

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Mercedes -- Benz USA, LLC,

Petitioner,

vs.

Case No. IPR2023-01040

U.S. Patent No. 9,555,551

Yechezkal Evan Spero.,

Patent Owner.

The Video Recorded Deposition
of MATTHEW A. TURK, Ph.D.,
Taken at 150 West Second Street, Suite 450,
Royal Oak, Michigan,
Commencing at 10:03 a.m.,
Tuesday, May 21, 2024,
Before Stenographic Shorthand Reporter,
Lori Ann Baldwin, CSR-5207, RPR, CRR.

Veritext Job No: PA 6709600

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TABLE OF CONTENTS

WITNESS	PAGE
MATTHEW A. TURK, Ph.D.	

EXAMINATION BY MR. RAFFETTO:

6

EXHIBITS

EXHIBIT	PAGE
(Exhibits attached to transcript.)	

DEPOSITION EXHIBIT 1	13
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SPERO EX. 2002

Curriculum Vitae - Michael A. Turk,
Ph.D.

DEPOSITION EXHIBIT 2	26
----------------------	----

SPERO EX. 2040

Second Declaration of Matthew A. Turk,
Ph.D. - IPR Case No. 2023-01049

DEPOSITION EXHIBIT 3	26
----------------------	----

SPERO EX. 2040

Second Declaration of Matthew A. Turk,
Ph.D. - IPR Case No. 2023-01040

1	DEPOSITION EXHIBIT 4	76
2	United States Patent US 9,955,551 B2	
3	DEPOSITION EXHIBIT 5	81
4	SPERO Ex. 2006	
5	Pages 39-40 of 189	
6	DEPOSITION EXHIBIT 6	85
7	United States Patent US 2003/0137849 A1	
8	(Alden)	

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1 Royal Oak, Michigan
2 Tuesday, May 21, 2024
3 10:03 a.m.
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5 THE VIDEOGRAPHER: We are on the record at
6 10:03 on May 21st, 2024. This is the video recorded
7 deposition of Dr. Matthew Turk taken by Petitioner in
8 the matter of Mercedes-Benz USA, LLC versus Y. Evan
9 Spero, case number is 2023-01040 and 2023-01039.

10 We are located at 150 West Second Street,
11 Royal Oak, Michigan. My name is Justin Dloski for
12 Veritext. The court reporter is Lori Baldwin for
13 Veritext. Counsel may now introduce themselves for
14 the record, then the reporter will swear the witness.

15 MR. RAFFETTO: On behalf of Petitioner, you
16 have Joe Raffetto from Hogan Lovells. And with me is
17 my colleague Sally Zhang.

18 MS. SHAH: On behalf of Patent Owner
19 Evan Spero, Sangeeta Shah, Brooks Kushman.

20 (Witness sworn.)

21 MATTHEW A. TURK, Ph.D.,
22 Was thereupon called as a witness herein, and after
23 having first been duly sworn to testify to the truth,
24 the whole truth and nothing but the truth, was
25 examined and testified as follows:

EXAMINATION

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BY MR. RAFFETTO:

Q. Good morning, Dr. Turk.

A. Good morning.

Q. Could you please state your full name for the record?

A. My name is Matthew Alan Turk.

Q. And you understand that you are being deposed today in connection with Declarations that you submitted in two IPR proceedings, correct?

A. I do, yes.

Q. And for the record, the IPR proceedings are IPR 2023-01039 and IPR 2023-01040. Correct?

A. That sounds right to me.

Q. And both IPRs are related to US Patent 9,955,551, correct?

A. Yes, I believe so.

Q. And if I refer to this as the "'551 patent," will you understand that?

A. Yes.

Q. Have you been deposed before?

A. Yes, I have.

Q. About how many times?

A. I think around a dozen times.

Q. Okay. And when was the last time you were deposed?

A. March or April of this year.

1 Q. And was it in connection with proceedings in relation
2 to the '551 patent?

3 A. I don't think so.

4 Q. Do you recall what proceeding it was in relation to?

5 A. The one I'm thinking of was related to a case about
6 augmented reality.

7 Q. And you understand that you are under oath today,
8 correct?

9 A. Yes, I do.

10 Q. Is there anything that would prevent you from
11 testifying truthfully and accurately today?

12 A. No.

13 Q. So, it sounds like you've had a number of depositions,
14 but just to refresh on some of the ground rules, if
15 you don't understand a question, please ask me for
16 clarification. Your counsel may object but you still
17 need to answer the question unless specifically
18 instructed not. We should avoid talking over each
19 other, and please don't nod; we need an audible answer
20 so that the court reporter can transcribe.

21 Does that all sound fair?

22 A. It does, yes.

23 Q. And you're aware that Mr. Spero is the inventor of the
24 '551 patent, correct?

25 A. Yes, I am.

1 Q. Did Mr. Spero request that you submit a Declaration in
2 this matter?

3 A. Not to me directly.

4 Q. What do you mean by that?

5 A. I mean, I was asked by the attorneys I've been working
6 with in this case to submit the Declaration on his
7 behalf.

8 Q. And, and it was on Mr. Spero's behalf or Torchlight
9 Technology's behalf?

10 A. I'm not sure exactly. I'm not sure.

11 Q. Okay. Have you ever spoken with Mr. Spero?

12 A. I have not.

13 Q. When were you retained in connection with the IPR
14 proceedings we are here for today?

15 A. I don't remember specifically. It's been a while.

16 Q. About when would you say?

17 A. I don't really remember, so it would be somewhat of a
18 wild guess, but it seems like about two years ago.

19 Q. Okay. And how much are you charging for working on
20 this matter?

21 A. I believe my rate is 490 an hour.

22 Q. Are you retained in any other matter that's related to
23 the '551 patent?

24 A. I have been retained in another matter, yes, related
25 to this patent.

1 Q. And what matter is that?

2 A. It involves Volkswagen.

3 Q. And what did you do to prepare for your deposition
4 today?

5 A. I reviewed my declarations and the materials listed as
6 things I depended in my Declarations and met with my
7 attorney colleagues to discuss things.

8 Q. What materials did you review?

9 A. If you want to show me my Declarations, I can point to
10 you -- point them to you there.

11 Q. Can you recall anything that you reviewed?

12 A. Yes. My, my Declarations, the '551 patent, the, the
13 prior art specifically referenced in my Declarations,
14 the expert on Mercedes' side, his Declarations related
15 to this, and depositions related to this, some other
16 things as well.

17 Q. When you say "depositions related to this," are you
18 referring to the testimony of Mercedes's expert?

19 A. Yes.

20 Q. Do you know Mercedes' expert?

21 A. Not to my knowledge.

22 Q. And you said you also reviewed prior art.

23 What prior art?

24 A. Well, the Alden reference, Kobayashi reference, the
25 Stam reference, the Kondo reference, I believe it is.

1 Maybe some others. Again, I -- if you want to show me
2 my Declarations, I can point them to you specifically.

3 Q. And you said you met with the attorneys as well?

4 A. Yes, I did.

5 Q. And how many times did you meet with them in
6 preparation for your deposition?

7 A. I don't know how exactly to define "meeting in
8 preparation." I've met with them a lot over the
9 period of time I've been involved in this with them,
10 but at least some time, I think yesterday, and some
11 time last week.

12 Q. And was yesterday an in-person meeting here?

13 A. No. Yesterday was remote.

14 Q. Okay. And I take it last week was remote as well?

15 A. Yes, it was.

16 Q. About how long did you meet with counsel yesterday?

17 A. About three or four hours.

18 Q. And what about last week?

19 A. I don't recall precisely, but perhaps two or three
20 hours.

21 Q. And who did you meet with yesterday?

22 A. I met with Ms. Shah here.

23 Q. Anyone else?

24 A. No, I don't think so.

25 Q. And what about last week?

1 A. I believe I met with Ms. Shah and, and Andy whose last
2 name is escaping me at the moment. Andy.

3 Q. Andy. And you mentioned you reviewed a number of
4 different materials.

5 How did you select the materials you
6 reviewed?

7 A. I, I think just, I probably determined what I thought
8 was most relevant and important to go over.

9 Q. Did you review any material that's not discussed in
10 your Declarations?

11 A. Not that I recall.

12 Q. Is there anything in your Declarations that you wish
13 to change?

14 A. There's some minor typos, grammatical things, that I
15 could imagine changing but I don't think they're
16 substantial so, no, nothing that I wish to change at
17 this point.

18 Q. How many hours did you spend preparing your
19 Declarations for these proceedings?

20 A. I don't remember.

21 MS. SHAH: Objection; vague.

22 BY MR. RAFFETTO:

23 Q. You think it would have been one hour? Five hours?

24 MS. SHAH: Same objection.

25 A. I, I don't remember.

1 BY MR. RAFFETTO:

2 Q. Do you remember preparing your Declarations in
3 connection with these proceedings?

4 A. In general, yes.

5 Q. Do you remember when it was?

6 A. It was in the time leading up to the date they were
7 submitted which, if I recall, was in early March.

8 Q. Early March of this year?

9 A. I, I think so, if I recall correctly.

10 Q. And you are not sure how long you worked on your
11 Declarations?

12 A. No, I don't recall that.

13 Q. Who drafted them?

14 A. We, the attorneys that I worked with and I drafted
15 them together.

16 Q. What do you mean by that?

17 A. I mean that we talked about all of the matters, all of
18 the points in my Declarations. At times, attorneys
19 may have provided an initial draft of a sentence or a
20 paragraph or a part of it. At times, I provided some
21 things.

22 In all cases, we went over them and
23 converged on eventual sentences that, that I felt
24 expressed my opinions about the matters. So there
25 was, there was some back and forth. But in the end,

1 the Declarations are my words and my opinions.

2 Q. Did you rely on any materials that aren't cited in
3 your Declarations when you prepared them?

4 MS. SHAH: Objection; vague.

5 A. I don't believe so. Not that I can recall right now.

6 BY MR. RAFFETTO:

7 Q. Was there anything that you requested but didn't
8 receive in connection with preparing your
9 Declarations?

10 A. I don't think so.

11 Q. Do you have any staff that work with you on matters
12 like this?

13 A. In this case, no.

14 MARKED FOR IDENTIFICATION:

15 DEPOSITION EXHIBIT 1

16 SPERO EX. 2002

17 Curriculum Vitae - Michael A. Turk, Ph.D.

18 10:18 a.m.

19 BY MR. RAFFETTO:

20 Q. So I'd like to hand you now what has been marked as
21 Exhibit 1 in these proceedings.

22 Do you recognize this as a copy of your CV
23 that was submitted in IPR 2023-1039?

24 A. It does seem to be a version of my CV, so I presume
25 this was submitted.

1 Q. And you submitted this same CV in both proceedings, is
2 that correct?

3 MS. SHAH: Objection; vague.

4 A. I would, I would expect so, yes.

5 BY MR. RAFFETTO:

6 Q. And the information in your CV accurately reflects
7 your education and work experience, correct?

8 A. I believe it does, yes.

9 Q. Is there anything you'd like to change in this CV?

10 A. No.

11 Q. So your CV currently shows you as president of Toyota
12 Technological Institution in Chicago. You can see
13 this at page 2. Correct?

14 A. That's correct.

15 Q. What's your role as president of this institution?

16 A. Generally, my role is the chief executive officer of
17 the institution as well as being a professor there.

18 Q. And what does the institution do?

19 A. It's a graduate school in computer science.

20 Q. Okay. So it's an educational institution?

21 A. Yes.

22 Q. Do you conduct research as part of your role with this
23 institution?

24 A. Yes, I do.

25 MS. SHAH: I'm sorry, just one quick thing,

1 just so the record is clear, so when you are referring
2 to both proceedings for this particular deposition, it
3 will always be the two matters that you identified in
4 the beginning, right? I just want to make sure that
5 the record is clear as he's asking -- answering the
6 questions, that the, the "proceedings" you are
7 referring to, as you ask your questions, or with
8 respect to the proceedings, the IPR matters associated
9 with the '551 patent.

10 MR. RAFFETTO: Yes. IPR 2023-1039 and
11 1040.

12 MS. SHAH: That's correct.

13 MR. RAFFETTO: Yes.

14 MS. SHAH: So, just so that everybody's
15 clear, you're going to keep referring to the
16 "proceedings," and so the witness is also clear those
17 are the specific Declarations or, or IPR matters that
18 are in question.

19 MR. RAFFETTO: Yes. Yes. That's correct.

20 BY MR. RAFFETTO:

21 Q. I think there was a pending question here.

22 So what research did you conduct at Toyota
23 Technological Institute?

24 A. My research is primarily in computer vision and some
25 areas related to that.

1 Q. What areas related to that?

2 A. Machine learning and pattern recognition, imaging, and
3 sometimes human-computer interaction.

4 Q. Anything else?

5 A. Yes, there are other areas that, that touch on the
6 kind of research I do, but those are the main ones.

7 Q. Do you do any research in vehicle headlights?

8 A. I've been involved in research projects that include
9 vehicle headlights. And I've been involved in
10 research and development planning and decisions and
11 experiments with respect to vehicles and vehicle
12 headlights, but I haven't published anything
13 specifically on vehicle headlights.

14 Q. And when you say you've been "involved," you are
15 referring to during your work at Toyota Technological
16 Institute from 2019 to the present?

17 A. No, what I was referring to there was from earlier in
18 my career.

19 Q. Okay. We'll come back to that.

20 So you are also -- strike that.

21 So during your tenure at Toyota
22 Technological Institute, you haven't done any research
23 in vehicle headlights, correct?

24 A. Not specifically vehicle headlights, no.

25 Q. And you don't teach classes in vehicle headlights at

1 Toyota Technological Institute?

2 A. No, I don't. I teach -- strike that. No, I don't.

3 Q. And you're, currently, you are also a professor at
4 UC Santa Barbara, correct?

5 A. I am an emeritus professor at US Santa Barbara which,
6 which means technically that I'm retired from UC Santa
7 Barbara but I still have interactions there.

8 Q. What types of interactions?

9 A. Since leaving there and moving to TTIC, I have
10 continued to be on Ph.D. student committees,
11 collaborated with some people there in research and
12 have other interactions administratively as well with
13 people in my department, my former department.

14 Q. What areas have you done research in at
15 UC Santa Barbara?

16 A. A lot of areas; mostly relating in some ways to
17 imaging and computer vision but touching on several
18 other areas as well, including some of the things I
19 mentioned earlier; pattern recognition, machine
20 learning, human-computer interaction, but also
21 augmented reality, computational photography, some
22 aspects of neuroscience or computational neuroscience,
23 media arts, and several other things. I was there a
24 long time.

25 Q. Has any of your research at UCSB been directed to

1 vehicle headlights?

2 A. Some to vehicles and a good bit to lighting and
3 imaging environments, though not necessarily vehicle
4 headlights, not necessarily focused on vehicle
5 headlights.

6 Q. And what do you mean by "lighting and imaging
7 environments," what does that refer to?

8 A. Well, lighting, in general, lighting is an important
9 part of computer vision and imaging, understanding the
10 physics of lighting and how imaging systems should be
11 designed with lighting in mind, how, how they should
12 consider lighting in processing images.

13 And some of the work I've done has been
14 very specifically on lighting in imaging environments,
15 so taking pictures or images of objects with cameras
16 in varying light in order to determine things about
17 the scene.

18 Q. And when you say that some of your research at UCSB
19 was directed to vehicles, what aspects of the vehicles
20 did the research involve?

21 A. The work I'm thinking of at the moment was about
22 recognizing vehicles and images.

23 Q. And by that, you mean some type of system that can
24 detect vehicles and images -- strike that.

25 Is the system that you are thinking of, was

1 that something that was in a vehicle or are you just
2 saying that it was some type of system that can detect
3 vehicles?

4 A. Well, for the work at UCSB that I'm referring to, it's
5 system that captures images that may include vehicles
6 and then detects and identifies the vehicles or
7 attempts to.

8 Q. And how is that system used?

9 A. I'm not sure what you mean.

10 Q. In what type of applications?

11 A. It was researched, so it wasn't application-specific.
12 But there are potentially a number of applications for
13 that kind of work.

14 Q. On top of page 3 of your CV, Exhibit 1 to this
15 deposition, it says that you are the co-director of
16 Four Eyes Laboratory.

17 Do you see that?

18 A. Yes.

19 Q. What does Four Eyes Laboratory do?

20 A. The Four Eyes Lab is a lab at UC Santa Barbara,
21 primarily in the computer science department, that
22 does work in imaging interaction and innovative
23 interfaces.

24 Q. And what was your role as the co-director?

25 A. For most of the time I was at UC Santa Barbara, I was

1 one of the two faculty that ran the lab. So it was
2 primarily comprising the two of us and our students
3 and various visitors and a number of research projects
4 going on at any, at any given time.

5 Q. Do you still work at Four Eyes Laboratory?

6 A. I still have an association with the lab but I don't
7 work there. I work at TTIC.

8 Q. Did any of your work at Four Eyes Lab relate to
9 vehicle headlights?

10 A. There was a good amount that related to lighting. I
11 don't recall any being specific to the vehicle
12 headlight aspect of lighting.

13 Q. And your CV, Exhibit 1, also says you co-founded a
14 company called Caugnate, correct?

15 A. That's right.

16 Q. Is this still an operating company?

17 A. Not independently. It was acquired by a company and
18 it now exists inside that larger company.

19 Q. And what did this company do?

20 A. It did augmented reality and particularly augmented
21 reality to connect remote people in some kind of
22 physical environment that one of them would be in, and
23 present that environment in a way that the two people,
24 the local person and the remote person, could
25 collaborate on a physical task together; for example,

1 repairing a machine.

2 Q. And you also previously worked for Microsoft, correct?

3 A. Yes, I did.

4 Q. And how many years did you work at Microsoft?

5 A. About six years.

6 Q. What years?

7 A. I believe it was 1994 to 2000.

8 Q. And what was your title at Microsoft?

9 A. I was a researcher.

10 Q. And did you have the same title the entire time you
11 worked there?

12 A. I think so.

13 Q. And what did you do there?

14 A. I did computer vision -- I did research primarily in
15 computer vision, vision-based human-computer
16 interaction and what we call "perceptual user
17 interfaces."

18 Q. Was any of your work at Microsoft directed to vehicle
19 headlights?

20 A. There were, there were lighting aspects of my work
21 there but I don't believe any of it was specifically
22 vehicle lighting.

23 Q. Now, you, you mentioned earlier that you were involved
24 in research product -- projects that included vehicle
25 headlights.

1 Do you recall that?

2 A. Yes.

3 Q. What research projects?

4 A. Well, one I've mentioned, the recognition of cars
5 using computer vision, and the largest one probably
6 for me was the work I did at Martin Marietta in the
7 mid to late 1980s.

8 Q. And when did you do -- strike that.

9 So how did the research project that
10 involved the recognition of cars involve vehicle
11 headlights?

12 A. Headlights are part of cars, and in capturing images
13 of cars and using that data to recognize, or capturing
14 images in general, using that data to try to
15 recognize, detect and recognize cars, imaging the
16 headlights and processing visual information about the
17 headlights is a fundamental part of that.

18 Q. So the research used vehicle headlights to help
19 determine that the object in question was a vehicle,
20 is that fair?

21 A. Essentially, yes.

22 Q. And how did your work at Martin Marietta involve
23 vehicle headlights?

24 A. Most of my work there was in relation to an autonomous
25 vehicle project. So I was working on computer vision

1 primarily but sometimes other aspects of that
2 autonomous vehicle to try to determine how to do
3 things you need to do to drive autonomously which
4 included things like figuring out where the road is,
5 looking at obstacles, looking at and detecting
6 obstacles, that is, detecting other vehicles that may
7 be in the environment, determining lighting conditions
8 to enable those things to be done well, and things
9 like that.

10 Q. And how did that involve vehicle headlights
11 specifically?

12 A. Well, at least in a couple ways. In considering how
13 to understand the world in front of the autonomous
14 vehicle, we needed to think about times of day when
15 headlights would be useful in that process, how they
16 would be used in that case.

17 And in terms of considering recognizing
18 other vehicles, we'd have to think about how those
19 vehicles might look when their headlights were on or
20 off. So there were various things about headlights
21 that came into discussions and designs, design
22 decisions in that work.

23 Q. So were the headlights used to identify the object
24 that's being detected as a vehicle?

25 MS. SHAH: Objection; vague.

1 A. I'm not sure what you mean by "headlights being used"
2 for that. The detection and, and recognition in that
3 case was done by camera capturing images and sending
4 them to a computer to process, but all of the
5 information in the scene, which could include
6 headlights illuminating the scene, or headlights from
7 other cars, would be relevant to the problems.

8 BY MR. RAFFETTO:

9 Q. Before Microsoft, turning back to your CV, it says you
10 worked at a company called Teleos Research.

11 Do you see that?

12 A. Yes, Teleos.

13 Q. Teleos. And what years did you work there?

14 A. 1993 and 1994.

15 Q. And what was your role there?

16 A. My title was computer scientist and I did research and
17 development in computer vision and vision-based
18 interaction, object recognition, mobile robots, things
19 like that.

20 (Reporter clarification at 10:41 a.m.)

21 BY MR. RAFFETTO:

22 Q. Did you have the same title the entire time you worked
23 there?

24 A. I think so.

25 Q. Was any of your work there directed to vehicle

1 headlights?

2 A. The, the mobile robot project probably had some aspect
3 of headlights. It was a golf cart was our primary
4 vehicle, but I don't recall many details about that at
5 this point, so I don't remember specifically what, how
6 we used headlights in that project.

7 Q. What was the mobile robot project?

8 A. It, it was the, it was making a golf cart style of
9 vehicle autonomous to some degree.

10 Q. And so you consider a, a golf cart to be a vehicle, is
11 that correct?

12 A. Yes, for the purposes of this description of the work.

13 Q. You've never actually designed a vehicle headlight,
14 correct?

15 MS. SHAH: Objection; vague.

16 A. No, I haven't.

17 BY MR. RAFFETTO:

18 Q. You obtained your doctorate from MIT, correct?

19 A. That's right.

20 Q. And what was your dissertation there about?

21 A. It was primarily about facial recognition using
22 computer vision.

23 Q. Where did you get your master's degree?

24 A. At Carnegie Mellon University.

25 Q. And what was the subject of your thesis there?

1 A. It was on fine motion planning for robotics.

2 Q. And where did you go to undergrad?

3 A. Virginia Tech.

4 Q. And what was your major there?

5 A. Electrical engineering.

6 MARKED FOR IDENTIFICATION:

7 DEPOSITION EXHIBIT 2

8 SPERO EX. 2040

9 Second Declaration of Matthew A. Turk,
10 Ph.D. - IPR Case No. 2023-01049

11 10:44 a.m.

12 MARKED FOR IDENTIFICATION:

13 DEPOSITION EXHIBIT 3

14 SPERO EX. 2040

15 Second Declaration of Matthew A. Turk,
16 Ph.D. - IPR Case No. 2023-01040

17 10:44 a.m.

18 BY MR. RAFFETTO:

19 Q. So, Dr. Turk, the court reporter has just handed you
20 what has been marked as Exhibit 2 to your deposition
21 which is your Second Declaration from IPR 2023-1039.

22 Do you see that?

23 A. Yes.

24 Q. And you were also just handed a copy of what's been
25 marked as Exhibit 3 to your deposition which is your

1 Second Declaration from IPR 2023-1040.

2 Do you see that?

3 A. Yes, I do.

4 Q. And do these appear to be complete copies of your
5 Declaration?

6 A. It seems like they are.

7 Q. So, maybe for ease of reference, I'd like to focus on
8 your 1039 Declaration first, so this is Exhibit 2.

9 And could you please turn to page 17 of
10 that? Just let me know when you're there.

11 A. Okay.

12 Q. Okay. And there's a section II here at the bottom
13 titled Relevant Legal Standards.

14 Do you see that?

15 A. Yes, I do.

16 Q. Did you apply the same legal standards across your
17 Declarations in both proceedings?

18 A. I tried to.

19 Q. What do you mean by that?

20 A. I mean that that was my intent; that was my goal.

21 Q. But you're not sure if you did?

22 MS. SHAH: Objection; mischaracterizes the
23 testimony.

24 A. I certainly tried to and intended to and I think that
25 I did.

1 BY MR. RAFFETTO:

2 Q. Is it fair to say that your description of the legal
3 standards in both Declarations is the, is the same?

4 And for the record, I'm not trying to ask a
5 trick question; I just don't want to have to ask the
6 question, all the questions twice.

7 A. I believe they are the same or very similar.

8 Q. Okay. Now, at the beginning of paragraph 24 of your
9 Declaration, this is at page 18, you discuss the legal
10 principles of anticipation, correct?

11 A. Yes.

12 Q. And you state that your understanding of anticipation
13 is that a claimed invention, quote, is "unpatentable
14 is if a prior art reference teaches every element of
15 the claim," correct?

16 A. Yes.

17 Q. And is that the standard you applied in assessing
18 invalidity in these proceedings?

19 (Reporter clarification at 10:48 a.m.)

20 A. It's the standard that I applied to my Declarations.

21 BY MR. RAFFETTO:

22 Q. What do you mean by that?

23 A. It's the standard that I applied in formulating and
24 writing and submitting my Declarations.

25 Q. And in determining whether, in your opinion, the

1 patents -- the patent is invalid?

2 A. Well, I don't recall using the word "invalidity" in
3 the Declarations. But I did apply the standard in my
4 analysis that led to the Declarations.

5 Q. Did you assess whether the claims are unpatentable
6 under 35 USC Section 102?

7 MS. SHAH: Objection; calls for a legal
8 conclusion.

9 (Above objection subsequently struck by
10 Ms. Shah at lines 19 and 20).

11 A. I, I made, I provided opinions here in response to
12 claims that they are unpatentable.

13 BY MR. RAFFETTO:

14 Q. So you don't have an opinion as to whether the claims
15 of the '551 patent are unpatentable under 35 USC
16 Section 102?

17 MS. SHAH: Objection; mischaracterizes the
18 witness' testimony.

19 You can actually strike the last objection,
20 the prior one.

21 A. So you are asking if I have an opinion if the '551
22 claims are unpatentable under Section 102?

23 BY MR. RAFFETTO:

24 Q. Mm-hmm.

25 A. Yes, and I state that opinion in my Declarations.

1 Q. And what's your opinion?

2 A. Let's see how I phrased it.

3 MS. SHAH: Objection; vague, objection;
4 compound, objection; form and foundation.

5 A. I think a reasonable summary of my opinion regarding
6 this is in the conclusion in paragraph 180 that "the
7 prior art references discussed above, taken alone or
8 in any permissible combination, do not disclose or
9 suggest each and every element of the challenged
10 claims."

11 BY MR. RAFFETTO:

12 Q. And in that conclusion, you don't mention Section 102,
13 correct?

14 A. That's correct, I don't mention it there.

15 Q. And you don't mention the word "anticipation,"
16 correct?

17 A. In that conclusion sentence, that's correct, I don't.

18 Q. And you don't offer an opinion as to whether the
19 claims are patentable in that Section 180 -- or
20 paragraph 180, correct?

21 A. I don't opine on that there in that sentence, correct.

22 Q. Do you offer an opinion on that?

23 MS. SHAH: Objection; vague.

24 A. I don't recall offhand if I offer an opinion on that
25 specifically in these Declarations or not. I'd have

1 to look through them to recall.

2 BY MR. RAFFETTO:

3 Q. So is your opinion just then that the prior art
4 doesn't disclose certain limitations of the claims?

5 A. I'm not sure what you mean by "just" in that question
6 but it is my opinion that the prior art doesn't
7 disclose some elements of the claims.

8 Q. Turning back to paragraph 24 when you mentioned the
9 standard that you said you applied in your
10 Declaration, does a reference have to use the same
11 words as a patent's claim to teach the elements of
12 that claim?

13 A. I don't believe it has to use the exact words.

14 Q. So a, a reference that discloses what's claimed in a
15 patent, but in different words, that can anticipate
16 the claimed invention, is that fair?

17 MS. SHAH: Objection; calls for a legal
18 conclusion.

19 A. My understanding is that if the claim is taught, that
20 it's not the exact words that's important but the, the
21 points of the claim.

22 BY MR. RAFFETTO:

23 Q. Are you familiar with the prior art reference Alden?

24 A. Yes, I am.

25 Q. Did you ever try to physically make any of the systems

1 disclosed in Alden?

2 A. I've tried to make things that are similar to some
3 things in Alden but I've not taken Alden and then
4 tried to make something specifically in Alden.

5 Q. So you haven't tried to physically make the systems
6 disclosed in Alden using Alden, is that fair?

7 A. That's fair.

8 Q. And is it fair that you haven't tried to make any
9 software-based representations of the systems
10 disclosed in Alden?

11 MS. SHAH: Objection; vague.

12 A. I would say, again, as with the last question, I've
13 built software that does things similar to some
14 components of Alden. I have not taken Alden and built
15 software systems specifically from that.

16 BY MR. RAFFETTO:

17 Q. So it's fair then that you haven't tried to make any
18 software-based representations of the systems
19 disclosed in Alden using Alden?

20 MS. SHAH: Objection; vague.

21 A. That seems fair.

22 BY MR. RAFFETTO:

23 Q. And your Declarations don't discuss any particular
24 experiments that you attempted with the disclosure of
25 Alden, correct?

1 (Reporter clarification at 10:59 a.m.)

2 BY MR. RAFFETTO:

3 Q. Let me strike that question.

4 Your Declarations don't discuss any
5 particular experiments that you attempted with the
6 systems disclosed in Alden, is that fair?

7 A. That's correct. My Declarations don't describe any
8 experiments of mine.

9 Q. Now, in both of your Declarations, you discuss what
10 qualifications a person of ordinary skill would have,
11 correct?

12 A. Yes, I do.

13 Q. So let's turn to paragraphs 57 to 58 of Exhibit 2,
14 your declaration from the 1039 IPR is represented.

15 Now, here you provide your own definition
16 of POSITA, correct?

17 A. Yes, I do.

18 Q. Have you provided a different definition of a POSITA
19 in any other proceedings related to the '551 patent?

20 A. I don't recall. I'd have to look at those
21 Declarations.

22 Q. So it's possible you could have offered different
23 POSITA definitions in different proceedings?

24 A. I, I just don't know.

25 Q. Wouldn't the POSITA definition be the same across

1 different proceedings involving the '551 patent?

2 MS. SHAH: Objection; calls for a legal
3 conclusion.

4 A. I don't know. I'd have to look.

5 BY MR. RAFFETTO:

6 Q. Why might the POSITA definition in this proceeding be
7 different from the POSITA definition in another
8 proceeding related to the '551 patent?

9 MS. SHAH: Objection; calls for speculation
10 and legal conclusion.

11 A. As I said, I don't know if they are different or not.
12 And off-hand, I don't know why they would or wouldn't
13 be.

14 BY MR. RAFFETTO:

15 Q. Did you come up with your POSITA definition in
16 paragraph 57?

17 A. What do you mean by "come up with"?

18 Q. Determine.

19 A. Yes. After discussion with the attorneys I'm working
20 with, yes.

21 Q. And your definition includes a number of different
22 degree options, correct?

23 A. That's right.

24 Q. And it also includes some work experience, correct?
25 At the bottom of page 75.

1 A. Yes. It, it does and it also adds at the top of
2 page 76 that education is, can be sort of traded off
3 with experience to some degree.

4 Q. And the work experience that you reference at the
5 bottom of page 75 includes intelligent vehicle
6 systems, automotive control systems, and lighting
7 control systems, correct?

8 A. That's correct.

9 Q. And so the experience, in your opinion, for a person
10 of ordinary skill, doesn't have to be specific to
11 automotive, correct?

12 A. Sorry, will you repeat that?

13 Q. And so the experience in your opinion, for a person of
14 ordinary skill, doesn't have to be specific to
15 automotive, correct?

16 MS. SHAH: Objection; vague.

17 A. I'm sorry, one, one more time, please.

18 BY MR. RAFFETTO:

19 Q. Yeah. So it's probably my question.

20 So the last experience that you reference
21 includes lighting control systems, correct?

22 A. Yes, it does.

23 Q. And that's not specific to automotive, correct?

24 A. That's correct. And I would add that intelligent
25 vehicle systems is not specific to lighting either.

1 So there are two things like that there.

2 Q. Okay. And so is the idea that someone working in the
3 field of lighting control systems, say someone working
4 on the control system for lights in a room, they could
5 be a person of ordinary skill if, if they met the
6 educational requirements?

7 MS. SHAH: Objection; calls for
8 speculation.

9 A. Yes, they could.

10 BY MR. RAFFETTO:

11 Q. And so that is the idea that someone could sort of
12 take their learnings from that other field and apply
13 it to the field of automotive headlights?

14 A. I would characterize it a little differently in that
15 lighting is a subject that's not attached to any one
16 particular domain. And there are fundamental
17 principles, physics of lighting and, and other
18 aspects, that, if you know those things, well, you can
19 apply them to a wide variety of domains. So that's
20 how I would sort of characterize that transfer of, of
21 important knowledge from one domain to another.

22 Q. Right. So the idea is that if you've gained knowledge
23 of lighting in the domain of, say, a room environment,
24 you could transfer that knowledge and- apply that
25 knowledge to another domain like automotive

1 headlights?

2 A. Yes, for a specific phrase, "lighting control
3 systems," that's a reasonable summary.

4 Q. Now, in paragraph 59, you repeat Petitioner's proposed
5 definition of a POSITA, correct?

6 A. That's correct.

7 Q. And then in paragraph 60, you state that, "Patent
8 owner does not dispute Petitioner's proposed skill
9 level because you've satisfied it," correct?

10 A. That's my understanding, correct.

11 Q. So is what you are saying, that if you hadn't
12 satisfied Petitioner's definition of the POSITA, then
13 you would have disputed this definition?

14 MS. SHAH: Objection; mischaracterizes the
15 testimony.

16 A. No, that's not what I'm saying.

17 BY MR. RAFFETTO:

18 Q. What are you saying?

19 A. I'm saying what the words say here. I, my
20 understanding is that the patent owner doesn't dispute
21 what's right above this in paragraph 59 because I
22 satisfy it.

23 Q. But it's fair to say that, if you hadn't satisfied it,
24 you would dispute the definition?

25 MS. SHAH: Objection; asked and answered,

1 mischaracterizes testimony.

2 A. No, that's not what I'm saying. This sentence in
3 paragraph 60 is about the patent owner, not about me.

4 BY MR. RAFFETTO:

5 Q. I understand. So, your testimony is that Torchlight
6 would have -- or strike that -- Spero would have
7 disputed Petitioner's proposed skill level if you
8 hadn't satisfied it?

9 MS. SHAH: Objection; calls for
10 speculation.

11 A. I don't know that to be the case.

12 BY MR. RAFFETTO:

13 Q. Okay. How is the POSA definition that you said you
14 came up with in paragraph 57 different from the POSA
15 definition that Petitioner proposed in paragraph 59?

16 A. They're very similar if, if not identical. You have
17 to go through the word-for-word to see if they are
18 exactly identical or not but they are very similar.

19 Q. So, did you determine your POSA definition based on
20 Petitioner's POSA definition?

21 A. I don't recall if I saw that first.

22 Q. Can you turn to paragraphs 104 through 107 of your
23 Declaration, Exhibit 2?

24 A. Yes.

25 Q. And you can see here at paragraph 104, there's a

1 statement that says "to demonstrate anticipation."

2 Do you see that?

3 A. Yes.

4 Q. And previously, we talked about the legal standard for
5 Section 102.

6 Do you recall that?

7 A. Yes.

8 Q. Is your understanding that Section 102 relates to
9 anticipation?

10 A. Yes, that is my understanding.

11 Q. And so here you are discussing a different legal
12 standard for anticipation in paragraph 104?

13 A. Different than what?

14 Q. What you previously discussed in your Declaration?

15 MS. SHAH: Objection; mischaracterizes
16 testimony, vague.

17 A. I'm referring to the same standard here.

18 BY MR. RAFFETTO:

19 Q. Well, paragraph 24 just says that "a claimed invention
20 is unpatentable under Section 102 if a prior art
21 reference teaches every element of the claim,"
22 correct?

23 A. Yes, I believe that's true.

24 Q. But paragraphs 104 to 105 reference additional
25 requirements, isn't that true?

1 A. In neither of these are these intended to be
2 exhaustive descriptions of Section 102. I believe
3 that they are both true, at least to my understanding,
4 about Section 102, but they are, they are different
5 descriptions.

6 Q. Which standard do you apply in your analysis, the one
7 in paragraph 24 or the one in paragraphs 104 to 107?

8 MS. SHAH: Objection; vague, objection;
9 form.

10 A. I tried to apply the standards of Section 102.

11 BY MR. RAFFETTO:

12 Q. As described in which paragraph of your Declaration,
13 24 or 104 to 107?

14 MS. SHAH: Objection; vague, objection;
15 form.

16 A. As I said, paragraphs 24 and paragraph, is it 104?

17 BY MR. RAFFETTO:

18 Q. Yes.

19 A. Both refer to the same standard which is USC
20 Section 102.

21 Q. Now, paragraph 24, though, says that a claimed
22 invention is unpatentable if a prior art teaches every
23 element of the claim, correct?

24 A. Yes.

25 Q. It doesn't say there are other conditions for

1 unpatentability, correct?

2 A. That sentence doesn't state other conditions, that's
3 correct.

4 Q. But if we turn to paragraphs 104 to 105, you are
5 referencing additional conditions, correct?

6 A. I would say that I'm giving a more thorough
7 description of Section 102 here in paragraphs 104
8 and 105 than the one sentence in paragraph 24, at
9 least in my understanding of Section 102.

10 Q. So is a claimed invention unpatentable if a prior art
11 reference teaches every element of the claim?

12 MS. SHAH: Objection; calls for a legal
13 conclusion.

14 A. To the degree that I understand all of the legal
15 implications of Section 102, that I've been told, I
16 believe so. And I think that's what the first
17 sentence of paragraph 24 says.

18 BY MR. RAFFETTO:

19 Q. Does a prior art reference have to have an enabling
20 disclosure to anticipate a patent claim?

21 MS. SHAH: Objection; calls for legal
22 conclusion.

23 A. Well, I believe my paragraph 105 addresses that
24 question saying, "To anticipate is also my
25 understanding that a prior art reference must enable a

1 POSA to make the claimed invention without undue
2 experimentation and that a claimed invention is not
3 anticipated if the allegedly anticipatory prior art
4 disclosures are not enabled."

5 BY MR. RAFFETTO:

6 Q. When does a prior art reference -- strike that.

7 What's the, what's your understanding of
8 the legal standard for when a prior art reference has
9 an enabling disclosure?

10 MS. SHAH: Objection; calls for a legal
11 analysis.

12 A. I don't know if I have a good summary of that legal
13 point on top of my head right here but I do think
14 that, again, the sentence in paragraph 105 at least
15 addresses that by, by saying that it "must enable a
16 POSA to make the claimed invention without undue
17 experimentation."

18 BY MR. RAFFETTO:

19 Q. So, is that your understanding as to the legal
20 standard for when a prior art reference has an
21 enabling disclosure?

22 A. As I said, I'm not sure I have a full legal
23 understanding of that in mind right here and right
24 now, but I think the sentence is at least relevant to
25 the question.

1 Q. And this sentence mentions "undue experimentation,"
2 correct?

3 A. It does, that's right.

4 Q. What is your understanding of "undue experimentation"?

5 MS. SHAH: Objection; calls for a legal
6 analysis.

7 A. I'm not sure that I have a, an exact legal definition
8 in mind right here at this moment, but in general, I
9 believe it means something to the effect of someone
10 having to determine some unknowns through
11 experimentation that is not simple and
12 straightforward, but again, I, I don't know the
13 specific legal definition of the term offhand.

14 BY MR. RAFFETTO:

15 Q. So your understanding of "undue experimentation" is
16 someone having to determine some unknowns through
17 experimentation that is not simple and
18 straightforward?

19 MS. SHAH: Objection; asked and answered.

20 A. I wouldn't say that's my full understanding but I'd
21 say that is, offhand right now, I think, quite
22 relevant to the question.

23 BY MR. RAFFETTO:

24 Q. Is it fair to say that a prior art reference can still
25 meet your enablement requirement even if a person of

1 ordinary skill has to conduct some experimentation?

2 MS. SHAH: Objection; calls for legal
3 analysis.

4 A. I don't know what "some" would mean specifically in
5 that question, so I'm not sure.

6 BY MR. RAFFETTO:

7 Q. Okay. Okay. Just to recap to make sure I understand
8 your opinion, or your understanding is that, for a
9 prior art reference to anticipate a claim, there are
10 two requirements: One is that the prior art needs to
11 teach every claim element; and the other is that the
12 prior art needs to enable its disclosure, is that
13 fair?

14 MS. SHAH: Objection; mischaracterizes the
15 witness' testimony, calls for a legal conclusion.

16 A. I, I don't agree that that's my full understanding or
17 definition of it. I do believe those two things are,
18 are required.

19 BY MR. RAFFETTO:

20 Q. Okay.

21 THE VIDEOGRAPHER: In ten minutes, I have
22 to go off the record to change the media.

23 MS. SHAH: That's fine.

24 MR. RAFFETTO: We should probably -- can we
25 go off the record?

1 We should probably do that now because the
2 next line of questioning is pretty long, so...

3 THE VIDEOGRAPHER: Off the record, 11:24.

4 (Off the record at 11:24 a.m.)

5 (Back on the record at 11:37 a.m.)

6 THE VIDEOGRAPHER: Back on the record,
7 11:37.

8 BY MR. RAFFETTO:

9 Q. So, Dr. Turk, if you could turn to paragraph 114 of
10 your Second Declaration, Exhibit 2.

11 A. Okay.

12 Q. You see in this paragraph the sentence that starts
13 with "I understand"?

14 A. Yes.

15 Q. And you opine in this paragraph that you understand
16 that "Alden fails to enable certain claim limitations
17 because it does not describe them with sufficient
18 precision to establish their existence as prior art."

19 Did I read that correctly?

20 A. Yes.

21 Q. What's your understanding based on?

22 A. My understanding of what?

23 Q. Well, the sentence says, "I understand that Alden also
24 fails to enable," it doesn't say "Alden also fails to
25 enable."

1 So is your understanding based on
2 instruction from counsel?

3 A. So the "I understand" part, the understanding is the
4 general sense that failing to enable the limitation --
5 or sorry -- that not describing with sufficient
6 precision fails to enable, that I'm also stating there
7 that, in my opinion, that is the case here.

8 Q. So your understanding is that for prior art to have an
9 enabling disclosure, it has to describe something with
10 sufficient precision, is that fair?

11 A. That's how I'm describing it here, yes.

12 Q. And what's your understanding of sufficient precision
13 to establish their existence as prior art?

14 MS. SHAH: Objection; calls for legal
15 analysis.

16 A. My general understanding, based on both what I've been
17 told from legal experts and even my own experiences in
18 applying for patents --

19 (Reporter clarification at 11:42 a.m.)

20 A. -- is that for something to be issued as a patent, it
21 has to provide enough detail, sufficient precision,
22 adequate detail regarding what its teaching. And
23 that's basically what I'm referring to here.

24 BY MR. RAFFETTO:

25 Q. Understood. Dr. Turk, what is your understanding of

1 "obviousness"?

2 MS. SHAH: Objection; calls for a legal
3 conclusion.

4 A. Well, I state some of my understanding of
5 "obviousness" in the paragraph 24 that we have
6 discussed where I say, "It is my understanding that a
7 claimed invention is unpatentable under 35 USC 103 if
8 the differences between the invention and the prior
9 art are such that the subject matter, as a whole,
10 would have been obvious at the time that the alleged
11 invention was made to a person having ordinary skill
12 in the art to which the subject matter pertains."

13 BY MR. RAFFETTO:

14 Q. Can you turn to paragraph 7 of your Declaration?

15 A. Yes.

16 Q. And here, you state you've considered the relevant
17 legal standards including the standard for obviousness
18 provided in KSR.

19 Do you see that?

20 A. I do see it, yes.

21 Q. What is the standard for obviousness provided in KSR?

22 MS. SHAH: Objection; calls for legal
23 analysis.

24 A. I don't remember the details of it.

25 BY MR. RAFFETTO:

1 Q. Can you tell me anything about the standard for
2 obviousness provided in KSR?

3 A. I recall that it is considered an important case and I
4 believe it's changed in some ways how people analyzed
5 obviousness. And I have discussed it to some degree
6 with attorneys but I don't remember any details right
7 now beyond that.

8 BY MR. RAFFETTO:

9 Q. Okay. Let's turn to paragraph 38, sticking with
10 Exhibit 2. Do you see this says "intentionally left
11 blank"?

12 A. Yes, I do.

13 Q. And if we flip to paragraphs 64 to 65, those also say
14 "intentionally left blank," correct?

15 A. Yes.

16 Q. Same thing with paragraphs 102 to 103?

17 A. Yes, they do.

18 Q. And then if we flip, as another example, to
19 paragraph 138, you can see all the way up to
20 paragraph 150, each paragraph reads "intentionally
21 left blank."

22 Do you see that?

23 A. Yes, I do.

24 Q. So you have references throughout your Declarations
25 that just say "intentionally left blank," correct?

1 A. Well, I wouldn't call them references but I have
2 paragraphs where it says that.

3 Q. Was it your idea to leave these paragraphs blank?

4 A. I don't recall how they, which, how they ended up like
5 that, which ones and, and whether it was because
6 paragraphs were deleted or merged or, or other things
7 where we wanted to keep the -- not change the
8 numbering at the start of the next section.

9 There are various reasons that tend to lead
10 to these, and I've had these in probably most of the
11 declarations I've done over the years but I really
12 don't recall the details for every one here.

13 Q. Okay. Let's flip back to page 19 of your Declaration.
14 It's Exhibit 2. And there's a section 3 at the top of
15 this page titled State of the Art as of 2002.

16 Do you see that?

17 A. Yes.

18 Q. And there's a similar section in your second
19 Declaration, Exhibit 3, correct?

20 A. I believe so, yes.

21 Q. Why did you include this section in your Declarations?

22 A. I think it's important, when analyzing a patent or --
23 and prior art related to a patent to understand the
24 landscape of technologies relating to that patent
25 around the time frame when it was starting, so this is

1 my attempt to summarize some of those things.

2 Q. And what do you mean by "state of the art"?

3 A. Generally, what the status of the technologies were,
4 including discussions about them, opportunities,
5 problems, a number of things relating to the relevant
6 technologies around that time frame.

7 Q. Now, you don't discuss the '551 patent in this section
8 in your Declarations, correct?

9 A. I think that's correct.

10 Q. And you don't discuss any prior art references in this
11 section, correct?

12 A. Do you mean specifically the prior art that was
13 submitted in the petition for this case?

14 Q. Correct.

15 A. Then I believe that's correct.

16 Q. Did you consider the state of the art as of 2002 in
17 your anticipation analysis in your Declarations?

18 MS. SHAH: Objection; calls for legal
19 analysis.

20 A. The, the state of the art, as summarized here, is, is
21 knowledge that I had in, in doing all of my analysis,
22 so I'm, I'm not sure offhand if it was explicitly used
23 in any special way for the obvious analysis. But I
24 certainly had, had this in mind throughout my
25 considerations in this case.

1 BY MR. RAFFETTO:

2 Q. So -- strike that.

3 Did you consider the state of the art as of
4 2002 in your obviousness analysis and in your
5 Declarations in these proceedings?

6 MS. SHAH: Objection; calls for legal
7 analysis.

8 A. I'd give the same answer as to your last question that
9 it was part of my understanding, part of my knowledge
10 when considering these matters. I don't recall
11 offhand if I specifically applied it in my obvious
12 analysis or not.

13 BY MR. RAFFETTO:

14 Q. So you may have, but you don't recall?

15 MS. SHAH: Objection; mischaracterizes the
16 witness' testimony.

17 A. As I said, I, off the top of my head, I don't recall
18 either way.

19 BY MR. RAFFETTO:

20 Q. Now, you refer to numerous articles in this Section 3,
21 correct?

22 A. Some articles, yes.

23 Q. And what else do you refer to in, in this Section 3,
24 in terms of materials?

25 A. In addition to articles, I refer to a book, Handbook

1 of Optics, and I refer to the Michigan Vehicle Code
2 Act of 1949. I refer to a Texas Instruments document.
3 And then I believe the rest are articles.

4 Q. Are you the author of any of the materials that you
5 discussed in this section?

6 A. No, I'm not.

7 Q. And for the articles, that you discussed in this
8 section, did you speak to any of the authors about
9 their work?

10 MS. SHAH: Objection; form and objection;
11 compound.

12 A. No, I do not recall speaking to any of the authors.

13 BY MR. RAFFETTO:

14 Q. Did you read each of the articles you discussed in
15 this section in its entirety?

16 A. Yes, I did -- let me rephrase this. The book that's
17 referenced here, I have not read the whole book but I
18 read the part relevant to what I, my, my point in
19 citing it.

20 Q. Mm-hmm. Did you find the materials you discussed in
21 this section yourself or did someone give them to you?

22 MS. SHAH: Objection; form, objection;
23 compound.

24 A. If I recall, most of these were presented to me
25 initially. I didn't find them myself. I don't

1 remember exactly for each one.

2 BY MR. RAFFETTO:

3 Q. And can, can you identify for me any of the materials
4 that are discussed in this section that you are aware
5 of prior to this proceeding?

6 A. Offhand, I, I was aware of the Handbook of Optics. I
7 was aware of the, what's footnote 7 on page 36, the
8 Texas Instruments web page.

9 Q. Mm-hmm.

10 A. And I believe I was aware of what is cited as
11 footnote 8 on that page as well. Others, I don't
12 recall specifically.

13 Q. What about the article reference to footnote 1, were
14 you aware of that?

15 A. Was I aware of that prior to what?

16 Q. This proceeding.

17 A. Yes, I was.

18 Q. When did you first learn about that article?

19 A. I would guess about a year ago.

20 Q. And did you learn about it in connection with other
21 proceedings involving the '551 patent?

22 A. With other proceedings generally in this family of
23 patents. I don't recall if it was the '551
24 specifically or not.

25 Q. So, is it fair to say, then, that you weren't aware of

1 this article before you became -- strike that.

2 So is it fair to say you weren't aware of
3 this article before other proceedings in this family
4 of patents?

5 MS. SHAH: Objection; vague.

6 A. I may have been aware of this article when it first
7 came out because I do often see SPIE proceedings, but
8 that was a long time ago, so I don't recall for sure.

9 And I could have come across it at some
10 other time since it's an area relevant to things that
11 I'm interested in technically but I don't recall.

12 BY MR. RAFFETTO:

13 Q. So I believe your testimony earlier was that you were
14 aware of a couple of the documents that are cited in
15 this section but most were provided to you by counsel,
16 is that correct?

17 MS. SHAH: Objection; mischaracterizes the
18 witness' testimony.

19 A. I think I said more than a couple in terms of what I
20 was aware of and I'm not sure that I said "most." But
21 certainly, in the full set of them, some I was aware
22 of, and some, I was not.

23 BY MR. RAFFETTO:

24 Q. Did you do any research to look for other articles
25 beyond the ones that are referenced in this Section 3

1 on the use of LEDs in vehicle headlights in connection
2 with preparing your Declaration?

3 A. I probably did at some points but I don't recall doing
4 it any time very recently.

5 Q. So you believe you looked for other articles on the
6 use of LEDs in vehicle headlights in preparing your
7 Declarations in these proceedings?

8 MS. SHAH: Objection; asked and answered.

9 A. As I said, I don't recall doing that very recently, so
10 I may not have done it in preparing these
11 Declarations. I just don't recall when.

12 BY MR. RAFFETTO:

13 Q. Did you locate any other articles on the use of LEDs
14 and vehicle headlights?

15 MS. SHAH: Objection; vague.

16 A. I'm sure I have seen other articles since there are
17 lots of them around on the topic, but I don't recall
18 any specifically.

19 BY MR. RAFFETTO:

20 Q. If you look at paragraph 26 in Exhibit 2, you state
21 that "Experts in vehicle lighting were uncertain even
22 years later in 2004 and beyond about the use of LED's
23 in vehicle forward lighting," correct?

24 A. Not those exact words, but generally, yes.

25 Q. You don't cite to anything to support the statement,

1 correct?

2 A. Not in this paragraph but in the ensuing paragraphs I
3 do.

4 Q. So you are saying that the ensuing paragraphs all
5 provide support for your opinion in paragraph 26?

6 MS. SHAH: Objection; mischaracterizes the
7 witness' testimony.

8 A. There are a number of things in the ensuing paragraphs
9 that, that do support what is stated here in
10 paragraph 26.

11 BY MR. RAFFETTO:

12 Q. Now you weren't working in the field of vehicle
13 forward lighting in 2004, is that fair?

14 MS. SHAH: Objection; vague.

15 A. I was working in lighting and in computer vision and
16 other areas used in the '551 patent and some of these
17 references at the time, but not, I don't think, LED
18 forward lighting specifically at that time.

19 BY MR. RAFFETTO:

20 Q. And not vehicle forward lighting more generally at
21 that time, correct?

22 MS. SHAH: Objection; asked and answered,
23 vague.

24 A. Correct. I wasn't working specifically in vehicle
25 forward lighting but, again, I was working in a lot of

1 areas relevant to the technical subjects of the patent
2 and the prior art and I was also teaching courses,
3 graduate courses on imaging which focused a lot on
4 lighting so I was doing a lot of work relevant to it.

5 BY MR. RAFFETTO:

6 Q. You haven't written articles on vehicle forward
7 lighting, correct?

8 MS. SHAH: Objection; vague.

9 A. I don't recall if any of the articles that I was an
10 author on about autonomous vehicle work covered
11 aspects of forward lighting. I, I don't think so.
12 I'm not a hundred percent sure.

13 BY MR. RAFFETTO:

14 Q. And you haven't attended conferences on vehicle
15 forward lighting, correct?

16 MS. SHAH: Objection; vague.

17 A. I haven't attended conferences focused on that topic
18 specifically, but I've attended a lot of conferences
19 relevant to the topic.

20 BY MR. RAFFETTO:

21 Q. What's an example?

22 A. Conferences on autonomous vehicles, conferences on
23 computer vision, conferences on computational,
24 computational photography, maybe some others.

25 Q. Staying in paragraph 26, you mentioned that, you

1 referred to "experts in vehicle lighting." See that?

2 A. Yes.

3 Q. What experts are you referring to here?

4 A. In general, I was referring to the community of
5 experts with the specific examples in the ensuing
6 paragraphs for which I provide citations.

7 Q. Okay. So you are saying that the individual in the
8 articles that follow in this section, those are
9 examples of the experts that you were referring to?

10 A. Some of them are, yes.

11 Q. Is Dr. Zhao an expert in the field of vehicle forward
12 lighting?

13 A. Well, I've not looked at Dr. Zhao's background for a
14 while so I don't remember all of the details but I
15 think he is or, or was, yes.

16 Q. And why do you consider him to be an expert in the
17 field of vehicle forward lighting?

18 A. I, I have seen his CV, I believe, and his combination
19 of education and experience seems to indicate that he
20 is an expert.

21 Q. Is Dr. Papanikolopoulos an expert in the field of
22 forward lighting?

23 A. I don't recall specifically what his relevant
24 experience is but I have no reason to believe that
25 he's not an expert.

1 Q. In preparing your Declarations in these proceedings,
2 did you speak with any of the experts in vehicle
3 lighting that you reference in paragraph 26?

4 MS. SHAH: Objection; vague.

5 A. I may have. I'm not sure.

6 BY MR. RAFFETTO:

7 Q. So you are saying that in preparing your Declarations,
8 you may have spoken with other experts in the field of
9 vehicle lighting?

10 A. Yes.

11 MS. SHAH: Objection; vague.

12 A. Yes, because I speak with people in my field of
13 expertise all the time and I may well have spoken with
14 some of those whose expertise overlaps here during
15 this period of time.

16 BY MR. RAFFETTO:

17 Q. And you spoke with them in preparing your
18 Declarations?

19 A. As I said during this period of time while I've been
20 preparing Declarations.

21 Q. Yeah, that wasn't quite my question.

22 So my question was, in preparing your
23 Declarations, did you speak with -- strike that.

24 So, in paragraph 26, you reference experts
25 in vehicle lighting, correct?

1 A. Yes.

2 Q. In preparing your Declarations, did you speak with any
3 of these experts in vehicle lighting?

4 A. Okay. I interpreted that as "while preparing," so I
5 will try to be more specific then.

6 I did not speak with any of those, to my
7 knowledge at least, specifically in the process of
8 preparing my Declarations.

9 Q. Why not?

10 MS. SHAH: Objection; vague.

11 A. I didn't feel it was necessary.

12 BY MR. RAFFETTO:

13 Q. So if we look at paragraph 27, you mention the
14 Federal Motor Vehicle Safety Standards, correct?

15 A. That's right.

16 Q. I think you abbreviate this FMVSS, correct?

17 A. Yes.

18 Q. And what is the FMVSS?

19 A. It's a set of regulations having to do with
20 automobiles in the US.

21 Q. Do you know if these are regulations or legal
22 statutes?

23 MS. SHAH: Objection; calls for legal
24 analysis.

25 A. My understanding is that they are regulations.

1 BY MR. RAFFETTO:

2 Q. Are there different sections to the FMVSS?

3 A. I expect there probably are, but I don't recall many
4 details about the FMVSS offhand.

5 Q. What sections did you review?

6 A. Excuse me?

7 Q. What sections did you review in preparing your
8 Declarations?

9 A. I also don't recall specifically what sections.

10 Q. Were you involved in drafting the FMVSS?

11 A. No, I was not.

12 Q. And you weren't involved in its creation in any way,
13 correct?

14 A. That's correct.

15 Q. When was the first time you reviewed the FMVSS?

16 A. Probably in the last year or so.

17 Q. Okay. And was that in connection with these
18 proceedings?

19 A. It was probably in connection with other proceedings
20 related to this patent.

21 Q. Have you ever referenced the FMVSS in your own
22 research?

23 A. I don't recall but I don't expect so.

24 Q. And why did you include a discussion of the FMVSS in
25 your Declarations?

1 A. Because I have a section on regulation, regulations
2 and standards in the state of the art review, and to
3 my understanding, the FMVSS had been significant
4 regulations in the US.

5 Q. Significant in regulations relating to automotive
6 vehicles?

7 MS. SHAH: Objection; vague.

8 A. Yes, I do believe they cover automotive vehicles.

9 BY MR. RAFFETTO:

10 Q. So is the reason you cite the FMVSS in your, in your
11 Declarations is because you believe the claims in the
12 '551 patent are limited to automotive vehicles?

13 MS. SHAH: Objection; calls for a legal
14 conclusion.

15 A. No, that's not why I brought up the FMVSS here.

16 BY MR. RAFFETTO:

17 Q. Then why is the FMVSS relevant?

18 MS. SHAH: Objection; asked and answered.

19 A. It's relevant because regulations like those that the
20 FMVSS may put out specify requirements that are
21 relevant to automobiles and components of automobiles
22 as, as said here, including maximum, minimum,
23 intensity, color beam, pattern, shape, low headlight
24 beams, high headlight beams, cornering beams, various
25 things that come up in, in this case. So I think it's

1 very relevant.

2 BY MR. RAFFETTO:

3 Q. But in you're opinion the claims of the '551 patent
4 aren't limited to automobiles, correct?

5 MS. SHAH: Objection; mischaracterizes the
6 witness' testimony, calls for a legal conclusion.

7 A. I don't recall opining specifically on the '551 claims
8 in terms of what they, what areas they cover or not in
9 these Declarations. So I don't have an opinion.

10 BY MR. RAFFETTO:

11 Q. So you are not sure if the '551 patent's claims are
12 limited to automotive vehicles or not?

13 MS. SHAH: Objection; asked and answered,
14 calls for a legal conclusion.

15 A. What I'm saying is I, I did not analyze and opine on
16 that question in my Declaration to my recollection.
17 So I have no opinion on it at the moment.

18 BY MR. RAFFETTO:

19 Q. Does the FMVSS impose any requirements on vehicles
20 outside of automobiles?

21 A. I don't know --

22 MS. SHAH: Objection; vague.

23 A. I don't know offhand.

24 BY MR. RAFFETTO:

25 Q. Now, if we stick with paragraph 27, I think at page 20

1 of Exhibit 2, you mention a POSA would not have
2 considered combining features from lamps having
3 different functions.

4 Do you see that? Sort of at the top of the
5 page?

6 A. Yes, I do see that.

7 Q. And then you say "A POSA also wouldn't have expected
8 such combinations to meet regulatory requirements for
9 a different type of lamp beam."

10 Do you see that?

11 A. Yes, I do.

12 Q. What do you mean by "features" in this paragraph 27?

13 A. I, I just generally mean aspects of, of the lamps,
14 components of the lamps.

15 Q. And could that include like control systems for the
16 lamps, things like that?

17 MS. SHAH: Objection; vague.

18 (Reporter clarification at 12:24 p.m.)

19 MS. SHAH: Objection; calls for legal
20 analysis.

21 A. Well, in the sentence here, I'm focusing on
22 functionality, lamps having different functions, and
23 regulatory requirements. So anything that could
24 impact those, I think would include what I mean by
25 "features."

1 BY MR. RAFFETTO:

2 Q. What's the "those" in your answer?

3 A. The two things I mentioned, functionality and
4 regulatory requirements.

5 Q. So is your testimony, then, that a person of ordinary
6 skill wouldn't have combined something from one lamp
7 that could have impacted the functionality of another
8 lamp?

9 MS. SHAH: Objection; mischaracterizes the
10 witness' testimony, calls for legal analysis.

11 I will continue the objection. Objection;
12 form, objection; imprecise hypothetical.

13 A. Can you repeat the question, please?

14 BY MR. RAFFETTO:

15 Q. Yes. So is it your testimony then that a person of
16 ordinary skill wouldn't have opined -- sorry --
17 combined something from one lamp that could have
18 impacted the functionality of another lamp?

19 MS. SHAH: Same objections.

20 A. What I'm stating here specifically is, if those two
21 have different functions, a POSA wouldn't have
22 considered combining them, or a person, a POSA
23 wouldn't have expected such combinations to meet
24 regulatory requirements.

25 BY MR. RAFFETTO:

1 Q. And when you say "combining them," do you mean
2 combining different features from the lamps, is that
3 what you mean?

4 A. Generally, yes.

5 Q. And you interpret "feature" to mean anything that
6 could impact the functionality of a lamp, is that
7 fair?

8 MS. SHAH: Objection; mischaracterizes the
9 witness' testimony, asked and answered, calls for
10 legal analysis.

11 A. I don't know if I said "anything" before and I don't
12 know if I have an exact definition of "features" off
13 the top of my head at the moment, but there are
14 examples here in parentheses, for example, the color
15 of the beams or high beam or low beam. So those are
16 some examples of these functions.

17 BY MR. RAFFETTO:

18 Q. So if we have a low beam light that has the feature of
19 automatically turning off when it's light outside,
20 could that feature be applied to a high beam light?

21 MS. SHAH: Objection; vague, calls for
22 speculation.

23 A. That's something -- that's not something that I've
24 thought about specifically, so I'm not sure.

25 BY MR. RAFFETTO:

1 Q. So you're not sure about if a high beam light could
2 utilize the feature from a low beam light of
3 automatically turning off when it's light outside?

4 MS. SHAH: Objection; asked and answered,
5 objection; vague.

6 A. Again, I just haven't thought about that particular
7 scenario, so I'm not sure I have an opinion.

8 BY MR. RAFFETTO:

9 Q. Do you drive a car?

10 A. I do, yes.

11 Q. And do both your low beams and your high beams stay
12 off when it's light outside?

13 A. Not always. I believe they are on sometimes.

14 Q. Do you have an automatic feature on your headlights in
15 your car?

16 A. I believe so.

17 Q. And if you turn that feature on when it's light out,
18 will your headlights remain off?

19 A. If I turn the automatic feature on and it's light out,
20 will the headlight remain off is your question?
21 Probably.

22 Q. So isn't it fair that there, there can be times when
23 the technologies used in one light could be applied to
24 another type of light?

25 MS. SHAH: Objection; vague.

1 A. Well, just to be clear, were you asking that question
2 regarding the time frame of 2002 or today?

3 BY MR. RAFFETTO:

4 Q. Let's do 2002.

5 A. Okay. So then, I don't know the answer about the
6 automatic lights.

7 Q. Okay. I'm referring to my, my current question.

8 A. Mm-hmm.

9 Q. Isn't it fair that there can be times when the
10 technology used in one type of light is applied to
11 another type of light?

12 MS. SHAH: Objection; vague, calls for
13 speculation.

14 A. I'm not sure that I've analyzed that question in
15 general as asked, so I'm just not sure.

16 BY MR. RAFFETTO:

17 Q. So you are saying there could be times when the
18 technology from one type of light is applied to
19 another type of light?

20 MS. SHAH: Objection; mischaracterizes the
21 witness' testimony.

22 A. I'm saying that I haven't analyzed that before to my
23 recollection, so I just don't know.

24 BY MR. RAFFETTO:

25 Q. Have you ever conducted any experiments to combine

1 features from lights having different functions?

2 MS. SHAH: Objection; vague.

3 A. Not that I recall.

4 BY MR. RAFFETTO:

5 Q. So let's turn to paragraph 29 of Exhibit 2.

6 Are you with me?

7 A. Yes.

8 Q. And in that paragraph, you say, "Regulations and
9 standards require white light for vehicle forward
10 lighting applications."

11 Do you see that?

12 A. Yes.

13 Q. Where is this a requirement? In the US or worldwide?

14 A. I don't re -- I don't recall specifically where
15 that's a requirement.

16 Q. So should this sentence read, "Regulations and
17 standards in some places require white light for
18 vehicle forward lighting applications"?

19 MS. SHAH: Objection; vague.

20 A. I think that would also be an accurate statement.

21 BY MR. RAFFETTO:

22 Q. Now, you cite the Michigan Vehicle Code Act in support
23 of your statement, correct?

24 A. Yes, I do.

25 Q. Do other states have vehicle codes?

1 MS. SHAH: Objection; calls for
2 speculation.

3 A. I expect that they do but I don't recall.

4 BY MR. RAFFETTO:

5 Q. Do you know if those codes require white lighting?

6 MS. SHAH: Objection; asked and answered,
7 calls for speculation.

8 A. As I said, I, I expect other states do, but I'm, I'm
9 not sure. I don't recall.

10 BY MR. RAFFETTO:

11 Q. Why did you cite the Michigan Vehicle Code Act but not
12 the Vehicle Code of other states?

13 A. Probably a couple of reasons. I, I think it was only
14 necessary to cite one to make the point here. And
15 we're in Michigan; I thought that would be somewhat
16 relevant.

17 Q. Who's the "we"?

18 A. The six of us right now.

19 Q. But these proceedings aren't in Michigan, correct?

20 A. That's correct.

21 Q. Where in this section of the Michigan Vehicle Code
22 Act, that you cite in paragraph 29, does it say that
23 there is a requirement that white light is used for
24 vehicle for lighting applications?

25 A. I'm not sure if this quote here states that

1 requirement.

2 Q. Well, doesn't this quote actually say something else?

3 MS. SHAH: Objection; vague.

4 A. This quote has two sentences. It says a few things.

5 BY MR. RAFFETTO:

6 Q. Doesn't the quote say that, "A lamp, if visible from
7 the front, must display or reflect a white or amber
8 light"?

9 A. Well, it does say that in the second sentence.

10 Q. So, in this sentence, it's requiring a white or amber
11 light, not just white light, right?

12 A. Yes.

13 Q. So let's turn to paragraph 30. And there's a section
14 titled Design Tradeoffs. It starts at page 25 and
15 then paragraph 30 starts on page 26.

16 In this section, you discuss what you
17 consider to be constraints or difficulties associated
18 with using LEDs in vehicle headlights around 2004,
19 correct?

20 A. Including around 2004, yes.

21 Q. Do you cite any of your own work in this section?

22 A. No, I cite other experts, other sources.

23 Q. In paragraph 31, you state that, "Years after the
24 patent application filed by Spero, experts in vehicle
25 forward lighting acknowledged that implementing LEDs

1 and headlamps presented great concerns and challenges
2 for the optical engineers," correct?

3 A. That's correct.

4 Q. What patent application are you referring to there?

5 A. In sentence 31?

6 MS. SHAH: Objection; vague; objection;
7 mischaracterizes the testimony.

8 (Reporter clarification at 12:40 p.m.)

9 A. In sentence 31?

10 BY MR. RAFFETTO:

11 Q. Yes.

12 A. I believe I'm referring to the application that led to
13 the '531 -- '551 patent.

14 Q. And then, if we turn to paragraph 33, which is page 29
15 of Exhibit 2, for example, you state, "Even in 2004,
16 it is unclear whether white LEDs would have sufficient
17 light output to generate a light beam meeting
18 applicable regulations and standards similar in
19 intensity to conventional halogen sources."

20 Do you see that?

21 A. Yes.

22 Q. So, is it your opinion, then, that no one would have
23 understood how to use white LEDs for headlights at
24 that time?

25 MS. SHAH: Objection; vague, calls for

1 speculation.

2 A. That's not specifically what I'm saying here.

3 BY MR. RAFFETTO:

4 Q. So then it's fair, then, isn't it, that people
5 understood how to use white LEDs for headlights at
6 that time, correct?

7 THE WITNESS: Okay?

8 MS. SHAH: Apologies.

9 A. I don't believe I state that anywhere here but can you
10 point me to, are you quoting me somewhere?

11 BY MR. RAFFETTO:

12 Q. Well, I asked if, based on what you say in
13 paragraph 33, if it was your opinion that no one would
14 have understood how to use white LEDs in vehicle
15 headlights around 2004?

16 (Reporter clarification at 12:42 p.m.)

17 BY MR. RAFFETTO:

18 Q. And you said that's not what you're saying.

19 And so my question is, well, then, what are
20 you saying?

21 MS. SHAH: Objection; vague, objection;
22 calls for speculation.

23 A. I'm saying what the sentence states here, that it was
24 unclear around that time whether white LEDs would have
25 sufficient light output to generate a light beam

1 meeting applicable regulations and standards.

2 BY MR. RAFFETTO:

3 Q. But your opinion isn't that no one would have
4 understood how to use white LEDs for headlights at
5 that time; you are just saying there was skepticism
6 about it?

7 A. I would say there was more than skepticism. There
8 were a lot of technical questions, and not only
9 technical, but other kinds of questions, questions of
10 costs, all kinds of things at the time.

11 Q. In your view, in 2004, was it possible to use white
12 LEDs for vehicle headlights?

13 MS. SHAH: Objection; vague, objection;
14 calls for speculation.

15 A. I think if, if that means was it possible to take
16 white LEDs and mount them on a car where a headlight
17 would typically be, I suspect someone could do that.

18 BY MR. RAFFETTO:

19 Q. Let's jump to paragraph 36. And right above this,
20 this is a section heading titled Spatial Light
21 Modulator.

22 Do you see that?

23 A. Yes.

24 Q. Why do you discuss a spatial light modulator in your
25 Declarations in these proceedings?

1 A. Spatial light modulators were either used or, or being
2 proposed around the time frame being discussed in this
3 section, so it's part of the consideration,
4 discussions, relevant state of the art at the time.

5 Q. Do any of the prior art references used in this, in
6 these proceedings talk about spatial light modulators?

7 A. Not that I recall.

8 Q. So then why would you include this section in your
9 Declaration?

10 A. I believe I just answered that.

11 Q. All right. You said that spatial light modulators
12 were used or being proposed around the time frame
13 being discussed in this section. So it's part of the
14 state of the art, right? That was your testimony?

15 A. That's right, and the section is State of the Art as
16 of 2002.

17 Q. But your testimony was that none of the prior art
18 discusses spatial light modulators, right?

19 A. I don't recall that any of them do, but again, it was
20 part of the state of the art at the time.

21 Q. But you didn't talk about other things that would have
22 been state of the art like cars on a -- strike that --
23 tires on a car or windshield wipers. So why would you
24 talk about a spatial light modulator?

25 A. Well, tires and windshield wipers, to my knowledge,

1 were not being discussed or used in headlights around
2 this time frame. But spatial light modulators were in
3 that conversation.

4 Q. Let's turn to paragraph 50 now.

5 A. Fifty --

6 Q. Fifty, yes.

7 Now, in both of your Declarations, you have
8 a section titled Overview of the '551 patent, correct?

9 A. I believe so, yes.

10 Q. And in this section of your Declarations, you provide
11 an overview of the '551 patent, is that fair?

12 A. Yes. I would call it a brief overview but yes.

13 MARKED FOR IDENTIFICATION:

14 DEPOSITION EXHIBIT 4

15 United States Patent US 9,955,551 B2

16 12:49 p.m.

17 BY MR. RAFFETTO:

18 Q. Okay. So you are being handed now what has been
19 marked as Exhibit 4 in your depositions. This is a
20 copy of the '551 patent that is the subject of these
21 proceedings, correct?

22 A. That's correct except that, to my recollection, this
23 does not include all of the claims.

24 Q. Are you referring to the reexamination claims?

25 A. Yes.

1 Q. Now, if you look at paragraph 52 back in your
2 Declaration, Exhibit 2, you state that, "The '551
3 patent describes a multitude of sensor-based
4 techniques for observing a scene, analyzing a scene,
5 determining varied illumination for a scene," correct?

6 A. Yes.

7 Q. And you site the disclosure from column 44 at line 36
8 to column 45 of line 44 of the '551 patent exhibit for
9 a support, correct?

10 A. Yes, as an example of that.

11 Q. So let's turn to column 44 starting at line 36 that
12 you cite to. Just let me know when you are there.

13 A. Okay.

14 Q. Now, the disclosure here in the '551 patent is about
15 indoor lighting systems such as those for use in a
16 room, correct?

17 A. Yes, I believe this is in that context here.

18 Q. And there is no specific discussion of vehicle
19 headlight applications in this citation you are
20 looking at, correct?

21 A. I think that's correct.

22 Q. And let's turn to Figure 7 and 8 of the '551 patent.

23 A. Okay.

24 Q. Now, those figures are illustrating a stairwell
25 lighting system, correct?

1 A. Yes, I believe so.

2 Q. And if we look at Figure 9 that's depicting pathway
3 lighting application, correct?

4 A. Yes.

5 Q. And then Figure 11 looks like another embodiment of
6 step lighting or stair lighting, correct?

7 A. Yes, I believe so.

8 Q. And is it fair to say that these disclosures that we
9 are looking at are not directed to vehicle headlights
10 specifically, correct?

11 MS. SHAH: Objection; vague.

12 A. Not specifically. They are directed to situations
13 where they need sensor-based techniques for observing
14 a scene, analyzing a scene, determining varied
15 illumination for a scene, but not specifically to
16 headlight scenarios.

17 BY MR. RAFFETTO:

18 Q. So, is it your opinion that a disclosure about indoor
19 stairwell or path lighting systems can apply to
20 vehicle headlights?

21 MS. SHAH: Objection; calls for a legal
22 analysis.

23 A. I didn't make, I did not make that opinion. What I am
24 stating here in paragraph 52 is describing
25 sensor-based techniques for doing these things and,

1 and this is an example of that.

2 BY MR. RAFFETTO:

3 Q. So can a disclosure about indoor lighting system apply
4 to a vehicle headlight system?

5 MS. SHAH: Objection; vague, objection;
6 calls for speculation, calls for a legal analysis.

7 A. That's not something that I've analyzed specifically
8 so I'm not sure if I have an opinion on that.

9 BY MR. RAFFETTO:

10 Q. And you would agree, though, that room lighting
11 requirements are different than vehicle lighting
12 requirements, is that fair?

13 MS. SHAH: Objection; vague.

14 A. In general, I think that's probably true.

15 BY MR. RAFFETTO:

16 Q. Let's turn to paragraph 78 of your Declaration.

17 A. What page?

18 Q. Page 87.

19 THE VIDEOGRAPHER: About ten minutes and I
20 have to go off again but you have a little bit of
21 time.

22 MR. RAFFETTO: Okay.

23 BY MR. RAFFETTO:

24 Q. Are you with me?

25 A. Yes.

1 Q. So do you recall in your Declarations referencing
2 Gentex Corporation which you can see here, for
3 example, on paragraph 78 of Exhibit 2?

4 A. Yes, I do.

5 Q. At the beginning of this paragraph, you used the word
6 "relatedly."

7 Do you see that?

8 A. Yes.

9 Q. What do you mean by "relatedly" here?

10 A. The word "relatedly" there refers to the previous
11 paragraph where I'm describing my opinion that Alden
12 is generally theoretical, is ambiguous, lacks detail,
13 these various things. And to me, that seems related
14 to this comment in paragraph 78 that automotive
15 industry supplier seemed to think this was perhaps
16 impractical, or at least far away from any practical
17 use.

18 Q. What's Gentex Corporation?

19 A. I believe it's an automotive industry supplier.

20 Q. What do they supply?

21 A. I don't recall offhand.

22 Q. What did they do in 2002?

23 A. I don't know what they did in 2002 offhand.

24 Q. Had you heard about this company before becoming
25 involved in these proceedings?

1 A. I'm not sure but not that I recall. I believe seeing
2 their name in the prosecution history is probably the
3 first I came across it.

4 Q. In the prosecution history of Alden?

5 A. Yes -- oh, sorry. I misspoke. Not the prosecution
6 history -- the -- oh, yeah, it is the pros -- the
7 prosecution history of Alden, yes.

8 Q. And you're not familiar with any Gentex products,
9 correct?

10 A. Not offhand, no.

11 MARKED FOR IDENTIFICATION:

12 DEPOSITION EXHIBIT 5

13 SPERO Ex. 2006

14 Pages 39-40 of 189

15 1:00 p.m.

16 BY MR. RAFFETTO:

17 Q. Dr. Turk, you've been handed what's been marked as
18 Exhibit 5 to your deposition.

19 Do you recognize this exhibit?

20 A. I don't recognize it offhand but I do believe it's the
21 Exhibit 2006 in my list of my exhibits, or at least
22 from that.

23 Q. And if we look at paragraph 78 to your Declaration,
24 Exhibit 2, you cite to Exhibit 2006, page 39, correct?

25 A. Yes.

1 Q. And this is page -- page 1 of Exhibit 5 to your
2 deposition is page 39, Exhibit 2006, correct?

3 A. I believe that's right.

4 Q. So let's look at page 2 which at the top says Gentex
5 Corp, Intellectual Property Evaluation Policy.

6 Do you see that?

7 A. Yes.

8 Q. Have you seen this page before?

9 A. I don't recall for sure.

10 Q. Now, you don't cite to this page in your Declaration,
11 correct?

12 A. The citation here lists page 39.

13 Q. And then if you flip to page 39, you see a letter
14 written to Mr. Alden, correct?

15 (Reporter clarification at 1:02 p.m.)

16 A. Yes. That's correct.

17 BY MR. RAFFETTO:

18 Q. And what is this letter saying to Mr. Alden?

19 MS. SHAH: Objection; vague.

20 A. He's apologizing for the delay in responding to him.
21 It's stating that they've reviewed the information
22 that he sent and is stating a couple of things they
23 determined from that. And they are stating that if he
24 gets a patent and wants to share that afterwards,
25 they'll review it again.

1 BY MR. RAFFETTO:

2 Q. Do you know Mr. Alden?

3 A. I don't believe so.

4 Q. Do you know what invention information is being
5 referred to in this letter?

6 A. I don't remember the details of this document very
7 well right now but I believe it is his segmented
8 headlight system which is the subject of the Alden
9 prior art in this case.

10 Q. So you believe he sent Gentex his segmented headlight
11 system?

12 MS. SHAH: Objection; vague.

13 A. I don't expect he sent them the physical system if
14 there was such a physical system.

15 BY MR. RAFFETTO:

16 Q. So you believe he sent them a description of the
17 system?

18 MS. SHAH: Objection; calls for
19 speculation, asked and answered.

20 A. Again, I don't remember the details of this but, but
21 offhand, just looking at page 40, there's 16 pages of
22 specification, 11 pages of drawing. So I am guessing
23 that is a description of the segmented beam system.

24 BY MR. RAFFETTO:

25 Q. What do you know about Gentex Corporation's IP

1 evaluation process?

2 MS. SHAH: Objection; relevance, and
3 objection; calls for speculation.

4 A. I don't know their specific IP evaluation process.

5 BY MR. RAFFETTO:

6 Q. Who reviewed Mr. Alden's submission?

7 MS. SHAH: Objection; relevance.

8 A. I'm not sure who reviewed it.

9 BY MR. RAFFETTO:

10 Q. And you don't know how they reviewed it either, right?

11 A. No.

12 MS. SHAH: Objection; vague, objection;
13 calls for speculation.

14 A. No, I don't know how they reviewed it.

15 BY MR. RAFFETTO:

16 Q. And you don't know what standard of review they used,
17 correct?

18 MS. SHAH: Objection; calls for
19 speculation.

20 A. No, I don't know Gentex' standards of review.

21 BY MR. RAFFETTO:

22 Q. And you hadn't heard of Gentex Corporation before
23 these proceedings, correct?

24 MS. SHAH: Objection; asked and answered.

25 A. I don't recall hearing about them. It's possible I

1 had.

2 MR. RAFFETTO: We should probably go off
3 the record.

4 THE VIDEOGRAPHER: Off the record, 1:07.
5 (Off the record at 1:07 p.m.)

6 (Back on the record at 1:48 p.m.)

7 THE VIDEOGRAPHER: Back on the record,
8 1:48.

9 MARKED FOR IDENTIFICATION:

10 DEPOSITION EXHIBIT 6

11 United States Patent US 2003/0137849 A1
12 (Alden)

13 1:48 p.m.

14 BY MR. RAFFETTO:

15 Q. So Dr. Turk, I'm handing you now what has been marked
16 as Exhibit 6 to your deposition which is a copy of the
17 Alden reference.

18 Do you recognize this?

19 A. Yes, I do.

20 Q. And let's look at paragraph 6 of Alden and
21 specifically the first sentence there. Here Alden
22 states that, "The present invention is a system for
23 automatically controlling the distribution of the
24 headlight in response to environmental conditions,"
25 correct?

1 A. Yes.

2 Q. So Alden's about vehicle headlight systems, correct?

3 A. Yes, it is.

4 Q. Let's turn to Figure 1 of the Alden reference. So
5 this depicts a vehicle which is labelled 31 employing
6 an automatic segmented illumination means of Alden,
7 correct?

8 A. Yes.

9 Q. Now, the car on the left of this figure appears quite
10 large, taking up most of the road, correct?

11 MS. SHAH: Objection; vague.

12 A. I don't know exactly how to describe the size of the
13 car here. I'm not sure I would say "taking up most of
14 the road." It's a little hard to interpret 3D
15 drawings like this specifically. So I'm not, I'm not
16 sure if I would agree with that.

17 BY MR. RAFFETTO:

18 Q. Well, the car 31, at least in this illustration here,
19 appears larger than the other cars in the
20 illustration, correct?

21 A. Yeah, with the perspective view of 3D to 2D, it is
22 larger in the 2D perspective of the, of the scene.

23 Q. Is it fair to say that this figure is just for
24 illustrative purposes?

25 MS. SHAH: Objection; calls for

1 speculation.

2 A. I don't recall if Alden states that it's just for such
3 purposes but it is illustrating a certain situation
4 that Alden states is relevant to this document.

5 BY MR. RAFFETTO:

6 Q. And it's fair to say this isn't intended to be an
7 engineering diagram, correct?

8 A. I --

9 MS. SHAH: Objection; calls for
10 speculation.

11 A. I have no way to know for sure what was intended here
12 but I wouldn't expect that it was intended to be an
13 engineering diagram.

14 BY MR. RAFFETTO:

15 Q. And, and why wouldn't you expect that?

16 MS. SHAH: Objection; vague.

17 A. Well, according to the specification, it's described
18 as depicting a vehicle employing a system of the
19 present -- present invention. So I think the main
20 focus is to depict the vehicle -- vehicles. It
21 doesn't seem to be intended to depict any particular
22 components or details.

23 BY MR. RAFFETTO:

24 Q. So it's depicting a concept, is that fair?

25 MS. SHAH: Objection; calls for

1 speculation, vague.

2 A. I don't know if I would necessarily call it a
3 "concept," but again, it is a depiction of a scenario
4 which is relevant to the document.

5 BY MR. RAFFETTO:

6 Q. Would you call it an illustration?

7 A. Yeah, I think I'd call it an illustration.

8 Q. Let's turn to paragraph 25 now.

9 So this paragraph is discussing Figure 1 of
10 Alden, correct?

11 A. Yes, that's right.

12 Q. And this paragraph -- in this paragraph 25, Alden
13 discloses that the "vehicle 31 comprises a means to
14 detect the sector in which vehicle 33 or any other
15 vehicle is located." Correct?

16 A. Yes, I see that.

17 Q. And the end of paragraph 25 says, "Specific means for
18 sensing location of vehicles and independent sector
19 illumination control within the light distribution
20 area will be discussed later."

21 Do you see that?

22 A. I see that.

23 Q. So this is mentioning "vehicles" plural, right?

24 A. It uses the word "vehicles" plural. I think it uses
25 it in a general sense of this is about vehicles. It's

1 not saying it can only do, ever do one, for example.
2 I think this is not saying anything about working with
3 multiple vehicles, for example, but it does use the
4 word "vehicles."

5 Q. Let's look at Claim 1 of Alden. It's at page 6.

6 The first element in this claim says, "A
7 means for sensing locations of other vehicles,"
8 plural, correct?

9 A. Yes, it uses the word "vehicles."

10 Q. And it also mentions "A means for diminishing light
11 directed to said other vehicles," plural, right?

12 A. Yes, again, like I said before, I don't think this is
13 to be restricted to only one, to only work on one
14 vehicle ever.

15 Q. Let's move on to Figure 2 of Alden. Figure 2
16 illustrates the elements of the segmented distribution
17 illumination system disclosed in Alden, correct?

18 A. In general, yes.

19 Q. Is Figure 2 drawn to scale?

20 A. Since we -- there is no indication of the plane on
21 which the car in the figure is located. So it may be
22 drawn to scale in terms of the 3D to 2D projection but
23 there's not, not enough information to say for sure.

24 Q. So you, you think that Figure 2 may be drawn to scale?

25 MS. SHAH: Objection; mischaracterizes the

1 witness' testimony.

2 A. Like I said, there's, there's not enough information
3 here to determine for sure.

4 BY MR. RAFFETTO:

5 Q. Have you ever used demonstrative figures that aren't
6 to scale in papers you have published?

7 A. I don't recall offhand if I have or not.

8 Q. You're not sure if you -- strike that.

9 So, any time you've included a page -- a
10 figure in papers that you've published, it's always
11 been to scale, is that what you are saying?

12 MS. SHAH: Objection; mischaracterizes the
13 witness' testimony.

14 A. No, what I said is I'm not sure.

15 BY MR. RAFFETTO:

16 Q. What about during the course of your professional
17 career, say, when you are teaching, have you ever
18 drawn a figure that's not to scale?

19 MS. SHAH: Objection; vague.

20 A. I can't recall a specific incidence in which I did,
21 but I'm not sure.

22 BY MR. RAFFETTO:

23 Q. So you are saying -- how long have you been working in
24 the field of engineering?

25 A. Approximately 40 years.

1 Q. So you are saying over the course of 40 years, you
2 can't remember one instance where you've drawn a
3 figure that's not to scale in your professional
4 career?

5 MS. SHAH: Objection; asked and answered.

6 A. Well, what I'm saying is I've drawn so many figures
7 over a span of 40 years that I don't really remember
8 any specifically that stand out to me at the moment.

9 BY MR. RAFFETTO:

10 Q. But many of them would have not been to scale,
11 correct?

12 MS. SHAH: Objection; mischaracterizes the
13 witness' testimony, asked and answered.

14 A. As I said, I'm not sure.

15 BY MR. RAFFETTO:

16 Q. So, your testimony here today under oath is that you
17 have no idea if you've ever drawn a figure that's not
18 to scale in 40 years of your professional career in
19 engineering?

20 MS. SHAH: Objection -- I'm sorry,
21 objection, argumentative, asked and answered, vague.

22 A. My answer, again, is that I don't recall any specific
23 situations in which I have done that offhand here now.

24 BY MR. RAFFETTO:

25 Q. Do you think it's likely that you have drawn figures

1 that aren't to scale over your 40-year professional
2 career?

3 A. It wouldn't surprise me if I have. And like you
4 mentioned teaching there, for example, if I had in a
5 teaching situation, I probably would have been careful
6 to clarify when things, if things were not to scale
7 and why, but again, I don't recall offhand any
8 examples of doing that.

9 Q. And you said it wouldn't surprise you if, over your 40
10 year engineering career, that you would have drawn
11 figures that are not to scale.

12 Why wouldn't it have surprised you?

13 A. I guess because I've probably drawn or produced a lot
14 of figures over 40 years, and statistically speaking,
15 you would think there would be at least one of just
16 about any possible situation over that time period.

17 Q. And might one reason why you draw a figure that's not
18 to scale be that you want to illustrate a concept or
19 an idea?

20 MS. SHAH: Objection; vague.

21 A. Hypothetically, I could imagine somebody doing that.
22 But again, for me, in teaching or a research kind of
23 environment, it would be important for me, if doing
24 that, to explain it and to state why it's not to scale
25 and what the point of the diagram is if it's not

1 veridical in that sense.

2 (Reporter clarification at 2:04 p.m.)

3 BY MR. RAFFETTO:

4 Q. So when you look at drawings in your professional
5 career, is your immediate assumption that the drawing
6 is to scale unless there is a specific disclaimer that
7 says the drawing is not to scale?

8 MS. SHAH: Objection; calls for
9 speculation, vague.

10 A. I don't think I've ever thought of that before just
11 now but I think, again, especially in a teaching or
12 research kind of scenario, if there is information
13 being imparted by a diagram, I would expect it either
14 to be to scale or to explain why it is not to scale.

15 BY MR. RAFFETTO:

16 Q. Are the images in the '551 patent to scale?

17 MS. SHAH: Objection; vague, compound.

18 A. I don't know.

19 BY MR. RAFFETTO:

20 Q. Is your assumption that they are to scale because
21 there is no disclaimer in the patent?

22 MS. SHAH: Objection; vague, compound.

23 A. I don't have any particular assumption about the scale
24 of the figures in that patent.

25 BY MR. RAFFETTO:

1 Q. So they could be to scale?

2 MS. SHAH: Objection; asked and answered.

3 A. Yeah, I don't have any assumption about them.

4 BY MR. RAFFETTO:

5 Q. And so you don't likewise have any assumption in Alden
6 as to whether the figures are to scale, correct?

7 MS. SHAH: Objection; vague.

8 A. Are you asking about all the figures or Figure 2?

9 BY MR. RAFFETTO:

10 Q. Let's talk about Figure 2.

11 A. My assumption would be that this one is to scale.
12 It's showing a car on the right that's reasonably far
13 away which is why the 2D projection of it is small.

14 And the, the viewpoint is very close to the
15 headlight which is why the headlight in that structure
16 is much larger in the 2D projection.

17 Q. Figure 2 shows the headlight 61, correct?

18 A. Yes.

19 Q. And that's the headlight of Alden system, right?

20 A. Yes.

21 Q. And how big do you think the diameter of that
22 headlight is?

23 MS. SHAH: Objection; calls for
24 speculation.

25 A. I don't know about that one in particular. It seems

1 like headlights tend to be around six inches or so in
2 diameter but I don't really know for sure.

3 BY MR. RAFFETTO:

4 Q. And you see vehicle 41 off to the right, right?

5 A. I do, yes.

6 Q. And that's shown just a few inches away in the figure,
7 is that fair?

8 A. In this figure which looks like a 2D projection of a
9 3D scene, yes, it's about that far away.

10 Q. So if Figure 2 were, were to scale, is it your opinion
11 that, given the size of the headlight, vehicle 41
12 would be an inch or so long?

13 MS. SHAH: Objection; calls for
14 speculation.

15 A. I don't know about an inch or anything, any specific
16 measurements like that for automobile 41 but it
17 probably could be an inch or so if this is to scale.

18 BY MR. RAFFETTO:

19 Q. Doctor, using demonstrative figures is common in
20 patents, right?

21 MS. SHAH: Objection; calls for
22 speculation.

23 A. I don't have a good sense for how common it is but I
24 think it is done.

25 BY MR. RAFFETTO:

1 Q. And you filed -- strike that.

2 Have you been a named inventor on any
3 patents?

4 A. Yes, I have.

5 Q. How many would you say?

6 A. I think it's three. I don't remember for sure.
7 Somewhere around there.

8 Q. And in any of those patents, did you include figures
9 that weren't to scale?

10 A. I don't recall.

11 Q. Would it surprise you if you did?

12 A. It probably would surprise me no matter what I did
13 because I just don't remember.

14 Q. So if Figure 2 is not, of Alden, is not to scale, can
15 you still understand the concept of what is being
16 depicted in that figure?

17 MS. SHAH: Objection; vague.

18 A. This figure is described as illustrating elements.
19 And it, off the top of my head, it doesn't seem to me
20 that -- well, I'd have to think more about what the
21 implications of scale are in this figure. I'd have
22 to -- I've not analyzed that. I'm just not sure.

23 BY MR. RAFFETTO:

24 Q. So now you are saying you are not sure if Figure 2 is
25 to scale?

1 MS. SHAH: Objection; mischaracterizes the
2 witness' testimony, argumentative.

3 A. I don't think I said that.

4 BY MR. RAFFETTO:

5 Q. My question was, if Figure 2 is not to scale, can you
6 still understand the concept of what is being
7 depicted?

8 A. So I answered that, right?

9 Q. You did not.

10 MS. SHAH: Same set of objections; asked
11 and answered, mischaracterizes the witness' testimony.

12 A. I'm sorry, I'm confused. I thought I had answered
13 that. Are you saying that it wasn't a good answer or
14 I just did not answer it?

15 BY MR. RAFFETTO:

16 Q. You didn't answer it.

17 A. Okay. So, sorry. Please repeat the question again.

18 MR. RAFFETTO: Can you read that back,
19 please?

20 THE REPORTER: Mm-hmm.

21 (The record was read at 2:16 p.m.)

22 A. So, so you're saying "my question was" -- so you did
23 ask that question earlier and did I respond to the
24 earlier question?

25 BY MR. RAFFETTO:

1 Q. Are you going to answer the question?

2 MS. SHAH: Objection.

3 A. I'm just trying to understand the situation.

4 MS. SHAH: If you could please let him,
5 he's asking to have the court reporter read back to
6 clarify he actually answered the question, so if you
7 could let him do that.

8 BY MR. RAFFETTO:

9 Q. Do you want her to read back the question again?

10 A. So, in the question that was just read, you said
11 something at the very beginning, like "as I asked" or
12 "as I said," or I forget what it was, but that seemed
13 to be referring to an earlier question, so that's the
14 one I'd like to understand.

15 Q. Okay.

16 A. What was that question and did I respond to it?

17 Q. Okay. So I will remove the past tense and we can just
18 use the present tense.

19 So my question is, if Figure 2 is not to
20 scale, can you still under the concept of what is
21 being depicted?

22 A. Okay. And I believe I --

23 MS. SHAH: Objection; asked and answered.

24 A. And I believe I answered that question.

25 BY MR. RAFFETTO:

1 Q. Well, what was your answer?

2 MS. SHAH: Objection; argumentative, asked
3 and answered.

4 A. Can you please read me back my answer to that
5 question?

6 THE REPORTER: Is that okay?

7 MR. RAFFETTO: I've never heard a witness
8 read back the transcript. Do you want the real time,
9 too? I don't know why you can't answer the question.

10 MS. SHAH: Because you are asking him the
11 same thing over and over again. He has answered. You
12 have the real time feed. You can read his answer.

13 BY MR. RAFFETTO:

14 Q. I will read you your answer.

15 "This figure is described as illustrating
16 elements and it, off the top of my head, it doesn't
17 seem to me that -- well, I have to think about, more
18 about what the immaterial --

19 THE REPORTER: Sorry... "implications."

20 BY MR. RAFFETTO:

21 Q. " -- what the implications of scale are in this
22 figure. I've not analyzed that. I'm just not sure."

23 A. So I would answer the same way, without the mumbling
24 of the first part of that, but yes, I, I have not
25 analyzed this question. I'm not sure what the

1 implications of scale are in Figure 2. I would have
2 to think about that and I've not thought about it. So
3 I'm not sure.

4 Q. So you are not sure if you can understand the concept
5 depicted in Figure 2?

6 MS. SHAH: Objection; mischaracterizes the
7 witness' testimony, asked and answered, argumentative.

8 (Reporter clarification at 2:19 p.m.)

9 A. Again, I've not thought about or analyzed the
10 hypothetical you are asking, so I just don't know.

11 BY MR. RAFFETTO:

12 Q. So paragraph 26 of Alden describes Figure 2, correct?

13 A. Yes, it does.

14 Q. And in paragraph 40 -- 26, Alden explains that 45,
15 which is in Figure 2, is a sensor unit, correct?

16 A. It does call 45 a "sensor unit."

17 Q. And the sensor unit include a primary lens 49,
18 correct?

19 A. Yes. Correct.

20 Q. So you agree that Alden discloses that its headlight
21 system has sensors, correct?

22 A. Alden includes --

23 MS. SHAH: I'm sorry, objection; vague.

24 A. Alden includes a figure with a sensor along with a
25 headlight.

1 BY MR. RAFFETTO:

2 Q. So the system includes sensors, correct?

3 MS. SHAH: Objection; vague.

4 A. Figure 2 does, yes.

5 BY MR. RAFFETTO:

6 Q. And if we stick with paragraph 26, Alden explains that
7 "Vehicle 41," which is in Figure 2, "emits light 43
8 which passes through the primary lens 49 and falls
9 upon one or more sectors within the detector array
10 51," correct?

11 A. Sorry, can you tell me where you are reading? I don't
12 see the "one or more sectors."

13 Q. I think it's towards the beginning where it says, "A
14 light emitting vehicle emits an emitted light 43 which
15 passes through a primary lens therefore converging the
16 43 falling upon one or more sectors within a detector
17 array."

18 Do you see that?

19 A. Yes, I do.

20 Q. So Alden explains that the vehicle 41 emits light 43
21 which passes through the primary lens 49 and falls
22 upon one or more sectors within the detector array 51,
23 correct?

24 A. That's right.

25 Q. And Alden then explains that "The detector array 51

1 converts photons to electrons which are then sent to
2 the light control circuit 55," correct?

3 A. Yes, that's right.

4 Q. And Alden continues to state that "The light control
5 circuit 55 controls which segments of the headlight
6 that are on low and which are on high by controlling
7 the power flow to each respective sector from the
8 power source 57," correct?

9 A. Yes.

10 Q. "As a result, the headlight 61 produces a high beam in
11 the first sector 65 while concurrently producing a low
12 beam in a second respective sector 63 where the
13 vehicle 41 is sensed," correct?

14 A. Pretty much, yeah.

15 Q. All right. Let's look at Figure 3 of Alden now.
16 Figure 3 is an illustration of the information flow
17 processes and architecture of the elements described
18 in Figure 2, correct?

19 A. Sorry, the architecture and what?

20 Q. The information flow processes and architecture of the
21 elements described in Figure 2?

22 A. Generally, yes.

23 Q. And what does Alden mean by "illustrate" there?

24 A. Where --

25 MS. SHAH: Objection; calls for

1 speculation.

2 BY MR. RAFFETTO:

3 Q. Let's look at paragraph 11 and 12.

4 A. That seems to generally mean presents a rendering of
5 or a view of, something like that.

6 Q. Now, if we look at paragraph 27, that paragraph is
7 discussing Figure 3 of Alden, correct?

8 A. Other figures, too, but yes.

9 Q. And Figure 3 shows a left sensor 51a and a right
10 sensor 51b.

11 Do you see that?

12 A. I do, yes.

13 Q. If we look back at paragraph 27, Alden explains that
14 "The left sensor 51a detects the two headlights of the
15 vehicle 41 in Figure 2 at a first illuminated spot 43a
16 and a second eliminated spot 43b respectively,"
17 correct?

18 A. I see where that's written, yes.

19 Q. And Alden also explains that "The spots 43a and 43b
20 represent spots of lights that fall upon a photon
21 detector array," correct?

22 A. Yes.

23 Q. And Alden explains that "Electrons corresponding to
24 the position and intensity of light are categorized by
25 a logic and CPU 71 and stored in a memory 72."

1 Do you see that?

2 A. I do see that.

3 Q. What does the term "categorized" mean here?

4 MS. SHAH: Objection; calls for
5 speculation.

6 A. Well, when I have read this, I felt that Alden is
7 somewhat ambiguous about this because it says, as you
8 read, that the sensors themselves detect the
9 headlights, or the sensor in this case, 51a, and then
10 says electrons coming from the sensor are categorized
11 which doesn't make a lot of sense to me. So I'm not
12 really sure what Alden is trying to say here.

13 BY MR. RAFFETTO:

14 Q. Now, Alden also indicates that, "The right sensor 51b
15 functions the same way as the left sensor 51a,"
16 correct?

17 A. Essentially the same, yes.

18 Q. And if we look back at Figure 3, that shows a left
19 control circuit 55a and a right control circuit 55b.

20 Do you see that?

21 A. Yes.

22 Q. And in paragraph 27, Alden explains that the left
23 control circuit 55a and the right control circuit 55b
24 each is a switch array.

25 Do you agree?

1 A. Where are you reading?

2 Q. I think it's towards the bottom of page 2,
3 paragraph 27 is where it references the switch arrays.

4 MS. SHAH: Objection; vague.

5 A. Yeah, I'm just a little confused now by the question
6 because the "switch array" words here don't have a
7 number associated with them. So maybe I'm just not
8 sure what the question is.

9 BY MR. RAFFETTO:

10 Q. Well, if we look back at Figure 3, and we look at the
11 control circuits 55a and 55b. Do you see those?

12 A. Yes, I do.

13 Q. And there's an area that's shaded. Do you see that?

14 A. Mm-hmm. Yes.

15 Q. What's your understanding of what the shaded areas
16 represent?

17 A. My understanding of what Alden wants those to be are
18 the areas where the area in each headlights wherein
19 the light will be dimmed.

20 Q. And if we look back at paragraph 27, which we were
21 just looking at, towards the bottom on page 2, it says
22 that, "The left shaded circuit area 75 indicates the
23 areas of the switch array switches that will cause
24 portions of the left headlight to be dimmed," correct?

25 A. Yes, it does say that.

1 Q. And the right shaded circuit area 79 likewise
2 indicates the switches that will cause the portions of
3 the right headlight to be dimmed, correct?

4 A. 77, not 79, but otherwise, yes.

5 Q. So I'm referring to the right light control circuit
6 which is where 79 is.

7 A. What were you just reading says 77, the bottom of
8 page 2, the right column. I think that's where you
9 were reading.

10 Q. Yeah, I think, originally, I was asking about the left
11 shaded circuit area 75.

12 A. Well, maybe you just moved ahead and I didn't notice.

13 Q. Yeah, that's okay.

14 A. I understand.

15 Q. Yeah. And you agree that the shaded areas are more
16 than just the dots that represent the headlights of
17 the vehicle?

18 MS. SHAH: Objection; vague, calls for
19 speculation.

20 A. It seems that that's what Alden wants them to be as
21 shown in this figure.

22 BY MR. RAFFETTO:

23 Q. And this, and the switches that we're looking at here,
24 this is a two-dimensional array depicted in Figure 3,
25 right?

1 A. In, in this figure, yes.

2 Q. Now, in paragraph 77 of your Declarations, maybe we
3 could look at Exhibit 2, and this is the 1039
4 Declaration?

5 A. Paragraph 77?

6 Q. Yes, sir. At page 87.

7 A. Mm-hmm.

8 Q. Last sentence in paragraph 77, you state that, "Alden
9 specifically states that the switch arrays of the
10 light control circuits 55a, 55b shown in Figure 3 are
11 merely for illustrative purposes," correct?

12 A. I see that, yes.

13 Q. Now, if we look back at Alden, in paragraph 27,
14 there's a statement there that says, "The shaded areas
15 of 55a and 55b are for illustrative purposes," on page
16 3 of Alden sort of towards the bottom of paragraph 27
17 in a parenthetical.

18 A. Yes.

19 Q. And so my question is, in your Declaration, when you
20 say that, "Alden specifically states that the switch
21 arrays are for illustrative purposes," are you
22 referring to that parenthetical that indicates that
23 the shaded areas of 55a and 55b are for illustrative
24 purposes?

25 A. I'm referring both to that specific statement -- let's

1 see -- sorry, scratch that.

2 Yes. I am referring to that statement.

3 Q. Now, let's look back at Figure 3. Figure 3 depicts a
4 non-shaded area 77 in the left control circuit 55a,
5 right?

6 A. Yes.

7 Q. And it also depicts a non-shaded area 81 in the right
8 control circuit 55b, correct?

9 A. Is it 81 or 79? I can't tell. I think it's 79.

10 Q. Okay. But we can agree that there's a non-shaded area
11 in that right control circuit regardless of the
12 reference numeral?

13 A. In that figure, yes.

14 Q. And what's, what's your understanding of what these
15 non-shaded areas represent?

16 A. I think Alden wants them to represent the bright
17 headlights, head beams, bright beams.

18 Q. Now if we look towards the end of paragraph 27, Alden
19 discloses that, "The control circuit 55a controls the
20 power flow from 73 to a less segmented headlight 83
21 which distributes high beams throughout its
22 distribution areas except in a box in the direction of
23 the vehicle 41," correct?

24 A. Yes, I see that.

25 Q. And Alden further discloses that, "The control circuit

1 55b controls the power flow from 73 to a right
2 segmented headlight 85 which distributes high beams
3 throughout its distribution areas except in a box in
4 the direction of the vehicle 41," correct?

5 A. That's how he's describing that figure, yes.

6 Q. And so, "as a result, the driver of vehicle 41 has
7 minimum glare while the driver of vehicle 47 has
8 maximum light," correct?

9 MS. SHAH: Objection; vague, calls for
10 speculation.

11 A. That's what that sentence says, yes.

12 BY MR. RAFFETTO:

13 Q. So let's move on to Figure 4 of Alden.

14 Figure 4 shows a flow chart describing the
15 logic of the control process described in Figure 3,
16 correct?

17 A. I believe that's the intent, yes.

18 Q. And you agree that paragraph 28 of Alden discusses
19 Figure 4, correct?

20 A. Yes.

21 Q. Now, in paragraph 28, Alden discloses that "The CPU
22 checks the status of each respective sector of the
23 light sensors," correct?

24 A. That's what it says there, yes.

25 Q. So let's look at Figure 4.

1 Do you see 89 which says, "Is Threshold
2 Light Present At A1L Sensor Position?"

3 A. Yes.

4 Q. And so Alden there is talking about evaluating
5 threshold light at a sensor position, correct?

6 A. That seems to be right.

7 Q. And then 90 -- still in Figure 4, referenced numerals
8 91, 93, 95. They also talk about checking threshold
9 light at other sensor positions, right?

10 A. They do.

11 Q. And Alden further discloses that a left map and a
12 right map will be compiled, correct?

13 A. Like all of these steps we've been discussing except
14 the first, they might happen. They won't necessarily
15 happen because there are two directions coming out of
16 each of those boxes but those might happen.

17 Q. Well, if we look at Figure 4, it says in step 97
18 "Compile Left Sensor Map," correct?

19 A. Right, but a flow chart may never get there, so that's
20 why I mean that it might happen, but not always.

21 Q. Do you mean because threshold life isn't present or
22 something else?

23 MS. SHAH: Objection; vague.

24 A. Well, Alden is not specific about this, doesn't
25 provide details that I actually think are necessary to

1 understand this figure thoroughly, but it seems to be
2 that the arrows going down are answering the question
3 in the positive.

4 And the arrows going to the right are
5 answering the question to the negative which would be
6 the typical thing for this kind of a flow chart.

7 And so at each decision point, there is a
8 possibility of either going down or to the right. And
9 if you go to the right, you, you never compile the
10 left sensor map or the right sensor map.

11 So the way the logic works here is, if any
12 sensor position does not have a threshold light
13 present, the left and right sensor maps are not
14 compiled.

15 Q. And you are making that determination based on
16 Figure 4?

17 A. That is my understanding of Figure 4, yes.

18 Q. Now, if we look back at paragraph 28, though, sort of
19 in the middle, it specifically says, "A left map of
20 sense light is stored in 97 -- stored 97 in memory and
21 a right map of sense light is stored in memory 99,"
22 correct?

23 A. Yeah, it does say that but the actual flow charts
24 indicates that sometimes that may happen, but not all
25 the time.

1 Q. Do you agree that the left map would, if it's
2 compiled, would reflect the amount of light received
3 at each sensor position in the left headlight?

4 MS. SHAH: Objection; vague, calls for
5 speculation.

6 A. Will you repeat that, please?

7 BY MR. RAFFETTO:

8 Q. So the question was, you agree that the left map, if
9 it's compiled, reflects the amount of light received
10 at each sensor position in the left headlight?

11 MS. SHAH: Objection; same set of
12 objections.

13 A. So described as maps of sensed light, I don't believe
14 Alden describes that any further, at least I don't
15 recall that. So that I would say they are intended to
16 be maps of sensed light.

17 BY MR. RAFFETTO:

18 Q. Right. And there's one in the left headlight and one
19 in the right headlight, correct?

20 A. That's correct.

21 Q. Now, the amount of light received at each sensor
22 position, it could come from any source, correct?

23 MS. SHAH: Objection; vague.

24 A. I wouldn't say it could come from any source.
25 Physically, any sources would be impossible, to reach

1 that.

2 BY MR. RAFFETTO:

3 Q. Well, it could come from different types of sources,
4 is that fair?

5 A. Yes.

6 Q. It doesn't just have to come from vehicle headlights,
7 correct?

8 A. That's correct.

9 Q. So, one example of another source could be two people
10 walking down a road with flashlights facing the
11 sensors, correct?

12 MS. SHAH: Objection; calls for
13 speculation, vague.

14 A. I believe that's correct.

15 BY MR. RAFFETTO:

16 Q. Now, if the light coming from those flashlights is
17 below the threshold in Alden, Alden wouldn't consider
18 those two people with flashlights another vehicle,
19 correct?

20 A. I believe that's correct.

21 Q. And so it wouldn't dim the light in the area of those
22 two people, correct?

23 A. That's correct. And similarly, if they were above the
24 threshold, it, it would do that.

25 Q. Now, going back to paragraph 28, Alden further

1 discloses that "The CPU compares the right map to the
2 left map to determine the distance and intensity of
3 each object sensed in a calculating process," correct?

4 A. I apologize. May I ask you a favor?

5 When you are telling me a paragraph and
6 just start reading, it takes me a while to find it --

7 Q. Yeah, sure.

8 A. -- and these are long paragraphs, so if you can help
9 me out, I'd appreciate it. But anyway, I found that.

10 Q. You found that.

11 A. Yes.

12 Q. I'll give you some more direction, yeah.

13 A. Thank you.

14 Q. So I'll repeat the question. So towards the, about
15 halfway through the paragraph 28, "Alden further
16 discloses that the CPU compares the right map to the
17 left map to determine the distance and intensity of
18 each object sensed in a calculating process," correct?

19 A. I do see that. And when I have read that before, I've
20 noted there is no, no further information about how
21 that comparison could work, but yes, I do see that
22 sentence.

23 Q. And Alden goes on to say, sticking in the same area,
24 that "A triangulation process 105 is used to determine
25 the distance of each object," correct?

1 A. I see that, yes.

2 Q. And is it fair to say that the term "each object" here
3 indicates there could be multiple objects?

4 A. Not at one time but, at different times, there could
5 be different objects.

6 Q. But if we look at the next sentence, it says, "The
7 location of objects is used to calculate which zones
8 of each headlight need to be dimmed."

9 Do you see that?

10 A. I do see that.

11 Q. So, isn't it fair to say that Alden here is saying
12 that the location of the objects can be used to
13 calculate the specific zones that need to be dimmed,
14 plural "objects"?

15 A. It does say plural "objects." And again, it means one
16 object at one point in time and later, perhaps, a
17 different object. There is no teaching here of
18 multiple objects at the same time.

19 Q. So you read that sentence in paragraph 28, two-thirds
20 of the way through that I just read, you read that to
21 mean one object at a time, correct?

22 A. Yes, I think that's what's indicated.

23 Q. And so what you are saying is that, if there is two
24 objects in the field of view of Alden, Alden can only
25 dim the light to one of those detected objects?

1 MS. SHAH: Objection; mischaracterizes the
2 witness' testimony.

3 A. Well, what I expect from the, whatever information
4 Alden does present about this process is that it
5 wouldn't know what to do in such a case or, or maybe
6 it would just take the first two dots or something.
7 It gives no information about that scenario.

8 BY MR. RAFFETTO:

9 Q. Now, that sentence, though, that we are looking at in
10 paragraph 28, that doesn't read "the location of
11 objects is used to calculate which zone of each
12 headlight to dim," correct?

13 MS. SHAH: Objection; vague.

14 A. Correct. I think object A, at some point in time, is
15 going to have a zone associated with it if this works.
16 Object B, at another point in time, would have another
17 zone associated with it, if this works. So that's
18 talking about zones.

19 BY MR. RAFFETTO:

20 Q. But that sentence that we are looking at says nothing
21 about dimming the light to an object one at a time,
22 correct?

23 A. Remind me which sentence we're talking about.

24 Q. We're talking about the sentence that says, "The
25 location of objects is used to calculate which zones

1 of each headlight needed to be dimmed:

2 A. Right. It doesn't use the phrase "one at a time" but
3 it's describing the process that Alden describes here
4 which only does one at a time.

5 Q. Now, if we look though at the next sentence, it says,
6 "Signals are sent to each of the headlight control
7 circuit zones," plural, "that need to be dimmed,"
8 correct?

9 A. It does read that way, yes.

10 Q. So, again, this doesn't say anything about dimming
11 just one zone, correct?

12 A. It doesn't use the phrase "one zone," but again, this
13 language is describing the process in Alden which is
14 only one at a time. There is no teaching any
15 information about doing otherwise.

16 As an analogy, I could say I shook hands
17 with all the people in this room and that would not
18 imply that I shook all of them simultaneously. I
19 don't know if that's a good analogy or not but just to
20 try to help.

21 Q. But with that analogy, that doesn't mean it could
22 exclude the other way either, right?

23 MS. SHAH: Objection; vague, calls for
24 speculation.

25 A. Well, it's just an analogy, but if I had not otherwise

1 described that I had multiple arms or something like
2 that, I think it would be clear that it was not
3 simultaneous.

4 BY MR. RAFFETTO:

5 Q. So -- okay. If we go back to paragraph 28 of Alden,
6 Alden discloses that, "In each calculating process,
7 based on the location of the sensed objects, signals
8 are sent to each of the headlight control circuit
9 zones that need to be dimmed to dim those portions of
10 the headlight," correct?

11 A. Sorry, I couldn't find you.

12 Q. Yeah. We -- this is what we just talked about
13 already.

14 A. Where are you?

15 Q. Towards the bottom, about two-thirds of the way
16 through.

17 A. Okay. Sorry, there's not a question, is there?

18 Q. Yeah, I will repeat it because we had that exchange.

19 So the question was, and we talked about
20 this a little bit earlier, and I'm just reiterating,
21 with the calculating process, each time, based on the
22 location of the sensed objects, signals are sent to
23 each of the headlight control circuit zones that need
24 to be dimmed to dim those portions of the headlights,
25 correct?

1 A. Right.

2 Q. And then the last sentence in paragraph 28 says, "The
3 process begins again so as to be responsive to
4 changing environmental conditions in real time,"
5 correct?

6 A. Yes.

7 Q. And so you agree that the process in Figure 4 is a
8 real time process, correct?

9 MS. SHAH: Objection; vague, calls for
10 speculation.

11 A. I, I agree that Alden wants it to be.

12 BY MR. RAFFETTO:

13 Q. When you say "Alden wants it to be," do you mean
14 that's what Alden is disclosing on the page here?

15 MS. SHAH: Objection; vague.

16 A. What I mean is he's describing it to be responsive in
17 real time. Whether it would actually do that is a
18 different question because there aren't many details
19 about how this works.

20 And as I've described before, some of the
21 details seemed to be what I would call not functional.
22 So I do believe that's what he wants. I'm not sure
23 that's what the system would actually do.

24 BY MR. RAFFETTO:

25 Q. What do you consider to be "changing environmental

1 conditions in real time"?

2 MS. SHAH: Objection; calls for
3 speculation, vague.

4 A. I don't know specifically what Alden means by that
5 here.

6 BY MR. RAFFETTO:

7 Q. Could a changing environmental condition include an
8 oncoming vehicle as it continues to move closer to a
9 vehicle equipped with Alden's system?

10 MS. SHAH: Objection; calls for
11 speculation.

12 A. Again, I, I don't really know what Alden means by that
13 here. I don't believe that is defined elsewhere, but
14 if it is, please point me there.

15 BY MR. RAFFETTO:

16 Q. All right. Let's look at Figure 5 of Alden. Are you
17 with me?

18 A. Yes.

19 Q. Now, Figure 5 shows an array of individual lighting
20 elements, correct?

21 A. Yes, it does.

22 Q. And paragraph 29 of Alden discusses Figure 5, correct?

23 A. Yes.

24 Q. And if we look towards the beginning of paragraph 29,
25 we see that Alden indicates that "the lighting

1 elements can be LEDs," right?

2 A. Yes.

3 Q. And at the top of the second column, Alden also
4 discloses that "each lighting element is independently
5 controlled by a corresponding switch in an array of
6 switches," correct?

7 A. That's right.

8 Q. So, Alden is saying here that there is one switch for
9 each LED, correct?

10 A. I believe so, yes.

11 Q. So if there were nine LEDs, you would have nine
12 switches, right?

13 A. I believe so.

14 Q. And if there were 27 LEDs, there would be 27 switches,
15 right?

16 MS. SHAH: Objection; calls for
17 speculation.

18 A. There should be, yes.

19 BY MR. RAFFETTO:

20 Q. Now, if we continue on in paragraph 29, the next
21 sentence, Alden further discloses that "each switch is
22 controlled by the CPU and logic previously described,"
23 correct?

24 A. I see that, yes.

25 Q. And the CPU and logic was previously described in

1 paragraph 28 in relation to Figure 4, right?

2 MS. SHAH: Objection; calls for
3 speculation.

4 A. Can you repeat that specific question, please?

5 BY MR. RAFFETTO:

6 Q. And the CPU and logic was previously described in
7 relation to Figure 4 in paragraph 28, correct?

8 A. Figure 4 in paragraph 28 describes a CPU and logic.
9 It's unclear to me if Alden intends these to be the
10 same in, in the paragraph we're looking at now because
11 I don't think they would work if they were the same.

12 Q. So you would agree that in paragraph 29, it's
13 referencing CPU and logic previously described,
14 correct?

15 A. Yes, it does say that.

16 Q. And it's true, isn't it, that the only CPU and logic
17 previously described is in paragraph 28 and 27,
18 correct?

19 MS. SHAH: Objection; calls for
20 speculation.

21 A. I believe that's the only previously described CPU and
22 logic.

23 BY MR. RAFFETTO:

24 Q. And if we look at paragraph 29 still, it goes on to
25 say, a couple sentences on, that the "power to 119 is

1 controlled by the CPU which dictates its respective
2 switch characteristics at 115 such that the power from
3 a power supply 113 carried via segment wire 117 is
4 controlled in response to the sensed environmental
5 conditions," correct?

6 A. I do see that, yes.

7 Q. Let's turn to paragraph 59 of Alden. If you look at
8 that paragraph, there's a heading there that says
9 Conclusion, Ramifications and Scope.

10 Do you see that?

11 A. Yes.

12 Q. So is it fair to say that Alden here is providing a
13 conclusion or a sum-up of what he believes his
14 intention is?

15 MS. SHAH: Objection; calls for
16 speculation.

17 A. I really don't know what was in his mind but the words
18 you read are the title there, or it seems like maybe
19 they are a title.

20 BY MR. RAFFETTO:

21 Q. And if we look at the last sentence of that paragraph,
22 Alden states that, "The independently controlled
23 lights" -- oh, I'm sorry, strike that.

24 If you turn to paragraph 61 and we look at
25 the last sentence of that paragraph, Alden states

1 that, "The independently controlled lights in a system
2 can be operable within a range of intensities between
3 high beam and low beam state."

4 Do you see that?

5 A. I do see those words, yes.

6 Q. So, is it fair to say that what Alden was teaching
7 here is that his system can be operable within a range
8 of intensities and not just high beam and low beam?

9 MS. SHAH: Objection; calls for legal
10 analysis, speculation, vague.

11 A. My understanding of this is that Alden perhaps hopes
12 that that would be the case, but there's absolutely no
13 details in this document about how that could work.
14 And I think there are a lot of questions about whether
15 it would work and how it could work, but it does seem
16 to be his hope.

17 BY MR. RAFFETTO:

18 Q. If we look at paragraph 36 of Alden, he talks about
19 Figure 11, right?

20 A. Yes.

21 Q. And there, he says that "Figure 11 illustrates the art
22 of the present invention being used to concentrate
23 light to look around corners in response to road
24 conditions," right?

25 A. That's what it says, yes.

1 Q. And this paragraph doesn't mention any specific
2 embodiment in Alden, correct?

3 A. That's correct. It mentions neither an embodiment or
4 how this would actually work.

5 Q. Okay.

6 MR. RAFFETTO: Let's go off the record.

7 THE VIDEOGRAPHER: Off the record, 3:11.

8 (Off the record at 3:11 p.m.)

9 (Back on the record at 3:17 p.m.)

10 THE VIDEOGRAPHER: Back on the record,
11 3:17.

12 BY MR. RAFFETTO:

13 Q. Dr. Turk, do you agree that an array can be
14 two-dimensional?

15 MS. SHAH: Objection; vague, calls for
16 speculation, incomplete hypothetical.

17 A. Generally, it can be and it can also be
18 one-dimensional.

19 BY MR. RAFFETTO:

20 Q. But it can be two-dimensional?

21 MS. SHAH: Objection; asked and answered
22 objection.

23 A. It can be; it can also be one-dimensional.

24 MR. RAFFETTO: I don't have any further
25 questions.

1 MS. SHAH: I don't have any redirect.

2 MR. RAFFETTO: Okay.

3 THE VIDEOGRAPHER: Okay. This completes
4 the deposition of Dr. Matthew Turk.

5 Off the record, 3:18.

6 (The Video Recorded deposition was
7 concluded at 3:18 p.m. Signature of the witness
8 was not requested by counsel for the respective
9 parties hereto.)

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CERTIFICATE

STATE OF MICHIGAN

COUNTY OF OAKLAND

LORI ANN BALDWIN, a Notary Public in and
for the above county and state, do hereby certify that
this deposition was taken before me at the time and
place hereinbefore set forth; that the witness was by
me first duly sworn to testify to the truth; that this
is a true, full and correct transcript of my
stenographic notes so taken to the best of my skill
and ability; and that I am not related, nor of counsel
to either party, nor interested in the event of this
cause.

Lori Baldwin

Lori Ann Baldwin, CSR-5207, RPR, CRR

Notary Public

Oakland County, Michigan

My commission expires: December 21, 2025

1	114 45:9	2	2019 16:16
1 3:14 13:15,21 19:14 20:13 53:13 82:1 86:4 88:9 89:5 102 29:6,16,22 30:12 39:5,8 39:20 40:2,4 40:10,20 41:7 41:9,15 48:16 103 47:7 48:16 1039 27:8 33:14 107:3 104 38:22,25 39:12,24 40:7 40:13,16 41:4 41:7 1040 15:11 105 39:24 41:4 41:8,23 42:14 114:24 107 38:22 40:7 40:13 10:03 1:19 5:3 5:6 10:18 13:18 10:41 24:20 10:44 26:11,17 10:48 28:19 10:59 33:1 11 78:5 83:22 103:3 124:19 124:21 113 123:3	115 123:2 117 123:3 119 122:25 11:24 45:3,4 11:37 45:5,7 11:42 46:19 12 103:3 12:24 64:18 12:40 72:8 12:42 73:16 12:49 76:16 13 3:14 138 48:19 13th 2:5 150 1:17 2:19 5:10 48:20 16 83:21 17 27:9 18 28:9 180 30:6,19,20 189 4:5 81:14 19 29:10 49:13 1949 52:2 1980s 22:7 1993 24:14 1994 21:7 24:14 1:00 81:15 1:02 82:15 1:07 85:4,5 1:48 85:6,8,13	2 3:18 14:13 26:7,20 27:8 33:13 38:23 45:10 48:10 49:14 55:20 64:1 69:5 72:15 77:2 80:3 81:24 82:4 89:15,15 89:19,24 94:8 94:10,17 95:10 96:14,24 97:5 98:19 100:1,5 100:12,15 101:4,7 102:18 102:21 103:15 105:2,21 106:8 107:3 20 29:10 63:25 2000 21:7 20004 2:6 2002 3:15 13:16 49:15 50:16 51:4 68:2,4 75:16 80:22,23 2003/0137849 4:7 85:11 2004 55:22 56:13 71:18,20 72:15 73:15 74:11 2006 4:4 81:13 81:21,24 82:2	202.637.5600 2:7 2023-01039 5:9 6:12 2023-01040 3:25 5:9 6:12 26:16 2023-01049 3:21 26:10 2023-1039 13:23 15:10 26:21 2023-1040 27:1 2024 1:20 5:2,6 2025 127:24 2040 3:19,23 26:8,14 21 1:20 5:2 127:24 21st 5:6 24 28:8 31:8 39:19 40:7,13 40:16,21 41:8 41:17 47:5 248.358.4400 2:21 25 71:14 88:8 88:12,17 26 3:18,22 55:20 56:5,10 57:25 59:3,24 71:15 100:12 100:14 101:6

26737 127:19 27 60:13 63:25 64:12 103:6,13 104:22 105:3 105:20 107:13 107:16 108:18 121:14,14 122:17 28 109:18,21 111:18 113:25 114:15 115:19 116:10 118:5 119:2 122:1,7 122:8,17 29 69:5 70:22 72:14 120:22 120:24 121:20 122:12,24 2:04 93:2 2:16 97:21 2:19 100:8 2d 86:21,22 89:22 94:13,16 95:8 3 3 3:22 19:14 26:13,25 49:14 49:19 51:20,23 54:25 102:15 102:16 103:7,9 104:18 105:10 106:24 107:10 107:16 108:3,3 109:15	30 71:13,15 31 71:23 72:5,9 86:5,18 88:13 33 72:14 73:13 88:14 35 29:6,15 47:7 36 53:7 74:19 77:7,11 124:18 38 48:9 39 81:24 82:2 82:12,13 39-40 4:5 81:14 3:11 125:7,8 3:17 125:9,11 3:18 126:5,7 3d 86:14,21 89:22 95:9 4 4 2:12 4:1 76:14,19 109:13,14,19 109:25 110:7 110:17 111:16 111:17 119:7 122:1,7,8 40 83:21 90:25 91:1,7,18 92:1 92:9,14 100:14 41 95:4,11,16 101:7,20 102:13 103:15 108:23 109:4,6 415.374.2311 2:14	43 101:7,14,16 101:20 43a 103:15,19 43b 103:16,19 44 77:7,8,11 45 77:8 100:14 100:16 450 1:17 2:19 47 109:7 48067 2:20 49 100:17 101:8,21 490 8:21 5 5 4:3 81:12,18 82:1 120:16,19 120:22 50 76:4 51 101:10,22,25 51a 103:9,14 104:9,15 51b 103:10 104:14 52 77:1 78:24 5207 1:22 127:21 531 72:13 55 102:2,5 551 6:17 7:2,24 8:23 9:12 15:9 29:15,21 33:19 34:1,8 50:7 53:21,23 56:16 62:12 63:3,7 63:11 72:13	76:8,11,20 77:2,8,14,22 93:16 555 2:5 55a 104:19,23 105:11 107:10 107:15,23 108:4,19 55b 104:19,23 105:11 107:10 107:15,23 108:8 109:1 57 33:13 34:16 38:14 102:8 58 33:13 59 37:4,21 38:15 123:7 6 6 3:7 4:6 85:10 85:16,20 89:5 60 37:7 38:3 61 94:17 102:10 123:24 63 102:12 64 48:13 65 48:13 102:11 6709600 1:25 7 7 47:14 53:7 77:22 71 103:25 72 103:25
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73 108:20 109:1 75 34:25 35:5 105:22 106:11 76 4:1 35:2 77 106:4,7 107:2,5,8 108:4 78 79:16 80:3 80:14 81:23 79 106:1,4,6 108:9,9	a	addresses 41:23 42:15 adds 35:1 adequate 46:22 administrativ... 17:12 ago 8:18 53:19 54:8 agree 44:16 79:10 86:16 100:20 104:25 106:15 108:10 109:18 112:1,8 119:7,11 122:12 125:13 ahead 106:12 alan 6:6 alden 4:8 9:24 31:23 32:1,3,3 32:4,6,6,10,14 32:14,19,19,25 33:6 45:16,23 45:24 80:11 81:4,7 82:14 82:18 83:2,8 85:12,17,20,21 86:4,6 87:2,4 88:10,12 89:5 89:15,17 94:5 94:19 96:14 100:12,14,20 100:22,24 101:6,20,25 102:4,15,23 103:7,13,19,23	104:6,12,14,22 105:17 106:20 107:8,13,16,20 108:16,18,25 109:13,18,21 110:4,11,24 112:14 113:17 113:17,25 114:15,23 115:11,24,24 116:4 117:3,13 118:5,6 119:11 119:13,14 120:4,12,16,22 120:25 121:3,8 121:21 122:9 123:7,12,22,25 124:6,11,18 125:2 alden's 84:6 86:2 120:9 alleged 47:10 allegedly 42:3 amber 71:7,10 ambiguous 80:12 104:7 amount 20:10 112:2,9,21 analogy 117:16 117:19,21,25 analysis 29:4 40:6 42:11 43:6 44:3 46:15 47:23 50:17,19,21,23
	a.m. 1:19 5:3 13:18 24:20 26:11,17 28:19 33:1 45:4,5 46:19 a1 4:7 85:11 all 110:2 abbreviate 60:16 ability 127:12 above 29:9 30:7 37:21 74:19 113:23 127:6 absolutely 124:12 accurate 69:20 accurately 7:11 14:6 acknowledged 71:25 acquired 20:17 act 52:2 69:22 70:11,22 actual 111:23 actually 25:13 29:19 71:2 98:6 110:25 119:17,23 125:4 add 35:24 addition 51:25 additional 39:24 41:5		
8			
8 53:11 77:22 81 4:3 108:7,9 83 108:20 85 4:6 109:2 87 79:18 107:6 89 110:1			
9			
9 78:2 9,555,551 1:9 9,955,551 4:2 6:14 76:15 90 110:7 91 110:8 93 110:8 94111 2:13 95 110:8 97 110:17 111:20,20 99 111:21			

51:4,7,12 60:24 64:20 65:10 66:10 78:22 79:6 124:10 analyze 63:15 analyzed 48:4 68:14,22 79:7 96:22 99:22,25 100:9 analyzing 49:22 77:4 78:14 andy 11:1,2,3 ann 1:22 127:5 127:21 answer 7:17,19 51:8 65:2 68:5 91:22 97:13,14 97:16 98:1 99:1,4,9,12,14 99:23 answered 37:25 43:19 55:8 56:22 62:18 63:13 66:9 67:4 70:6 75:10 83:19 84:24 91:5,13 91:21 94:2 97:8,11,12 98:6,23,24 99:3,11 100:7 125:21	answering 15:5 111:2,5 anticipate 31:15 41:20,24 44:9 anticipated 42:3 anticipation 28:10,12 30:15 39:1,9,12 50:17 anticipatory 42:3 anyway 114:9 apologies 73:8 apologize 114:4 apologizing 82:20 appeal 1:3 appear 27:4 appearances 2:1 appearing 2:9 2:16,23 appears 86:9 86:19 applicable 72:18 74:1 application 19:11 71:24 72:4,12 78:3 applications 19:10,12 69:10 69:18 70:24 77:19	applied 28:17 28:20,23 31:9 51:11 66:20 67:23 68:10,18 apply 27:16 29:3 36:12,19 36:24 40:6,10 78:19 79:3 applying 46:18 appreciate 114:9 approximately 90:25 april 6:25 architecture 102:17,19,20 area 54:10 88:20 105:13 105:18,22 106:1,11 108:4 108:7,10 113:21 114:23 areas 15:25 16:1,5 17:14 17:16,18 56:16 57:1 63:8 105:15,18,23 106:15 107:14 107:23 108:15 108:22 109:3 argumentative 91:21 97:2 99:2 100:7 arms 118:1	array 101:9,17 101:22,25 103:21 104:24 105:6,23 106:24 120:19 121:5 125:13 arrays 105:3 107:9,21 arrows 111:2,4 art 9:13,22,23 28:14 30:7 31:3,6,23 39:20 40:22 41:10,19,25 42:3,6,8,20 43:24 44:9,10 44:12 45:18 46:8,13 47:9 47:12 49:15,23 50:2,10,12,16 50:20 51:3 57:2 62:2 75:4 75:5,14,15,17 75:20,22 83:9 124:21 article 53:13,18 54:1,3,6 articles 51:20 51:22,25 52:3 52:7,14 54:24 55:5,13,16 57:6,9 58:8 arts 17:23 asked 8:5 37:25 43:19 55:8
---	--	---	--

56:22 62:18 63:13 66:9 67:4 68:15 70:6 73:12 83:19 84:24 91:5,13,21 94:2 97:10 98:11,23 99:2 100:7 125:21 asking 15:5 29:21 68:1 94:8 98:5 99:10 100:10 106:10 aspect 20:12 25:2 aspects 17:22 18:19 21:20 23:1 36:18 57:11 64:13 assess 29:5 assessing 28:17 associated 15:8 71:17 105:7 116:15,17 association 20:6 assumption 93:5,20,23 94:3,5,11 attached 3:12 36:15 attempt 50:1 attempted 32:24 33:5	attempts 19:7 attended 57:14 57:17,18 attorney 9:7 attorneys 8:5 10:3 12:14,18 34:19 48:6 audible 7:19 augmented 7:6 17:21 20:20,20 author 52:4 57:10 authors 52:8 52:12 automatic 67:14,19 68:6 86:6 automatically 66:19 67:3 85:23 automobile 95:16 automobiles 60:20 62:21,21 63:4,20 automotive 35:6,11,15,23 36:13,25 62:5 62:8,12 63:12 80:14,19 autonomous 22:24 23:2,13 25:9 57:10,22 autonomously 23:3	avoid 7:18 aware 7:23 53:4,6,7,10,14 53:15,25 54:2 54:6,14,20,21 b b 116:16 b2 4:2 76:15 back 12:25 16:19 24:9 31:8 45:5,6 49:13 77:1 85:6,7 97:18 98:5,9 99:4,8 103:13 104:18 105:10,20 107:13 108:3 111:18 113:25 118:5 125:9,10 background 58:13 baldwin 1:22 5:12 127:5,21 barbara 17:4,5 17:7,15 19:20 19:25 based 21:15 24:17 32:9,18 38:19 45:21 46:1,16 73:12 77:3 78:13,25 111:15 118:7 118:21 basically 46:23	beam 62:23 64:9 66:15,15 66:18,20 67:1 67:2 72:17 73:25 83:23 102:10,12 124:3,3,8,8 beams 62:24,24 62:24 66:15 67:11,11 108:17,17,21 109:2 becoming 80:24 beginning 15:4 28:8 80:5 98:11 101:13 120:24 begins 119:3 behalf 2:9,16 2:23 5:15,18 8:7,8,9 believe 6:16 8:21 9:25 11:1 13:5 14:8 21:7 21:21 28:7 31:13 39:23 40:2 41:16,23 43:9 44:17 48:4 49:20 50:15 52:3 53:10 54:13 55:5 58:18,24 62:8,11 67:13 67:16 72:12
---	--	---	--

73:9 75:10 76:9 77:17 78:1,7 80:19 81:1,20 82:3 83:3,7,10,16 98:22,24 109:17 112:13 113:14,20 119:22 120:13 121:10,13 122:21 believes 123:13 benz 1:6 5:8 best 127:11 beyond 48:7 54:25 55:22 big 94:21 bit 18:2 79:20 118:20 blank 48:11,14 48:21,25 49:3 board 1:3 book 51:25 52:16,17 bottom 27:12 34:25 35:5 105:2,21 106:7 107:16 118:15 box 108:22 109:3 boxes 110:16 brief 76:12 bright 108:16 108:17	brooks 2:18 5:19 brookskushm... 2:22 brought 62:15 built 32:13,14 c calculate 115:7 115:13 116:11 116:25 calculating 114:3,18 118:6 118:21 california 2:13 call 21:16 49:1 76:12 88:2,6,7 100:16 119:21 called 5:22 20:14 24:10 calls 29:7 31:17 34:2,9 36:7 38:9 41:12,21 42:10 43:5 44:2,15 46:14 47:2,22 50:18 51:6 60:23 62:13 63:6,14 64:19 65:10 66:9,21 68:12 70:1,7 72:25 73:22 74:14 78:21 79:6,6 83:18 84:3,13 84:18 86:25 87:9,25 93:8	94:23 95:13,21 102:25 104:4 106:18 109:9 112:4 113:12 117:23 119:9 120:2,10 121:16 122:2 122:19 123:15 124:9 125:15 camera 24:3 cameras 18:15 captures 19:5 capturing 22:12,13 24:3 car 67:9,15 74:16 75:23 86:9,13,18 89:21 94:12 career 16:18 90:17 91:4,18 92:2,10 93:5 careful 92:5 carnegie 25:24 carried 123:3 cars 22:4,10,12 22:13,15 24:7 75:22 86:19 cart 25:3,8,10 case 1:8 3:21 3:25 5:9 7:5 8:6 13:13 23:16 24:3 26:10,16 38:11 46:7 48:3 50:13,25 62:25	83:9 104:9 116:5 124:12 cases 12:22 categorized 103:24 104:3 104:10 caugmate 20:14 cause 105:23 106:2 127:14 center 2:12 certain 31:4 45:16 87:3 certainly 27:24 50:24 54:21 certificate 127:1 certify 127:6 challenged 30:9 challenges 72:1 change 11:13 11:16 14:9 44:22 49:7 changed 48:4 changing 11:15 119:4,25 120:7 characteristics 123:2 characterize 36:14,20 charging 8:19 chart 109:14 110:19 111:6 charts 111:23
---	--	---	--

checking 110:8 checks 109:22 chicago 14:12 chief 14:16 circuit 102:2,5 104:19,19,23 104:23 105:22 106:1,5,11 108:4,8,11,19 108:25 117:7 118:8,23 circuits 105:11 107:10 citation 77:19 82:12 citations 58:6 cite 55:25 62:10 69:22 70:11,14 70:22 71:21,22 77:12 81:24 82:10 cited 13:2 53:10 54:14 citing 52:19 claim 28:15 31:11,12,19,21 39:21 40:23 41:11,20 44:9 44:11 45:16 89:5,6 claimed 28:13 31:14,16 39:19 40:21 41:10 42:1,2,16 47:7	claims 29:5,12 29:14,22 30:10 30:19 31:4,7 62:11 63:3,7 63:11 76:23,24 clarification 7:16 24:20 28:19 33:1 46:19 64:18 72:8 73:16 82:15 93:2 100:8 clarify 92:6 98:6 classes 16:25 clear 15:1,5,15 15:16 68:1 118:2 close 94:14 closer 120:8 code 52:1 69:22 70:11,12,21 codes 69:25 70:5 collaborate 20:25 collaborated 17:11 colleague 5:17 colleagues 9:7 color 62:23 66:14 column 77:7,8 77:11 106:8 121:3	combination 30:8 58:18 combinations 64:8 65:23 combine 68:25 combined 65:6 65:17 combining 64:2 65:22 66:1,2 come 16:19 34:15,17 54:9 62:25 112:22 112:24 113:3,6 coming 104:10 110:15 113:16 commencing 1:19 comment 80:14 commission 127:24 committees 17:10 common 95:19 95:23 community 58:4 company 20:14 20:16,17,18,19 24:10 80:24 compares 114:1,16 comparison 114:21 compile 110:18 111:9	compiled 110:12 111:14 112:2,9 complete 27:4 completes 126:3 components 32:14 62:21 64:14 87:22 compound 30:4 52:11,23 93:17 93:22 comprises 88:13 comprising 20:2 computational 17:21,22 57:23 57:24 computer 14:19 15:24 16:3 17:17,20 18:9 19:21 21:14,15,15 22:5,25 24:4 24:16,17 25:22 56:15 57:23 concentrate 124:22 concept 87:24 88:3 92:18 96:15 97:6 98:20 100:4 concerns 72:1
--	---	---	---

concluded 126:7	119:25	controls 102:5	35:23,24 37:5
conclusion 29:8	consideration 75:3	108:19 109:1	37:6,9,10
30:6,12,17	considerations 50:25	conventional 72:19	39:22 40:23
31:18 34:3,10	considered 47:16 48:3	converged 12:23	41:1,3,5 43:2
41:13,22 44:15	64:2 65:22	converging 101:15	48:14,25 49:19
47:3 62:14	considering 23:12,17 51:10	conversation 76:3	50:8,9,11,14,15
63:6,14 123:9	constraints 71:17	converts 102:1	51:21 54:16
123:13	contents 3:1	copies 27:4	55:23 56:1,21
concurrently 102:11	context 77:17	copy 13:22	56:24 57:7,15
condition 120:7	continue 65:11	26:24 76:20	59:25 60:14,16
conditions 23:7	121:20	85:16	61:13,14 63:4
40:25 41:2,5	continued 17:10	cornering 62:24	69:23 70:19,20
85:24 119:4	continues 102:4 120:8	corners 124:23	71:19 72:2,3
120:1 123:5	control 35:6,7	corp 82:5	73:6 76:8,21
124:24	35:21 36:3,4	corporation 80:2,18 84:22	76:22 77:5,9
conduct 14:22	37:2 64:15	corporation's 83:25	77:16,20,21,25
15:22 44:1	88:19 102:2,4	correct 6:9,12	78:3,6,10 81:9
conducted 68:25	104:19,19,23	6:15 7:8,24	81:24 82:2,11
conferences 57:14,17,18,22	104:23 105:11	14:2,7,13,14	82:14,16 84:17
57:22,23	106:5 107:10	15:12,19 16:23	84:23 85:25
confused 97:12	108:4,8,11,19	17:4 20:14	86:2,7,10,20
105:5	108:25 109:15	21:2 25:11,14	87:7 88:10,15
connect 20:21	117:6 118:8,23	25:18 28:10,15	89:8,17 91:11
connection 6:8	controlled 121:5,22 123:1	30:13,14,16,17	94:6,17 100:12
7:1 8:13 12:3	123:4,22 124:1	30:20,21 32:25	100:15,18,19
13:8 53:20	controlling 85:23 102:6	33:7,11,16	100:21 101:2
55:1 61:17,19		34:22,24 35:7	101:10,23
consider 18:12		35:8,11,15,21	102:2,8,13,18
25:10 50:16			103:7,17,21
51:3 58:16			104:16 105:24
71:17 113:17			106:3 107:11
			108:8,23 109:4
			109:8,16,19,23
			110:5,12,18
			111:22 112:19

112:20,22 113:7,8,11,14 113:19,20,22 113:23 114:3 114:18,25 115:21 116:12 116:14,22 117:8,11 118:10,25 119:5,8 120:20 120:22 121:6,9 121:23 122:7 122:14,18 123:5 125:2,3 127:10 correctly 12:9 45:19 corresponding 103:23 121:5 costs 74:10 counsel 5:13 7:16 10:16 46:2 54:15 126:8 127:12 county 127:4,6 127:23 couple 23:12 54:14,19 70:13 82:22 122:25 course 90:16 91:1 courses 57:2,3 court 5:12 7:20 26:19 98:5	cover 62:8 63:8 covered 57:10 cpu 103:25 109:21 114:1 114:16 121:22 121:25 122:6,8 122:13,16,21 123:1 creation 61:12 crr 1:22 127:21 csr 1:22 127:21 current 68:7 currently 14:11 17:3 curriculum 3:16 13:17 cv 13:22,24 14:1,6,9,11 19:14 20:13 24:9 58:18 d d.c. 2:6 data 22:13,14 date 12:6 day 23:14 december 127:24 decision 111:7 decisions 16:10 23:22 declaration 3:20,24 8:1,6 26:9,15,21 27:1,5,8 28:9 31:10 33:14	38:23 39:14 40:12 45:10 47:14 49:13,19 55:2 63:16 75:9 77:2 79:16 81:23 82:10 107:4,19 declarations 6:8 9:5,6,9,12 9:13,14 10:2 11:10,12,19 12:2,11,18 13:1,3,9 15:17 27:17 28:3,20 28:24 29:3,4 29:25 30:25 32:23 33:4,7,9 33:21 48:24 49:11,21 50:8 50:17 51:5 55:7,11 59:1,7 59:18,20,23 60:2,8 61:8,25 62:11 63:9 74:25 76:7,10 80:1 107:2 define 10:7 defined 120:13 definition 33:15,18,25 34:6,7,15,21 37:5,12,13,24 38:13,15,19,20 43:7,13 44:17 66:12	definitions 33:23 degree 25:9,23 34:22 35:3 41:14 48:5 delay 82:20 deleted 49:6 demonstrate 39:1 demonstrative 90:5 95:19 department 17:13,13 19:21 depended 9:6 depict 87:20,21 depicted 96:16 97:7 98:21 100:5 106:24 depicting 78:2 87:18,24 depiction 88:3 depicts 86:5 108:3,7 deposed 6:7,20 6:24 deposition 1:15 3:14,18,22 4:1 4:3,6 5:7 9:3 10:6 13:15 15:2 19:15 26:7,13,20,25 76:14 81:12,18 82:2 85:10,16 126:4,6 127:7
---	---	--	---

depositions 7:13 9:15,17 76:19 describe 33:7 45:17 46:9 86:12 described 40:12 87:17 96:18 99:15 102:17,21 109:15 112:13 118:1 119:20 121:22,25 122:6,13,17,21 describes 77:3 100:12 112:14 117:3 122:8 describing 46:5 46:11 78:24 80:11 109:5,14 117:3,13 119:16 description 25:12 28:2 41:7 83:16,23 descriptions 40:2,5 design 23:21 71:14 designed 18:11 25:13 designs 23:21 detail 46:21,22 80:12	details 25:4 47:24 48:6 49:12 58:14 61:4 83:6,20 87:22 110:25 119:18,21 124:13 detect 18:24 19:2 22:15 88:14 104:8 detected 23:24 115:25 detecting 23:5 23:6 detection 24:2 detector 101:9 101:16,22,25 103:21 detects 19:6 103:14 determination 111:15 determine 18:16 22:19 23:2 34:18 38:19 43:10,16 90:3 114:2,17 114:24 determined 11:7 82:23 determining 23:7 28:25 77:5 78:14 development 16:10 24:17	diagram 87:7 87:13 92:25 93:13 diameter 94:21 95:2 dictates 123:1 differences 47:8 different 11:4 31:15 33:18,22 33:23 34:1,7 34:11,21 38:14 39:11,13 40:4 61:2 64:3,9,22 65:21 66:2 69:1 79:11 113:3 115:4,5 115:17 119:18 differently 36:14 difficulties 71:17 dim 113:21 115:25 116:12 118:9,24 dimensional 106:24 125:14 125:18,20,23 diminishing 89:10 dimmed 105:19 105:24 106:3 115:8,13 117:1 117:7 118:9,24	dimming 116:21 117:10 directed 17:25 18:19 21:18 24:25 78:9,12 89:11 direction 108:22 109:4 114:12 directions 110:15 directly 8:3 director 19:15 19:24 disclaimer 93:6 93:21 disclose 30:8 31:4,7 disclosed 32:1 32:6,10,19 33:6 89:17 discloses 31:14 88:13 100:20 108:19,25 109:21 110:11 114:1,16 118:6 121:4,21 disclosing 119:14 disclosure 32:24 41:20 42:9,21 44:12 46:9 77:7,14 78:18 79:3
--	--	--	---

disclosures 42:4 78:8 discuss 9:7 28:9 32:23 33:4,9 50:7,10 71:16 74:24 discussed 11:9 30:7 39:14 47:6 48:5 52:5 52:7,14,20 53:4 75:2,13 76:1 88:20 discusses 75:18 109:18 120:22 discussing 39:11 88:9 103:7 110:13 discussion 34:19 61:24 77:18 discussions 23:21 50:4 75:4 display 71:7 dispute 37:8,20 37:24 disputed 37:13 38:7 dissertation 25:20 distance 114:2 114:17,25 distributes 108:21 109:2	distribution 85:23 88:19 89:16 108:22 109:3 dloski 2:25 5:11 doctor 95:19 doctorate 25:18 document 52:2 83:6 87:4 88:4 124:13 documents 54:14 doing 50:21 55:3,9 57:4 78:25 92:8,21 92:23 117:15 domain 36:16 36:21,23,25 domains 36:19 dots 106:16 116:6 dozen 6:23 dr 5:7 6:3 26:19 45:9 46:25 58:11,13 58:21 81:17 85:15 125:13 126:4 draft 12:19 drafted 12:13 12:14 drafting 61:10	draw 92:17 drawing 83:22 93:5,7 drawings 86:15 93:4 drawn 89:19 89:22,24 90:18 91:2,6,17,25 92:10,13 drive 23:3 67:9 driver 109:6,7 duly 5:23 127:9 e earlier 16:17 17:19 21:23 54:13 97:23,24 98:13 118:20 early 12:7,8 ease 27:7 education 14:7 35:2 58:19 educational 14:20 36:6 effect 43:9 either 35:25 51:18 75:1 84:10 93:13 111:8 117:22 127:13 electrical 26:5 electrons 102:1 103:23 104:10 element 28:14 30:9 39:21 40:23 41:11	44:11 89:6 121:4 elements 31:7 31:11 89:16 96:18 99:16 102:17,21 120:20 121:1 eliminated 103:16 embarcadero 2:12 embodiment 78:5 125:2,3 emeritus 17:5 emits 101:7,14 101:20 emitted 101:14 emitting 101:14 employing 86:5 87:18 enable 23:8 41:25 42:15 44:12 45:16,24 45:25 46:4,6 enabled 42:4 enablement 43:25 enabling 41:19 42:9,21 46:9 ended 49:4 engineering 26:5 87:7,13 90:24 91:19 92:10
---	---	--	---

engineers 72:2 ensuing 56:2,4 56:8 58:5 entire 21:10 24:22 entirety 52:15 environment 20:22,23 23:7 36:23 92:23 environmental 85:24 119:4,25 120:7 123:4 environments 18:3,7,14 equipped 120:9 escaping 11:2 especially 93:11 essentially 22:21 104:17 establish 45:18 46:13 evaluating 110:4 evaluation 82:5 84:1,4 evan 1:10 5:8 5:19 event 127:13 eventual 12:23 everybody's 15:14 ex 3:15,19,23 4:4 13:16 26:8 26:14 81:13	exact 31:13,20 43:7 55:24 66:12 exactly 8:10 10:7 38:18 53:1 86:12 examination 3:6 6:1 examined 5:25 example 20:25 48:18 57:21 66:14 72:15 77:10 79:1 80:3 89:1,3 92:4 113:9 examples 58:5 58:9 66:14,16 92:8 except 76:22 108:22 109:3 110:13 exchange 118:18 exclude 117:22 excuse 61:6 executive 14:16 exhaustive 40:2 exhibit 3:11,14 3:18,22 4:1,3,6 13:15,21 19:14 20:13 26:7,13 26:20,25 27:8 33:13 38:23 45:10 48:10 49:14,19 55:20	64:1 69:5 72:15 76:14,19 77:2,8 80:3 81:12,18,19,21 81:24,24 82:1 82:2 85:10,16 107:3 exhibits 3:9,12 81:21 existence 45:18 46:13 exists 20:18 expect 14:4 61:3,23 70:3,8 83:13 87:12,15 93:13 116:3 expected 64:7 65:23 experience 14:7 34:24 35:3,4,9 35:13,20 58:19 58:24 experiences 46:17 experimentat... 42:2,17 43:1,4 43:11,15,17 44:1 experiments 16:11 32:24 33:5,8 68:25 expert 9:14,18 9:20 58:11,16 58:20,21,25	expertise 59:13 59:14 experts 46:17 55:21 58:1,3,5 58:9 59:2,8,24 60:3 71:22,24 expires 127:24 explain 92:24 93:14 explains 100:14 101:6,20,25 103:13,19,23 104:22 explicitly 50:22 expressed 12:24 eyes 19:16,19 19:20 20:5,8
f			
facial 25:21 facing 113:10 faculty 20:1 failing 46:4 fails 45:16,24 45:24 46:6 fair 7:21 22:20 28:2 31:16 32:6,7,8,17,21 33:6 37:23 43:24 44:13 46:10 53:25 54:2 56:13 66:7 67:22 68:9 73:4 76:11 78:8			

79:12 86:23 87:6,24 95:7 113:4 115:2,11 123:12 124:6 fall 103:20 falling 101:16 falls 101:8,21 familiar 31:23 81:8 family 53:22 54:3 far 80:16 94:12 95:9 favor 114:4 feature 66:5,18 66:20 67:2,14 67:17,19 features 64:2 64:12,25 66:2 66:12 69:1 federal 60:14 feed 99:12 feel 60:11 felt 12:23 104:6 field 36:3,12,13 56:12 58:11,17 58:21 59:8,12 90:24 115:24 fifty 76:5,6 figure 77:22 78:2,5 86:4,9 86:23 88:9 89:15,15,19,21 89:24 90:10,18 91:3,17 92:17	94:8,10,17 95:6,8,10 96:14,16,18,21 96:24 97:5 98:19 99:15,22 100:1,5,12,15 100:24 101:4,7 102:15,16,18 102:21 103:7,9 103:15 104:18 105:10 106:21 106:24 107:1 107:10 108:3,3 108:13 109:5 109:13,14,15 109:19,25 110:7,17 111:1 111:16,17 119:7 120:16 120:19,22 122:1,7,8 124:19,21 figures 77:24 90:5 91:6,25 92:11,14 93:24 94:6,8 95:19 96:8 103:8 figuring 23:4 filed 71:24 96:1 find 52:20,25 114:6 118:11 fine 26:1 44:23 first 5:23 27:8 38:21 41:16 53:18 54:6	61:15 81:3 85:21 89:6 99:24 102:11 103:15 110:14 116:6 127:9 five 11:23 flashlights 113:10,16,18 flip 48:13,18 49:13 82:13 flow 102:7,16 102:20 108:20 109:1,14 110:19 111:6 111:23 fmvss 60:16,18 61:2,4,10,15,21 61:24 62:3,10 62:15,17,20 63:19 focus 27:7 87:20 focused 18:4 57:3,17 focusing 64:21 follow 58:8 follows 5:25 footnote 53:7 53:11,13 forget 98:12 form 30:4 40:9 40:15 52:10,22 65:12 former 17:13	formulating 28:23 forth 12:25 127:8 forward 55:23 56:13,18,20,25 57:6,11,15 58:11,17,22 69:9,18 71:25 found 114:9,10 foundation 30:4 founded 20:13 four 10:17 19:16,19,20 20:5,8 frame 49:25 50:6 68:2 75:2 75:12 76:2 francisco 2:13 front 23:13 71:7 full 6:5 42:22 43:20 44:16 54:21 127:10 functional 119:21 functionality 64:22 65:3,7 65:18 66:6 functions 64:3 64:22 65:21 66:16 69:1 104:15
--	---	--	--

fundamental 22:17 36:16 further 108:25 110:11 112:14 113:25 114:15 114:20 121:21 125:24	glare 109:7 go 11:8 26:2 38:17 44:22,25 79:20 85:2 111:9 118:5 125:6 goal 27:20 goes 114:23 122:24 going 15:15 20:4 98:1 111:2,4,8 113:25 116:15 golf 25:3,8,10 good 6:3,4 18:2 20:10 42:12 95:23 97:13 117:19 graduate 14:19 57:3 grammatical 11:14 great 72:1 ground 7:14 guess 8:18 53:19 92:13 guessing 83:22	handed 26:19 26:24 76:18 81:17 handing 85:15 hands 117:16 happen 110:14 110:15,16,20 111:24 hard 86:14 head 42:13 51:17 66:13 96:19 99:16 108:17 heading 74:20 123:8 headlamps 72:1 headlight 20:12 25:13 62:23,24 67:20 74:16 77:19 78:16 79:4 83:8,10 85:24 86:2 94:15,15,17,19 94:22 95:11 100:20,25 102:5,10 105:24 106:3 108:20 109:2 112:3,10,18,19 115:8 116:12 117:1,6 118:8 118:10,23 headlights 16:7 16:9,12,13,23	16:24,25 18:1 18:4,5 20:9 21:19,25 22:11 22:12,16,17,18 22:23 23:10,15 23:19,20,23 24:1,6,6 25:1,3 25:6 36:13 37:1 55:1,6,14 67:14,18 71:18 72:23 73:5,15 74:4,12 76:1 78:9,20 95:1 103:14 104:9 105:18 106:16 108:17 113:6 118:24 heard 80:24 84:22 99:7 hearing 84:25 help 22:18 114:8 117:20 hereinbefore 127:8 hereto 126:9 high 62:24 66:15,20 67:1 67:11 102:6,10 108:21 109:2 124:3,8 history 81:2,4,6 81:7 hmm 29:24 52:20 53:9 68:8 97:20
g	g 2:17 gained 36:22 general 12:4 18:8 22:14 43:8 46:4,16 58:4 68:15 79:14 88:25 89:18 generally 14:16 50:3 53:22 55:24 56:20 64:13 66:4 80:12 102:22 103:4 125:17 generate 72:17 73:25 gentex 80:2,18 81:8 82:4 83:10,25 84:20 84:22 give 51:8 52:21 114:12 given 20:4 95:11 gives 116:7 giving 41:6	h	
	halfway 114:15 halogen 72:19 hand 13:20 34:12 handbook 51:25 53:6		

105:14 107:7 hogan 2:4 5:16 hoganlovells.... 2:8,15 hogen 2:11 hope 124:16 hopes 124:11 hour 8:21 11:23 hours 10:17,20 11:18,23 human 16:3 17:20 21:15 hundred 57:12 hypothetical 65:12 100:10 125:16 hypothetically 92:21	illuminated 103:15 illuminating 24:6 illumination 77:5 78:15 86:6 88:19 89:17 illustrate 92:18 102:23 illustrates 89:16 124:21 illustrating 77:24 87:3 96:18 99:15 illustration 86:18,20 88:6 88:7 102:16 illustrative 86:24 107:11 107:15,21,23 images 18:12 18:15,22,24 19:5 22:12,14 24:3 93:16 imagine 11:15 92:21 imaging 16:2 17:17 18:3,6,9 18:10,14 19:22 22:15 57:3 immaterial 99:18 immediate 93:5	impact 64:24 66:6 impacted 65:7 65:18 imparted 93:13 implementing 71:25 implications 41:15 96:21 99:19,21 100:1 imply 117:18 important 11:8 18:8 31:20 36:21 48:3 49:22 92:23 impose 63:19 impossible 112:25 impractical 80:16 imprecise 65:12 inch 95:12,15 95:17 inches 95:1,6 incidence 90:20 include 16:8 19:5 24:5 49:21 61:24 64:15,24 75:8 76:23 96:8 100:17 120:7 included 21:24 23:4 90:9	includes 34:21 34:24 35:5,21 100:22,24 101:2 including 17:18 47:17 50:4 62:22 71:20 incomplete 125:16 independent 88:18 independently 20:17 121:4 123:22 124:1 indicate 58:19 indicated 115:22 indicates 104:14 105:22 106:2 107:22 111:24 115:3 120:25 indication 89:20 individual 58:7 120:19 indoor 77:15 78:18 79:3 industry 80:15 80:19 information 14:6 22:16 24:5 82:21 83:4 89:23 90:2 93:12
i			
idea 36:2,11,22 49:3 91:17 92:19 identical 38:16 38:18 identification 13:14 26:6,12 76:13 81:11 85:9 identified 15:3 identifies 19:6 identify 23:23 53:3 ii 27:12			

102:16,20 114:20 116:3,7 117:15 initial 12:19 initially 52:25 innovative 19:22 inside 20:18 instance 91:2 institute 15:23 16:16,22 17:1 institution 14:12,15,17,18 14:20,23 instructed 7:18 instruction 46:2 instruments 52:2 53:8 intellectual 82:5 intelligent 35:5 35:24 intended 27:24 40:1 87:6,11 87:12,21 112:15 intends 122:9 intensities 124:2,8 intensity 62:23 72:19 103:24 114:2,17 intent 27:20 109:17	intention 123:14 intentionally 48:10,14,20,25 interaction 16:3 17:20 19:22 21:16 24:18 interactions 17:7,8,12 interested 54:11 127:13 interfaces 19:23 21:17 interpret 66:5 86:14 interpreted 60:4 introduce 5:13 invalid 29:1 invalidity 28:18 29:2 invention 28:13 31:16 39:19 40:22 41:10 42:1,2,16 47:7 47:8,11 83:4 85:22 87:19 124:22 inventor 7:23 96:2 involve 18:20 22:10,22 23:10 involved 10:9 16:8,9,14	21:23 22:10 61:10,12 80:25 involves 9:2 involving 34:1 53:21 ip 83:25 84:4 ipr 3:21,25 6:9 6:11,12,12 8:13 13:23 15:8,10,17 26:10,16,21 27:1 33:14 ipr2023-01040 1:8 iprs 6:14 issued 46:20	36:18 38:11 42:12 43:12 44:4 60:21 63:21,23 66:11 66:12 68:5,23 70:5 77:12 80:23 83:2,4 83:25 84:4,10 84:14,16,20 86:12 87:11 88:2 93:18 94:25 95:2,15 99:9 100:10 116:5 117:19 120:4,12 123:17
		j	knowledge 9:21 36:21,22 36:24,25 50:21 51:9 60:7 75:25 kobayashi 9:24 kondo 9:25 ksr 47:18,21 48:2 kushman 2:18 5:19
		j 2:3 job 1:25 joe 5:16 joseph 2:3 joseph.raffetto 2:8 jump 74:19 justin 2:25 5:11	
		k	
		keep 15:15 49:7 kind 16:6 19:13 20:21 92:22 93:12 111:6 kinds 74:9,10 know 9:20 10:7 27:10 33:24 34:4,11,12	l
			lab 19:20,20 20:1,6,8 labelled 86:5 laboratory 19:16,19 20:5 lacks 80:12

lamp 64:9 65:6 65:8,17,18 66:6 71:6 lamps 64:2,13 64:14,16,22 66:2 landscape 49:24 language 117:13 large 86:10 larger 20:18 86:19,22 94:16 largest 22:5 late 22:7 lead 49:9 leading 12:6 learn 53:18,20 learning 16:2 17:20 learnings 36:12 leave 49:3 leaving 17:9 led 29:4 56:17 72:12 121:9 led's 55:22 leds 55:1,6,13 71:18,25 72:16 72:23 73:5,14 73:24 74:4,12 74:16 121:1,11 121:14 left 48:10,14,21 48:25 86:9 103:9,14	104:15,18,22 105:22,24 106:10 108:4 110:11,18 111:10,13,19 112:1,3,8,10,18 114:2,17 legal 27:13,16 28:2,9 29:7 31:17 34:2,10 39:4,11 41:12 41:14,21 42:8 42:10,12,19,22 43:5,7,13 44:2 44:15 46:14,17 47:2,17,22 50:18 51:6 60:21,23 62:13 63:6,14 64:19 65:10 66:10 78:21 79:6 124:9 lens 100:17 101:8,15,21 letter 82:13,18 83:5 level 37:9 38:7 life 110:21 light 18:16 66:18,19,20 67:1,2,3,12,17 67:19,23,24 68:10,11,18,19 69:9,17 70:23 71:8,11,11	72:17,17 73:25 73:25 74:20,24 75:1,6,11,18,24 76:2 88:19 89:10 101:7,14 101:14,20 102:2,4 103:24 105:19 106:5 107:10 109:8 109:23 110:2,5 110:9 111:12 111:20,21 112:2,9,13,16 112:21 113:16 113:21 115:25 116:21 124:23 lighting 18:2,6 18:8,8,10,11,12 18:14 20:10,12 21:20,22 23:7 35:6,21,25 36:3,15,17,23 37:2 55:21,23 56:13,15,18,20 56:25 57:4,7 57:11,15 58:1 58:12,17,22 59:3,9,25 60:3 69:10,18 70:5 70:24 71:25 77:15,25 78:3 78:6,6,19 79:3 79:10,11 120:19,25 121:4	lights 36:4 68:6 69:1 103:20 123:23 124:1 likely 91:25 likewise 94:5 106:1 limitation 46:4 limitations 31:4 45:16 limited 62:12 63:4,12 line 45:2 77:7,8 77:11 lines 29:10 list 81:21 listed 9:5 lists 82:12 little 36:14 79:20 86:14 105:5 118:20 llc 1:6 5:8 llp 2:4,11 local 20:24 locate 55:13 located 5:10 88:15 89:21 location 88:18 115:7,12 116:10,25 118:7,22 locations 89:7 logic 103:25 109:15 111:11 121:22,25 122:6,8,13,16
--	---	--	--

122:22 long 10:16 12:10 17:24 45:2 54:8 90:23 95:12 114:8 look 23:19 31:1 33:20 34:4 54:24 55:20 60:13 77:1 78:2 81:23 82:4 85:20 89:5 93:4 102:15 103:3,6 103:13 104:18 105:10,10,20 107:3,13 108:3 108:18 109:25 110:17 111:18 115:6 117:5 120:16,24 122:24 123:7 123:21,24 124:18,23 looked 55:5 58:13 looking 23:5,5 77:20 78:9 83:21 105:21 106:23 116:9 116:20 122:10 looks 78:5 95:8 lori 1:22 5:12 127:5,21	lot 10:8 17:16 56:25 57:3,4 57:18 74:8 92:13 104:11 124:14 lots 55:17 lovells 2:4,11 5:16 low 62:23 66:15,18 67:2 67:11 102:6,11 124:3,8 m machine 16:2 17:19 21:1 made 29:11 47:11 main 16:6 87:19 major 26:4 make 15:4 31:25 32:2,4,5 32:8,17 42:1 42:16 44:7 70:14 78:23,23 104:11 making 25:8 111:15 map 110:11,12 110:18 111:10 111:10,19,21 112:1,8 114:1 114:2,16,17 maps 111:13 112:13,16	march 6:25 12:7,8 marietta 22:6 22:22 marked 13:14 13:20 26:6,12 26:20,25 76:13 76:19 81:11,17 85:9,15 martin 22:6,22 master's 25:23 material 11:9 materials 9:5,8 11:4,5 13:2 51:24 52:4,20 53:3 matter 5:8 8:2 8:20,22,24 9:1 47:9,12 96:12 matters 12:17 12:24 13:11 15:3,8,17 51:10 matthew 1:16 3:4,20,24 5:7 5:21 6:6 26:9 26:15 126:4 maximum 62:22 109:8 mean 8:4,5 12:16,17 18:6 18:23 19:9 24:1 27:19,20 28:22 31:5 34:17 44:4	50:2,12 64:12 64:13,24 66:1 66:3,5 80:9 102:23 103:4 104:3 110:20 110:21 115:21 117:21 119:13 119:16 means 17:6 43:9 74:15 86:6 88:13,17 89:7,10 115:15 120:4,12 measurements 95:16 media 17:23 44:22 meet 10:5,16,21 43:25 64:8 65:23 meeting 10:7 10:12 72:17 74:1 mellon 25:24 memory 103:25 111:20,21 mention 30:12 30:14,15 60:13 64:1 125:1 mentioned 11:3 17:19 21:23 22:4 31:8 57:25 65:3 92:4
--	--	--	--

mentioning 88:23 mentions 43:1 89:10 125:3 mercedes 1:6 5:8 9:14,20 mercedes's 9:18 merely 107:11 merged 49:6 met 9:6 10:3,8 10:22 11:1 36:5 michael 3:16 13:17 michigan 1:18 2:20 5:1,11 52:1 69:22 70:11,15,19,21 127:3,23 microsoft 21:2 21:4,8,18 24:9 mid 22:7 middle 111:19 mind 18:11 42:23 43:8 50:24 123:17 mine 33:8 minimum 62:22 109:7 minor 11:14 minutes 44:21 79:19 mischaracteri... 27:22 29:17	37:14 38:1 39:15 44:14 51:15 54:17 56:6 63:5 65:9 66:8 68:20 72:7 89:25 90:12 91:12 97:1,11 100:6 116:1 misspoke 81:5 mit 25:18 mm 29:24 52:20 53:9 68:8 97:20 105:14 107:7 mobile 24:18 25:2,7 modulator 74:21,24 75:24 modulators 75:1,6,11,18 76:2 moment 11:2 18:21 43:8 63:17 66:13 91:8 morning 6:3,4 motion 26:1 motor 60:14 mount 74:16 move 89:15 109:13 120:8 moved 106:12 moving 17:9	multiple 89:3 115:3,18 118:1 multitude 77:3 mumbling 99:23 n n.w. 2:5 name 5:11 6:5 6:6 11:2 81:2 named 96:2 necessarily 18:3,4 88:2 110:14 necessary 60:11 70:14 110:25 need 7:17,19 23:3 78:13 115:8,13 117:7 118:9,23 needed 23:14 117:1 needs 44:10,12 negative 111:5 neither 40:1 125:3 neuroscience 17:22,22 never 25:13 99:7 110:19 111:9 nine 121:11,11 nod 7:19 non 108:4,7,10 108:15	notary 127:5 127:22 noted 114:20 notes 127:11 notice 106:12 number 5:9 7:13 11:3 19:12 20:3 34:21 50:5 56:8 105:7 numbering 49:8 numeral 108:12 numerals 110:7 numerous 51:20 o oak 1:18 2:20 5:1,11 oakland 127:4 127:23 oath 7:7 91:16 object 7:16 22:19 23:23 24:18 114:3,18 114:25 115:2 115:16,17,21 116:14,16,21 objection 11:21 11:24 13:4 14:3 23:25 25:15 27:22 29:7,9,17,19 30:3,3,4,23
---	---	--	--

31:17 32:11,20 34:2,9 35:16 36:7 37:14,25 38:9 39:15 40:8,8,14,14 41:12,21 42:10 43:5,19 44:2 44:14 46:14 47:2,22 50:18 51:6,15 52:10 52:10,22,22 54:5,17 55:8 55:15 56:6,14 56:22 57:8,16 59:4,11 60:10 60:23 62:7,13 62:18 63:5,13 63:22 64:17,19 65:9,11,11,12 66:8,21 67:4,5 67:25 68:12,20 69:2,19 70:1,6 71:3 72:6,6,25 73:21,21 74:13 74:13 78:11,21 79:5,5,13 82:19 83:12,18 84:2,3,7,12,12 84:18,24 86:11 86:25 87:9,16 87:25 89:25 90:12,19 91:5 91:12,20,21 92:20 93:8,17 93:22 94:2,7	94:23 95:13,21 96:17 97:1 98:2,23 99:2 100:6,23 101:3 102:25 104:4 105:4 106:18 109:9 110:23 112:4,11,23 113:12 116:1 116:13 117:23 119:9,15 120:2 120:10 121:16 122:2,19 123:15 124:9 125:15,21,22 objections 65:19 97:10 112:12 objects 18:15 115:3,5,7,12,14 115:15,18,24 115:25 116:11 116:25 118:7 118:22 observing 77:4 78:13 obstacles 23:5 23:6 obtained 25:18 obvious 47:10 50:23 51:11 obviousness 47:1,5,17,21 48:2,5 51:4	offer 30:18,22 30:24 offered 33:22 offhand 30:24 43:13,21 50:22 51:11 53:6 61:4 63:23 80:21,23 81:10 81:20 83:21 90:7 91:23 92:7 office 1:1 officer 14:16 oh 81:5,6 123:23 okay 6:24 8:11 8:19 10:14 14:20 16:19 27:11,12 28:8 36:2 38:13 44:7,7,20 45:11 48:9 49:13 58:7 60:4 61:17 68:5,7 73:7 76:18 77:13,23 79:22 97:17 98:15,17,22 99:6 106:13 108:10 118:5 118:17 125:5 126:2,3 oncoming 120:8	ones 16:6 49:5 54:25 operable 124:2 124:7 operating 20:16 opine 30:21 45:15 63:15 opined 65:16 opining 63:7 opinion 28:25 29:14,21,25 30:1,5,18,22,24 31:3,6 35:9,13 44:8 46:7 56:5 63:3,9,17 67:7 72:22 73:13 74:3 78:18,23 79:8 80:11 95:10 opinions 12:24 13:1 29:11 opportunities 50:4 optical 72:2 optics 52:1 53:6 options 34:22 order 18:16 ordinary 33:10 35:10,14 36:5 44:1 47:11 65:5,16 originally 106:10
---	---	---	---

output 72:17 73:25 outside 63:20 66:19 67:3,12 overlaps 59:14 overview 76:8 76:11,12 own 33:15 46:17 61:21 71:21 owner 1:11 2:23 5:18 37:8 37:20 38:3	119:14 pages 4:5 81:14 83:21,22 papanikolopo... 58:21 pape 90:9 papers 90:6,10 paragraph 12:20 28:8 30:6,20 31:8 34:16 37:4,7 37:21 38:3,14 38:15,25 39:12 39:19 40:7,12 40:16,21 41:8 41:17,23 42:14 45:9,12,15 47:5,14 48:9 48:19,20,20 55:20 56:2,5 56:10 57:25 59:3,24 60:13 63:25 64:12 69:5,8 70:22 71:13,15,23 72:14 73:13 74:19 76:4 77:1 78:24 79:16 80:3,5 80:11,14 81:23 85:20 88:8,9 88:12,12,17 100:12,14 101:6 103:3,6 103:6,13	104:22 105:3 105:20 107:2,5 107:8,13,16 108:18 109:18 109:21 111:18 113:25 114:5 114:15 115:19 116:10 118:5 119:2 120:22 120:24 121:20 122:1,7,8,10,12 122:17,24 123:7,8,21,24 123:25 124:18 125:1 paragraphs 33:13 38:22 39:24 40:7,16 41:4,7 48:13 48:16 49:2,3,6 56:2,4,8 58:6 114:8 parentheses 66:14 parenthetical 107:17,22 part 12:20 14:22 18:9 22:12,17 46:3 51:9,9 52:18 75:3,13,20 99:24 particular 15:2 32:23 33:5 36:16 67:6	87:21 93:23 94:25 particularly 20:20 parties 126:9 party 127:13 passes 101:8,15 101:21 past 98:17 patent 1:1,3,9 1:11 2:23 4:2,7 5:18 6:14,17 7:2,24 8:23,25 9:12 15:9 29:1 29:15 31:15 33:19 34:1,8 37:7,20 38:3 41:20 46:20 49:22,23,24 50:7 53:21 56:16 57:1 61:20 62:12 63:3 71:24 72:4,13 76:8 76:11,15,20 77:3,8,14,22 82:24 85:11 93:16,21,24 patent's 31:11 63:11 patentable 30:19 patents 29:1 46:18 53:23 54:4 95:20
p			
p.c. 2:18 p.m. 64:18 72:8 73:16 76:16 81:15 82:15 85:5,6,13 93:2 97:21 100:8 125:8,9 126:7 pa 1:25 page 3:3,11 14:13 19:14 27:9 28:9 34:25 35:2,5 49:13,15 53:7 53:8,11 63:25 64:5 71:14,15 72:14 79:17,18 81:24 82:1,1,2 82:4,8,10,12,13 83:21 89:5 105:2,21 106:8 107:6,15			

96:3,8 path 78:19 pathway 78:2 pattern 16:2 17:19 62:23 pending 15:21 people 17:11,13 20:21,23 48:4 59:12 73:4 113:9,18,22 117:17 percent 57:12 perceptual 21:16 period 10:9 59:15,19 92:16 permissible 30:8 person 10:12 20:24,24 33:10 35:9,13 36:5 43:25 47:11 65:5,15,22 perspective 86:21,22 pertains 47:12 petition 50:13 petitioner 1:7 2:9,16 5:7,15 38:15 petitioner's 37:4,8,12 38:7 38:20 ph.d. 1:16 3:4 3:17,21,25	5:21 13:17 17:10 26:10,16 photography 17:21 57:24 photon 103:20 photons 102:1 phrase 37:2 117:2,12 phrased 30:2 physical 20:22 20:25 83:13,14 physically 31:25 32:5 112:25 physics 18:10 36:17 pictures 18:15 place 127:8 places 69:17 plane 89:20 planning 16:10 26:1 please 6:5 7:15 7:19 27:9 35:17 65:13 97:17,19 98:4 99:4 112:6 120:14 122:4 plural 88:23,24 89:8,11 115:14 115:15 117:7 point 9:9,10 10:2 11:17 25:5 42:13 52:18 70:14	73:10 92:25 111:7 115:16 116:14,16 120:14 points 12:18 31:21 55:3 policy 82:5 portions 105:24 106:2 118:9,24 posa 38:13,14 38:19,20 42:1 42:16 64:1,7 65:21,22 posita 33:16,18 33:23,25 34:6 34:7,15 37:5 37:12 position 103:24 110:2,5 111:12 112:3,10,22 positions 110:9 positive 111:3 possibility 111:8 possible 33:22 74:11,15 84:25 92:16 potentially 19:12 power 102:7,8 108:20 109:1 122:25 123:2,3 practical 80:16	precisely 10:19 precision 45:18 46:6,10,12,21 preparation 10:6,8 prepare 9:3 prepared 13:3 preparing 11:18 12:2 13:8 55:2,6,10 59:1,7,17,20,22 60:2,4,8 61:7 present 2:24 16:16 20:23 85:22 87:19,19 98:18 110:2,21 111:13 116:4 124:22 presented 52:24 72:1 presents 103:4 president 14:11 14:15 presume 13:24 pretty 45:2 102:14 prevent 7:10 previous 80:10 previously 21:2 39:4,14 121:22 121:25 122:6 122:13,17,21 primarily 15:24 19:21 20:2 21:14
---	--	--	---

23:1 25:21 primary 25:3 100:17 101:8 101:15,21 principles 28:10 36:17 prior 9:13,22 9:23 28:14 29:20 30:7 31:3,6,23 39:20 40:22 41:10,19,25 42:3,6,8,20 43:24 44:9,10 44:12 45:18 46:8,13 47:8 49:23 50:10,12 53:5,15 57:2 75:5,17 83:9 probably 11:7 22:5 25:2 35:19 44:24 45:1 49:10 55:3 61:3,16 61:19 67:21 70:13 79:14 81:2 85:2 92:5 92:13 95:17 96:12 problems 24:7 50:5 proceeding 7:4 34:6,8 53:5,16 proceedings 6:9,11 7:1 8:14	11:19 12:3 13:21 14:1 15:2,6,8,16 27:17 28:18 33:19,23 34:1 51:5 53:21,22 54:3,7 55:7 59:1 61:18,19 70:19 74:25 75:6 76:21 80:25 84:23 process 23:15 24:4 60:7 84:1 84:4 109:15 114:3,18,24 116:4 117:3,13 118:6,21 119:3 119:7,8 processes 102:17,20 processing 18:12 22:16 produced 92:13 produces 102:10 producing 102:11 product 21:24 products 81:8 professional 90:16 91:3,18 92:1 93:4 professor 14:17 17:3,5	project 22:9,25 25:2,6,7 projection 89:22 94:13,16 95:8 projects 16:8 20:3 21:24 22:3 property 82:5 proposed 37:4 37:8 38:7,15 75:2,12 pros 81:6 prosecution 81:2,4,5,7 provide 33:15 46:21 56:5 58:6 76:10 110:25 provided 12:19 12:20 29:11 33:18 47:18,21 48:2 54:15 providing 123:12 public 127:5,22 published 16:12 90:6,10 purposes 25:12 86:24 87:3 107:11,15,21 107:24 put 62:20	q qualifications 33:10 question 7:15 7:17 15:18,21 22:19 28:5,6 31:5 32:12 33:3 35:19 41:24 42:25 43:22 44:5 51:8 59:21,22 63:16 65:13 67:20 68:1,7 68:14 73:19 97:5,17,22,23 97:24 98:1,6,9 98:10,13,16,19 98:24 99:5,9 99:25 105:5,8 107:19 111:2,5 112:8 114:14 118:17,19 119:18 122:4 questioning 45:2 questions 15:6 15:7 28:6 74:8 74:9,9 124:14 125:25 quick 14:25 quite 43:21 59:21 86:9 quote 28:13 70:25 71:2,4,6
--	--	--	--

quoting 73:10	73:17 74:2,18	range 124:2,7	12:7,9,12 13:5
r	76:17 78:17	rate 8:21	20:11 22:1
raffetto 2:3 3:6	79:2,9,15,22,23	reach 112:25	25:4 29:2
5:15,16 6:2	81:16 82:17	read 45:19	30:24 31:1
11:22 12:1	83:1,15,24	52:14,17,18	33:20 38:21
13:6,19 14:5	84:5,9,15,21	69:16 97:18,21	39:6 48:3 49:4
15:10,13,19,20	85:2,14 86:17	98:5,9,10 99:4	49:12 51:10,14
24:8,21 25:17	87:5,14,23	99:8,12,14	51:17 52:12,24
26:18 28:1,21	88:5 90:4,15	104:6,8 114:19	53:12,23 54:8
29:13,23 30:11	90:22 91:9,15	115:19,20,20	54:11 55:3,9
31:2,22 32:16	91:24 93:3,15	116:10 117:9	55:11,17 57:9
32:22 33:2	93:19,25 94:4	123:18	58:23 61:3,9
34:5,14 35:18	94:9 95:3,18	reading 101:11	61:23 63:7
36:10 37:17	95:25 96:23	105:1 106:7,9	69:3,14 70:3,9
38:4,12 39:18	97:4,15,18,25	114:6	75:7,19 80:1
40:11,17 41:18	98:8,25 99:7	reads 48:20	80:21 81:1
42:5,18 43:14	99:13,20	real 99:8,12	82:9 84:25
43:23 44:6,19	100:11 101:1,5	119:4,8,17	87:2 90:7,20
44:24 45:8	103:2 104:13	120:1	91:22 92:7
46:24 47:13,25	105:9 106:22	reality 7:6	96:10 112:15
48:8 51:1,13	109:12 112:7	17:21 20:20,21	recap 44:7
51:19 52:13	112:17 113:2	really 8:17	receive 13:8
53:2 54:12,23	113:15 116:8	49:11 91:7	received 112:2
55:12,19 56:11	116:19 118:4	95:2 104:12	112:9,21
56:19 57:5,13	119:12,24	120:12 123:17	recently 55:4,9
57:20 59:6,16	120:6,15	reason 58:24	recognition
60:12 61:1	121:19 122:5	62:10 92:17	16:2 17:19
62:9,16 63:2	122:23 123:20	reasonable	22:4,10 24:2
63:10,18,24	124:17 125:6	30:5 37:3	24:18 25:21
65:1,14,25	125:12,19,24	reasonably	recognize
66:17,25 67:8	126:2	94:12	13:22 22:13,15
68:3,16,24	ramifications	reasons 49:9	22:15 81:19,20
69:4,21 70:4	123:9	70:13	85:18
70:10 71:5	ran 20:1	recall 7:4 9:11	recognizing
72:10 73:3,11		10:19 11:11	18:22 23:17

recollection 63:16 68:23 76:22 record 5:5,14 6:5,11 15:1,5 28:4 44:22,25 45:3,4,5,6 85:3 85:4,5,6,7 97:21 125:6,7 125:8,9,10 126:5 recorded 1:15 5:6 126:6 redirect 126:1 reexamination 76:24 refer 6:17 18:7 40:19 51:20,23 51:25 52:1,2 reference 9:24 9:24,25,25 27:7 28:14 31:10,14,23 35:4,20 39:21 39:24 41:11,19 41:25 42:6,8 42:20 43:24 44:9 53:13 59:3,24 85:17 86:4 108:12 referenced 9:13 52:17 54:25 61:21 110:7 references 30:7 48:24 49:1	50:10 56:17 75:5 105:3 referencing 41:5 80:1 122:13 referred 58:1 83:5 referring 9:18 15:1,7,15 16:15,17 19:4 39:17 46:23 58:3,4,9 68:7 72:4,12 76:24 98:13 106:5 107:22,25 108:2 refers 80:10 reflect 71:7 112:2 reflects 14:6 112:9 refresh 7:14 regarding 30:5 46:22 68:2 regardless 108:11 regulation 62:1 regulations 60:19,21,25 62:1,4,5,19 69:8,16 72:18 74:1 regulatory 64:8 64:23 65:4,24	reiterating 118:20 relate 20:8 related 6:14 7:5 8:22,24 9:14 9:15,17 15:25 16:1 20:10 33:19 34:8 49:23 61:20 80:13 127:12 relatedly 80:6,9 80:10 relates 39:8 relating 17:16 49:24 50:5 62:5 relation 7:1,4 22:24 122:1,7 relevance 84:2 84:7 relevant 11:8 24:7 27:13 42:24 43:22 47:16 50:5 52:18 54:10 57:1,4,19 58:23 62:17,19 62:21 63:1 70:16 75:4 87:4 88:4 rely 13:2 remain 67:18 67:20 remember 8:15 8:17 11:20,25	12:2,5 25:5 47:24 48:6 53:1 58:14 83:6,20 91:2,7 96:6,13 remind 116:23 remote 10:13 10:14 20:21,24 remove 98:17 rendering 103:4 repairing 21:1 repeat 35:12 37:4 65:13 97:17 112:6 114:14 118:18 122:4 rephrase 52:16 reporter 1:21 5:12,14 7:20 24:20 26:19 28:19 33:1 46:19 64:18 72:8 73:16 82:15 93:2 97:20 98:5 99:6,19 100:8 represent 103:20 105:16 106:16 108:15 108:16 representations 32:9,18 represented 33:14
---	--	---	--

request 8:1 requested 13:7 126:8 require 69:9,17 70:5 required 44:18 requirement 43:25 69:13,15 70:23 71:1 requirements 36:6 39:25 44:10 62:20 63:19 64:8,23 65:4,24 79:11 79:12 requiring 71:10 research 14:22 15:22,24 16:6 16:7,8,10,22 17:11,14,25 18:18,20 20:3 21:14,24 22:3 22:9,18 24:10 24:16 54:24 61:22 92:22 93:12 researched 19:11 researcher 21:9 respect 15:8 16:11 respective 102:7,12 109:22 123:1	126:8 respectively 103:16 respond 97:23 98:16 responding 82:20 response 29:11 85:24 123:4 124:23 responsive 119:3,16 rest 52:3 restricted 89:13 result 102:10 109:6 retained 8:13 8:22,24 retired 17:6 review 9:8 11:9 61:5,7 62:2 82:25 84:16,20 reviewed 9:5 9:11,22 11:3,6 61:15 82:21 84:6,8,10,14 right 6:13 13:5 15:4 20:15 25:19 34:23 36:22 37:21 42:13,23,23 43:3,8,21 48:6 60:15 70:18 71:11 74:19	75:11,14,15,18 82:3 83:7 84:10 88:11,23 89:11 94:12,19 95:4,4,20 97:8 101:24 102:3 102:15 103:9 104:14,19,23 106:1,3,5,8,25 108:5,7,11 109:1 110:6,9 110:12,19 111:4,8,9,10,13 111:21 112:18 112:19 114:1 114:16 117:2 117:22 119:1 120:16 121:1,7 121:12,15 122:1 124:19 124:24 road 23:4 86:10,14 113:10 124:23 robot 25:2,7 robotics 26:1 robots 24:18 role 14:15,16 14:22 19:24 24:15 room 36:4,23 77:16 79:10 117:17 royal 1:18 2:20 5:1,11	rpr 1:22 127:21 rules 7:14 s safety 60:14 sally 2:10 5:17 san 2:13 sangeeta 2:17 5:19 santa 17:4,5,6 17:15 19:20,25 satisfied 37:9 37:12,23 38:8 satisfy 37:22 saw 38:21 saying 19:2 37:11,16,18,19 38:2 41:24 42:15 56:4 58:7 59:7 63:15 68:17,22 73:2,18,20,23 74:5 82:18 89:1,2 90:11 90:23 91:1,6 96:24 97:13,22 115:11,23 121:8 says 19:15 20:13 24:9 39:1,19 40:21 41:17 45:23 48:10 49:2 71:4 82:4 88:17 89:6 93:7 101:13
---	---	---	---

104:7,10	scratch 108:1	45:12 47:19,20	segmented 83:7
105:21 106:7	second 1:17	48:10,19,22	83:10,23 86:6
107:14 109:11	2:19 3:20,24	49:16 54:7	89:16 108:20
109:24 110:1	5:10 26:9,15	58:1 64:4,6,10	109:2
110:17 111:19	26:21 27:1	69:11 72:20	segments 102:5
115:6 116:20	45:10 49:18	74:22 80:2,7	select 11:5
116:24 117:5	71:9 102:12	82:6,13 88:16	sending 24:3
119:2 123:8	103:16 121:3	88:21,22 95:4	sense 46:4
124:21,25	section 27:12	101:12,18	88:25 93:1
scale 89:19,22	29:6,16,22	103:11,18	95:23 104:11
89:24 90:6,11	30:12,19 39:5	104:1,2,20	111:20,21
90:18 91:3,10	39:8,20 40:2,4	105:11,13	sensed 102:13
91:18 92:1,6	40:10,20 41:7	107:12 108:1	112:13,16
92:11,18,24	41:9,15 49:8	108:24 110:1	114:3,18 118:7
93:6,7,14,14,16	49:14,18,21	114:19,21	118:22 123:4
93:20,23 94:1	50:7,11 51:20	115:1,9,10	sensing 88:18
94:6,11 95:10	51:23 52:5,8	120:25 121:24	89:7
95:17 96:9,14	52:15,21 53:4	123:6,10 124:4	sensor 77:3
96:21,25 97:5	54:15,25 58:8	124:5	78:13,25
98:20 99:21	62:1 70:21	seeing 81:1	100:15,16,17
100:1	71:13,16,21	seem 13:24	100:24 103:9
scenario 67:7	74:20 75:3,8	87:21 96:19	103:10,14
88:3 93:12	75:13,15 76:8	99:17 124:15	104:9,10,14,15
116:7	76:10	seemed 80:15	110:2,5,9,18
scenarios 78:16	sections 61:2,5	98:12 119:21	111:10,10,12
scene 18:17	61:7,9	seems 8:18 27:6	111:13 112:3
24:5,6 77:4,4,5	sector 88:14,18	32:21 58:19	112:10,21
78:14,14,15	102:7,11,12	80:13 94:25	sensors 100:21
86:22 95:9	109:22	103:4 106:20	101:2 104:8
school 14:19	sectors 101:9	110:6 111:1	109:23 113:11
science 14:19	101:12,16,22	123:18	sent 82:22
19:21	see 14:12 19:17	seen 55:16	83:10,13,16
scientist 24:16	24:11 26:22	58:18 82:8	102:1 117:6
scope 123:9	27:2,14 30:2	segment 123:3	118:8,22
	38:17,25 39:2		

sentence 12:19 30:17,21 38:2 41:2,8,17 42:14,24 43:1 45:12,23 64:21 69:16 71:9,10 72:5,9 73:23 85:21 107:8 109:11 114:22 115:6,19 116:9 116:20,23,24 117:5 119:2 121:21 123:21 123:25 sentences 12:23 71:4 122:25 set 54:21 60:19 97:10 112:11 127:8 several 17:17 17:23 shaded 105:13 105:15,22 106:1,11,15 107:14,23 108:4,7,10,15 shah 2:17 5:18 5:19 10:22 11:1,21,24 13:4 14:3,25 15:12,14 23:25 25:15 27:22 29:7,10,17 30:3,23 31:17 32:11,20 34:2	34:9 35:16 36:7 37:14,25 38:9 39:15 40:8,14 41:12 41:21 42:10 43:5,19 44:2 44:14,23 46:14 47:2,22 50:18 51:6,15 52:10 52:22 54:5,17 55:8,15 56:6 56:14,22 57:8 57:16 59:4,11 60:10,23 62:7 62:13,18 63:5 63:13,22 64:17 64:19 65:9,19 66:8,21 67:4 67:25 68:12,20 69:2,19 70:1,6 71:3 72:6,25 73:8,21 74:13 78:11,21 79:5 79:13 82:19 83:12,18 84:2 84:7,12,18,24 86:11,25 87:9 87:16,25 89:25 90:12,19 91:5 91:12,20 92:20 93:8,17,22 94:2,7,23 95:13,21 96:17 97:1,10 98:2,4 98:23 99:2,10	100:6,23 101:3 102:25 104:4 105:4 106:18 109:9 110:23 112:4,11,23 113:12 116:1 116:13 117:23 119:9,15 120:2 120:10 121:16 122:2,19 123:15 124:9 125:15,21 126:1 shape 62:23 share 82:24 shook 117:16 117:18 shorthand 1:21 show 9:9 10:1 showing 94:12 shown 95:6 106:21 107:10 shows 14:11 94:17 103:9 104:18 109:14 120:19 side 9:14 signals 117:6 118:7,22 signature 126:7 127:19 significant 62:3 62:5 similar 28:7 32:2,13 38:16	38:18 49:18 72:18 similarly 113:23 simple 43:11,17 simultaneous 118:3 simultaneously 117:18 sir 107:6 site 77:7 situation 87:3 92:5,16 98:3 situations 78:12 91:23 six 21:5 70:18 95:1 size 86:12 95:11 skepticism 74:5 74:7 skill 33:10 35:10,14 36:5 37:8 38:7 44:1 47:11 65:6,16 127:11 small 94:13 software 32:9 32:13,15,18 somebody 92:21 somewhat 8:17 70:15 104:7 sorry 14:25 35:12,17 46:5
--	--	--	--

65:16 81:5 91:20 97:12,17 99:19 100:23 101:11 102:19 108:1 118:11 118:17 123:23 sort 35:2 36:11 36:20 64:4 107:16 111:18 sound 7:21 sounds 6:13 7:13 source 102:8 112:22,24 113:9 sources 71:22 72:19 112:25 113:3 sp 58:14 span 91:7 spatial 74:20 74:24 75:1,6 75:11,18,24 76:2 speak 52:8 59:2 59:12,23 60:2 60:6 speaking 52:12 92:14 special 50:23 specific 15:17 19:11 20:11 35:10,14,23,25 37:2 43:13 58:5 60:5	77:18 84:4 88:17 90:20 91:22 93:6 95:15 107:25 110:24 115:13 122:4 125:1 specifically 7:17 8:15 9:13 10:2 16:13,24 18:14 21:21 23:11 25:5 30:25 32:4,15 44:4 50:12 51:11 53:12,24 55:18 56:18,24 57:18 58:23 60:7 61:9 63:7 65:20 66:24 69:14 73:2 78:10,12,15 79:7 85:21 86:15 91:8 107:9,20 111:19 120:4 specification 83:22 87:17 specify 62:20 speculation 34:9 36:8 38:10 66:22 68:13 70:2,7 73:1,22 74:14 79:6 83:19 84:3,13,19 87:1,10 88:1	93:9 94:24 95:14,22 103:1 104:5 106:19 109:10 112:5 113:13 117:24 119:10 120:3 120:11 121:17 122:3,20 123:16 124:10 125:16 spend 11:18 spero 1:10 3:15 3:19,23 4:4 5:9 5:19 7:23 8:1 8:11 13:16 26:8,14 38:6 71:24 81:13 spero's 8:8 spie 54:7 spoke 59:17 spoken 8:11 59:8,13 spot 103:15,16 spots 103:19,20 sshah 2:22 staff 13:11 stair 78:6 stairwell 77:24 78:19 stam 9:25 stand 91:8 standard 28:17 28:20,23 29:3 31:9 39:4,12 39:17 40:6,19	42:8,20 47:17 47:21 48:1 84:16 standards 27:13,16 28:3 40:10 47:17 60:14 62:2 69:9,17 72:18 74:1 84:20 start 49:8 114:6 starting 49:25 77:11 starts 45:12 71:14,15 state 6:5 28:12 29:25 37:7 41:2 47:4,16 49:15 50:2,16 50:20 51:3 55:20 62:2 71:23 72:15 73:9 75:4,14 75:15,20,22 77:2 92:24 102:4 107:8 124:3 127:3,6 stated 56:9 statement 39:1 55:25 69:20,23 107:14,25 108:2 states 1:1 4:2,7 69:25 70:8,12 70:25 73:23
--	--	---	---

76:15 85:11,22 87:2,4 107:9 107:20 123:22 123:25 stating 46:6 65:20 78:24 82:21,22,23 statistically 92:14 status 50:3 109:22 statutes 60:22 stay 67:11 staying 57:25 stenographic 1:21 127:11 step 78:6 110:17 steps 110:13 stick 63:25 101:6 sticking 48:9 114:23 stored 103:25 111:20,20,21 straightforward 43:12,18 street 1:17 2:5 2:19 5:10 strike 16:20 17:2 18:24 22:8 29:19 33:3 38:6 42:6 51:2 54:1 59:23 75:22	90:8 96:1 123:23 struck 29:9 structure 94:15 student 17:10 students 20:2 style 25:8 subject 25:25 36:15 47:9,12 76:20 83:8 subjects 57:1 submission 84:6 submit 8:1,6 submitted 6:8 12:7 13:23,25 14:1 50:13 submitting 28:24 subsequently 29:9 substantial 11:16 sufficient 45:17 46:5,10,12,21 72:16 73:25 suggest 30:9 suite 1:17 2:19 sum 123:13 summarize 50:1 summarized 50:20 summary 30:5 37:3 42:12	supplier 80:15 80:19 supply 80:20 123:3 support 55:25 56:5,9 69:22 77:9 sure 8:10,10 12:10 15:4 19:9 24:1 27:21 31:5 42:22 43:7 44:5,7 50:22 54:8,20 55:16 57:12 59:5 63:11 66:24 67:1,7 68:14 68:15 70:9,25 79:8 81:1 82:9 84:8 86:13,16 87:11 89:23 90:3,8,14,21 91:14 95:2 96:6,22,24 99:22,25 100:3 100:4 104:12 105:8 114:7 119:22 surprise 92:3,9 96:11,12 surprised 92:12 suspect 74:17 swear 5:14	switch 104:24 105:3,6,23 107:9,20 121:5 121:8,21 123:2 switches 105:23 106:2 106:23 121:6 121:12,14 sworn 5:20,23 127:9 system 18:23 18:25 19:2,5,8 36:4 77:25 79:3,4 83:8,11 83:13,14,17,23 85:22 87:18 89:17 94:19 100:21 101:2 119:23 120:9 124:1,7 systems 18:10 31:25 32:5,9 32:15,18 33:6 35:6,6,7,21,25 36:3 37:3 64:15 77:15 78:19 86:2
			t
			table 3:1 take 10:14 36:12 74:15 116:6 taken 1:17 5:7 30:7 32:3,14 127:7,11

takes 114:6 talk 75:6,21,24 94:10 110:8 talked 12:17 39:4 118:12,19 talking 7:18 110:4 116:18 116:23,24 talks 124:18 task 20:25 taught 31:19 teach 16:25 17:2 31:11 44:11 teaches 28:14 39:21 40:22 41:11 teaching 46:22 57:2 90:17 92:4,5,22 93:11 115:17 117:14 124:6 tech 26:3 technical 57:1 74:8,9 technically 17:6 54:11 techniques 77:4 78:13,25 technological 14:12 15:23 16:15,22 17:1 technologies 49:24 50:3,6 67:23	technology 68:10,18 technology's 8:9 teleos 24:10,12 24:13 tell 48:1 101:11 108:9 telling 114:5 ten 44:21 79:19 tend 49:9 95:1 tense 98:17,18 tenure 16:21 term 43:13 104:3 115:2 terms 23:17 51:24 54:19 63:8 89:22 testified 5:25 testify 5:23 127:9 testifying 7:11 testimony 9:18 27:23 29:18 37:15 38:1,5 39:16 44:15 51:16 54:13,18 56:7 63:6 65:5 65:10,15 66:9 68:21 72:7 75:14,17 90:1 90:13 91:13,16 97:2,11 100:7 116:2	texas 52:2 53:8 thank 114:13 theoretical 80:12 thesis 25:25 thing 14:25 48:16 99:11 111:6 things 9:6,7,16 11:14 12:21 17:18,23 18:16 23:3,4,8,8,20 24:18 32:2,3 32:13 36:1,18 44:17 49:6 50:1,5 54:10 56:8 62:25 64:16 65:3 71:4 74:10 75:21 78:25 80:13 82:22 92:6,6 think 6:23 7:3 10:10,24 11:7 11:15,23 12:9 13:10 15:21 21:12 23:14,18 24:24 27:24 30:5 41:16 42:13,24 43:21 49:22 50:9 54:19 56:17 57:11 58:15 60:16 62:25 63:25 64:24	69:20 70:13 74:15 77:21 79:14 80:15 87:19 88:7,24 89:2,12,24 91:25 92:15 93:10,11 94:21 95:24 96:6,20 97:3 99:17 100:2 101:13 105:2 106:8,10 108:9,16 110:25 115:22 116:14 118:2 122:11 124:14 thinking 7:5 18:21,25 thirds 115:19 118:15 thorough 41:6 thoroughly 111:1 thought 11:7 66:24 67:6 70:15 93:10 97:12 100:2,9 three 10:17,19 96:6 threshold 110:1,5,8,21 111:12 113:17 113:24 time 6:24 10:9 10:10,11 12:6 17:24 19:25
---	--	---	---

20:4 21:10 24:22 35:17 47:10 49:25 50:6 54:8,10 55:4 56:17,18 56:21 59:13,15 59:19 61:15 68:2 72:24 73:6,24 74:5 74:10 75:2,4 75:12,20 76:2 79:21 90:9 92:16 99:8,12 111:25 115:4 115:16,18,21 116:14,16,21 117:2,4,14 118:21 119:4,8 119:17 120:1 127:7 times 6:22,23 10:5 12:18,20 23:14 67:22 68:9,17 115:4 tires 75:23,25 title 21:8,10 24:16,22 123:18,19 titled 27:13 49:15 71:14 74:20 76:8 today 6:7 7:7 7:11 8:14 9:4 68:2 91:16	together 12:15 20:25 told 41:15 46:17 top 19:14 35:1 42:13 49:14 51:17 64:4 66:13 82:4 96:19 99:16 121:3 topic 55:17 57:17,19 torchlight 8:8 38:5 touch 16:5 touching 17:17 towards 101:13 105:2,21 107:16 108:18 114:14 118:15 120:24 toyota 14:11 15:22 16:15,21 17:1 traded 35:2 trademark 1:1 tradeoffs 71:14 transcribe 7:20 transcript 3:12 99:8 127:10 transfer 36:20 36:24 trial 1:3 triangulation 114:24	trick 28:5 tried 27:18,24 32:2,4,5,8,17 40:10 true 39:23,25 40:3 79:14 122:16 127:10 truth 5:23,24 5:24 127:9 truthfully 7:11 try 22:14 23:2 31:25 60:5 117:20 trying 28:4 98:3 104:12 ttic 17:9 20:7 tuesday 1:20 5:2 turk 1:16 3:4 3:16,20,24 5:7 5:21 6:3,6 13:17 26:9,15 26:19 45:9 46:25 81:17 85:15 125:13 126:4 turn 27:9 33:13 38:22 41:4 45:9 47:14 48:9 67:17,19 69:5 71:13 72:14 76:4 77:11,22 79:16 86:4 88:8 123:7,24	turning 24:9 31:8 66:19 67:3 twice 28:6 two 6:8 8:18 10:19 15:3 20:1,2,23 36:1 44:10,17 65:3 65:20 71:4 103:14 106:24 110:15 113:9 113:18,22 115:19,23 116:6 118:15 125:14,20 type 18:23 19:2 19:10 64:9 67:24 68:10,11 68:18,19 types 17:8 113:3 typical 111:6 typically 74:17 typos 11:14 u u.s. 1:9 uc 17:4,6,15 19:20,25 ucsb 17:25 18:18 19:4 uncertain 55:21 unclear 72:16 73:24 122:9
---	--	---	---

under 7:7 29:6 29:15,22 39:20 47:7 91:16 98:20 undergrad 26:2 understand 6:7 6:18 7:7,15 23:13 38:5 41:14 44:7 45:13,15,23 46:3 49:23 96:15 97:6 98:3,14 100:4 106:14 111:1 understanding 18:9 28:12 31:19 37:10,20 39:8,10 40:3 41:9,25 42:7 42:19,23 43:4 43:15,20 44:8 44:16 45:21,22 46:1,3,8,12,16 46:25 47:4,6 51:9 60:25 62:3 105:15,17 108:14 111:17 124:11 understood 46:25 72:23 73:5,14 74:4 undue 42:1,16 43:1,4,15	unit 100:15,16 100:17 united 1:1 4:2,7 76:15 85:11 university 25:24 unknowns 43:10,16 unpatentability 41:1 unpatentable 28:13 29:5,12 29:15,22 39:20 40:22 41:10 47:7 usa 1:6 5:8 usc 29:6,15 40:19 47:7 use 31:10,13 55:1,6,13,22 72:23 73:5,14 74:4,11 77:15 80:17 89:3 98:18 117:2,12 used 19:8 22:18 23:16,23 24:1 25:6 50:22 56:16 67:23 68:10 70:23 75:1,5,12 76:1 80:5 84:16 90:5 114:24 115:7,12 116:11,25 124:22	useful 23:15 user 21:16 uses 88:24,24 89:9 using 22:5,13 22:14 25:21 29:2 32:6,19 71:18 95:19 utilize 67:2 v vague 11:21 13:4 14:3 23:25 25:15 30:3,23 32:11 32:20 35:16 39:16 40:8,14 54:5 55:15 56:14,23 57:8 57:16 59:4,11 60:10 62:7 63:22 64:17 66:21 67:5,25 68:12 69:2,19 71:3 72:6,25 73:21 74:13 78:11 79:5,13 82:19 83:12 84:12 86:11 87:16 88:1 90:19 91:21 92:20 93:9,17 93:22 94:7 96:17 100:23 101:3 105:4 106:18 109:9	110:23 112:4 112:23 113:13 116:13 117:23 119:9,15 120:3 124:10 125:15 varied 77:5 78:14 variety 36:19 various 20:3 23:20 49:9 62:24 80:13 varying 18:16 vehicle 16:7,9 16:11,13,23,24 16:25 18:1,3,4 19:1 20:9,11 21:18,22,24 22:10,18,19,23 22:25 23:2,10 23:14,24 24:25 25:4,9,10,13 35:5,25 52:1 55:1,6,14,21,23 56:12,20,24 57:6,10,14 58:1,11,17 59:2,9,25 60:3 60:14 69:9,18 69:22,25 70:11 70:12,21,24 71:18,24 73:14 74:12 77:18 78:9,20 79:4 79:11 86:2,5 87:18,20 88:13
--	---	--	--

88:14,15 89:14 95:4,11 101:7 101:14,20 102:13 103:15 106:17 108:23 109:4,6,7 113:6,18 120:8 120:9 vehicles 16:11 18:2,19,19,22 18:24 19:3,5,6 23:6,18,19 57:22 62:6,8 62:12 63:12,19 87:20 88:18,23 88:24,25 89:3 89:4,7,9,11 veridical 93:1 veritext 1:25 5:12,13 version 13:24 versus 5:8 video 1:15 5:6 126:6 videographer 2:25 5:5 44:21 45:3,6 79:19 85:4,7 125:7 125:10 126:3 view 74:11 86:21 103:5 115:24 viewpoint 94:14	virginia 26:3 visible 71:6 vision 15:24 17:17 18:9 21:14,15,15 22:5,25 24:17 24:17 25:22 56:15 57:23 visitors 20:3 visual 22:16 vitae 3:16 13:17 volkswagen 9:2 vs 1:8 w walking 113:10 want 9:9 10:1 15:4 28:5 92:18 98:9 99:8 wanted 49:7 wants 82:24 105:17 106:20 108:16 119:11 119:13,22 washington 2:6 way 20:23 48:19 50:23 51:18 61:12 87:11 99:23 104:15 111:11 115:20 117:9 117:22 118:15 ways 17:16 23:12 48:4	we've 110:13 web 53:8 week 10:11,14 10:18,25 went 12:22 west 1:17 2:19 5:10 white 69:9,17 70:5,23 71:7 71:10,11 72:16 72:23 73:5,14 73:24 74:4,11 74:16 wide 36:19 wild 8:18 windshield 75:23,25 wipers 75:23 75:25 wire 123:3 wish 11:12,16 witness 3:3 5:14,20,22 15:16 29:18 44:15 51:16 54:18 56:7 63:6 65:10 66:9 68:21 73:7 90:1,13 91:13 97:2,11 99:7 100:7 116:2 126:7 127:8 word 29:2 30:15 38:17,17	80:5,10 88:24 89:4,9 words 13:1 31:11,13,15,20 37:19 55:24 105:6 123:17 124:5 work 13:11 14:7 16:15 18:13,21 19:4 19:13,22 20:5 20:7,7,8 21:4 21:18,20 22:6 22:22,24 23:22 24:13,25 25:12 34:24 35:4 52:9 57:4,10 71:21 89:13 114:21 122:11 124:13,15,15 125:4 worked 12:10 12:14 21:2,11 24:10,22 working 8:5,19 22:25 34:19 36:2,3 56:12 56:15,24,25 89:2 90:23 works 111:11 116:15,17 119:19 world 23:13 worldwide 69:13
---	---	---	--

writing 28:24	zhao's 58:13
written 57:6	zone 116:11,15
82:14 103:18	116:17 117:11
y	117:12
y 5:8	zones 115:7,13
yeah 35:19	116:18,25
59:21 81:6	117:7 118:9,23
86:21 88:7	
94:3 102:14	
105:5 106:10	
106:13,15	
111:23 114:7	
114:12 118:12	
118:18	
year 6:25 12:8	
53:19 61:16	
92:1,10	
years 8:18 21:4	
21:5,6 24:13	
49:11 55:22	
71:23 90:25	
91:1,7,18	
92:14	
yechezkal 1:10	
yesterday	
10:10,12,13,16	
10:21	
yi 2:10	
yi.zhang 2:15	
z	
zhang 2:10	
5:17	
zhao 58:11	

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

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