:12,18 66:9
92:24 93:23,24	reactor 164:11	66:12 67:9	67:19,20 69:3
94:2,24 95:4,7	read 14:9 25:17	68:5 69:14	69:25 78:2
95:13,16,20	36:14 40:21	105:8,18	87:21 95:19,25
96:10,15 101:1	43:2 53:18	114:23 115:3	96:16 107:15
105:9 106:25	64:12 65:21	115:13 118:25	108:23 134:2,6
107:9 108:24	70:11 72:16	129:13 140:3	receiver 23:22
109:6,7,10,12	76:18,20 77:23	157:20	64:15 65:19,22
111:20 112:14	82:10,13 83:6	realm 159:5	74:6,9
113:4,5,6,9,10	85:21 86:21	reason 11:11	receivers 63:4
113:17,18,19	88:12 90:18	99:6 101:24	63:6,22 64:4
114:9,20,25	91:16 92:12	105:1 112:8	64:20 66:12
115:1,2,4,10	93:7 96:25	148:13 170:11	78:4
116:1,3,7,17,17	100:24 102:23	172:8 173:3	receives 23:23
116:19,23	104:5 120:10	reasoning	33:6 41:10
117:21,23	130:20 137:20	141:18	59:19 61:2
124:24 125:4	140:12 153:3	reasons 101:13	65:22 83:10,23
125:12,13,15	153:17 156:11	recall 13:6	89:14
126:24 127:1,9	156:24 162:18	35:13 39:20	receiving 59:11
127:13 128:1	163:5 171:5,6	43:13 49:12,15	65:10,25 66:21
128:10,13	171:12 172:5,6	54:7 87:14	67:1 74:11
130:7,9 132:12	172:17	94:20 136:16	133:15
133:7 146:10		146:17 147:20	

recess 56:13 80:14 107:20 134:18 151:3 167:14 recognize 10:25 11:20 19:10 20:3,19 119:21 138:21 162:2 recollection 135:8 record 7:4,11 8:7 56:11,15 80:13,16 104:19 107:19 107:22 123:13 134:17,20 151:2,4 161:22 167:12,15,23 167:24 168:1 169:10 172:9 recorded 7:13 163:16 recording 7:9 164:8 recover 67:6 redefine 148:15 refer 20:24 60:17 139:12 139:18 reference 20:9 20:25 21:4,5 40:4 42:4 52:19 55:7 80:21 97:2	100:8 107:13 120:25 170:4 171:2 172:2 referenced 151:23 153:9 171:11 172:15 references 99:25 100:7 148:2,23 referred 32:7 162:8 referring 17:14 17:19 20:10 21:1 74:24 80:2 100:15 117:15,16 120:17,18 122:5 136:14 139:25 refers 120:15 reflected 86:10 86:14 regardless 94:8 regular 109:13 relate 139:22 related 8:1 15:6 16:4 17:16 140:1,4 relationship 136:25 relative 45:8 46:15 48:3 169:15 relevance 123:15 142:7	142:22 161:23 relevant 138:2 139:6 relying 166:15 remaining 23:21 26:3 remember 9:9 16:9,14,19 36:13 56:25 57:4 103:11,16 103:22 108:5,9 132:10,15,21 149:1 rendered 19:18 renders 145:25 repackaged 66:14 repeat 9:13 40:24 41:2 44:17 132:8 141:20 report 15:18,20 reported 1:22 reporter 2:20 7:24 10:13 11:15 19:4,22 20:14 93:13 102:9 119:17 138:15 151:14 161:16 169:4 171:7 representation 145:2 represented 83:14 163:6	164:21 representing 87:23 95:22 109:3 153:14 represents 146:9 156:17 request 172:9 172:11 requested 63:24 159:16 require 47:10 required 63:24 82:4 170:25 requires 40:10 40:17 47:13 resides 26:25 32:17 resistance 23:8 23:23 43:10 53:23 77:25 79:14 respect 15:17 33:1 41:22 42:17 60:14 68:11,20 71:17 72:10 76:13 92:5 96:1 97:8 100:17,24 102:6,6 103:3 103:7 107:7,12 109:7 121:11 129:11 respectively 31:16 97:16
--	---	---	---

respond 77:24 79:12 158:23 167:1 response 15:12 15:14,22 16:1 16:8 60:17 86:18 103:4 118:20 127:19 127:23 148:9 149:24 166:16 rest 35:5 70:3 77:8 resting 26:15 34:22 result 48:7,24 84:22 109:12 125:10 149:23 160:12 results 163:16 164:8 retained 168:5 returned 170:15 review 104:22 136:8 152:14 170:9 171:1 172:1 reviewed 15:8 15:11,13,22 16:3,6,25 17:2 17:6,23 102:20 137:2 152:19 reviewing 42:12,16 49:4 51:9 152:18	revolving 22:9 rid 77:11 right 9:1,2 10:9 10:10 12:12 13:6 15:4 16:22 17:22 19:19 24:5,14 24:22 26:4,19 27:16 28:11,14 28:22 29:20 30:22,24 32:9 32:22 33:14 35:18,22 36:17 39:7,13 41:6 46:16 50:2 51:6,14 53:9 56:10 59:8 60:2 69:9,14 75:11,19 78:8 78:9,10 84:5 84:22 89:18 93:3,8 95:3,5 95:16 96:11 97:11 102:21 103:2 108:12 108:19 111:2 111:16 112:22 114:2,5,13 116:7,21 117:1 117:5,19,20 122:11,23,25 123:19 124:15 124:16 128:24 135:8 136:20 138:19 144:24	144:24 146:18 146:23 147:18 148:1 152:8 154:22 157:12 162:12 riley 5:17 40:13 role 130:3,4 room 71:25 101:16 routines 40:2 rules 171:5 172:5 ruling 103:7 run 31:14,16 34:3,4 39:9 50:11,11 80:6 126:14 running 22:6 33:8 54:1	127:15 128:6 130:7 131:24 132:1 140:25 141:3,7 147:3 147:21,22 155:8,9 161:12 167:6 says 12:21 14:5 31:9 34:20,24 43:2 65:21 69:14 81:16 82:3,10 83:6 88:11 90:17 96:22 104:1,5 104:14,20 117:10 120:9 121:5 136:19 137:25 138:13 140:12 153:3 155:11 162:18 163:4 scan 43:12 94:17 scattering 164:10 scholar 3:16 4:4 science 61:25 68:6 110:4 118:2 119:7,15 139:22,24 140:22 141:23 142:1 scope 70:17,20 71:13
		s	
		s 170:12 172:8 172:8 173:3 save 98:16 saw 9:7 71:9 87:13,14 106:1 106:2 109:1 123:1 148:14 149:7 saying 28:6 35:22 43:20 45:25 71:10 77:9 79:11 81:5 100:16 105:15,18 111:15 127:10	

screen 22:24 seal 171:15 172:21 second 12:20 12:23 14:2 95:1 97:13 104:5 120:9 152:21 153:1,3 153:16 155:5,9 163:4,9 164:20 165:3,7 166:8 166:13 seconds 36:23 91:10 92:21 109:11 section 26:17 30:11 33:14,22 35:12 39:15 44:7,8 45:22 49:6 59:11 77:6 102:4 104:1 107:2 111:24 130:16 sections 35:14 90:14 99:23 see 12:4,9 14:2 14:5,17 21:5 40:3 43:15 61:14,19 62:13 62:22 64:25 65:2,2 69:10 82:17 87:16 94:18,19 96:20 99:1,2 104:1,3 104:23 105:5	112:13 119:6 120:6,9,14,16 120:21,22 121:4,22 122:4 122:6 124:17 124:17,17 136:18,19 137:18,25 138:13 140:10 140:18 151:19 151:25 155:11 162:15,24 seems 61:14 72:5 seen 120:2 137:14 sen 24:8 130:9 send 49:25 67:23 82:25 84:14 128:7 131:11 133:13 sending 66:13 68:8 74:15 84:11,12,16,16 84:19 85:13 111:21 133:20 133:20,21 148:24 150:1,2 150:4,4 166:25 sends 91:6 92:18 109:17 117:18 sens 30:9 94:12 sense 37:8 39:12 52:20	57:10 66:21 82:24 84:3 85:3 116:12 121:13 122:6 129:24 131:25 161:1 163:19 163:22 164:24 sensed 30:17,19 41:11,18 60:21 61:2 82:23 87:5 112:19 132:11 160:5 senses 22:18 91:2 92:13 106:10 128:17 sensing 30:14 85:17 86:3 87:9,9 sensitive 7:7 sensor 22:13,15 22:18 24:4,13 24:15,21,24 25:5,8,15,20,24 26:10 27:13 29:16,23 30:18 36:24 41:11,18 51:13 55:22 57:14 59:21 60:22 61:3 62:10 69:2,23 72:15 82:6,7 82:24 83:4,7 83:21 84:9,10 84:25 85:13,19 85:22 86:13	87:12,21 94:12 95:9,20 107:15 108:24 112:13 112:19,20 114:1,3,7,10 115:9,19 116:2 116:8,16,23 117:22 119:11 128:2 130:8 132:12 133:11 133:13,25 146:18 147:12 160:5,12,18 161:10 sensors 23:18 24:2,3,8 25:15 25:18,25 72:18 72:21,22,22,25 81:24 82:14,22 84:3 85:16 86:16,22,23 88:5 112:15 115:5 166:12 sent 34:20 62:3 66:7,19 67:6 67:16 68:22 73:10 96:9,11 104:11 105:17 108:15 112:1 115:23 117:21 128:3 132:14 132:23 149:5,7 149:8,10 150:14,15 158:19,24
--	---	--	---

159:11,14 160:10 166:19 166:22 167:3 sentence 104:5 119:2 120:9,20 137:1,25 138:11 152:21 153:3,17 separate 46:5 72:1 81:20 101:20 114:18 separately 116:13 september 139:8 sequence 121:21 122:10 122:23 124:6,7 124:10,13 125:4,7,14,23 126:13 127:2 146:7 sequences 154:18 sequentially 129:18 serial 65:1,3,4 65:6,9,11,12,13 66:7,10 67:3 67:13 149:25 series 9:11 66:8 67:14,15 126:6 126:20,25 127:7,7 128:14 128:19 150:17	150:18 set 40:5 43:9 53:22 63:21 70:1 101:10,12 113:6,7 115:4 117:1,21 126:13 128:24 130:8 146:6,7 169:7 setup 74:13 several 29:19 30:22 38:2 47:25 sheet 170:10 172:7,10,18 173:1 shock 35:7 shorten 43:10 53:23 shorthand 2:20 169:3,11 shortly 154:22 show 75:13 showing 22:1 shown 24:18 26:15 39:21 41:5 56:23 76:15,16 77:13 82:22 170:13 shows 63:15 sic 30:13 74:5 89:8 100:4,12 134:23 151:9 side 57:22 62:23 66:9	162:12 signal 73:14 83:9,22,23 84:7,14 86:17 signals 23:14 27:9 63:2,2 67:15 73:24 83:11 85:24 signature 12:5 12:5 169:23 170:11 signed 171:13 172:18 signing 170:17 similar 40:12 40:15 50:23 52:8 53:8 54:2 54:18 56:3 78:5,9 80:24 82:7,21 97:10 103:21 107:2,6 113:3 similarities 103:18 106:11 similarly 54:18 78:22 113:19 126:23 simple 34:6 82:17 123:2 simply 67:25 158:12 simultaneous 60:9 sincerely 170:20	single 76:22 sir 170:7 sit 12:14 15:1 136:8 162:16 site 81:9,18 sitting 22:23 34:24 39:24 105:2 146:17 148:1 sixth 6:6,12 152:22 skill 40:11,14 40:17 42:11,14 44:1 49:2,4 50:21 54:10 55:1 70:24 71:12,21 94:10 97:21,25 98:14 98:22 99:17 141:25 147:5,7 147:11 165:25 skilled 39:10 42:5 51:8 52:21 70:15 71:3 87:2 98:24 140:22 141:23 148:19 skin 86:15 slightly 74:17 slow 31:13 32:3 34:5 37:1 45:12 50:8 56:2 57:25 63:12,19 91:22 91:24 94:4,6
---	---	--	--

110:19 113:22 114:12 115:11 slower 31:16 34:4 50:11 54:1 slowing 48:25 54:2 slowly 9:24 36:21 soft 143:5 softer 31:15 software 79:21 80:2,6,7 115:6 116:24 131:3 143:4,5 159:9 solutions 7:23 7:25 168:5 173:1 someone's 82:18 soon 47:16 155:24 sorry 10:18,23 27:1 30:5 53:6 56:9,9 60:19 78:4 79:9 100:9 101:5 102:16 104:13 104:17 105:11 111:1 130:3 152:2,8 166:9 sort 35:17 37:1 131:25 sorts 133:4	sound 9:20 10:3,10 29:13 59:15 sounds 23:25 25:14 28:2 30:24 41:20 89:17 south 2:16 7:20 space 65:8 spe 95:21 speakers 101:22 speaking 60:9 143:10 spec 73:1 147:6 148:14 specific 16:17 29:10 39:20 49:19 51:5 54:7 67:13 79:3,22 91:8 92:20 98:23 100:3 107:11 109:19,25 110:18 117:21 124:12 128:10 133:17 134:25 141:12 143:21 145:9,15 146:6 146:7 147:22 148:2 154:18 159:6 160:24 161:9 specifically 16:9 25:4	35:13 81:1 95:24 103:17 117:16 119:2 120:20 162:8 specification 21:23 40:16 51:21 70:4 96:22 97:14 specifications 71:5 specifics 136:17 speech 140:1 speed 23:18,19 25:17 26:2 31:13,24 34:4 34:20 35:4,6 35:23 37:7 43:22 45:12 48:12 50:8 56:1 57:25 63:12,19 66:5 77:25 79:13,16 79:18 90:24 91:8,15,19 92:1,6,19 93:1 94:1 106:8,24 109:18,25 110:18,19 111:8 113:13 113:16,22 114:22 115:2,8 115:21 116:5 126:9,18,19,21 126:22 127:2,3	127:6 166:24 166:24 speeding 48:25 54:1 spirit 70:17 83:20 standalone 27:19 standard 38:1 83:8 standing 104:19 standpoint 110:5 start 21:3,20 64:12 98:9 111:1 122:22 122:24 124:4 129:3 144:15 starting 8:7 21:23,24 24:1 26:13 74:4 81:3 102:4 124:5 153:2 starts 81:7 state 8:4,6 14:8 25:22 26:1 59:12 64:14 169:4 171:10 172:15 statement 45:18 104:22 105:2,7 106:15 121:1 137:20 171:13,14
---	---	---	--

172:19,19 statements 70:10 126:25 states 1:1 2:1 5:17,20,24 6:2 6:9 7:18 23:15 23:18,19 27:3 32:18 stating 138:12 138:12 station 26:24 27:1 step 32:8 41:1 47:20 48:14 115:24 116:15 126:2 128:7 stepper 77:22 78:1,19 stepping 77:25 79:13 steps 59:23 61:5 105:19 112:10 116:9 116:11,12,24 steven 4:16 7:22 stick 21:18 sticker 10:17 stop 89:11 91:24 94:6 165:22 stops 75:17,24 storage 153:6 stored 143:16 153:7	storing 140:16 141:9,14 straight 110:23 straightforward 119:11 157:20 strap 83:8 85:25 stream 65:12 street 2:17 3:19 7:21 strike 68:8 string 131:18 strings 131:17 131:21 structure 144:24 146:14 161:10 structured 144:10,18,23 146:19 structures 83:17 147:10 stuff 19:8 68:6 98:7 subarea 139:23 139:25 submitted 11:24 12:11 subparts 79:24 subscribed 169:18 171:10 172:14 173:21 subsequently 153:8,9	subset 142:2 subsidiary 13:20 substance 56:19 108:1 substitute 159:3 subtract 131:8 sudden 37:5 suitable 163:7 164:22 suite 3:20 summarized 44:14 sunday 18:12 sure 9:21 13:10 17:18 19:16 20:11 21:2 22:10 28:16 29:5,7,14 30:10 40:25 41:20 42:21 44:18 45:1 46:5,8 47:17 49:16,17 51:25 57:11 59:3,17 62:5 71:2 90:10 93:10,10 99:6 100:14 105:6 107:17 111:4 119:22 134:15 135:11 138:7 139:14 139:23 140:25	surmise 136:7 switch 60:20 126:2,2 sworn 8:18 171:10,13 172:14,18 173:21 system 22:2,5 28:13 67:16 76:22 77:5 81:1 88:16 103:12,14 116:4,18 117:2 117:7,7 119:11 129:9 131:10 161:5 system's 101:3 systems 163:25 164:17
			t
			take 7:10 10:5 10:8 18:11 36:11,11 47:15 49:18 56:8 63:12 71:22 80:9 99:11 107:16 109:6 128:20 131:19 134:14 135:7 150:23 167:11 taken 2:16 7:14 115:12 116:15 116:23 118:21 127:18 130:5 153:21 157:8

169:6 takes 90:20 112:19 127:9 134:6 159:18 talk 9:24,25 35:14 40:6 45:10 55:13 85:6 87:12 99:24 100:23 107:25 111:9 141:7 142:3 148:24 149:2 152:16 talked 17:25,25 26:15 32:12 68:10 70:1 78:15 95:15 103:14 106:23 108:7 132:10 132:17,22 talking 25:3,20 27:22 32:16,25 33:23 40:18 41:4,7 42:12 48:15 53:25 56:22 57:2,19 58:12,15 73:13 78:8 81:4 96:8 96:10,14,16 101:6 103:12 105:8 108:3 111:24 114:14 132:1 151:8 154:9,15 164:17 166:11	talks 23:12 26:20 53:3,16 64:7 72:16 73:16 74:4 76:7,13 77:18 85:16,18 86:20 87:18 93:23 106:6 109:5 target 31:11,22 31:23,25 32:1 33:10,19,25 34:9,15,19,22 35:21 37:14 38:9,11 41:23 43:20 45:8,11 46:15 47:3 48:3,24 49:8 49:22 50:5 51:13 55:23 88:14,18,22,25 89:3,15,16,21 89:22,24 91:6 91:12,13,17,20 92:6,17,23,24 93:24,25 94:3 106:24,25 107:8 109:7,13 113:9,15 114:10 116:17 117:23 127:1 128:11 150:16 targets 112:16 teach 101:1 teaches 50:4	teaching 43:18 43:19 technology 86:2,8 87:1 television 101:10,12,17 101:20,21 tell 69:16 118:11,12 telling 91:7 92:19 109:18 137:17 157:4 tells 121:10 123:23 ten 36:23 term 24:9 143:8 148:15 terms 79:17 108:8 124:25 140:23 141:24 test 95:2 testified 8:22 testify 11:11 93:16 testifying 11:5 11:9 169:9 testimony 56:19 108:1 168:2 171:6,7 172:6,9,12 tests 91:10 92:22 109:10 109:12 text 69:17	thank 8:16,19 10:21 11:18 20:1 88:3 102:13,18 118:23 151:18 152:12 161:20 167:18,19 thanks 13:15 167:20,22 thereof 66:4 68:13 169:13 thereto 10:4 thing 22:4 47:25 49:14 55:1,2,9 60:18 97:24 102:23 115:3 123:24 128:3 129:14 131:5,5 142:17 154:5 things 27:7 67:4,4 70:23 71:6,11,19 79:15,17 88:7 95:13 97:20 98:13,15,17,21 98:25 99:9,15 99:17 100:22 103:1 110:2 112:6 115:14 129:20 131:10 131:12,14,20 132:4,22 141:5 141:15 142:5 143:9,15,18
--	--	--	---

144:14 155:15 157:19 164:18 166:1 think 10:23 15:4 16:15 17:11,22 18:5 18:9,9,12,17 25:17 27:11 28:6,12,21,22 29:25 30:8,24 32:7,15 33:13 35:7 36:19 37:1,21,21 38:9,23,25 39:2 40:2,13 41:14 42:22 44:5,9 45:20 48:14 49:6,16 50:13 51:6 55:8,17 57:8 57:12 58:11,19 59:9 60:21 62:18 68:6 71:4,20 72:23 75:12 80:11 82:16 85:6 87:8 90:1 91:25 93:5 97:12 99:5,25 100:3,12,16,21 102:25 103:6 103:17 104:14 104:14,20,21 108:10 110:1 111:1,14,25	117:17 118:4 120:3,18,24 122:5,15,18 131:16 132:18 134:25 135:15 136:5,22,23 137:4,13,21 138:1,4,10 141:5 142:23 143:9,15 144:15 146:13 148:8,12 149:2 149:7 150:24 152:9,24 154:7 154:7,13,16 156:15 157:9 158:9 159:6,23 160:1 162:7 163:9,11,15,18 163:21,23 164:7,14,20 165:9,24 166:7 167:7 thinking 136:15 third 12:20 13:2 120:5 thirds 162:12 thorough 9:10 thought 99:6 100:11 103:14 132:9 thoughts 15:21 three 12:24 162:16 166:23	167:6 threshold 130:10 threw 152:7 thursday 1:18 2:18 7:1 18:12 till 33:15 time 8:4,5 13:11 23:20,21 26:2,3 29:6 35:18 36:22 37:17 38:18,19 42:13 51:7,20 51:22 85:3 91:9 92:20 95:2 96:1 136:9,10,12,13 167:20 168:6 169:7 times 18:3,5 38:2 43:11 53:24 121:18 156:1 timing 85:9 today 8:9,13 9:11 11:6,12 12:14 13:12,16 15:1,5 16:3 20:8,24 70:5 102:21 167:20 today's 9:22 16:24 18:21 168:2 togami 4:16 7:22	together 97:22 98:3,7,15,25 99:4,10,25 115:12 132:4 told 67:10 89:4 89:10 90:4 156:4 165:24 took 43:12 67:2 111:13,23 112:25 113:1 126:24 163:13 163:15 164:9 164:11 top 14:3 22:23 25:19 73:25 120:7 152:11 total 18:20 168:4 trademark 1:1 2:1 7:18 train 113:8,8 113:14,17 115:9,18 tran 73:14 149:18 transceiver 77:12 transcribed 9:23 169:11 171:7 transcript 17:8 17:13,24 170:8 170:9 171:5,12 172:5,11,17
--	--	--	--

transcription 169:13	28:4,13 29:17 30:19 41:13,19	91:14,18,21,23 92:18,25 93:25	trying 26:7 32:12 40:25
transferred 68:21 73:8 147:8	44:23 57:15 59:22 61:4 62:9 64:13	94:3,6,24 101:8,19 102:1 104:9,10,12	46:4 55:9,11 57:6 60:10,19 78:13 93:12
transmission 78:9,14 133:19 163:8 164:18 164:22	65:9,16,24 66:8 73:15,17 73:20 74:5,12 74:15 75:6	105:16,18 109:15,18,24 110:18 115:11 115:21 126:9	110:3 136:16 137:10
transmissions 78:6	76:1 77:11 78:3 82:25	treadmills 22:9 92:2 94:25 106:9	tuesday 18:13 tuners 101:21
transmit 23:14 29:23 65:15 73:14,17 82:23 84:4 149:17,19	transmitters 63:4,5,22 64:20,25 66:12 73:13	treat 145:17 159:13	turn 13:7,24 96:4 120:4 131:1,1,22 141:14 162:11
transmits 22:20 27:14,19 29:17 30:19 64:13 74:5	transmitting 28:5,13 30:13 30:14 64:21,21 64:22 75:6,7 149:16,25 166:12	treated 133:12 134:3 158:11 158:13 159:1	turning 96:17 turns 95:15 122:24 166:17
transmitted 31:3 41:12,19 57:14 59:21 61:3 63:2,8,13 63:20 64:19 65:11 69:2,24 78:2 88:5 104:8 105:16 105:20 106:4 119:12 132:12 133:23,24 143:17 150:11 163:24 164:25	treadmill 22:6 22:7,8 23:3,9 23:14,15,20 25:16,25 31:12 31:15,16,24 32:3 34:20 35:3,16 38:6 39:13 45:12 48:25 49:1 50:8,12 54:2 57:25 63:11,25 77:20 78:6,18 78:24 79:15 90:24,24 91:7	treating 158:4 treats 145:12 trend 65:6 trial 1:2 2:2 7:17 tried 40:21 160:1 trigger 115:6 125:4,7,14 126:5 triggers 115:20 116:3,4 150:18 true 46:25 truthfully 11:12 try 9:24 18:16 36:11 60:22	two 24:2 55:8 58:4,12,15 59:23 61:6,8 65:3 75:17,24 76:14 77:10,12 77:16 90:8 95:13 97:15 98:6,15,25 99:9 110:1 131:17,17,20 131:21,21 132:4,5 141:4 149:8 152:7 157:19 158:3 162:12 166:23 type 16:17,20 42:1 79:22 131:4 134:25 135:2,4,4,9,17

141:12 143:21 145:2,16 157:25 164:15 types 40:18 47:7,25 48:17 49:20 58:4 59:10 80:7 85:16 87:13 99:16 121:10 143:24 typically 66:16 typos 12:16 13:4	52:21,22 55:8 55:10 57:6,21 59:8 60:10 62:1 70:2 72:6 78:13 79:21 90:10 95:3 103:2 108:12 110:2,3 112:22 118:18 121:6 121:23 122:9 132:6 133:23 135:23 137:1,8 139:5 141:17 142:1,24 148:9 148:20 156:2 159:22,25 164:3 165:4,11 165:25 166:15 understanding 21:10 39:4 135:5 understood 9:18 52:2 70:12 71:7 101:18 143:2 unit 7:12 22:21 23:1,9,24 26:15,21 27:1 27:2,10,15,19 27:19,20,22 28:3,6,7,19 29:18,18 30:15 30:20,21 31:3 31:17 32:9,17 33:6 37:11	39:10 41:10,16 42:1 44:21 45:5 46:13 47:1,11,23 48:17 51:11 54:22 57:3,14 59:19,24 61:1 61:4,4 62:11 62:21 63:10,14 63:14 68:8,16 68:22 69:1,12 69:23 72:4 73:9 74:9,10 74:11,16,20 75:7,8,18,19,22 83:1 104:8 105:16,20,22 106:3,18 132:12,23 153:19 unit's 31:8 united 1:1 2:1 5:17,20,24 6:2 6:9 7:17 unnecessary 101:23 update 156:24 upper 131:15 ups 37:5,16 usa 1:5 2:5 7:16 use 24:9 51:19 52:4,5 55:18 55:19,20,22 60:16 72:24,24 73:24 77:15	82:25 89:22 101:16 116:14 117:18 129:17 135:20 141:23 149:1 156:9,25 163:8 164:22 164:23 used 30:8,11 42:18 43:5,14 52:13 62:18 66:15 72:18 83:18 90:23 110:13 129:19 150:12 155:5 162:22 164:12 168:4 user 22:5,11,12 23:7 24:14,22 25:9,23 31:14 31:21,22,24 32:3 33:10 34:3 35:3,7,15 39:13 43:23 48:10 50:11 51:14 71:24 74:6 77:1 130:22 131:20 user's 22:6,18 24:19 25:24 27:4 31:11,11 31:18 32:5,19 33:9,24,25 34:5 35:20 41:22 45:7 46:14 47:2
u			
ultimate 13:20 ultimately 31:13 umbrella 139:24 under 11:6,8 55:7 80:4,5 109:20 162:16 164:6 165:3 169:9,12 underneath 152:8 undersigned 169:3 understand 9:14,16 11:5 20:9,25 26:8 28:2,21 33:18 35:21 39:7 45:24,25 46:6 49:17 51:2			

48:3 101:1 113:18 users 37:4 38:4 131:15 uses 108:4 146:2 using 52:14 53:4,14,16 54:11 56:4,5 63:21 65:15,16 75:2 76:8 89:15 95:1 109:6 114:21 115:1 135:10 135:12 140:21 140:23 141:21 142:2 144:23 145:10 169:10 utilize 87:4	156:24 160:12 van 134:23 151:9 variables 153:6 variance 68:13 71:8,12 76:5 variant 69:5,11 variations 70:16 varieties 101:11 various 23:15 23:18 25:21 verbal 9:23 verbally 10:1 veritext 7:23,25 168:5 170:4 173:1 veritext.com. 170:14 versus 7:16 131:21 vessel 86:12 vessels 86:19 video 7:9,13 142:25 143:1,2 videographer 4:15 7:4,23 8:16,19 10:18 10:21 56:10,14 80:12,15 107:18,21 134:16,19 151:1,4 167:12 167:15,23	168:1 videos 142:21 videotaped 1:16 2:15 view 104:6 visible 61:20 86:9 visual 145:1 volume 1:19 2:16 5:4 von 120:15,21 121:5 122:16 124:21 135:13 135:20,21 136:2,15,20 137:2,18,22,25 138:2,8,13 151:10,11,22 152:15,24 154:13,17 155:12,12 vs 1:8 2:8	80:10 101:15 101:15 104:18 105:11 131:22 136:8 137:19 152:25 wanted 161:22 washington 4:9 watch 101:17 way 13:17 15:16 18:18 19:2 24:12 28:23 29:11 30:6 31:10 37:20 38:3,14 38:23 39:12 40:8,21 41:15 42:6 44:14 46:17 70:6 71:6 73:23 79:19 82:24 83:25 84:9,24 85:14 89:19 99:4 103:19 105:6,8,9,23 113:4,19 118:8 124:12 125:3,5 125:19,20 131:3,6,13 133:17 138:6 138:10 140:21 141:22 142:3 144:11,19 145:14 147:8,9 160:24 161:9 162:13
v			
v 170:3 171:3 172:3 value 121:14 121:15,17,18 121:20 125:3 125:13,15,16 127:1,9 128:10 128:12 129:22 130:7,11 133:13,25 146:2 153:8 159:10,10 160:23,25 values 129:25 130:9 133:11			
		w	
		wait 67:12 waived 170:17 walk 21:9 29:11 46:4 80:25 walking 22:11 35:6 59:14,17 want 18:16 21:18 29:2,11 35:5 36:12 40:6 43:23 48:8 70:2	

ways 70:23 71:11 85:17 87:8,9 146:13 146:15 we've 10:15 11:16 19:5,24 20:16 30:21 36:6 52:21 68:10 70:1,5 71:17 72:10 102:11 119:19 119:19 138:17 151:8,16,21 161:18 wearing 22:12 wednesday 18:13 week 18:13 weird 149:22 welcome 36:14 went 111:16 west 3:19 whatnot 110:15 116:1 whereof 169:17 whispers 7:7 wholly 141:4 wiley 6:15 16:15,15 162:7 162:8 165:15 wilshire 3:8 wire 76:9,11 133:24 wishes 93:16	witness 5:2 8:18 10:20 11:18 20:1 24:7 27:18 29:22 30:8,24 32:15 33:13,22 35:2 36:1 37:19 38:14 39:15 42:10 44:17,19 45:10 47:10 48:6 50:4 51:16 53:2 54:25 55:13 57:17,24 58:11,19 60:4 61:13,19 62:7 64:6 66:24 68:25 70:9 72:13 73:12 75:2,21 79:3 79:11 80:4 83:3 84:24 89:21 90:12 93:14,16 95:18 96:14 97:19 99:23 100:11 100:21 102:13 106:1,22 110:7 111:11 112:25 114:17 116:11 123:21 127:15 128:6 132:17 133:10 135:15 136:5 137:13 139:16 140:25	142:8,16,23 143:15 146:13 147:3,20 148:8 148:23 150:25 155:8 156:8 157:25 158:18 160:8 165:23 165:24 167:18 167:22 169:17 170:5,8 171:1 171:4,11 172:1 172:4,15 witnesses 169:8 witness' 170:11 wondering 36:15 word 13:3 30:10 60:16 61:23 62:17 116:14 149:1 155:4 156:9 words 12:24 60:20 140:21 141:22 159:3 167:4 work 9:15 31:14,15 43:23 48:11 53:12 68:20 70:7 99:5 158:5,5 working 31:25 32:3 workout 23:21 23:21 26:3,3 40:1 43:3,7,11	50:16 53:4,11 53:12,13,20,24 54:5,12 55:14 55:16,21,22 56:5 128:4,8 works 21:11 46:6 70:6 81:1 worn 24:14,21 25:8,23 write 133:4 writing 127:8 166:4 written 125:3,5 130:24 131:3 131:13 163:20 wrong 49:13 61:23 124:5 148:12 wrote 15:17 164:12
			y
			ya 59:13 95:12 yeah 9:5 10:21 12:18 13:10 16:6 21:20 24:23 25:19 27:24 28:17 29:3,7 35:10 35:24 39:23 41:3,7 45:2,4 53:8 56:9 60:8 69:20 71:19 73:12 76:12 80:10 93:2,5,6 93:9 96:24

100:2 101:5,6 101:7 137:9 149:6 165:5
z
zero 61:24 zone 38:12 91:18 93:24,25 zones 49:22 51:13

Federal Rules of Civil Procedure

Rule 30

(e) Review By the Witness; Changes.

(1) Review; Statement of Changes. On request by the deponent or a party before the deposition is completed, the deponent must be allowed 30 days after being notified by the officer that the transcript or recording is available in which:

(A) to review the transcript or recording; and

(B) if there are changes in form or substance, to sign a statement listing the changes and the reasons for making them.

(2) Changes Indicated in the Officer's Certificate. The officer must note in the certificate prescribed by Rule 30(f)(1) whether a review was requested and, if so, must attach any changes the deponent makes during the 30-day period.

DISCLAIMER: THE FOREGOING FEDERAL PROCEDURE RULES ARE PROVIDED FOR INFORMATIONAL PURPOSES ONLY.

THE ABOVE RULES ARE CURRENT AS OF APRIL 1, 2019. PLEASE REFER TO THE APPLICABLE FEDERAL RULES OF CIVIL PROCEDURE FOR UP-TO-DATE INFORMATION.

VERITEXT LEGAL SOLUTIONS

COMPANY CERTIFICATE AND DISCLOSURE STATEMENT

Veritext Legal Solutions represents that the foregoing transcript is a true, correct and complete transcript of the colloquies, questions and answers as submitted by the court reporter. Veritext Legal Solutions further represents that the attached exhibits, if any, are true, correct and complete documents as submitted by the court reporter and/or attorneys in relation to this deposition and that the documents were processed in accordance with our litigation support and production standards.

Veritext Legal Solutions is committed to maintaining the confidentiality of client and witness information, in accordance with the regulations promulgated under the Health Insurance Portability and Accountability Act (HIPAA), as amended with respect to protected health information and the Gramm-Leach-Bliley Act, as amended, with respect to Personally Identifiable Information (PII). Physical transcripts and exhibits are managed under strict facility and personnel access controls. Electronic files of documents are stored in encrypted form and are transmitted in an encrypted

fashion to authenticated parties who are permitted to access the material. Our data is hosted in a Tier 4 SSAE 16 certified facility.

Veritext Legal Solutions complies with all federal and State regulations with respect to the provision of court reporting services, and maintains its neutrality and independence regardless of relationship or the financial outcome of any litigation. Veritext requires adherence to the foregoing professional and ethical standards from all of its subcontractors in their independent contractor agreements.

Inquiries about Veritext Legal Solutions' confidentiality and security policies and practices should be directed to Veritext's Client Services Associates indicated on the cover of this document or at www.veritext.com.