UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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Mercedes -- Benz USA, LLC,

Petitioner,

vs. Case No. IPR2023-01040

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

Yechezkal Evan Spero.,

Patent Owner.

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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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6 DEPOSITION EXHIBIT 6 85
7 United States Patent US 2003/0137849 A1
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Royal Oak, Michigan
Tuesday, May 21, 2024
10:03 a.m.

THE VIDEOGRAPHER: We are on the record at 10:03 on May 21st, 2024. This is the video recorded deposition of Dr. Matthew Turk taken by Petitioner in the matter of Mercedes-Benz USA, LLC versus Y. Evan Spero, case number is 2023-01040 and 2023-01039.

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

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

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

(Witness sworn.)

MATTHEW A. TURK, Ph.D.,

Was thereupon called as a witness herein, and after having first been duly sworn to testify to the truth, the whole truth and nothing but the truth, was examined and testified as follows:


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EXAMINATION

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.



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Q. And was it in connection with proceedings in relation to the '551 patent?
A. I don't think so.
Q. Do you recall what proceeding it was in relation to?
A. The one I'm thinking of was related to a case about augmented reality.
Q. And you understand that you are under oath today, correct?
A. Yes, I do.
Q. Is there anything that would prevent you from testifying truthfully and accurately today?
A. No.
Q. So, it sounds like you've had a number of depositions, but just to refresh on some of the ground rules, if you don't understand a question, please ask me for clarification. Your counsel may object but you still need to answer the question unless specifically instructed not. We should avoid talking over each other, and please don't nod; we need an audible answer so that the court reporter can transcribe.

Does that all sound fair?

A. It does, yes.
Q. And you're aware that Mr. Spero is the inventor of the '551 patent, correct?
A. Yes, I am.


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Q. Did Mr. Spero request that you submit a Declaration in this matter?
A. Not to me directly.
Q. What do you mean by that?
A. I mean, I was asked by the attorneys I've been working with in this case to submit the Declaration on his behalf.
Q. And, and it was on Mr. Spero's behalf or Torchlight Technology's behalf?
A. I'm not sure exactly. I'm not sure.
Q. Okay. Have you ever spoken with Mr. Spero?
A. I have not.
Q. When were you retained in connection with the IPR proceedings we are here for today?
A. I don't remember specifically. It's been a while.
Q. About when would you say?
A. I don't really remember, so it would be somewhat of a wild guess, but it seems like about two years ago.
Q. Okay. And how much are you charging for working on this matter?
A. I believe my rate is 490 an hour.
Q. Are you retained in any other matter that's related to the '551 patent?
A. I have been retained in another matter, yes, related to this patent.


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Q. And what matter is that?
A. It involves Volkswagen.
Q. And what did you do to prepare for your deposition today?
A. I reviewed my declarations and the materials listed as things I depended in my Declarations and met with my attorney colleagues to discuss things.
Q. What materials did you review?
A. If you want to show me my Declarations, I can point to you -- point them to you there.
Q. Can you recall anything that you reviewed?
A. Yes. My, my Declarations, the '551 patent, the, the prior art specifically referenced in my Declarations, the expert on Mercedes' side, his Declarations related to this, and depositions related to this, some other things as well.
Q. When you say "depositions related to this," are you referring to the testimony of Mercedes's expert?
A. Yes.
Q. Do you know Mercedes' expert?
A. Not to my knowledge.
Q. And you said you also reviewed prior art.
What prior art?
A. Well, the Alden reference, Kobayashi reference, the Stam reference, the Kondo reference, I believe it is.


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

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

A. Yes, I did.

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

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

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

A. No. Yesterday was remote.

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

A. Yes, it was.

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

A. About three or four hours.

Q. And what about last week?

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

Q. And who did you meet with yesterday?

A. I met with Ms. Shah here.

Q. Anyone else?

A. No, I don't think so.

Q. And what about last week?


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

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

How did you select the materials you reviewed?

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

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

A. Not that I recall.

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

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

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

A. I don't remember.

MS. SHAH: Objection; vague.

BY MR. RAFFETTO:

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

MS. SHAH: Same objection.

A. I, I don't remember.


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BY MR. RAFFETTO:
Q. Do you remember preparing your Declarations in connection with these proceedings?
A. In general, yes.
Q. Do you remember when it was?
A. It was in the time leading up to the date they were submitted which, if I recall, was in early March.
Q. Early March of this year?
A. I, I think so, if I recall correctly.
Q. And you are not sure how long you worked on your Declarations?
A. No, I don't recall that.
Q. Who drafted them?
A. We, the attorneys that I worked with and I drafted them together.
Q. What do you mean by that?
A. I mean that we talked about all of the matters, all of the points in my Declarations. At times, attorneys may have provided an initial draft of a sentence or a paragraph or a part of it. At times, I provided some things.

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


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the Declarations are my words and my opinions.

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

MS. SHAH: Objection; vague.

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

BY MR. RAFFETTO:

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

A. I don't think so.

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

A. In this case, no.

MARKED FOR IDENTIFICATION:

DEPOSITION EXHIBIT 1

SPERO EX. 2002

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

10:18 a.m.

BY MR. RAFFETTO:

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

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

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



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

MS. SHAH: Objection; vague.

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

BY MR. RAFFETTO:

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

A. I believe it does, yes.

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

A. No.

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

A. That's correct.

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

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

Q. And what does the institution do?

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

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

A. Yes.

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

A. Yes, I do.

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


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

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

MS. SHAH: That's correct.

MR. RAFFETTO: Yes.

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

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

BY MR. RAFFETTO:

Q. I think there was a pending question here.

So what research did you conduct at Toyota Technological Institute?

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


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Q. What areas related to that?
A. Machine learning and pattern recognition, imaging, and sometimes human-computer interaction.
Q. Anything else?
A. Yes, there are other areas that, that touch on the kind of research I do, but those are the main ones.
Q. Do you do any research in vehicle headlights?
A. I've been involved in research projects that include vehicle headlights. And I've been involved in research and development planning and decisions and experiments with respect to vehicles and vehicle headlights, but I haven't published anything specifically on vehicle headlights.
Q. And when you say you've been "involved," you are referring to during your work at Toyota Technological Institute from 2019 to the present?
A. No, what I was referring to there was from earlier in my career.
Q. Okay. We'll come back to that.
So you are also -- strike that.
So during your tenure at Toyota Technological Institute, you haven't done any research in vehicle headlights, correct?
A. Not specifically vehicle headlights, no.
Q. And you don't teach classes in vehicle headlights at


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Toyota Technological Institute?
A. No, I don't. I teach -- strike that. No, I don't.
Q. And you're, currently, you are also a professor at UC Santa Barbara, correct?
A. I am an emeritus professor at US Santa Barbara which, which means technically that I'm retired from UC Santa Barbara but I still have interactions there.
Q. What types of interactions?
A. Since leaving there and moving to TTIC, I have continued to be on Ph.D. student committees, collaborated with some people there in research and have other interactions administratively as well with people in my department, my former department.
Q. What areas have you done research in at UC Santa Barbara?
A. A lot of areas; mostly relating in some ways to imaging and computer vision but touching on several other areas as well, including some of the things I mentioned earlier; pattern recognition, machine learning, human-computer interaction, but also augmented reality, computational photography, some aspects of neuroscience or computational neuroscience, media arts, and several other things. I was there a long time.
Q. Has any of your research at UCSB been directed to


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vehicle headlights?

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

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

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

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

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

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

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

Is the system that you are thinking of, was


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

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

Q. And how is that system used?

A. I'm not sure what you mean.

Q. In what type of applications?

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

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

Do you see that?

A. Yes.

Q. What does Four Eyes Laboratory do?

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

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

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


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

Q. Do you still work at Four Eyes Laboratory?

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

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

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

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

A. That's right.

Q. Is this still an operating company?

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

Q. And what did this company do?

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


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repairing a machine.

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

A. Yes, I did.

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

A. About six years.

Q. What years?

A. I believe it was 1994 to 2000.

Q. And what was your title at Microsoft?

A. I was a researcher.

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

A. I think so.

Q. And what did you do there?

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

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

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

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


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Do you recall that?

A. Yes.

Q. What research projects?

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

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

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

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

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

A. Essentially, yes.

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

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


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

Q. And how did that involve vehicle headlights specifically?

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

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

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

MS. SHAH: Objection; vague.


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

BY MR. RAFFETTO:

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

Do you see that?

A. Yes, Teleos.

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

A. 1993 and 1994.

Q. And what was your role there?

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

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

BY MR. RAFFETTO:

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

A. I think so.

Q. Was any of your work there directed to vehicle


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headlights?
A. The, the mobile robot project probably had some aspect of headlights. It was a golf cart was our primary vehicle, but I don't recall many details about that at this point, so I don't remember specifically what, how we used headlights in that project.
Q. What was the mobile robot project?
A. It, it was the, it was making a golf cart style of vehicle autonomous to some degree.
Q. And so you consider a, a golf cart to be a vehicle, is that correct?
A. Yes, for the purposes of this description of the work.
Q. You've never actually designed a vehicle headlight, correct?
MS. SHAH: Objection; vague.
A. No, I haven't.
BY MR. RAFFETTO:
Q. You obtained your doctorate from MIT, correct?
A. That's right.
Q. And what was your dissertation there about?
A. It was primarily about facial recognition using computer vision.
Q. Where did you get your master's degree?
A. At Carnegie Mellon University.
Q. And what was the subject of your thesis there?

A. It was on fine motion planning for robotics.
Q. And where did you go to undergrad?
A. Virginia Tech.
Q. And what was your major there?
A. Electrical engineering.

MARKED FOR IDENTIFICATION:
DEPOSITION EXHIBIT 2
SPERO EX. 2040
Second Declaration of Matthew A. Turk,
Ph.D. - IPR Case No. 2023-01049
10:44 a.m.

MARKED FOR IDENTIFICATION:
DEPOSITION EXHIBIT 3
SPERO EX. 2040
Second Declaration of Matthew A. Turk,
Ph.D. - IPR Case No. 2023-01040
10:44 a.m.

BY MR. RAFFETTO:
Q. So, Dr. Turk, the court reporter has just handed you what has been marked as Exhibit 2 to your deposition which is your Second Declaration from IPR 2023-1039.
Do you see that?
A. Yes.
Q. And you were also just handed a copy of what's been marked as Exhibit 3 to your deposition which is your


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Second Declaration from IPR 2023-1040.

Do you see that?

A. Yes, I do.

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

A. It seems like they are.

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

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

A. Okay.

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

Do you see that?

A. Yes, I do.

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

A. I tried to.

Q. What do you mean by that?

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

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

MS. SHAH: Objection; mischaracterizes the testimony.

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


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BY MR. RAFFETTO:
Q. Is it fair to say that your description of the legal standards in both Declarations is the, is the same?
And for the record, I'm not trying to ask a trick question; I just don't want to have to ask the question, all the questions twice.
A. I believe they are the same or very similar.
Q. Okay. Now, at the beginning of paragraph 24 of your Declaration, this is at page 18, you discuss the legal principles of anticipation, correct?
A. Yes.
Q. And you state that your understanding of anticipation is that a claimed invention, quote, is "unpatentable is if a prior art reference teaches every element of the claim," correct?
A. Yes.
Q. And is that the standard you applied in assessing invalidity in these proceedings?
(Reporter clarification at 10:48 a.m.)
A. It's the standard that I applied to my Declarations.
BY MR. RAFFETTO:
Q. What do you mean by that?
A. It's the standard that I applied in formulating and writing and submitting my Declarations.
Q. And in determining whether, in your opinion, the


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patents -- the patent is invalid?

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

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

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

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

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

BY MR. RAFFETTO:

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

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

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

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

BY MR. RAFFETTO:

Q. Mm-hmm.

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


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Q. And what's your opinion?
A. Let's see how I phrased it.
MS. SHAH: Objection; vague, objection; compound, objection; form and foundation.
A. I think a reasonable summary of my opinion regarding this is in the conclusion in paragraph 180 that "the prior art references discussed above, taken alone or in any permissible combination, do not disclose or suggest each and every element of the challenged claims."
BY MR. RAFFETTO:
Q. And in that conclusion, you don't mention Section 102, correct?
A. That's correct, I don't mention it there.
Q. And you don't mention the word "anticipation," correct?
A. In that conclusion sentence, that's correct, I don't.
Q. And you don't offer an opinion as to whether the claims are patentable in that Section 180 -- or paragraph 180, correct?
A. I don't opine on that there in that sentence, correct.
Q. Do you offer an opinion on that?
MS. SHAH: Objection; vague.
A. I don't recall offhand if I offer an opinion on that specifically in these Declarations or not. I'd have

to look through them to recall.

BY MR. RAFFETTO:

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

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

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

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

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

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

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

BY MR. RAFFETTO:

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

A. Yes, I am.

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


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disclosed in Alden?

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

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

A. That's fair.

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

MS. SHAH: Objection; vague.

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

BY MR. RAFFETTO:

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

MS. SHAH: Objection; vague.

A. That seems fair.

BY MR. RAFFETTO:

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


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

BY MR. RAFFETTO:

Q. Let me strike that question.

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

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

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

A. Yes, I do.

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

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

A. Yes, I do.

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

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

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

A. I, I just don't know.

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

different proceedings involving the '551 patent?

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

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

BY MR. RAFFETTO:

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

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

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

BY MR. RAFFETTO:

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

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

Q. Determine.

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

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

A. That's right.

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


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

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

A. That's correct.

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

A. Sorry, will you repeat that?

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

MS. SHAH: Objection; vague.

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

BY MR. RAFFETTO:

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

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

A. Yes, it does.

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

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


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So there are two things like that there.
Q. Okay. And so is the idea that someone working in the field of lighting control systems, say someone working on the control system for lights in a room, they could be a person of ordinary skill if, if they met the educational requirements?
MS. SHAH: Objection; calls for speculation.
A. Yes, they could.
BY MR. RAFFETTO:
Q. And so that is the idea that someone could sort of take their learnings from that other field and apply it to the field of automotive headlights?
A. I would characterize it a little differently in that lighting is a subject that's not attached to any one particular domain. And there are fundamental principles, physics of lighting and, and other aspects, that, if you know those things, well, you can apply them to a wide variety of domains. So that's how I would sort of characterize that transfer of, of important knowledge from one domain to another.
Q. Right. So the idea is that if you've gained knowledge of lighting in the domain of, say, a room environment, you could transfer that knowledge and- apply that knowledge to another domain like automotive

headlights?

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

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

A. That's correct.

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

A. That's my understanding, correct.

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

MS. SHAH: Objection; mischaracterizes the testimony.

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

BY MR. RAFFETTO:

Q. What are you saying?

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

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

MS. SHAH: Objection; asked and answered,


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mischaracterizes testimony.
A. No, that's not what I'm saying. This sentence in paragraph 60 is about the patent owner, not about me.
BY MR. RAFFETTO:
Q. I understand. So, your testimony is that Torchlight would have -- or strike that -- Spero would have disputed Petitioner's proposed skill level if you hadn't satisfied it?
MS. SHAH: Objection; calls for speculation.
A. I don't know that to be the case.
BY MR. RAFFETTO:
Q. Okay. How is the POSA definition that you said you came up with in paragraph 57 different from the POSA definition that Petitioner proposed in paragraph 59?
A. They're very similar if, if not identical. You have to go through the word-for-word to see if they are exactly identical or not but they are very similar.
Q. So, did you determine your POSA definition based on Petitioner's POSA definition?
A. I don't recall if I saw that first.
Q. Can you turn to paragraphs 104 through 107 of your Declaration, Exhibit 2?
A. Yes.
Q. And you can see here at paragraph 104, there's a

statement that says "to demonstrate anticipation."
Do you see that?
A. Yes.
Q. And previously, we talked about the legal standard for Section 102.
Do you recall that?
A. Yes.
Q. Is your understanding that Section 102 relates to anticipation?
A. Yes, that is my understanding.
Q. And so here you are discussing a different legal standard for anticipation in paragraph 104?
A. Different than what?
Q. What you previously discussed in your Declaration?
MS. SHAH: Objection; mischaracterizes testimony, vague.
A. I'm referring to the same standard here.
BY MR. RAFFETTO:
Q. Well, paragraph 24 just says that "a claimed invention is unpatentable under Section 102 if a prior art reference teaches every element of the claim," correct?
A. Yes, I believe that's true.
Q. But paragraphs 104 to 105 reference additional requirements, isn't that true?

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

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

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

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

BY MR. RAFFETTO:

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

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

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

BY MR. RAFFETTO:

Q. Yes.

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

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

A. Yes.

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


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unpatentability, correct?

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

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

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

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

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

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

BY MR. RAFFETTO:

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

MS. SHAH: Objection; calls for legal conclusion.

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

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

BY MR. RAFFETTO:

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

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

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

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

BY MR. RAFFETTO:

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

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


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Q. And this sentence mentions "undue experimentation," correct?
A. It does, that's right.
Q. What is your understanding of "undue experimentation"?
MS. SHAH: Objection; calls for a legal analysis.
A. I'm not sure that I have a, an exact legal definition in mind right here at this moment, but in general, I believe it means something to the effect of someone having to determine some unknowns through experimentation that is not simple and straightforward, but again, I, I don't know the specific legal definition of the term offhand.
BY MR. RAFFETTO:
Q. So your understanding of "undue experimentation" is someone having to determine some unknowns through experimentation that is not simple and straightforward?
MS. SHAH: Objection; asked and answered.
A. I wouldn't say that's my full understanding but I'd say that is, offhand right now, I think, quite relevant to the question.
BY MR. RAFFETTO:
Q. Is it fair to say that a prior art reference can still meet your enablement requirement even if a person of


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ordinary skill has to conduct some experimentation?

MS. SHAH: Objection; calls for legal analysis.

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

BY MR. RAFFETTO:

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

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

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

BY MR. RAFFETTO:

Q. Okay.

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

MS. SHAH: That's fine.

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


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

THE VIDEOGRAPHER: Off the record, 11:24.

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

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

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

BY MR. RAFFETTO:

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

A. Okay.

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

A. Yes.

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

Did I read that correctly?

A. Yes.

Q. What's your understanding based on?

A. My understanding of what?

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


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So is your understanding based on instruction from counsel?

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

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

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

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

MS. SHAH: Objection; calls for legal analysis.

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

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

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

BY MR. RAFFETTO:

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


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"obviousness"?

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

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

BY MR. RAFFETTO:

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

A. Yes.

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

Do you see that?

A. I do see it, yes.

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

MS. SHAH: Objection; calls for legal analysis.

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

BY MR. RAFFETTO:


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

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

BY MR. RAFFETTO:

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

A. Yes, I do.

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

A. Yes.

Q. Same thing with paragraphs 102 to 103?

A. Yes, they do.

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

Do you see that?

A. Yes, I do.

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


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

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

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

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

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

Do you see that?

A. Yes.

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

A. I believe so, yes.

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

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


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my attempt to summarize some of those things.
Q. And what do you mean by "state of the art"?
A. Generally, what the status of the technologies were, including discussions about them, opportunities, problems, a number of things relating to the relevant technologies around that time frame.
Q. Now, you don't discuss the '551 patent in this section in your Declarations, correct?
A. I think that's correct.
Q. And you don't discuss any prior art references in this section, correct?
A. Do you mean specifically the prior art that was submitted in the petition for this case?
Q. Correct.
A. Then I believe that's correct.
Q. Did you consider the state of the art as of 2002 in your anticipation analysis in your Declarations?
MS. SHAH: Objection; calls for legal analysis.
A. The, the state of the art, as summarized here, is, is knowledge that I had in, in doing all of my analysis, so I'm, I'm not sure offhand if it was explicitly used in any special way for the obvious analysis. But I certainly had, had this in mind throughout my considerations in this case.


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BY MR. RAFFETTO:
Q. So -- strike that.
Did you consider the state of the art as of 2002 in your obviousness analysis and in your Declarations in these proceedings?
MS. SHAH: Objection; calls for legal analysis.
A. I'd give the same answer as to your last question that it was part of my understanding, part of my knowledge when considering these matters. I don't recall offhand if I specifically applied it in my obvious analysis or not.
BY MR. RAFFETTO:
Q. So you may have, but you don't recall?
MS. SHAH: Objection; mischaracterizes the witness' testimony.
A. As I said, I, off the top of my head, I don't recall either way.
BY MR. RAFFETTO:
Q. Now, you refer to numerous articles in this Section 3, correct?
A. Some articles, yes.
Q. And what else do you refer to in, in this Section 3, in terms of materials?
A. In addition to articles, I refer to a book, Handbook


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

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

A. No, I'm not.

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

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

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

BY MR. RAFFETTO:

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

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

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

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

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


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remember exactly for each one.

BY MR. RAFFETTO:

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

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

Q. Mm-hmm.

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

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

A. Was I aware of that prior to what?

Q. This proceeding.

A. Yes, I was.

Q. When did you first learn about that article?

A. I would guess about a year ago.

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

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

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


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this article before you became -- strike that.

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

MS. SHAH: Objection; vague.

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

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

BY MR. RAFFETTO:

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

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

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

BY MR. RAFFETTO:

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


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

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

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

MS. SHAH: Objection; asked and answered.

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

BY MR. RAFFETTO:

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

MS. SHAH: Objection; vague.

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

BY MR. RAFFETTO:

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

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

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


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correct?

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

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

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

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

BY MR. RAFFETTO:

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

MS. SHAH: Objection; vague.

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

BY MR. RAFFETTO:

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

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

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


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

BY MR. RAFFETTO:

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

MS. SHAH: Objection; vague.

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

BY MR. RAFFETTO:

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

MS. SHAH: Objection; vague.

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

BY MR. RAFFETTO:

Q. What's an example?

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

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


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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 sp 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.

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

MS. SHAH: Objection; vague.

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

BY MR. RAFFETTO:

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

A. Yes.

MS. SHAH: Objection; vague.

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

BY MR. RAFFETTO:

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

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

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

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

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


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A. Yes.
Q. In preparing your Declarations, did you speak with any of these experts in vehicle lighting?
A. Okay. I interpreted that as "while preparing," so I will try to be more specific then.
I did not speak with any of those, to my knowledge at least, specifically in the process of preparing my Declarations.
Q. Why not?
MS. SHAH: Objection; vague.
A. I didn't feel it was necessary.
BY MR. RAFFETTO:
Q. So if we look at paragraph 27, you mention the Federal Motor Vehicle Safety Standards, correct?
A. That's right.
Q. I think you abbreviate this FMVSS, correct?
A. Yes.
Q. And what is the FMVSS?
A. It's a set of regulations having to do with automobiles in the US.
Q. Do you know if these are regulations or legal statutes?
MS. SHAH: Objection; calls for legal analysis.
A. My understanding is that they are regulations.


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BY MR. RAFFETTO:
Q. Are there different sections to the FMVSS?
A. I expect there probably are, but I don't recall many details about the FMVSS offhand.
Q. What sections did you review?
A. Excuse me?
Q. What sections did you review in preparing your Declarations?
A. I also don't recall specifically what sections.
Q. Were you involved in drafting the FMVSS?
A. No, I was not.
Q. And you weren't involved in its creation in any way, correct?
A. That's correct.
Q. When was the first time you reviewed the FMVSS?
A. Probably in the last year or so.
Q. Okay. And was that in connection with these proceedings?
A. It was probably in connection with other proceedings related to this patent.
Q. Have you ever referenced the FMVSS in your own research?
A. I don't recall but I don't expect so.
Q. And why did you include a discussion of the FMVSS in your Declarations?

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

Q. Significant in regulations relating to automotive vehicles?

MS. SHAH: Objection; vague.

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

BY MR. RAFFETTO:

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

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

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

BY MR. RAFFETTO:

Q. Then why is the FMVSS relevant?

MS. SHAH: Objection; asked and answered.

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


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very relevant.
BY MR. RAFFETTO:
Q. But in you're opinion the claims of the '551 patent aren't limited to automobiles, correct?
MS. SHAH: Objection; mischaracterizes the witness' testimony, calls for a legal conclusion.
A. I don't recall opining specifically on the '551 claims in terms of what they, what areas they cover or not in these Declarations. So I don't have an opinion.
BY MR. RAFFETTO:
Q. So you are not sure if the '551 patent's claims are limited to automotive vehicles or not?
MS. SHAH: Objection; asked and answered, calls for a legal conclusion.
A. What I'm saying is I, I did not analyze and opine on that question in my Declaration to my recollection. So I have no opinion on it at the moment.
BY MR. RAFFETTO:
Q. Does the FMVSS impose any requirements on vehicles outside of automobiles?
A. I don't know --
MS. SHAH: Objection; vague.
A. I don't know offhand.
BY MR. RAFFETTO:
Q. Now, if we stick with paragraph 27, I think at page 20


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

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

A. Yes, I do see that.

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

Do you see that?

A. Yes, I do.

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

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

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

MS. SHAH: Objection; vague.

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

MS. SHAH: Objection; calls for legal analysis.

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


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BY MR. RAFFETTO:
Q. What's the "those" in your answer?
A. The two things I mentioned, functionality and regulatory requirements.
Q. So is your testimony, then, that a person of ordinary skill wouldn't have combined something from one lamp that could have impacted the functionality of another lamp?
MS. SHAH: Objection; mischaracterizes the witness' testimony, calls for legal analysis.
I will continue the objection. Objection; form, objection; imprecise hypothetical.
A. Can you repeat the question, please?
BY MR. RAFFETTO:
Q. Yes. So is it your testimony then that a person of ordinary skill wouldn't have opined -- sorry -- combined something from one lamp that could have impacted the functionality of another lamp?
MS. SHAH: Same objections.
A. What I'm stating here specifically is, if those two have different functions, a POSA wouldn't have considered combining them, or a person, a POSA wouldn't have expected such combinations to meet regulatory requirements.
BY MR. RAFFETTO:


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

A. Generally, yes.

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

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

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

BY MR. RAFFETTO:

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

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

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

BY MR. RAFFETTO:


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

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

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

BY MR. RAFFETTO:

Q. Do you drive a car?

A. I do, yes.

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

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

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

A. I believe so.

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

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

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

MS. SHAH: Objection; vague.


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

BY MR. RAFFETTO:

Q. Let's do 2002.

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

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

A. Mm-hmm.

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

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

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

BY MR. RAFFETTO:

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

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

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

BY MR. RAFFETTO:

Q. Have you ever conducted any experiments to combine


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features from lights having different functions?

MS. SHAH: Objection; vague.

A. Not that I recall.

BY MR. RAFFETTO:

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

Are you with me?

A. Yes.

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

Do you see that?

A. Yes.

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

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

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

MS. SHAH: Objection; vague.

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

BY MR. RAFFETTO:

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

A. Yes, I do.

Q. Do other states have vehicle codes?


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MS. SHAH: Objection; calls for speculation.

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

BY MR. RAFFETTO:

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

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

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

BY MR. RAFFETTO:

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

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

Q. Who's the "we"?

A. The six of us right now.

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

A. That's correct.

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

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


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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


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

A. That's correct.

Q. What patent application are you referring to there?

A. In sentence 31?

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

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

A. In sentence 31?

BY MR. RAFFETTO:

Q. Yes.

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

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

Do you see that?

A. Yes.

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

MS. SHAH: Objection; vague, calls for


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speculation.
A. That's not specifically what I'm saying here.
BY MR. RAFFETTO:
Q. So then it's fair, then, isn't it, that people understood how to use white LEDs for headlights at that time, correct?
THE WITNESS: Okay?
MS. SHAH: Apologies.
A. I don't believe I state that anywhere here but can you point me to, are you quoting me somewhere?
BY MR. RAFFETTO:
Q. Well, I asked if, based on what you say in paragraph 33, if it was your opinion that no one would have understood how to use white LEDs in vehicle headlights around 2004?
(Reporter clarification at 12:42 p.m.)
BY MR. RAFFETTO:
Q. And you said that's not what you're saying.
And so my question is, well, then, what are you saying?
MS. SHAH: Objection; vague, objection; calls for speculation.
A. I'm saying what the sentence states here, that it was unclear around that time whether white LEDs would have sufficient light output to generate a light beam

meeting applicable regulations and standards.

BY MR. RAFFETTO:

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

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

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

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

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

BY MR. RAFFETTO:

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

Do you see that?

A. Yes.

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


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A. Spatial light modulators were either used or, or being proposed around the time frame being discussed in this section, so it's part of the consideration, discussions, relevant state of the art at the time.
Q. Do any of the prior art references used in this, in these proceedings talk about spatial light modulators?
A. Not that I recall.
Q. So then why would you include this section in your Declaration?
A. I believe I just answered that.
Q. All right. You said that spatial light modulators were used or being proposed around the time frame being discussed in this section. So it's part of the state of the art, right? That was your testimony?
A. That's right, and the section is State of the Art as of 2002.
Q. But your testimony was that none of the prior art discusses spatial light modulators, right?
A. I don't recall that any of them do, but again, it was part of the state of the art at the time.
Q. But you didn't talk about other things that would have been state of the art like cars on a -- strike that -- tires on a car or windshield wipers. So why would you talk about a spatial light modulator?
A. Well, tires and windshield wipers, to my knowledge,

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

Q. Let's turn to paragraph 50 now.

A. Fifty --

Q. Fifty, yes.

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

A. I believe so, yes.

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

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

MARKED FOR IDENTIFICATION:

DEPOSITION EXHIBIT 4

United States Patent US 9,955,551 B2

12:49 p.m.

BY MR. RAFFETTO:

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

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

Q. Are you referring to the reexamination claims?

A. Yes.



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Q. Now, if you look at paragraph 52 back in your Declaration, Exhibit 2, you state that, "The '551 patent describes a multitude of sensor-based techniques for observing a scene, analyzing a scene, determining varied illumination for a scene," correct?
A. Yes.
Q. And you site the disclosure from column 44 at line 36 to column 45 of line 44 of the '551 patent exhibit for a support, correct?
A. Yes, as an example of that.
Q. So let's turn to column 44 starting at line 36 that you cite to. Just let me know when you are there.
A. Okay.
Q. Now, the disclosure here in the '551 patent is about indoor lighting systems such as those for use in a room, correct?
A. Yes, I believe this is in that context here.
Q. And there is no specific discussion of vehicle headlight applications in this citation you are looking at, correct?
A. I think that's correct.
Q. And let's turn to Figure 7 and 8 of the '551 patent.
A. Okay.
Q. Now, those figures are illustrating a stairwell lighting system, correct?

A. Yes, I believe so.
Q. And if we look at Figure 9 that's depicting pathway lighting application, correct?
A. Yes.
Q. And then Figure 11 looks like another embodiment of step lighting or stair lighting, correct?
A. Yes, I believe so.
Q. And is it fair to say that these disclosures that we are looking at are not directed to vehicle headlights specifically, correct?
MS. SHAH: Objection; vague.
A. Not specifically. They are directed to situations where they need sensor-based techniques for observing a scene, analyzing a scene, determining varied illumination for a scene, but not specifically to headlight scenarios.
BY MR. RAFFETTO:
Q. So, is it your opinion that a disclosure about indoor stairwell or path lighting systems can apply to vehicle headlights?
MS. SHAH: Objection; calls for a legal analysis.
A. I didn't make, I did not make that opinion. What I am stating here in paragraph 52 is describing sensor-based techniques for doing these things and,


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and this is an example of that.
BY MR. RAFFETTO:
Q. So can a disclosure about indoor lighting system apply to a vehicle headlight system?
MS. SHAH: Objection; vague, objection; calls for speculation, calls for a legal analysis.
A. That's not something that I've analyzed specifically so I'm not sure if I have an opinion on that.
BY MR. RAFFETTO:
Q. And you would agree, though, that room lighting requirements are different than vehicle lighting requirements, is that fair?
MS. SHAH: Objection; vague.
A. In general, I think that's probably true.
BY MR. RAFFETTO:
Q. Let's turn to paragraph 78 of your Declaration.
A. What page?
Q. Page 87.
THE VIDEOGRAPHER: About ten minutes and I have to go off again but you have a little bit of time.
MR. RAFFETTO: Okay.
BY MR. RAFFETTO:
Q. Are you with me?
A. Yes.

Q. So do you recall in your Declarations referencing Gentex Corporation which you can see here, for example, on paragraph 78 of Exhibit 2?
A. Yes, I do.
Q. At the beginning of this paragraph, you used the word "relatedly."
Do you see that?
A. Yes.
Q. What do you mean by "relatedly" here?
A. The word "relatedly" there refers to the previous paragraph where I'm describing my opinion that Alden is generally theoretical, is ambiguous, lacks detail, these various things. And to me, that seems related to this comment in paragraph 78 that automotive industry supplier seemed to think this was perhaps impractical, or at least far away from any practical use.
Q. What's Gentex Corporation?
A. I believe it's an automotive industry supplier.
Q. What do they supply?
A. I don't recall offhand.
Q. What did they do in 2002?
A. I don't know what they did in 2002 offhand.
Q. Had you heard about this company before becoming involved in these proceedings?

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

Q. In the prosecution history of Alden?

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

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

A. Not offhand, no.

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DEPOSITION EXHIBIT 5
SPERO Ex. 2006
Pages 39-40 of 189
1:00 p.m.

BY MR. RAFFETTO:

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

Do you recognize this exhibit?

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

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

A. Yes.


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Q. And this is page -- page 1 of Exhibit 5 to your deposition is page 39, Exhibit 2006, correct?
A. I believe that's right.
Q. So let's look at page 2 which at the top says Gentex Corp, Intellectual Property Evaluation Policy.
Do you see that?
A. Yes.
Q. Have you seen this page before?
A. I don't recall for sure.
Q. Now, you don't cite to this page in your Declaration, correct?
A. The citation here lists page 39.
Q. And then if you flip to page 39, you see a letter written to Mr. Alden, correct?
(Reporter clarification at 1:02 p.m.)
A. Yes. That's correct.
BY MR. RAFFETTO:
Q. And what is this letter saying to Mr. Alden?
MS. SHAH: Objection; vague.
A. He's apologizing for the delay in responding to him. It's stating that they've reviewed the information that he sent and is stating a couple of things they determined from that. And they are stating that if he gets a patent and wants to share that afterwards, they'll review it again.


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BY MR. RAFFETTO:
Q. Do you know Mr. Alden?
A. I don't believe so.
Q. Do you know what invention information is being referred to in this letter?
A. I don't remember the details of this document very well right now but I believe it is his segmented headlight system which is the subject of the Alden prior art in this case.
Q. So you believe he sent Gentex his segmented headlight system?
MS. SHAH: Objection; vague.
A. I don't expect he sent them the physical system if there was such a physical system.
BY MR. RAFFETTO:
Q. So you believe he sent them a description of the system?
MS. SHAH: Objection; calls for speculation, asked and answered.
A. Again, I don't remember the details of this but, but offhand, just looking at page 40, there's 16 pages of specification, 11 pages of drawing. So I am guessing that is a description of the segmented beam system.
BY MR. RAFFETTO:
Q. What do you know about Gentex Corporation's IP

evaluation process?

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

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

BY MR. RAFFETTO:

Q. Who reviewed Mr. Alden's submission?

MS. SHAH: Objection; relevance.

A. I'm not sure who reviewed it.

BY MR. RAFFETTO:

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

A. No.

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

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

BY MR. RAFFETTO:

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

MS. SHAH: Objection; calls for speculation.

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

BY MR. RAFFETTO:

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

MS. SHAH: Objection; asked and answered.

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


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had.

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

THE VIDEOGRAPHER: Off the record, 1:07.

(Off the record at 1:07 p.m.)

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

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

MARKED FOR IDENTIFICATION:

DEPOSITION EXHIBIT 6

United States Patent US 2003/0137849 A1

(Alden)

1:48 p.m.

BY MR. RAFFETTO:

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

Do you recognize this?

A. Yes, I do.

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


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A. Yes.
Q. So Alden's about vehicle headlight systems, correct?
A. Yes, it is.
Q. Let's turn to Figure 1 of the Alden reference. So this depicts a vehicle which is labelled 31 employing an automatic segmented illumination means of Alden, correct?
A. Yes.
Q. Now, the car on the left of this figure appears quite large, taking up most of the road, correct?
MS. SHAH: Objection; vague.
A. I don't know exactly how to describe the size of the car here. I'm not sure I would say "taking up most of the road." It's a little hard to interpret 3D drawings like this specifically. So I'm not, I'm not sure if I would agree with that.
BY MR. RAFFETTO:
Q. Well, the car 31, at least in this illustration here, appears larger than the other cars in the illustration, correct?
A. Yeah, with the perspective view of 3D to 2D, it is larger in the 2D perspective of the, of the scene.
Q. Is it fair to say that this figure is just for illustrative purposes?
MS. SHAH: Objection; calls for


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speculation.
A. I don't recall if Alden states that it's just for such purposes but it is illustrating a certain situation that Alden states is relevant to this document.
BY MR. RAFFETTO:
Q. And it's fair to say this isn't intended to be an engineering diagram, correct?
A. I --
MS. SHAH: Objection; calls for speculation.
A. I have no way to know for sure what was intended here but I wouldn't expect that it was intended to be an engineering diagram.
BY MR. RAFFETTO:
Q. And, and why wouldn't you expect that?
MS. SHAH: Objection; vague.
A. Well, according to the specification, it's described as depicting a vehicle employing a system of the present -- present invention. So I think the main focus is to depict the vehicle -- vehicles. It doesn't seem to be intended to depict any particular components or details.
BY MR. RAFFETTO:
Q. So it's depicting a concept, is that fair?
MS. SHAH: Objection; calls for


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speculation, vague.

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

BY MR. RAFFETTO:

Q. Would you call it an illustration?

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

Q. Let's turn to paragraph 25 now.

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

A. Yes, that's right.

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

A. Yes, I see that.

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

Do you see that?

A. I see that.

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

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


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

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

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

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

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

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

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

A. In general, yes.

Q. Is Figure 2 drawn to scale?

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

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

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 pape -- 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.


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

MS. SHAH: Objection; asked and answered.

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

BY MR. RAFFETTO:

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

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

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

BY MR. RAFFETTO:

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

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

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

BY MR. RAFFETTO:

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


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

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

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

Why wouldn't it have surprised you?

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

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

MS. SHAH: Objection; vague.

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


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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:

Q. So they could be to scale?
MS. SHAH: Objection; asked and answered.
A. Yeah, I don't have any assumption about them.
BY MR. RAFFETTO:
Q. And so you don't likewise have any assumption in Alden as to whether the figures are to scale, correct?
MS. SHAH: Objection; vague.
A. Are you asking about all the figures or Figure 2?
BY MR. RAFFETTO:
Q. Let's talk about Figure 2.
A. My assumption would be that this one is to scale. It's showing a car on the right that's reasonably far away which is why the 2D projection of it is small.
And the, the viewpoint is very close to the headlight which is why the headlight in that structure is much larger in the 2D projection.
Q. Figure 2 shows the headlight 61, correct?
A. Yes.
Q. And that's the headlight of Alden system, right?
A. Yes.
Q. And how big do you think the diameter of that headlight is?
MS. SHAH: Objection; calls for speculation.
A. I don't know about that one in particular. It seems


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

BY MR. RAFFETTO:

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

A. I do, yes.

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

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

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

MS. SHAH: Objection; calls for speculation.

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

BY MR. RAFFETTO:

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

MS. SHAH: Objection; calls for speculation.

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

BY MR. RAFFETTO:


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Q. And you filed -- strike that.
Have you been a named inventor on any patents?
A. Yes, I have.
Q. How many would you say?
A. I think it's three. I don't remember for sure. Somewhere around there.
Q. And in any of those patents, did you include figures that weren't to scale?
A. I don't recall.
Q. Would it surprise you if you did?
A. It probably would surprise me no matter what I did because I just don't remember.
Q. So if Figure 2 is not, of Alden, is not to scale, can you still understand the concept of what is being depicted in that figure?
MS. SHAH: Objection; vague.
A. This figure is described as illustrating elements. And it, off the top of my head, it doesn't seem to me that -- well, I'd have to think more about what the implications of scale are in this figure. I'd have to -- I've not analyzed that. I'm just not sure.
BY MR. RAFFETTO:
Q. So now you are saying you are not sure if Figure 2 is to scale?


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

A. I don't think I said that.

BY MR. RAFFETTO:

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

A. So I answered that, right?

Q. You did not.

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

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

BY MR. RAFFETTO:

Q. You didn't answer it.

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

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

THE REPORTER: Mm-hmm.

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

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

BY MR. RAFFETTO:


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Q. Are you going to answer the question?
MS. SHAH: Objection.
A. I'm just trying to understand the situation.
MS. SHAH: If you could please let him, he's asking to have the court reporter read back to clarify he actually answered the question, so if you could let him do that.
BY MR. RAFFETTO:
Q. Do you want her to read back the question again?
A. So, in the question that was just read, you said something at the very beginning, like "as I asked" or "as I said," or I forget what it was, but that seemed to be referring to an earlier question, so that's the one I'd like to understand.
Q. Okay.
A. What was that question and did I respond to it?
Q. Okay. So I will remove the past tense and we can just use the present tense.
So my question is, if Figure 2 is not to scale, can you still under the concept of what is being depicted?
A. Okay. And I believe I --
MS. SHAH: Objection; asked and answered.
A. And I believe I answered that question.
BY MR. RAFFETTO:


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Q. Well, what was your answer?

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

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

THE REPORTER: Is that okay?

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

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

BY MR. RAFFETTO:

Q. I will read you your answer.

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

THE REPORTER: Sorry... "implications."

BY MR. RAFFETTO:

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

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


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

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

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

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

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

BY MR. RAFFETTO:

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

A. Yes, it does.

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

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

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

A. Yes. Correct.

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

A. Alden includes --

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

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


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BY MR. RAFFETTO:
Q. So the system includes sensors, correct?
MS. SHAH: Objection; vague.
A. Figure 2 does, yes.
BY MR. RAFFETTO:
Q. And if we stick with paragraph 26, Alden explains that "Vehicle 41," which is in Figure 2, "emits light 43 which passes through the primary lens 49 and falls upon one or more sectors within the detector array 51," correct?
A. Sorry, can you tell me where you are reading? I don't see the "one or more sectors."
Q. I think it's towards the beginning where it says, "A light emitting vehicle emits an emitted light 43 which passes through a primary lens therefore converging the 43 falling upon one or more sectors within a detector array."
Do you see that?
A. Yes, I do.
Q. So Alden explains that the vehicle 41 emits light 43 which passes through the primary lens 49 and falls upon one or more sectors within the detector array 51, correct?
A. That's right.
Q. And Alden then explains that "The detector array 51

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

A. Yes, that's right.

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

A. Yes.

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

A. Pretty much, yeah.

Q. All right. Let's look at Figure 3 of Alden now. Figure 3 is an illustration of the information flow processes and architecture of the elements described in Figure 2, correct?

A. Sorry, the architecture and what?

Q. The information flow processes and architecture of the elements described in Figure 2?

A. Generally, yes.

Q. And what does Alden mean by "illustrate" there?

A. Where --

MS. SHAH: Objection; calls for


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speculation.

BY MR. RAFFETTO:

Q. Let's look at paragraph 11 and 12.

A. That seems to generally mean presents a rendering of or a view of, something like that.

Q. Now, if we look at paragraph 27, that paragraph is discussing Figure 3 of Alden, correct?

A. Other figures, too, but yes.

Q. And Figure 3 shows a left sensor 51a and a right sensor 51b.

Do you see that?

A. I do, yes.

Q. If we look back at paragraph 27, Alden explains that "The left sensor 51a detects the two headlights of the vehicle 41 in Figure 2 at a first illuminated spot 43a and a second eliminated spot 43b respectively," correct?

A. I see where that's written, yes.

Q. And Alden also explains that "The spots 43a and 43b represent spots of lights that fall upon a photon detector array," correct?

A. Yes.

Q. And Alden explains that "Electrons corresponding to the position and intensity of light are categorized by a logic and CPU 71 and stored in a memory 72."

Do you see that?

A. I do see that.

Q. What does the term "categorized" mean here?

MS. SHAH: Objection; calls for speculation.

A. Well, when I have read this, I felt that Alden is somewhat ambiguous about this because it says, as you read, that the sensors themselves detect the headlights, or the sensor in this case, 51a, and then says electrons coming from the sensor are categorized which doesn't make a lot of sense to me. So I'm not really sure what Alden is trying to say here.

BY MR. RAFFETTO:

Q. Now, Alden also indicates that, "The right sensor 51b functions the same way as the left sensor 51a," correct?

A. Essentially the same, yes.

Q. And if we look back at Figure 3, that shows a left control circuit 55a and a right control circuit 55b.

Do you see that?

A. Yes.

Q. And in paragraph 27, Alden explains that the left control circuit 55a and the right control circuit 55b each is a switch array.

Do you agree?


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A. Where are you reading?
Q. I think it's towards the bottom of page 2, paragraph 27 is where it references the switch arrays.
MS. SHAH: Objection; vague.
A. Yeah, I'm just a little confused now by the question because the "switch array" words here don't have a number associated with them. So maybe I'm just not sure what the question is.
BY MR. RAFFETTO:
Q. Well, if we look back at Figure 3, and we look at the control circuits 55a and 55b. Do you see those?
A. Yes, I do.
Q. And there's an area that's shaded. Do you see that?
A. Mm-hmm. Yes.
Q. What's your understanding of what the shaded areas represent?
A. My understanding of what Alden wants those to be are the areas where the area in each headlights wherein the light will be dimmed.
Q. And if we look back at paragraph 27, which we were just looking at, towards the bottom on page 2, it says that, "The left shaded circuit area 75 indicates the areas of the switch array switches that will cause portions of the left headlight to be dimmed," correct?
A. Yes, it does say that.

Q. And the right shaded circuit area 79 likewise indicates the switches that will cause the portions of the right headlight to be dimmed, correct?
A. 77, not 79, but otherwise, yes.
Q. So I'm referring to the right light control circuit which is where 79 is.
A. What were you just reading says 77, the bottom of page 2, the right column. I think that's where you were reading.
Q. Yeah, I think, originally, I was asking about the left shaded circuit area 75.
A. Well, maybe you just moved ahead and I didn't notice.
Q. Yeah, that's okay.
A. I understand.
Q. Yeah. And you agree that the shaded areas are more than just the dots that represent the headlights of the vehicle?
MS. SHAH: Objection; vague, calls for speculation.
A. It seems that that's what Alden wants them to be as shown in this figure.
BY MR. RAFFETTO:
Q. And this, and the switches that we're looking at here, this is a two-dimensional array depicted in Figure 3, right?


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A. In, in this figure, yes.
Q. Now, in paragraph 77 of your Declarations, maybe we could look at Exhibit 2, and this is the 1039 Declaration?
A. Paragraph 77?
Q. Yes, sir. At page 87.
A. Mm-hmm.
Q. Last sentence in paragraph 77, you state that, "Alden specifically states that the switch arrays of the light control circuits 55a, 55b shown in Figure 3 are merely for illustrative purposes," correct?
A. I see that, yes.
Q. Now, if we look back at Alden, in paragraph 27, there's a statement there that says, "The shaded areas of 55a and 55b are for illustrative purposes," on page 3 of Alden sort of towards the bottom of paragraph 27 in a parenthetical.
A. Yes.
Q. And so my question is, in your Declaration, when you say that, "Alden specifically states that the switch arrays are for illustrative purposes," are you referring to that parenthetical that indicates that the shaded areas of 55a and 55b are for illustrative purposes?
A. I'm referring both to that specific statement -- let's

see -- sorry, scratch that.

Yes. I am referring to that statement.

Q. Now, let's look back at Figure 3. Figure 3 depicts a non-shaded area 77 in the left control circuit 55a, right?

A. Yes.

Q. And it also depicts a non-shaded area 81 in the right control circuit 55b, correct?

A. Is it 81 or 79? I can't tell. I think it's 79.

Q. Okay. But we can agree that there's a non-shaded area in that right control circuit regardless of the reference numeral?

A. In that figure, yes.

Q. And what's, what's your understanding of what these non-shaded areas represent?

A. I think Alden wants them to represent the bright headlights, head beams, bright beams.

Q. Now if we look towards the end of paragraph 27, Alden discloses that, "The control circuit 55a controls the power flow from 73 to a less segmented headlight 83 which distributes high beams throughout its distribution areas except in a box in the direction of the vehicle 41," correct?

A. Yes, I see that.

Q. And Alden further discloses that, "The control circuit


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55b controls the power flow from 73 to a right segmented headlight 85 which distributes high beams throughout its distribution areas except in a box in the direction of the vehicle 41," correct?

A. That's how he's describing that figure, yes.

Q. And so, "as a result, the driver of vehicle 41 has minimum glare while the driver of vehicle 47 has maximum light," correct?

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

A. That's what that sentence says, yes.

BY MR. RAFFETTO:

Q. So let's move on to Figure 4 of Alden.

Figure 4 shows a flow chart describing the logic of the control process described in Figure 3, correct?

A. I believe that's the intent, yes.

Q. And you agree that paragraph 28 of Alden discusses Figure 4, correct?

A. Yes.

Q. Now, in paragraph 28, Alden discloses that "The CPU checks the status of each respective sector of the light sensors," correct?

A. That's what it says there, yes.

Q. So let's look at Figure 4.


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Do you see 89 which says, "Is Threshold Light Present At A1L Sensor Position?"

A. Yes.

Q. And so Alden there is talking about evaluating threshold light at a sensor position, correct?

A. That seems to be right.

Q. And then 90 -- still in Figure 4, referenced numerals 91, 93, 95. They also talk about checking threshold light at other sensor positions, right?

A. They do.

Q. And Alden further discloses that a left map and a right map will be compiled, correct?

A. Like all of these steps we've been discussing except the first, they might happen. They won't necessarily happen because there are two directions coming out of each of those boxes but those might happen.

Q. Well, if we look at Figure 4, it says in step 97 "Compile Left Sensor Map," correct?

A. Right, but a flow chart may never get there, so that's why I mean that it might happen, but not always.

Q. Do you mean because threshold life isn't present or something else?

MS. SHAH: Objection; vague.

A. Well, Alden is not specific about this, doesn't provide details that I actually think are necessary to


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understand this figure thoroughly, but it seems to be that the arrows going down are answering the question in the positive.

And the arrows going to the right are answering the question to the negative which would be the typical thing for this kind of a flow chart.

And so at each decision point, there is a possibility of either going down or to the right. And if you go to the right, you, you never compile the left sensor map or the right sensor map.

So the way the logic works here is, if any sensor position does not have a threshold light present, the left and right sensor maps are not compiled.

Q. And you are making that determination based on Figure 4?

A. That is my understanding of Figure 4, yes.

Q. Now, if we look back at paragraph 28, though, sort of in the middle, it specifically says, "A left map of sense light is stored in 97 -- stored 97 in memory and a right map of sense light is stored in memory 99," correct?

A. Yeah, it does say that but the actual flow charts indicates that sometimes that may happen, but not all the time.


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Q. Do you agree that the left map would, if it's compiled, would reflect the amount of light received at each sensor position in the left headlight?

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

A. Will you repeat that, please?

BY MR. RAFFETTO:

Q. So the question was, you agree that the left map, if it's compiled, reflects the amount of light received at each sensor position in the left headlight?

MS. SHAH: Objection; same set of objections.

A. So described as maps of sensed light, I don't believe Alden describes that any further, at least I don't recall that. So that I would say they are intended to be maps of sensed light.

BY MR. RAFFETTO:

Q. Right. And there's one in the left headlight and one in the right headlight, correct?

A. That's correct.

Q. Now, the amount of light received at each sensor position, it could come from any source, correct?

MS. SHAH: Objection; vague.

A. I wouldn't say it could come from any source. Physically, any sources would be impossible, to reach


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that.
BY MR. RAFFETTO:
Q. Well, it could come from different types of sources, is that fair?
A. Yes.
Q. It doesn't just have to come from vehicle headlights, correct?
A. That's correct.
Q. So, one example of another source could be two people walking down a road with flashlights facing the sensors, correct?
MS. SHAH: Objection; calls for speculation, vague.
A. I believe that's correct.
BY MR. RAFFETTO:
Q. Now, if the light coming from those flashlights is below the threshold in Alden, Alden wouldn't consider those two people with flashlights another vehicle, correct?
A. I believe that's correct.
Q. And so it wouldn't dim the light in the area of those two people, correct?
A. That's correct. And similarly, if they were above the threshold, it, it would do that.
Q. Now, going back to paragraph 28, Alden further

discloses that "The CPU compares the right map to the left map to determine the distance and intensity of each object sensed in a calculating process," correct?

A. I apologize. May I ask you a favor?

When you are telling me a paragraph and just start reading, it takes me a while to find it --

Q. Yeah, sure.

A. -- and these are long paragraphs, so if you can help me out, I'd appreciate it. But anyway, I found that.

Q. You found that.

A. Yes.

Q. I'll give you some more direction, yeah.

A. Thank you.

Q. So I'll repeat the question. So towards the, about halfway through the paragraph 28, "Alden further discloses that the CPU compares the right map to the left map to determine the distance and intensity of each object sensed in a calculating process," correct?

A. I do see that. And when I have read that before, I've noted there is no, no further information about how that comparison could work, but yes, I do see that sentence.

Q. And Alden goes on to say, sticking in the same area, that "A triangulation process 105 is used to determine the distance of each object," correct?

A. I see that, yes.
Q. And is it fair to say that the term "each object" here indicates there could be multiple objects?
A. Not at one time but, at different times, there could be different objects.
Q. But if we look at the next sentence, it says, "The location of objects is used to calculate which zones of each headlight need to be dimmed."
Do you see that?
A. I do see that.
Q. So, isn't it fair to say that Alden here is saying that the location of the objects can be used to calculate the specific zones that need to be dimmed, plural "objects"?
A. It does say plural "objects." And again, it means one object at one point in time and later, perhaps, a different object. There is no teaching here of multiple objects at the same time.
Q. So you read that sentence in paragraph 28, two-thirds of the way through that I just read, you read that to mean one object at a time, correct?
A. Yes, I think that's what's indicated.
Q. And so what you are saying is that, if there is two objects in the field of view of Alden, Alden can only dim the light to one of those detected objects?

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

A. Well, what I expect from the, whatever information Alden does present about this process is that it wouldn't know what to do in such a case or, or maybe it would just take the first two dots or something. It gives no information about that scenario.

BY MR. RAFFETTO:

Q. Now, that sentence, though, that we are looking at in paragraph 28, that doesn't read "the location of objects is used to calculate which zone of each headlight to dim," correct?

MS. SHAH: Objection; vague.

A. Correct. I think object A, at some point in time, is going to have a zone associated with it if this works. Object B, at another point in time, would have another zone associated with it, if this works. So that's talking about zones.

BY MR. RAFFETTO:

Q. But that sentence that we are looking at says nothing about dimming the light to an object one at a time, correct?

A. Remind me which sentence we're talking about.

Q. We're talking about the sentence that says, "The location of objects is used to calculate which zones


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of each headlight needed to be dimmed:

A. Right. It doesn't use the phrase "one at a time" but it's describing the process that Alden describes here which only does one at a time.

Q. Now, if we look though at the next sentence, it says, "Signals are sent to each of the headlight control circuit zones," plural, "that need to be dimmed," correct?

A. It does read that way, yes.

Q. So, again, this doesn't say anything about dimming just one zone, correct?

A. It doesn't use the phrase "one zone," but again, this language is describing the process in Alden which is only one at a time. There is no teaching any information about doing otherwise.

As an analogy, I could say I shook hands with all the people in this room and that would not imply that I shook all of them simultaneously. I don't know if that's a good analogy or not but just to try to help.

Q. But with that analogy, that doesn't mean it could exclude the other way either, right?

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

A. Well, it's just an analogy, but if I had not otherwise


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described that I had multiple arms or something like that, I think it would be clear that it was not simultaneous.

BY MR. RAFFETTO:

Q. So -- okay. If we go back to paragraph 28 of Alden, Alden discloses that, "In each calculating process, based on the location of the sensed objects, signals are sent to each of the headlight control circuit zones that need to be dimmed to dim those portions of the headlight," correct?

A. Sorry, I couldn't find you.

Q. Yeah. We -- this is what we just talked about already.

A. Where are you?

Q. Towards the bottom, about two-thirds of the way through.

A. Okay. Sorry, there's not a question, is there?

Q. Yeah, I will repeat it because we had that exchange. So the question was, and we talked about this a little bit earlier, and I'm just reiterating, with the calculating process, each time, based on the location of the sensed objects, signals are sent to each of the headlight control circuit zones that need to be dimmed to dim those portions of the headlights, correct?


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A. Right.
Q. And then the last sentence in paragraph 28 says, "The process begins again so as to be responsive to changing environmental conditions in real time," correct?
A. Yes.
Q. And so you agree that the process in Figure 4 is a real time process, correct?
MS. SHAH: Objection; vague, calls for speculation.
A. I, I agree that Alden wants it to be.
BY MR. RAFFETTO:
Q. When you say "Alden wants it to be," do you mean that's what Alden is disclosing on the page here?
MS. SHAH: Objection; vague.
A. What I mean is he's describing it to be responsive in real time. Whether it would actually do that is a different question because there aren't many details about how this works.
And as I've described before, some of the details seemed to be what I would call not functional. So I do believe that's what he wants. I'm not sure that's what the system would actually do.
BY MR. RAFFETTO:
Q. What do you consider to be "changing environmental


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conditions in real time"?

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

A. I don't know specifically what Alden means by that here.

BY MR. RAFFETTO:

Q. Could a changing environmental condition include an oncoming vehicle as it continues to move closer to a vehicle equipped with Alden's system?

MS. SHAH: Objection; calls for speculation.

A. Again, I, I don't really know what Alden means by that here. I don't believe that is defined elsewhere, but if it is, please point me there.

BY MR. RAFFETTO:

Q. All right. Let's look at Figure 5 of Alden. Are you with me?

A. Yes.

Q. Now, Figure 5 shows an array of individual lighting elements, correct?

A. Yes, it does.

Q. And paragraph 29 of Alden discusses Figure 5, correct?

A. Yes.

Q. And if we look towards the beginning of paragraph 29, we see that Alden indicates that "the lighting


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elements can be LEDs," right?
A. Yes.
Q. And at the top of the second column, Alden also discloses that "each lighting element is independently controlled by a corresponding switch in an array of switches," correct?
A. That's right.
Q. So, Alden is saying here that there is one switch for each LED, correct?
A. I believe so, yes.
Q. So if there were nine LEDs, you would have nine switches, right?
A. I believe so.
Q. And if there were 27 LEDs, there would be 27 switches, right?
MS. SHAH: Objection; calls for speculation.
A. There should be, yes.
BY MR. RAFFETTO:
Q. Now, if we continue on in paragraph 29, the next sentence, Alden further discloses that "each switch is controlled by the CPU and logic previously described," correct?
A. I see that, yes.
Q. And the CPU and logic was previously described in


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paragraph 28 in relation to Figure 4, right?

MS. SHAH: Objection; calls for speculation.

A. Can you repeat that specific question, please?

BY MR. RAFFETTO:

Q. And the CPU and logic was previously described in relation to Figure 4 in paragraph 28, correct?

A. Figure 4 in paragraph 28 describes a CPU and logic. It's unclear to me if Alden intends these to be the same in, in the paragraph we're looking at now because I don't think they would work if they were the same.

Q. So you would agree that in paragraph 29, it's referencing CPU and logic previously described, correct?

A. Yes, it does say that.

Q. And it's true, isn't it, that the only CPU and logic previously described is in paragraph 28 and 27, correct?

MS. SHAH: Objection; calls for speculation.

A. I believe that's the only previously described CPU and logic.

BY MR. RAFFETTO:

Q. And if we look at paragraph 29 still, it goes on to say, a couple sentences on, that the "power to 119 is


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controlled by the CPU which dictates its respective switch characteristics at 115 such that the power from a power supply 113 carried via segment wire 117 is controlled in response to the sensed environmental conditions," correct?

A. I do see that, yes.

Q. Let's turn to paragraph 59 of Alden. If you look at that paragraph, there's a heading there that says Conclusion, Ramifications and Scope.

Do you see that?

A. Yes.

Q. So is it fair to say that Alden here is providing a conclusion or a sum-up of what he believes his intention is?

MS. SHAH: Objection; calls for speculation.

A. I really don't know what was in his mind but the words you read are the title there, or it seems like maybe they are a title.

BY MR. RAFFETTO:

Q. And if we look at the last sentence of that paragraph, Alden states that, "The independently controlled lights" -- oh, I'm sorry, strike that.

If you turn to paragraph 61 and we look at the last sentence of that paragraph, Alden states


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that, "The independently controlled lights in a system can be operable within a range of intensities between high beam and low beam state."

Do you see that?

A. I do see those words, yes.

Q. So, is it fair to say that what Alden was teaching here is that his system can be operable within a range of intensities and not just high beam and low beam?

MS. SHAH: Objection; calls for legal analysis, speculation, vague.

A. My understanding of this is that Alden perhaps hopes that that would be the case, but there's absolutely no details in this document about how that could work. And I think there are a lot of questions about whether it would work and how it could work, but it does seem to be his hope.

BY MR. RAFFETTO:

Q. If we look at paragraph 36 of Alden, he talks about Figure 11, right?

A. Yes.

Q. And there, he says that "Figure 11 illustrates the art of the present invention being used to concentrate light to look around corners in response to road conditions," right?

A. That's what it says, yes.


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Q. And this paragraph doesn't mention any specific embodiment in Alden, correct?
A. That's correct. It mentions neither an embodiment or how this would actually work.
Q. Okay.
MR. RAFFETTO: Let's go off the record.
THE VIDEOGRAPHER: Off the record, 3:11.
(Off the record at 3:11 p.m.)
(Back on the record at 3:17 p.m.)
THE VIDEOGRAPHER: Back on the record, 3:17.
BY MR. RAFFETTO:
Q. Dr. Turk, do you agree that an array can be two-dimensional?
MS. SHAH: Objection; vague, calls for speculation, incomplete hypothetical.
A. Generally, it can be and it can also be one-dimensional.
BY MR. RAFFETTO:
Q. But it can be two-dimensional?
MS. SHAH: Objection; asked and answered objection.
A. It can be; it can also be one-dimensional.
MR. RAFFETTO: I don't have any further questions.


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MS. SHAH: I don't have any redirect.

MR. RAFFETTO: Okay.

THE VIDEOGRAPHER: Okay. This completes the deposition of Dr. Matthew Turk.

Off the record, 3:18.

(The Video Recorded deposition was concluded at 3:18 p.m. Signature of the witness was not requested by counsel for the respective 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



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