SUPERIOR COURT OF THE STATE OF CALIFORNIA

COUNTY OF SANTA CLARA

SZ HUA HUANG, Individually and as successor in interest to WEI LUN HUANG, deceased; TRINITY HUANG, a minor; TRISTAN HUANG, a minor; HSI KENG HUANG; and CHING FEN HUANG, Plaintiffs, vs. TESLA INC. dba TESLA MOTORS, INC., THE STATE OF CALIFORNIA, and DOES 1 through 100, Defendants.	Case No. 19CV346663

REMOTE VIDEOTAPED DEPOSITION OF

ASHOK ELLUSWAMY

Thursday, June 30, 2022

STENOGRAPHICALLY REPORTED BY:
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Videotaped Deposition of ASHOK ELLUSWAMY, held remotely before Rhonda Hall-Breuwet, Registered Diplomate Reporter, Certified Realtime Reporter, Certified Shorthand Reporter (CA and TX), Licensed Court Reporter (TN), Certified Court Reporter (GA, LA, NV, and WA), Florida Professional Reporter, and Notary Public of the State of Florida.

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WITNESS: ASHOK ELLUSWAMY

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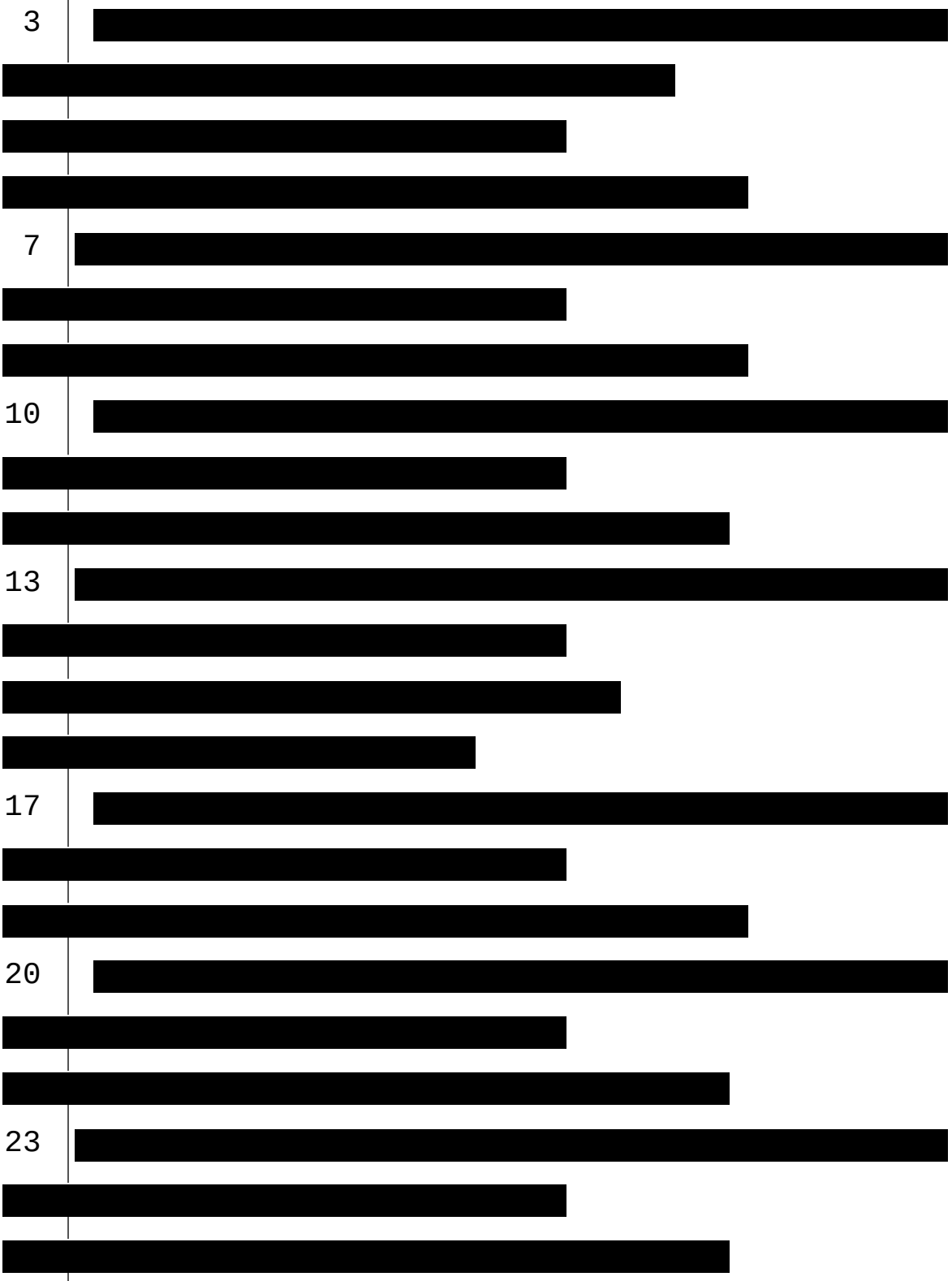

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[redacted]

(Exhibit Number 179, First Amended Notice of Taking Videotaped Deposition of Ashok Elluswamy and Request for Production of Documents, was premarked for identification.)

THE VIDEOGRAPHER: We are on the record. My name is Elijah Ochoa, and I am contracted by Steno. I'm not financially interested in this action, nor am I a relative or an employee of any of the attorneys or any of the parties.

Today is June 30th, 2022, and the time is 10:08 a.m. Pacific Time. This video deposition is taken remotely via MS Teams. The name of the case is Huang, et al., versus Tesla Inc., et al., filed in the Superior Court of the State of California for the County of Santa Clara, Case Number 19CV346663.

This is the video-recorded deposition of Ashok Elluswamy, Volume 1. The attorney taking this deposition is Andrew McDevitt.

Would the attorneys please introduce themselves and state who you represent.

MR. McDEVITT: Andrew McDevitt for plaintiff.

MR. BRANIGAN: Tom Branigan from the Bowman and Brooke law firm for Tesla Inc.

MS. MILLER: Lauren Miller for Tesla Inc.

MS. LOVE: This is Rosemary Love for the Department of Transportation.

THE VIDEOGRAPHER: We are ready to proceed. The court reporter today is Rhonda Breuwet with Steno.

Will the reporter please swear in the witness.

CERTIFIED STENOGRAPHER: Raise your right hand, please.

Do you solemnly swear the testimony you are about to give will be the truth, the whole truth, and nothing but the truth?

THE WITNESS: Yes.

MR. McDEVITT: And before we begin, I wanted to note that Greg McCullough, who's a consultant for plaintiffs, is also in the Teams meeting.

And then, Tom, if there's anybody else here from Tesla, can you just announce that, please.

MR. BRANIGAN: Yeah. Ryan McCarthy and Lindsay Adams-Hess are hooked into the deposition remotely.

ASHOK ELLUSWAMY

acknowledged having been duly sworn to tell the truth and testified upon his oath as follows:

///

DIRECT EXAMINATION

BY MR. McDEVITT:

Q. Good morning.

A. Good morning.

Q. Please state your full name for the record.

A. My full name is Ashok Kumar Elluswamy.

Q. Mr. Elluswamy, have you ever had your deposition taken before?

A. Yes.

Q. How many times?

A. Twice.

Q. And did both of those depositions occur in connection with lawsuits against Tesla?

A. Yes.

Q. Tell me your -- go ahead.

A. I'm not sure if it's against or -- it involved Tesla.

Q. Okay. Tell me your understanding of the underlying facts for each of those two cases.

A. The first case was in relation to IP conflict issue. The second one was related to a crash in Florida.

Q. Was the -- the second deposition, the one in Florida, was that in the Banner case?

A. Yes.

Q. And then the first case you mentioned, was that a lawsuit that Tesla brought against a former employee who allegedly took trade secret information?

A. Yes.

Q. What is your current job position with Tesla?

A. I'm a director of software.

Q. Director of Autopilot software?

A. Yes.

Q. How long have you been the director of Autopilot software?

A. I believe since mid-2019.

Q. And I'm going to pause for a moment and go over a few more rules related to the deposition. I presume you've already heard these things, but I just want to make sure that we all have the same understanding. Okay?

So the first -- you gave me a good intro there -- is your responses need to be verbal. So although I understood when you nodded your head, that doesn't come across on the transcript. So please make an effort throughout today to respond verbally. If you forget to do so, I will prompt you. I'm not trying to be rude. It's just so that

we have a clear and accurate record.

Okay?

A. Understood.

Q. I don't want you to guess. I don't want you to speculate. I obviously don't want you to make things up in response to my questions.

Do you understand that?

A. Yes.

Q. Do you understand that the instruction I just gave you about not guessing and not speculating, that applies for the entire deposition?

A. Yes.

Q. Okay. And do you feel like you will be able to remember that throughout today's deposition, that you don't need to be reminded not to guess or speculate; correct?

A. Yes.

Q. If you don't understand one of my questions, please let me know, and I will either have the court reporter read it back if I think the question is clear, or I will reword the question.

I'm going to do my best to ask you questions that, from my perspective, are understandable and answerable, but I don't know if you -- you know, for some reason you might not understand the way I word

a question; so I'm going to rely on you to let me know. Okay?

A. Yes.

Q. You understand that you are under oath today?

A. Yes.

Q. Okay. And you appreciate that the oath that you took today carries with it the penalty of perjury?

A. Yes.

Q. This may or may not be obvious to you, but today's deposition is being videotaped -- or video recorded. Okay?

A. Yes.

Q. And just so you have a full appreciation of the significance of that, the deposition being video recorded means that if this case goes to trial, portions of the questions that I ask you and your answers could be shown to the jurors in court on a large screen with speakers.

Okay?

A. Yes.

Q. If you need a break for any particular reason, let us know. We'll generally try to take a break every hour. Okay?

A. Understood.

MR. BRANIGAN: Andrew, can I interject? Since you mentioned breaks, Mr. Elluswamy told me before we get started that he will need to take a short break around 11:30ish for a business point. I don't think it'll take very long, but I wanted to make you aware of that.

MR. McDEVITT: Thanks. That's fine. Okay.

BY MR. McDEVITT:

Q. Okay. If you answer my questions during the deposition today, I'm going to believe that you heard the question, you understood the question, and you're providing a truthful response.

Fair enough?

A. That's fair.

Q. All right. When did you first start working for Tesla?

A. Since Jan. 2014.

Q. And you have a somewhat unique story about how you got hired; right?

MR. BRANIGAN: Objection. Form. Vague.

Go ahead, if you can answer, if you understand it.

THE WITNESS: I understand it. I'm not sure if it's unique. I have some story, yeah.

(Stenographer requests clarification.)

THE WITNESS: I understand it. I'm not sure if it's unique, but I have -- I'm not sure I'd call it a story. It is something, yeah.

BY MR. McDEVITT:

Q. Okay. Can you describe for us the circumstances that led to you getting hired to -- hired by Tesla, starting with the tweet you saw by Elon?

A. Yeah. In 2013, Elon had tweeted publicly that he's hiring for the Autopilot team. So I applied in response to that, and that's how the interview process started.

Q. And is it your understanding you were the first person to be hired in response to the particular tweet that Elon -- that Elon issued in 2013?

A. I believe from the outside, that is true. I think there were internal engineers who already had been working on Autopilot even before I started.

Q. Describe for us what the tweet stated.

A. I don't precisely recall.

Q. What was your understanding of what Elon Musk was communicating by his tweet, the one that you responded to?

A. My understanding was that Tesla was starting an Autopilot team, and it was an open call for engineers to apply.

Q. And when you started with Tesla, what was your job title?

A. I believe it was software engineer.

Q. Let me back up for a moment. Can you tell us your -- your educational background, and just tell us what your bachelor's was in and what your master's was in and where you obtained those two degrees.

A. My bachelor's was in electronics and communication. I got it from college of Engineering Guindy in India, and then I did my master's in robotic system development. That was from Carnegie Mellon University in Pittsburgh.

Q. What year did you complete your studies at Carnegie Mellon?

A. December 2013.

Q. And you worked for WABCO Vehicle Control Systems for a period of time; correct?

A. Yes.

Q. When did you work for WABCO?

A. I believe it was from 2010 until 2012.

Q. On your LinkedIn page, it states that at

WABCO you worked in the vehicle dynamics and control group.

Is that accurate?

A. That's correct.

Q. And you worked on brake actuation modules to establish real-time performance guarantees of actuators?

A. Yes.

Q. What does that mean?

A. The brake actuators have software in them to actuate, for example, ABS systems, which kick in when the brakes are at the limits of the traction, so sort of like pulse the brakes to get more traction and things like those. There's a bunch of software regarding such systems, and I worked on making sure that the algorithms there and the compute are scheduled in a manner that fit inside the time budget.

For any real-time system, it needs to produce its outputs within a certain amount of time.

(Stenographer requests clarification.)

THE WITNESS: I can repeat.

For any real-time system, the software has to produce the outputs within a certain amount of time in order to be effective. I worked on the

software that schedules that and also reports any failures to meet the deadline. There's a long list of things, but that's roughly the idea.

BY MR. McDEVITT:

Q. While you were at WABCO, did you have any involvement in design, development, or testing of automatic emergency braking systems?

A. No.

Q. After WABCO, you spent some amount of time for -- working for Volkswagen's Electronic Research Lab; correct?

A. Yes.

Q. And can you describe for us what you did while working at Volkswagen Electronic Research Lab.

A. I was working on their autonomous driving research platform. And, specifically, there is a module called "localization" which helps the car understand where it is with respect to a prebuilt map. I was working on that localization system.

Q. Did the localization system utilize GPS?

A. It does use GPS, I believe, but I was not involved in that part of the system.

Q. What part of the system did you work on?

A. I was trying to use camera features such as lane lines and such to help with localization.

Q. And in simple or ordinary language, can you please describe for us what "localization" means.

A. Back then, one of the strategies to do autonomous driving was to build a map up front with precise locations of obstacles. And then when the car needs to drive the road, it localizes itself in the map so that used precise location of the car and its heading in a prebuilt map. And now that you have a map and you know the location of the car on the map, you can then also know the location of the obstacles with respect to the car, and that helps the car navigate around the scene while avoiding obstacles.

[redacted]

Q. Give me one moment.

Okay. I'm going to show you what was

previously marked as Exhibit 152.

Hold on.

MR. BRANIGAN: It's either not working, or it's a picture of all of us.

MR. McDEVITT: No, I'm -- it was giving -- only giving me the option to, like, show the screen that we were already looking at. So I was trying to change that.

MR. BRANIGAN: There we go.

MR. McDEVITT: Okay. Are you able to see Exhibit 152?

MR. BRANIGAN: It's very, very small.

MR. McDEVITT: Is that any better?

THE WITNESS: That's better, but I can only see parts of it.

BY MR. McDEVITT:

Q. Okay. Do you see this exhibit says "Upgrading Autopilot: Seeing the World in Radar"?

A. I can read that here.

Q. Okay. Do you see it's dated September 11th, 2016?

A. I see that.

Q. Are you familiar with this blog post?

A. I don't recall this blog post.

Q. Okay. I'm going to show you -- on the

second page, the last sentence refers to a geocoded whitelist.

Do you see that?

MR. BRANIGAN: Can you see it okay?

THE WITNESS: Yes, I can see it.

MR. BRANIGAN: All right.

BY MR. McDEVITT:

[redacted]

Q. Okay. And let me just pause for a moment.

So for Autopilot, through today, there is Hardware 1, Hardware 2, Hardware 2.5, and Hardware 3.0 in terms of production vehicles; correct?

A. That is correct.

Q. And Hardware 1, that Autopilot system used components by Mobileye; correct?

A. Yes.

Q. And did Hardware 2 -- as far as you understand it, was that the first version that -- of Autopilot that utilized Tesla's in-house design?

A. Yes.

Q. And what's your understanding of the

difference between Hardware 2.0 and Hardware 2.5?

A. I believe the hardware had one more GPU in it. And then secondly, the camera modules had some differences in the Bayer pattern.

Q. I'm sorry. The last two words you said, the what pattern?

A. Cameras have a thing called "Bayer pattern." That's how they register color and brightness. There were some differences. I believe the Hardware 2 cameras had a red, clear, clear, clear pixel arrangement, but the Hardware 2.5 had a red, clear, clear, green arrangement.

Q. Okay. Now shifting to Hardware 2.0, with hardware 2.0, did Autopilot at any point in time utilize the strategy of having map data and localizing the vehicle as part of the scheme for Autopilot to work?

A. Will you please repeat the question?

Q. Yes.

So you mentioned your work at Volkswagen having to do with localizing a vehicle within a predefined map; correct?

A. Is your question did I work on localization with respect to a map at Volkswagen?

Q. For now, yes, that's the question.

A. Yes.

[redacted]

Q. And you understand "hw-2" to refer to Hardware 2?

A. Yes.

Q. And tell us what Autosteer is.

A. Autosteer is part of the Autopilot feature set where, when turned on, the car would stay within the lanes.

Q. What is the difference between Autosteer and the feature called "ALC," or automatic lane change?

A. I think there is --

MR. BRANIGAN: Let me just object to the overly broad nature of the question.

But go ahead.

THE WITNESS: Yeah, my understanding is Autosteer is referring to the auto's functionality, and automatic lane change is part of it. Auto -- when turned on, Autosteer tries to keep the car inside the lane, and automatic lane change triggers when the driver puts on their blinkers to request a lane change, and then the car attempts to complete the lane change.

BY MR. McDEVITT:

Q. Okay. And there's -- in addition to automatic lane change, there is a functionality called "uncommanded lane change"; correct?

A. Yes, that's correct.

Q. Or also referred to as "ULC"? True?

A. Yes, that's correct.

Q. Describe the difference between automatic lane change and uncommanded lane change.

A. The automatic lane change, the driver presses the blinker stalk to request a lane change to the left or the right. And then once requested, the system would then -- when it thinks it's appropriate, plans the lane change maneuver and executes it.

In the ULC case, the system can trigger such lane changes based on some conditions and then can automatically execute that lane change as well. It does require -- I believe the software does require the driver to be hands-on or sometimes confirm such requests.

Q. Okay. And with respect to the uncommanded lane change, depending on what market you're in or depending on what time period we are referring to, the vehicle may or may not require the driver to acknowledge and confirm the lane change that the vehicle is about to perform; correct?

A. The question was too long. I am not able to follow. Could you please repeat?

Q. Okay. So for the uncommanded lane change, initially when that was introduced, before the Tesla would change lanes, the driver had to acknowledge or confirm that the driver was okay each time the Tesla was going to prompt its own lane change; right?

A. Yes.

Q. Then there has been a period of time where the uncommanded lane change feature will automatically function, meaning that it will initiate a blinker activity and move the vehicle over without any input from the driver. True?

A. In the Navigate on Autopilot feature set, it still requires hands-on. So the -- they don't need to confirm, but they need to have their hands on the steering wheel. At least that's my understanding. I'm not sure what the current cointegration is.

Q. Now, going back to Exhibit 183 -- well, actually, let me ask you a few more questions about Autosteer.

In the -- in certain versions of the Tesla manual, it describes Autosteer the following way: Autosteer intelligently keeps a Tesla in its driving lane when cruising at a set speed.

Is that an accurate description of Autosteer?

A. Yeah, I think so.

Q. Another description of Autosteer indicates that Autosteer detects lane markings and the presence of vehicle objects to steer a Tesla.

Is that an accurate description of Autosteer?

A. One could say so.

Q. Okay. In terms of Autopilot, the most basic Autopilot is a combination of Traffic-Aware Cruise Control and Autosteer; correct?

A. I think so.

Q. And Traffic-Aware Cruise Control will automatically accelerate or brake in response to traffic moving in front of the Tesla?

A. Yes.

Q. And then Autosteer -- you described Autosteer will keep the Tesla -- or the objective of Autosteer is to keep the Tesla within the lane that the Tesla was in at the time that the driver activated Autosteer; correct?

A. That's what it tries to do.

Q. Okay. And now getting back to Exhibit 183, the ticket says:

"Autosteer pulls towards almost every exit."

Do you see that?

A. Yes.
Q. And do you see under the "Watchers" field, you are listed as one of the watchers?
A. Yes.
Q. Okay. And that means that when the ticket -- the Jira ticket was created, you would be one of the people to receive an email indicating that the ticket had been created; correct?
A. I think so.
Q. That also means that whenever a person would add a comment, you would receive an email with the text of the content -- the comment; correct?
A. I think it's possible. I do not have -- I do not know what setting I have for the notifications for the ticket.
Q. Okay. Fair enough.
With respect to Autosteer, the -- let me back up.
So we talked about the uncommanded lane change feature, and with the uncommanded lane change, am I correct that one of the functionalities includes the Tesla leaving the lane that it is in to go off to take an exit?
A. Yeah, if the navigation route suggests that some exit must be taken, I believe it tries to take

that exit off the highway.

(Stenographer requests clarification.)

THE WITNESS: Tries to take that exit off the highway.

BY MR. McDEVITT:

Q. Before Navigate on Autopilot was released to the public, there were no occasions where Autosteer was designed to leave the freeway by taking an exit; correct?

A. Before Navigate on Autopilot, there was no intent to follow some kind of navigation route. So it might not intentionally choose some exit to follow the route.

Q. Okay. But if we're just -- let's just focus on Autosteer. If you're -- if we're talking about Autosteer, if there's no automatic lane change initiated and there's no uncommanded lane change initiated, Autosteer is intended to remain in a single lane of travel; correct?

A. Autosteer generally attempts to stay in the lane.

Q. Okay. And from the Autopilot software development side, to the extent the team learned of instances where Autosteer did not stay within the lane, the team would create tickets to flag that

activity; correct?

A. Generally, yes.

Q. And one of the reasons that the Autopilot software team would create a ticket to flag scenarios where Autosteer would leave the original travel lane was because it was a potential safety issue; correct?

MR. BRANIGAN: Objection to the form.

THE WITNESS: I don't think so.

MR. BRANIGAN: Incomplete hypothetical.

BY MR. McDEVITT:

Q. So is it your understanding that the Autopilot software team never created tickets to flag instances where Autosteer left the lane out of concern for safety?

MR. BRANIGAN: Objection. Overly broad. Lack of foundation.

THE WITNESS: I cannot comment on whether it was created for safety or not.

BY MR. McDEVITT:

Q. Okay. During your time working at Tesla, have you recognized that if Autosteer controls the steering of the Tesla in a way that takes the Tesla out of the lane it's in, that creates a potential safety issue?

MR. BRANIGAN: Objection. Form. Incomplete hypothetical.

THE WITNESS: It depends on the situation. That is normal answer for this question.

BY MR. McDEVITT:

Q. Well, you recognize that there are situations where if Autosteer controls the steering of the Tesla out of the lane the vehicle's in, that can result in a crash. True?

MR. BRANIGAN: Same objection. Vague. Incomplete hypothetical.

THE WITNESS: Again, it depends on the situation.

BY MR. McDEVITT:

Q. Okay. And I understand it depends on the situation, but you -- during your time with Tesla, you've recognized that there are instances where if Autosteer controls the steering of the Tesla out of the lane it's in, that can cause a crash; right?

A. The --

MR. BRANIGAN: Same objections.

THE WITNESS: My understanding is that if the driver was paying attention and watching the road, I do not believe there is any safety concern.

///

BY MR. McDEVITT:

Q. And has that been your mentality the entire time that you've worked at Tesla?

A. Yes.

Q. That you have not felt there's a need for a safety concern upon learning that Autosteer controlled a Tesla vehicle out of the lane it was in because you've always assumed that the driver will always be able to take over; correct?

MR. BRANIGAN: Objection. Form. Incomplete hypothetical. Also misstates the witness's prior testimony.

THE WITNESS: The system is designed to stay within the limits of steering and braking. Any attention-paying human should be able to override the system with ease and then drive the car safely.

BY MR. McDEVITT:

Q. Is there anybody on the Autopilot team that is a human factors engineer?

A. I do not know.

Q. During your time with Tesla, have you ever received any training on the topic of perception-reaction time?

A. I do not recall.

Q. Do you have any familiarity with the concept

of perception-reaction time?

A. I would have to guess what those words mean.

Q. Well, when you've worked at Autopilot -- or worked at Tesla on Autopilot, have you had in mind the notion that humans have some sort of lag time in processing visual information?

A. I am not the person who is studying human -- whatever time you alluded to. I am a software engineer on the team.

Q. Okay. Well, my question to you, though, has any -- have you ever been a part of any discussions at Tesla where there has been an acknowledgment that humans have a lag time in processing visual information?

MR. BRANIGAN: Objection. Overly broad.

THE WITNESS: I do not recall either way.

BY MR. McDEVITT:

Q. With respect to Autopilot and Autosteer, has Tesla ever had a documented set of functional specifications for Autosteer?

A. I do not know what that means.

Q. Have you ever heard of the phrasing "behavioral competencies"?

A. Not to my recollection.

Q. During your time with Tesla, have you ever

reviewed a document that's called "Automated Driving Systems, a Vision for Safety"?

A. I do not recall.

Q. Let me just show you it on the screen so that you can take a look at the cover and see if that refreshes your recollection.

Okay. Do you see what's displayed as Exhibit -- it's Exhibit 111 from the deposition of Chris Payne on September 29th, 2021. Do you see the cover page there?

A. Yes.

Q. Have you ever seen that document?

A. I don't think so.

Q. Have you ever been at a meeting at Tesla where this document was reviewed?

A. I don't recall.

Q. Have you ever heard any of your colleagues at Tesla refer to this document, Exhibit 111?

A. I do not recall.

Q. Were you aware that the -- or strike that.

Do you know what NHTSA is?

A. Yes.

Q. Were you aware that the NHTSA generated guidance for the automotive industry on design best practices for the testing and safe deployment of

automated driving technologies?

MR. BRANIGAN: Objection. Form. Also to the extent it misstates the intention of NHTSA.

THE WITNESS: I do not recall reading this document.

BY MR. McDEVITT:

Q. Okay. And I'll address the objection. So I'm going to -- I'm going to PDF page 4 which is internal document page ii.

Do you see the paragraph that starts with "In this document"? I've just highlighted it.

MR. BRANIGAN: It would be helpful if you could enlarge it.

MR. McDEVITT: Sure.

MR. BRANIGAN: It's very small. Please. That's better.

THE WITNESS: I see what you have highlighted here.

BY MR. McDEVITT:

Q. Okay. Do you see that it says:

"In this document, NHTSA offers a nonregulatory approach to automated vehicle technology safety"?

Do you see that language?

A. Yes.

Q. And then the next sentence says:

"Section 1: Voluntary Guidance for Automated Driving Systems (Volunteer Guidance) supports the automotive industry and other key stakeholders as they consider and design best practices for the testing and safe deployment of Automated Driving Systems"?

Do you see that?

A. I see that.

Q. Have you ever heard anybody at Tesla ever refer to this document?

A. I don't recall.

Q. Okay. Now I'm going to PDF page 7, document page number 1. I'm going to direct you to the second paragraph. The second sentence refers to this -- this voluntary guidance document. It says:

"It updates the Federal Automated Vehicles Policy released in September 2016 and serves as NHTSA's current operating guidance for ADSs."

Do you see that?

A. I see that wording.

Q. During your time at Tesla, have you ever been aware that the NHTSA has issued operating guidance for automated driving systems?

MR. BRANIGAN: Let me just object to the

form of the question because I think it mischaracterizes the scope of the document.

But go ahead.

THE WITNESS: I do not recall either way.

BY MR. McDEVITT:

Q. On the -- there's a text -- or there's a box within this particular page that has the heading of "NHTSA's Mission."

Do you see that?

A. Yes.

Q. It says:

"Save lives, prevent injuries, and reduce economic costs due to road traffic crashes, through education, research, safety standards, and enforcement activity."

Prior to me reading that to you, were you aware that that was NHTSA's mission?

A. I don't think so.

Q. Have you ever become familiar with 12 priority safety design elements where -- that were generated by the NHTSA for automated driving systems?

A. I do not recall.

Q. What is an operational design domain?

A. I do not know.

Q. During your time at Tesla, have you ever heard anybody within the Tesla Autopilot software team refer to an operational design domain?

A. I've heard those words before, but I do not recall much more than that.

Q. During your time with Tesla, have you ever seen a document that sets forth an operational design domain for Autosteer?

A. I do not recall.

Q. As you sit here today, do you know of any document that sets forth an operational design domain for Autosteer?

A. I do not know.

Q. During your time with Tesla, have you ever seen a document that sets forth an operational design domain for Autopilot?

A. I do not know.

Q. As you sit here today, do you know of any document that describes an operational design domain for Autopilot?

A. I do not know.

Q. And I'm going to -- let me go back to that document, and I'm going to ask some follow-up questions just to see if perhaps the wording is different.

So I'm going to page -- PDF page 12, and it says -- there's a -- heading "2," says "Operational Design Domain," and I'm going to direct your attention to the -- oops, excuse me -- the sentence that starts with "The ODD."

Do you see that?

A. Yes.

Q. I've highlighted it. Okay. And I'm going to just read it into the record:

"The ODD is the definition of where (such as what roadway types and speeds) and when (under what conditions such as day/night, weather limits, etc.) an ADS is designed to operate."

So let me just have you focus on that sentence. Okay?

A. Yes.

Q. Are you aware of any document within Tesla that describes the -- or where and when Autosteer is designed to operate?

A. I do not know whether the document exists or not.

Q. Have you ever learned that the Tesla Autopilot software team made a decision about where and when Autosteer is designed to operate?

MR. BRANIGAN: Objection. Form. Overly

broad.

THE WITNESS: I do not know.

BY MR. McDEVITT:

Q. Okay. Now I'm going to direct you to the right-hand column of the document. The top sentence starts with:

"The ODD would include the following information at a minimum to define each ADS's capabilities limits/boundaries."

Do you see that?

A. I see the --

Q. Okay.

A. -- that reference.

Q. And the first bullet point is "Roadway types on which the ADS is intended to operate safely."

Do you see that?

A. Yes.

Q. Has Tesla defined the roadway types where Autosteer is intended to operate safely?

A. Will you please repeat the question?

Q. Yes.

Has Tesla identified roadway types on which Autosteer is intended to operate safely?

A. What do you mean by "identify"?

Q. Like, in other words, has Tesla said, "Well,

Autosteer is intended to operate safely on freeways or highways separated by a median barrier but is" -- "you know, rural streets within, you know, neighborhoods are outside the operational design domain"? Anything like that?

A. There are some activation conditions for Autopilot, such as presence of lane lines, or there are a few more conditions. I don't recall all the conditions. So Autopilot's only available in such conditions.

Q. Are there roadway types on which Autosteer is intended to operate safely?

MR. BRANIGAN: Sorry, Andrew. Can you repeat that question one more time?

MR. McDEVITT: Yes.

BY MR. McDEVITT:

Q. Are there roadway types on which Autosteer is intended to operate safely?

A. I'm thinking about it, but I can't -- I don't know for sure if there are any such restrictions or not in the software.

Q. As you understand it as the director of Autopilot software, is Autosteer intended to operate safely on freeways?

MR. BRANIGAN: Objection to form with

respect to the timing. Do you mean at the time of the subject crash or anytime?

MR. McDEVITT: I'm going to ask both.

BY MR. McDEVITT:

Q. Let me just start with: As you understand it as the director of Autopilot software, has Autosteer ever been intended to operate safely on freeways?

A. Autopilot and specifically Autosteer is generally designed to keep the car within the lane, and it is -- the production version of the Autopilot software has some conditions for enabling it. And then once enabled, it does its best to stay within those lanes.

Q. Okay. But my question is a little bit different. Is Autosteer -- or has Autosteer ever been intended to operate safely on freeways?

A. If used appropriately, it should operate safely everywhere.

Q. Okay. Is there a speed range for Autosteer?

A. I believe there's a max speed.

Q. Is that -- the max speed currently 90 smile an hour?

A. On some software configurations it's 90 miles per hour. On some others, it's 85 miles

per hour. But throughout the Autopilot development period, there have been different top speed limits.

Q. Okay. The -- I'm going to -- are there any constraints that Tesla has identified and documented for the operation of Autosteer?

MR. BRANIGAN: Objection. Overly broad. Vague.

THE WITNESS: At what time point?

BY MR. McDEVITT:

Q. Well, let's focus on the first six months of 2018. Were there constraints that Tesla internally identified for the operation of Autosteer?

A. As I mentioned earlier, the system would only present itself upon some conditions. So you could call that as constraints to the system.

Q. During the year 2018, was Autosteer intended to operate safely on freeways?

A. Yes.

Q. Now I'm going to go back to the document. So the paragraph -- the second paragraph on this particular page says:

"An ADS should be able to operate safely within the ODD for which it is designed."

Do you see that?

A. Yes.

Q. And at Tesla, was that the policy internally, that the Autopilot features should be able to operate safely within the design domain for which they were designed?

A. From the beginning, the philosophy for Autopilot has been it is a safe system for anyone who is using the system appropriately.

Q. Okay. Well, do you agree that there -- with respect to Autopilot, when an Autosteer is activated, the Tesla is in control of the acceleration, braking, and steering of the Tesla; correct?

A. When activated, Autopilot can control those three axis but within limits.

Q. Did you say those three axis, a-x-i-s?

A. Yes.

Q. Okay.

A. What I mean was the steering, braking, and acceleration.

Q. And within, Tesla Autosteer is identified as what's called an "active feature"; correct?

A. Yes.

Q. And an active feature means that it takes over control of the vehicle. True?

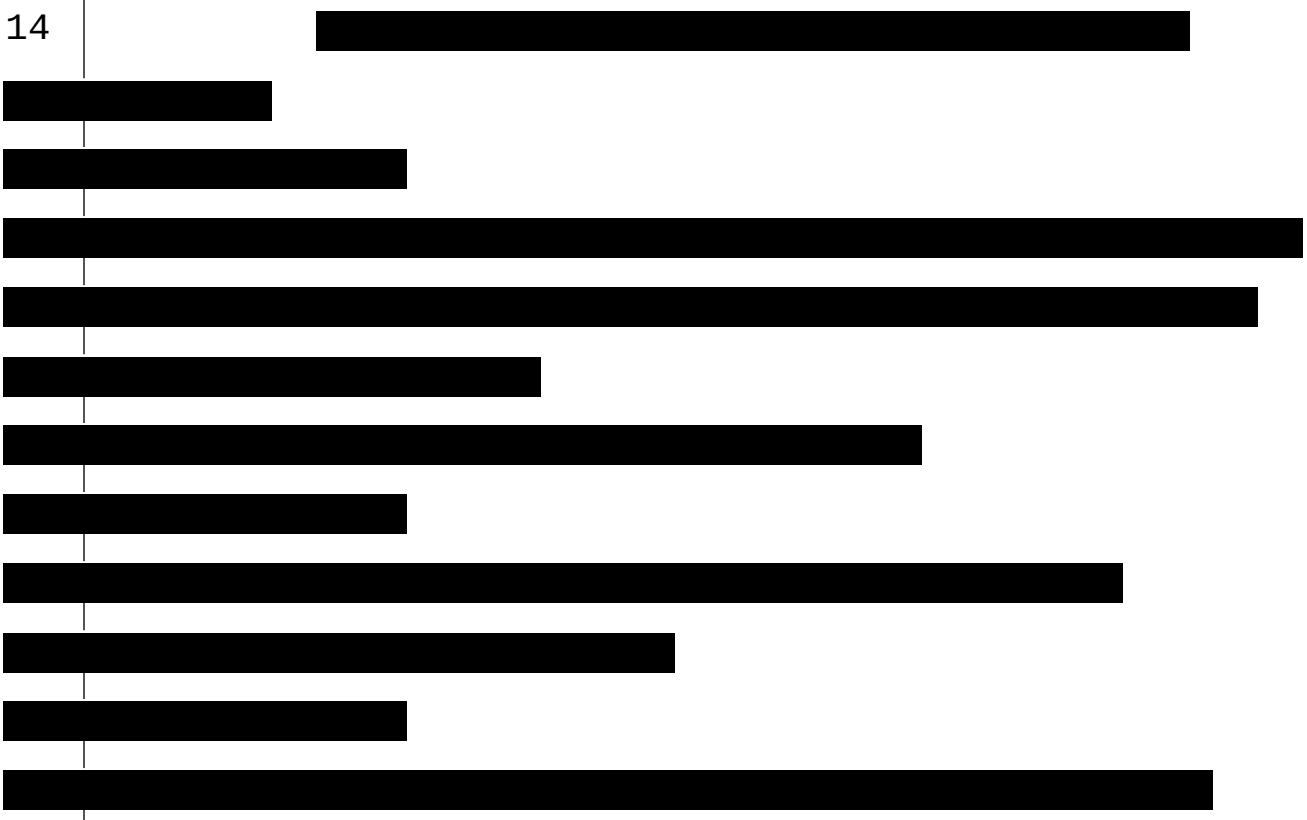
A. "Active" means it can control the car, as

opposed to "passive," where the car has no control.

Q. Okay. At Tesla, when the -- when referring to an active feature, that's a feature that take -- those are features that take control over the vehicle; correct?

A. I'm not sure what you mean by "take control." It can change steering action or the braking or acceleration.

Q. Let me just -- I'm going to refer you to -- oops, wrong one. Let me show you Exhibit 71 in this case to -- this was marked as Exhibit 71 to the deposition of Mr. Shroff, and then it was also 71 to the deposition of Mr. Payne.



[redacted]

Q. So it's 11:30. So I don't know how much time of a -- or how long of a break do you need?

A. Maybe like five or ten minutes.

MR. BRANIGAN: Why don't we take ten minutes.

MR. McDEVITT: Okay.

THE VIDEOGRAPHER: We are off the record. The time is 11:29 a.m. Pacific Time.

(Break taken from 11:29 a.m. to 11:42 a.m.)

THE VIDEOGRAPHER: We are back on the record. The time is 11:42 a.m. Pacific Time.

BY MR. McDEVITT:

Q. Mr. Elluswamy, have you heard Elon Musk refer to the prime directive for Autopilot?

A. Yes.

Q. Tell us your understanding of what the prime directive is.

A. The prime directive is to not collide.

Q. Okay. So the prime directive for Autopilot is for -- well, strike that.

So we discussed when Autopilot is activated it can control both steering and -- well, strike that.

When Autopilot's activated, it can control steering, braking, and acceleration; correct?

A. Yes.

Q. The prime directive for Autopilot is for Autopilot to not accelerate or steer in a manner that results in the Tesla colliding with either an object or a person; correct?

A. That is the objective.

Q. When did you first hear Elon Musk identify that as the prime directive?

A. I don't recall when.

Q. Is it your recollection that Elon Musk developed that prime directive for Autopilot after the fatal crash involving Joshua Brown?

A. That is not my understanding.

Q. Okay. Is it your recollection or belief that Elon Musk always had the prime directive for Autopilot to be not to collide with people or objects, even before the fatal crash involving Joshua Brown?

A. Yeah, that's roughly my understanding. From the beginning, it's always been: Try not to crash.

Q. Have you also heard Elon Musk refer to the prime directive as, quote, do not smash?

A. Yeah. There's a few ways to phrase that, yes.

Q. What are the other ways that you've heard Elon Musk refer to the prime directive besides "do not collide," "do not smash"?

A. "Do not crash."

Q. Okay. And you've understood that when Elon Musk said that, what he meant was that he didn't want the Autopilot system to steer the Tesla onto a path that would result in it colliding with a person, vehicle, or object. True?

A. I believe the intent was to build a system that would, you know, try its best to avoid all collisions.

Q. Okay. But when Elon Musk said that, the prime directive, he didn't say, "Try your best to make the vehicle not collide."

He said, "The prime directive is for the vehicle to not collide with people, objects, or vehicles when Autopilot has control of the Tesla." True?

A. Elon said prime directive was do not crash.

Q. And, again, you understood that when Elon Musk said the prime directive for Autopilot was do not crash, he meant that he doesn't want auto -- the Autopilot system to steer the Tesla onto a path that would result in it colliding with a person, vehicle, or object. True?

A. That's what one would infer, I guess. It's English. That's what he said: Autopilot should not crash.

Q. Okay. And as the director of Autopilot software, have you become aware of Tesla maintaining data regarding instances in which a Tesla crashed while Autopilot was activated?

A. Will you please repeat the question?

Q. Yes.

You're aware, I presume, that Tesla has maintained data tracking instances in which a Tesla vehicle was involved in a crash while Autopilot is activated. True?

A. Yes.

Q. And is it your understanding that there are several hundred instances in which a Tesla vehicle has been involved in a crash while Autopilot is activated?

MR. BRANIGAN: Objection. Form. Vague.

THE WITNESS: Your question is -- don't have years of time ranges, and I'm not aware of the exact count right now.

BY MR. McDEVITT:

Q. Okay. But regardless of you being aware of the precise number, you do understand that there have been several hundred instances in which a Tesla vehicle has been involved in a crash while Autopilot is activated. True?

MR. BRANIGAN: Same objection.

THE WITNESS: Again, I do not recall the number, whether it was several hundreds or tens. I know there have been crashes. I just do not know the range of the numbers.

BY MR. McDEVITT:

Q. Okay. Did you -- did you learn within the last month of the NHTSA publishing information about the number of crashes that were reported by Tesla in which Autopilot was activated?

A. I recall the document came out.

Q. Okay. And am I correct you understood that the NHTSA published information indicating 270-plus reported crashes of Tesla vehicles in which Autopilot was activated at the time? True?

A. If that's what -- if that's the number on the document, then that -- you know, that's the number. And I think the document also presents all data where Autopilot was active within 30 seconds prior to crash. So Autopilot may or may not have been active at the time of the crash.

[redacted]

[redacted]

(Stenographer requests clarification.)

BY MR. McDEVITT:

Q. Within the Autopilot software team, does the team believe that whenever there is no hands-on detection signal, that means the driver's not paying attention?

MR. BRANIGAN: Objection. Form. Incomplete hypothetical.

THE WITNESS: The hands-on system checks in with the driver based on some frequency as to whether the driver is available or not, and, further, it requests some kind of hands on the wheel.

BY MR. McDEVITT:

Q. So for Tesla vehicles, in terms of driver monitoring, the way that is performed within Tesla is by a steering wheel torque signal; correct?

A. Yeah. For many of the configurations, yeah, that's how it's done.

Q. And there have been instances or time periods where the Autopilot engineers have discussed or considered using the in-car camera as a way to monitor whether the driver is attentive; correct?

A. Yes.

Q. Within the Autopilot software engineering team, there is recognition that the steering wheel torque method of evaluating a driver's attention is flawed. True?

MR. BRANIGAN: Objection. Form. Overly broad. Vague.

THE WITNESS: I do not think so.

BY MR. McDEVITT:

Q. Okay. So your belief is that the Autopilot software engineering team has not identified any flaws in using the steering wheel torque method to evaluate a driver's attention?

MR. BRANIGAN: Same objections.

THE WITNESS: Will you please you repeat the question?

BY MR. McDEVITT:

Q. Yes.

Is it your belief that the Autopilot software engineering team has not identified any flaws in using the steering wheel torque method to

evaluate a driver's attention?

MR. BRANIGAN: Same objection.

THE WITNESS: My belief is that the hands-on system is a sufficient system to do nominal checks that the driver is present.

BY MR. McDEVITT:

Q. Okay. My question was slightly different. My question was: Is it your belief that the Autopilot software engineering team has not identified any flaws in using the steering wheel torque method to evaluate a driver's attention?

MR. BRANIGAN: Same objection. Overly broad. Vague.

THE WITNESS: I'm not aware of any flaws that indicate.

BY MR. McDEVITT:

Q. Isn't it true that there's been points in time where engineers at Tesla have said the torque method really doesn't work very well?

A. I'm not aware of the statements.

Q. And with respect to the torque method of evaluating driver attention, am I correct that the engineers recognize that the absence of a torque signal doesn't even mean that the driver doesn't have his or her hands on the wheel?

MR. BRANIGAN: Objection. Form. Overly broad. Lack of foundation.

THE WITNESS: The test of whether the torque is present or not is precisely what it is. The system requests some amount of torque be placed on the wheel. And if that was not present when requested or after a while, then that's -- for some reason the torque was not present, and if you don't request it for some time, then, you know, we would not measure that. But it's a trade-off between how annoying the automatic system because if you always request the torque, then it may be too much and too tedious. But if you request too little, then you are checking in on the driver less frequently.

So we try to strike this balance between not to be extremely annoying and nagging as opposed to being extremely lenient, so that we try to strike that balance in general.

BY MR. McDEVITT:

Q. And there's -- there was at least one point in time when Tesla changed the frequency with which it had auto -- or had the vehicle check for torque based on Elon Musk receiving a tweet from a customer; correct?

A. I don't --

MR. BRANIGAN: Objection. Lack of foundation. If you know.

THE WITNESS: I'm not aware of the tweet.

BY MR. McDEVITT:

Q. Okay. You don't have any recollection of a customer tweeting that they were annoyed with how many or how often they were asked to input torque on the wheel and Elon Musk responding that he would make a change to that?

MR. BRANIGAN: Objection. Form. Lack of foundation. Also object to the extent it mischaracterizes the statements of the people referred to.

THE WITNESS: I do not recall such incident.

BY MR. McDEVITT:

Q. Has Elon Musk ever provided direction to the Autopilot team regarding how often the system should check for a torque signal?

A. He has provided some direction, yes.

(Stenographer requests clarification.)

BY MR. McDEVITT:

Q. Okay. Tell us about the instances in which he has provided direction to the team on that.

A. I only vaguely recall the discussions. I do not precisely know the numbers nor the times when

those are happening. I recall that there were some discussions, and he had some inputs on this.

Q. Okay. And when you say "some inputs on this," you mean Elon Musk has provided some direction on how often the Autopilot system should be checking for the presence of torque on the steering wheel?

A. To my understanding, yes. And it's also not just how often, also when, because sometimes it can be contextual on to when to present this.

Q. Okay. And one example of that would be when the system is about to initiate an uncommanded lane change, Autopilot in that period of time will want -- will perform a check to see if there's a torque on the wheel; correct?

A. Yeah. Exactly.

Q. With respect to the steering wheel torque as the hands-on detection, the presence of a torque on the wheel doesn't actually mean necessarily that the driver has his or her hands on the wheel; right?

A. So any such system that is known to what we would call as position recall, that's, like, a scientific term where you -- if your question is, is it possible to fool the system, yes, it's possible to fool the system.

Q. Okay. And, for example, if you put a banana at the corner of the steering wheel, that could supply enough torque on the wheel for the Autopilot system to believe a driver had his or her hands on the wheel; right?

MR. BRANIGAN: Objection. Vague. Lack of foundation.

THE WITNESS: We have to perform the test, but it's -- like I said, if your question is, is it possible to fool the system, yes, it's possible to fool the system.

BY MR. McDEVITT:

Q. Okay. And because of that, that means that when a torque is detected, that doesn't necessarily mean the driver has his or her hands on the wheel; correct?

MR. BRANIGAN: Objection. Form. Incomplete hypothetical.

THE WITNESS: It is possible to fool the system. So, yes, you can do something to trick the system into thinking that you're paying attention when you're not paying attention.

BY MR. McDEVITT:

Q. Okay. And with respect to the inverse of that, the absence of a steering wheel torque signal

does not mean that the driver does not have his or her hands on the wheel; correct?

MR. BRANIGAN: Same objection. Vague. Incomplete hypothetical.

Go ahead.

THE WITNESS: I don't think the opposite is true because we request for some hands-on, and the user is not acknowledging it for a while. It does not mean that they are somewhat placing their hands on the wheel.

BY MR. McDEVITT:

Q. And I'm distinguishing between responding to a prompt to have your hands on the wheel and just the torque signal for now. So let me ask a new question.

The -- the existence of a signal -- steering wheel torque signal, the fact that there is a signal there, that doesn't mean that the driver has his or her hands on the wheel -- or strike that. Let me start over.

When there is no torque signal on the steering wheel, the absence of that torque signal doesn't mean that the driver doesn't have his or her hands off the wheel. True?

MR. BRANIGAN: Objection. Form. Vague.

Incomplete hypothetical.

THE WITNESS: Will you please repeat the question?

BY MR. McDEVITT:

Q. Yeah. The absence of a torque signal on the steering wheel does not necessarily mean that the driver doesn't have his or her hands on the wheel. True?

MR. BRANIGAN: Same objections.

THE WITNESS: I mean, the pedantic definition would be that this absence of torque, it just means that there is no torque. So one could infer that as -- you know, that is the actual information to the objective of it. And why there was lack of torque is -- if that's your question, I'm not able to -- you know, there's any reason why there could be a lack of torque, including one of the reasons being that the hands -- they're not applying torque. So the hands could be on but not applying torque or, you know, they -- their hands would be off and not applying torque.

BY MR. McDEVITT:

Q. Okay. And, actually, just following up on your comment, the absence of torque -- you're accurate. That just means that there's no torque

being applied; correct?

A. Yes.

Q. Okay. So you could actually have your hand on the steering wheel and be gripping as hard as you possibly could grip, but if you aren't applying torque, the Autopilot would infer that there's no hand on the wheel; correct?

A. My understanding is that the prompt is to apply torque on the wheel. And when the Autopilot requests for the -- the driver present, it is the torque that it requests. So the driver must acknowledge with torque.

Q. Okay. But just to be clear, the way that Autopilot evaluates whether a driver has his or her hands on the wheel is by looking to see is there a torque being applied; correct?

A. It asks for the user to apply some torque and checks if the user applies the torque.

Q. Okay. And has that always been true?

A. To my understanding, yes, but I could be wrong.

Q. Okay. And you agree, though, that the absence of a torque signal doesn't actually mean that the driver has his or her hands off the wheel; correct?

MR. BRANIGAN: Objection. Form. Vague. Incomplete hypothetical.

Go ahead, sir.

THE WITNESS: The system requests a torque, and if it does not see the torque, then that is the answer. It request a torque -- it requested a torque, and there was no torque. So, you know, that's -- that is the inference of the subject and nature of it.

BY MR. McDEVITT:

Q. Okay. So let me break that down. Let's say that in between the instances in which the Autopilot system requests a torque -- let's say that's three -- there's a three-minute time period there.

In that three-minute time period, if the system doesn't detect a torque on the wheel, that doesn't mean that the driver doesn't have his or her hands on the wheel; correct?

A. It is possible, yes.

Q. And the reason that is possible is because there are a number of different ways you could have your hand on the steering wheel but also not be applying enough torque to trigger the signal on the sensor; correct?

A. Yes.

Q. Is there currently an Autopilot safety team?
A. What do you mean by "safety team"?
Q. A team within Autopilot that has the designation as the safety team or is responsible for safety.
A. Everyone on the team is working on improving the safety of the car.
Q. Okay. And what I'm -- I guess what I'm wondering is, so my understanding is within the Autopilot software team, there are subteams for Vision or subteams for Controls. What I'm wondering, is there a subteam that is specifically focused on safety?
A. I believe safety is improved by improving the components like you mentioned like Vision and Control. Safety comes from improving those things. And in that sense, yes, all these teams are safety teams.
Q. And I understand that, and I'm not -- I'm not challenging that notion. What I'm wondering is, is there a team that has a title of or designation, this is the safety team?
A. There is a team called "active safety." But other than that, I'm not aware of other teams that are just titled as safety teams.

Q. Okay. And is -- the active safety team, are they involved in automatic braking, forward-collision warning, lane departure, those things? Or is that something else?

A. My understanding is that that -- the active safety team really provides the regulations and tests the systems for this, but all the development is done by the other team, technician and planning and control, etc.

Q. Who are the people that you know of that are on the active safety team?

A. I believe Suraj was one person.

Q. Do you mind giving us --

A. I don't recall --

Q. Sorry. Do you mind giving a spelling for the court reporter?

A. Yes. It's -- first name is Suraj, S-u-r-a-j.

Q. The last name?

A. It's Nagaraj. I do not know the spelling. It starts with an N.

Q. Since you've become the -- or since you've acquired the title director for Autopilot safety, do you report to Elon Musk?

MR. BRANIGAN: Objection. Did you say since

he acquired the title of Autopilot safety?

MR. McDEVITT: Director. I'm sorry. You're right. I totally misspoke. So let me ask a new question.

MR. BRANIGAN: Maybe he gave you a promotion.

MR. McDEVITT: I did. You're promoted.

BY MR. McDEVITT:

Q. Okay. So since becoming director of Autopilot software, have you reported to Elon Musk?

A. Yes.

Q. And who besides yourself on the Autopilot software team reports directly to Elon Musk?

A. Milan Kovac and Andrej Exhibit 115A.

Q. Have you ever presented at a Tesla AI Day?

A. Yes.

Q. How many times?

A. There has only been one AI Day. So it's just that one instance.

Q. Have you presented at any other -- well, strike that.

So there's AI Day. My understanding is there's, like, a Battery Day.

Is that true?

A. I believe there was a Battery Day.

Q. Are there any other regular annual Tesla days where there's a presentation to the public?

A. I'm not sure if it's regular. We had a Exhibit 115A back in 2019.

Q. Okay. Did you present at the Autonomy Day?

A. I did not.

Q. Okay. You worked at Tesla during the year 2016; correct?

A. Yes.

Q. And in terms of the -- do you have an office, a physical office, that you would go to?

A. Yes.

Q. Where was that located?

A. 3500 Deer Creek Road, Palo Alto.

Q. So I'm going to pause here and show you what was previously marked as Exhibit 113 during the deposition of Mr. Payne. Give me a second to just pull it up.

Hold on. Let me -- I've got to change the setting here.

Are you able to see what I'm showing on the screen right now?

A. Yes, I see it.

Q. And you see that I paused at one second into Exhibit 113, there's text displayed that says "The

person in the driver's seat is only there for legal reasons. He is not doing anything. The car is driving itself."

Do you see that?

A. Yes, I see that.

Q. And from this -- just seeing this alone, do you know what video this is?

A. I think this was the Autonomy Day video.

Q. Let me hit play. I'll see if --

(Video playing.)

BY MR. McDEVITT:

Q. Let me pause there. I know it was a just a few moments, but do you recognize the person that is in the driver's seat of the vehicle?

A. Yes.

Q. Who is that?

A. I believe that was David Nister.

(Stenographer requests clarification.)

BY MR. McDEVITT:

Q. Does Mr. Nister work at Tesla anymore?

A. He does not.

Q. Okay. I presume now, by seeing this much of the video, you know the video that -- you recognize this video; right?

A. Yes.

Q. And were you involved in any way in the creation of this video?
A. Yes.
Q. And what was your role?
A. I was an engineer on the team that helped with this demo video.
Q. Is it true that for this demo video the route or a part of the route that was traveled by the vehicle in the video was 3-D mapped beforehand?
A. Yes.
Q. Was that done using LIDAR?
A. No.
Q. How was it 3-D mapped before?
A. Using the cameras and other sensors too.
Q. And am I correct that in connection with the effort to create this video, the Tesla that was used in the video actually crashed?
A. Yes.
Q. Where did it crash?
A. Into a fence inside our parking lot.
Q. Is that the -- is the -- the crash shown in any of the videos that were put on Tesla's website?
A. I'm not aware of.
Q. Okay. And as far as you know, when Tesla released this video, they didn't put any disclaimer

in the video indicating that the vehicle actually crashed during the process of creating the video; right?

A. I do not believe it crashed in this specific video, but during the development, it crashed before.

Q. Okay. And let me just hit play here for a second.

(Video playing.)

BY MR. McDEVITT:

Q. You agree that at this moment the driver is not holding on to the steering wheel; correct?

A. I can't see the bottom of the video because of the Teams thing. I can try to move it, but . . .

Yeah, if you say that person is not holding the wheel, then I believe you, yeah.

(Video playing.)

BY MR. McDEVITT:

Q. Was the -- or was Elon Musk involved in the creation of this video in any way?

A. In some ways.

Q. And describe how he was involved.

A. He asked for a demonstration of the system's capabilities.

Q. And did he specifically ask for the team to

generate a video that showed the Tesla driving by itself?

A. I do not recall the exact ask from him.

Q. Did Elon Musk know that the team had to 3-D map the route that the vehicle took before it drove?

A. I do not know if he knew or not.

Q. Did the Autopilot team give Elon Musk the impression that the Tesla was able to navigate the route without 3-D mapping that was done beforehand?

A. I do not recall the specifics of what was communicated to him.

Q. Okay. Do you recall any communications amongst the engineers that there was a decision to conceal information from Elon Musk about how the demonstration was created?

MR. BRANIGAN: Objection. Form. Foundation. Also object to the extent it mischaracterizes or misstates statements by others.

THE WITNESS: I am not aware of any such plans to conceal information.

BY MR. McDEVITT:

Q. Okay. So as far as you knew, nobody on the Autopilot team was part of a conspiracy to trick Elon Musk into thinking that the Tesla in the video that's marked as Exhibit 113 was able to perform the

drive without having 3-D mapping of the route in advance; right?

MR. BRANIGAN: Objection. Form. Foundation.

THE WITNESS: Will you please repeat the question?

BY MR. McDEVITT:

Q. Yes.

So as far as you know, nobody on the Autopilot team developed a conspiracy to trick Elon Musk into thinking the video that's marked as Exhibit 113 was generated without the help of advanced 3-D mapping; right?

MR. BRANIGAN: Objection. Form. Foundation.

THE WITNESS: I'm not aware of any conspiracy to hide this.

BY MR. McDEVITT:

Q. Okay. Do you have any reason to think that Elon Musk did not know that the route traveled by the vehicle in Exhibit 113 was 3-D mapped ahead of time?

MR. BRANIGAN: Objection. Form. Calls for speculation.

THE WITNESS: I do not know what he thought.

BY MR. McDEVITT:

Q. Okay. No, but I mean, do you have a reason to think -- either from conversations where he commented or any interactions that you had, do you have any reason to think that Elon Musk was unaware that the route the vehicle in Exhibit 113 traveled was 3-D mapped?

MR. BRANIGAN: Same objections. Form. Calls for speculation.

THE WITNESS: I'm not able to -- I do not recall what he knew or asked.

BY MR. McDEVITT:

Q. Okay. And what I mean by that is, you know, at some point after this video was generated, did Elon say, "Well, hey, the video shows that the car's able to navigate from this location to the office without any issue. Why" -- "why isn't full self-driving feature complete at this point?"

MR. BRANIGAN: Same objections.

THE WITNESS: I'm not sure what -- I mean, because 2016, so it's been six years since this video; so I don't recall what unfolded afterwards.

BY MR. McDEVITT:

Q. How many different attempts did it take in order to create Exhibit 113?

A. I do not know.

Q. It didn't -- you weren't -- the team was not able to generate the video in a single take; right?

A. Yeah, we went through a development process where we were trying to get a good demonstration.

Q. Okay. So my statement was accurate, that the video that's marked as Exhibit 113 was not generated in a single take. True?

A. If you define "single take" as a single consistent video, then it is a single take in the sense that it is not stitched together, but it required some iteration get to a point where when the entire drive would be zero intervention.

Q. I'm sorry. I may just have misunderstood your answer. So I apologize.

A. Usually a single take --

Q. Were you asking me a question, or were you -- I couldn't tell if you answered the question. I apologize.

A. Usually a single take means that the video is continuous and it's not stitched together. My understanding is that this video is continuous, and it's not stitched together. In that sense, it is single take, but it was not the first iteration. It required a few iterations to get this.

Q. And isn't it true that during the various attempts to generate the video, there were instances in which the person sitting in the seat had to intervene?

A. Yes.

Q. And were there also instances where the vehicle itself just disengaged as a part of fail-safe?

A. I do not recall the specifics.

Q. Okay. But you do know that, during the effort to create Exhibit 113, there were attempts to create the video where the driver actually had to take control of the steering wheel. True?

A. Yes.

Q. Okay. So now I'm going to show you Exhibit 113 again.

(Video playing.)

BY MR. McDEVITT:

Q. Let me pause that. I'm pausing it at 38 seconds into Exhibit 113.

What was the starting point for the video? Was it a particular individual's house, or where was it?

A. Somewhere in Menlo Park. I don't recall whose house it was.

Q. Okay. Does Exhibit 13 [sic] accurately reflect the capabilities of Autopilot as of November 2016?

MR. BRANIGAN: Objection. Form. Vague.

THE WITNESS: I believe the intent of the video was to showcase the potential of the system.

BY MR. McDEVITT:

Q. Okay. So given that it is showcasing the potential of the system, it -- Exhibit 113 should not be interpreted as accurately portraying the performance capabilities of Autopilot that -- at the time; right?

MR. BRANIGAN: Objection. Form. Mischaracterizes the witness's testimony.

THE WITNESS: Like I mentioned earlier, the objective of the video was to demonstrate the potential of what was capable of the system. That was the intent.

(Stenographer requests clarification.)

BY MR. McDEVITT:

Q. Okay. So my question is a little bit different. My question is actually:

Does Exhibit 113 accurately portray the performance capabilities of the version of Autopilot that was released to the public at the time?

MR. BRANIGAN: Same objections.

THE WITNESS: The intent of the video was -- the intent of the video was not to accurately portray what was available for customers in 2016. It was to portray what was possible to build the system.

BY MR. McDEVITT:

Q. Okay. So I just -- I just want to be clear. You agree that Exhibit 113 does not accurately portray the performance capabilities of the version of Autopilot that was released to the public at the time. True?

MR. BRANIGAN: Objection. Form. Mischaracterizes the witness's prior testimony. Repetitive. Asked and answered.

Go ahead, sir.

THE WITNESS: The intent of the video was to portray its capabilities, and that's what it tries to do. So in that sense, yes, it was not trying to portray what was -- what was the then state of Autopilot.

BY MR. McDEVITT:

Q. Okay. And the reason I'm asking the follow-up question is you're inserting the qualifier intent of the video and what the -- what you're

trying to do, and my question is a little bit different.

So my question is:

Does Exhibit 13 [sic] accurately portray the performance capabilities of the version of Autopilot that was released to the public at the time?

A. It does not.

(Video playing.)

BY MR. McDEVITT:

Q. All right. Okay. So now I'm pausing it at 52 seconds into Exhibit 113. There's a little bit better light in this frame. You can see that the driver is not holding the steering wheel; correct?

A. Yeah.

Q. Did you ever ride along in the Tesla vehicle for any of the efforts to create the video footage?

A. Yes.

Q. And were you in the vehicle at the time this particular video was captured?

A. I don't recall.

Q. When you did the ride-alongs, did you sit in the back seat?

A. Yes.

Q. Okay. So when -- earlier when you told us there were attempts where the driver had to

intervene, you actually observed that there were attempts where the driver actually had to take over the steering wheel; right?

A. Yes.

Q. Did you ever sit in the steering wheel during an attempt to create this video?

MR. BRANIGAN: You mean the driver's seat?

MR. McDEVITT: No. I meant within the air bag. Yes. Sorry. I messed up.

BY MR. McDEVITT:

Q. Did you ever sit in the driver's seat during an attempt to create the video that is marked as Exhibit 113?

A. I do not recall whether I was driving or not.

Q. Okay. Who else besides yourself and the individual you already identified participated in the effort to create the video?

A. Mostly all of our team were involved in this.

Q. Okay. And with respect to how the Autopilot in the video was operating when the video was created, how did that differ from the then-released version of Autopilot, how it operated?

A. The demo was specific to some predetermined

route; whereas, Autopilot tries to understand the scene around it and drive the car.

Q. Okay. The -- one of the fundamental concepts of Autopilot is for the vehicle to be able to navigate a situation based on Vision inputs alone; right?

MR. BRANIGAN: Objection. Form.

THE WITNESS: Generally the design intent is to use camera information to drive the car, yes.

BY MR. McDEVITT:

Q. Okay. But for the -- what we see in Exhibit 113, in addition to having the camera information, the Autopilot system had a 3-D mapped route that it could use to navigate. True?

MR. BRANIGAN: Objection. Asked and answered. Form.

Go ahead.

THE WITNESS: In this video, it was using additional premapped information to drive, yes.

MR. BRANIGAN: Andrew, are we getting to a point where we can take a short break?

MR. McDEVITT: Yeah. I'm just going to try to get through the end of this video. I mean, we came back on at 11:40; so we haven't been going an hour. But, yeah, I -- we can take a break after

this.

MR. BRANIGAN: Okay.

(Video playing.)

BY MR. McDEVITT:

Q. Okay. So now going back to this video, this -- do you agree the video just showed the Tesla vehicle recognizing a red light at the stoplight -- or at a traffic light and stopping for the traffic light without any driver input; right?

A. That's what the video shows.

Q. And the released version of Autopilot as of November 2016 did not have that capability. True?

A. In 2016, there was no traffic-light-handling capability.

Q. Okay. And we just saw from the last few seconds -- I just paused it, one minute and eight second -- the Tesla in the video recognizes that the traffic light has changed from red to green and accelerates without any driver input; correct?

MR. BRANIGAN: Objection. Form.

THE WITNESS: I mean, the video shows that the car goes on green.

BY MR. McDEVITT:

Q. And the video shows that the driver -- there was no driver input. In other words, the Autopilot

is doing that; correct?

MR. BRANIGAN: Same objection. Form. Foundation.

THE WITNESS: The video shows that there is no driver input.

BY MR. McDEVITT:

Q. Okay. And the production version of Autopilot as of November 2016 did not have the capability to accelerate in response to a traffic light changing from red to green. True?

A. Yes, it did not.

Q. Okay.

MR. BRANIGAN: Hey, Andrew, I've got to take a break for a minute. My phone's ringing.

MR. McDEVITT: Okay. Well, I mean, I'd like to get through this exhibit here.

MR. BRANIGAN: Yeah, I understand. Could we just take two minutes here so I can get rid of this?

MR. McDEVITT: Okay. I mean, we can just go off the record for a second, if you want to do that.

MR. BRANIGAN: Yeah. Hang on.

THE VIDEOGRAPHER: We are off the record. The time is 12:36 p.m. Pacific Time.

(Break taken from 12:36 p.m. to 12:41 p.m.)

THE VIDEOGRAPHER: We are back on the

record. The time is 12:41 p.m. Pacific Time.
BY MR. McDEVITT:
Q. Okay. I'm going to jump back a second here in Exhibit 113. I'm going to play from 1:04, and then I'm going to pause. So hitting play now.
(Video playing.)
BY MR. McDEVITT:
Q. Okay. So from 1:04 to 1:05 in the video, the -- we see that the traffic light changes to green, and then the view that is presented on the video shifts to the left forward vehicle camera; correct?
MR. BRANIGAN: Let me just object to the form of the question. The witness has already told you that this is a video that doesn't --
MR. McDEVITT: Tom, can you not make a speaking objection? You can -- just make an objection.
MR. BRANIGAN: I am, if you would let me finish.
MR. McDEVITT: Well, I don't want you to coach the witness by saying what he is and hasn't done. Just --
MR. BRANIGAN: The witness --
MR. McDEVITT: -- make it a legal objection.

MR. BRANIGAN: We can ask the witness to leave the room. The witness doesn't need to be coached by me. He's already told you that this video doesn't depict what was actually on the road, and so we object to the form of the questioning about this video.

MR. McDEVITT: Okay.

(Video playing.)

BY MR. McDEVITT:

Q. All right. So from 1:04 to 1:05, in the video we see the light change from red to green, and then the view of the video changes.

Do you see that?

A. The left video camera, yes.

Q. Okay. Now, did the Autopilot actually accelerate for the green light in this video, or did the driver do the acceleration?

MR. BRANIGAN: Same objections. Objection to form. The question's misleading and argumentative, given what the witness has already told you about this video.

THE WITNESS: The video shows that the driver -- I can't actually see the bottom of the video because of the Teams bar. But if you say that the driver was not pressing the accelerator, then

the system must have accelerated.
BY MR. McDEVITT:
Q. Okay. And actually what we see is when the light turns green, the view of the video changes when the vehicle accelerates.
And so what I'm asking you is, during these trial runs, did the Autopilot actually react to red and green lights, or did the person sitting in the driver's seat do the acceleration and braking?
MR. BRANIGAN: Objection. Form. Lack of foundation.
THE WITNESS: I do not recall to what extent the traffic controls were integral into the system.
BY MR. McDEVITT:
Q. In the video, was any of the acceleration or braking done by the person in the driver's seat?
MR. BRANIGAN: Same objection. Form. Lack of foundation.
THE WITNESS: I do not recall.
BY MR. McDEVITT:
Q. Okay. Is it your recollection that in November 2016 the team had already developed the neural network such that it was capable of responding to red and green lights?
A. I do not recall what neural networks was

running the car in 2016.

Q. Okay. And separate from that question, do you believe that in November 2016 any version, development or otherwise, of Autopilot had been developed to the point that it had the capability to detect red and green traffic lights?

MR. BRANIGAN: Objection. Lack of foundation.

THE WITNESS: My vague recollection is there were some neural networks that detected traffic lights and signs.

BY MR. McDEVITT:

Q. Okay. So I'm scrubbing forward in this video to 1:39.

(Video playing.)

BY MR. McDEVITT:

Q. From 1:39 to 1:52 of the video that's marked as Exhibit 113, that shows Autopilot taking a freeway exit and steering the vehicle up to a stop sign and coming to a stop for the stop sign. True?

MR. BRANIGAN: Objection. Form. Misleading. Argumentative, based on the witness's prior testimony about the video.

THE WITNESS: That is what this video shows.

///

BY MR. McDEVITT:

Q. Okay. And the -- as of November 2016, the publicly released versions of Autopilot were not capable of bringing the vehicle -- the Tesla vehicle to a stop in response to a stop sign. True?

A. I do not think so.

Q. And from one -- up through 1:59 in the video, we see the Tesla accelerating from a stop, going across lanes of traffic to make a left turn, and get into a travel lane. True?

A. That's what the video shows.

Q. And the production release version of Autopilot at the time in November 2016 did not have that capability. True?

A. True.

(Video playing.)

BY MR. McDEVITT:

Q. I'm pausing at two minutes and 17 seconds into Exhibit 113. Do you recognize the location shown in this frame?

A. Yes.

Q. What is this?

A. This is the entrance to 3500 Deer Creek Road.

Q. And within this particular frame at two

minutes 17 seconds into Exhibit 113, can we see the wall or whatever it was that the Tesla vehicle crashed into during one of the efforts to create this video?

MR. BRANIGAN: Objection. Form.

THE WITNESS: Yes.

BY MR. McDEVITT:

Q. Where is it?

A. It's near the main road, that fence.

Q. Okay. So did the vehicle actually go up onto the curb and hit the fence?

A. It was turning around the bend in the parking lot, and it -- I think it -- yeah, at the time, it was sideswiping the fence.

Q. Okay. So in one of the attempts to create this video, am I correct that the Tesla vehicle drove up over a curb, through the bushes, and hit a fence?

A. I'm not so sure about the curb or the bush. I do know about the fence.

Q. Okay. So the Tesla vehicle, in an effort to create this video, did drive into bushes and hit a fence?

MR. BRANIGAN: Objection. Form. Repetitive. Asked and answered.

THE WITNESS: Like I mentioned earlier, I do not recall the curb or the bushes. I recall that it hit the fence on the side.

BY MR. McDEVITT:

Q. Okay. And actually, I apologize. There's a chain-link fence that extends from the red curb line that's, in this portion of the video, about 5 or 6 feet in front of the Tesla; correct?

A. If you're asking me what is shown in the video, then, I mean, that's what's shown in the video.

Q. Yeah, and I'm just trying to identify the fence so that I can -- so that we're referring to the same thing. I didn't know if you were referring to what I'm motioning over now, which is like a wood --

A. Yeah, it's not that one. It's the one inside the parking lot.

Q. Okay. So there's a chain-link fence; right?

A. Yeah.

Q. And in this frame, two minutes 17 into Exhibit 113, there -- it appears that in one section of the chain-link fence, you can see, like, a red rectangular sign affixed to the fence; is that true?

A. Yes.

Q. I'm going to scroll forward here -- scrub forward.

(Video playing.)

BY MR. McDEVITT:

Q. At two minutes 32 seconds into Exhibit 113, the video shows the driver getting out of the Tesla; right?

A. Yes.

Q. And then at two minutes 35 seconds into Exhibit 113, there's no person sitting in the driver's seat of the Tesla vehicle as it begins to move forward?

A. Yes.

Q. Okay. And at two minutes 30 -- or 41 seconds into the video, there's an aerial overhead of the blue Model X that is -- has its controls being operated by Autopilot; correct?

MR. BRANIGAN: Same objection. Form. Misleading. Argumentative, based on the witness's prior statement about the video.

THE WITNESS: To my recollection, there is no driver in the car when the car is driving around this parking lot.

BY MR. McDEVITT:

Q. Okay. And is it during this -- this

maneuver that we see here -- I'm pausing at 2:41.

Was it during the attempt to video this maneuver that the Tesla vehicle crashed into a fence?

A. I think so.

Q. Okay. So nobody was actually in the car at the time; right? Or in the driver's seat, rather.

A. Yeah. I don't think there was anyone in the driver's seat.

Q. Who was in the -- was anybody in the vehicle when it crashed?

A. It's possible someone -- someone was in the back. I don't recall whether someone was or not.

Q. Did the Autopilot team bring it to Elon Musk's attention that there was a crash during an effort to create the video that's marked as Exhibit 113?

MR. BRANIGAN: Objection. Form. Lack of foundation.

THE WITNESS: I don't recall.

BY MR. McDEVITT:

Q. Okay. The vehicle that crashed had to be repaired; right?

MR. BRANIGAN: Objection. Lack of foundation.

THE WITNESS: Possible.
BY MR. McDEVITT:
Q. Was the vehicle that crashed the same blue Model X that we see in Exhibit 113?
A. I don't recall.
(Video playing.)
BY MR. McDEVITT:
Q. Okay. Then now at two minutes 43 seconds, this part of the video shows the blue Model X navigating through the parking lot with nobody in the driver's seat; right?
A. Yeah.
Q. Is there any -- has there ever been any released version of Autopilot that allowed the Tesla to drive without somebody in the driver's seat?
A. There are some features, like Summon, that allow for the car to be moved without someone inside the driver's seat.
Q. Okay. But Smart Summon and Summon, both of those features require the person that's using the app to be within a certain distance of the vehicle; correct?
A. I believe so.
Q. Neither of those features would allow a person to go into a building and ignore the vehicle

as the vehicle parked itself; correct?

A. The design is to have the driver close to the car.

Q. Okay. So to the extent Exhibit 113 shows the driver going into a building and ignoring the vehicle while the vehicle parked itself, there has never been a released version of Autopilot that allowed that; right?

MR. BRANIGAN: Objection. Form. Foundation.

THE WITNESS: As we mentioned earlier, the Summon feature is the only one where the driver may not be inside the vehicle, and that requires the driver to be somewhat close to the car. The exact specifics, I don't recall how close or far.

(Video playing.)

BY MR. McDEVITT:

Q. Okay. And I'm now pausing at two minutes 44 seconds into the video. On the -- toward the left-hand side of the video, we can see a chain-link fence. Is that the fence that the Tesla crashed into?

MR. BRANIGAN: Objection. Form.

THE WITNESS: I think so.

///

MR. McDEVITT: All right. So why don't we take a break here for -- for lunch. How long do you guys want to take?

MS. MILLER: 30 minutes.

MR. BRANIGAN: 30 minutes okay?

THE WITNESS: Yeah, 30 minutes okay.

MS. MILLER: 45 to --

MR. BRANIGAN: Why don't we say 40 minutes. I don't even know if our lunch is here.

MS. MILLER: It is.

MR. BRANIGAN: Okay. Why don't we -- why don't we say 40 minutes, Andrew.

MR. McDEVITT: Oh, Tom, are you there?

MR. BRANIGAN: Yeah.

MR. McDEVITT: Your background is so realistic. I thought you were somewhere else.

MR. BRANIGAN: That's actually a picture of my office in Detroit.

MR. McDEVITT: Okay. So --

THE VIDEOGRAPHER: Off the record?

MR. McDEVITT: -- why don't we come back -- why don't we shoot for -- want to shoot for 1:30?

MR. BRANIGAN: Yeah, 1:30, 1:35ish.

MR. McDEVITT: Okay. All right. See you.

THE VIDEOGRAPHER: We are off the record.

The time is 12:56 p.m. Pacific Time.

(Luncheon recess from 12:56 p.m. to 1:41 p.m.)

THE VIDEOGRAPHER: We are back on the record. The time is 1:41 p.m. Pacific Time.

BY MR. McDEVITT:

Q. Okay. Mr. Elluswamy, I just have a few more questions about the video that we were going through that was marked as Exhibit 113. After that -- the video was created, am I correct that the video was reviewed with Elon Musk?

MR. BRANIGAN: Objection. Lack of foundation.

THE WITNESS: I don't recall.

BY MR. McDEVITT:

Q. Who's -- who made the decision to publish the video that was marked as Exhibit 113 on Tesla's website?

MR. BRANIGAN: Same objection. Lack of foundation.

THE WITNESS: I do not know.

BY MR. McDEVITT:

Q. Do you believe that the Autopilot software team decided to publish that video on the website without Elon Musk's approval?

MR. BRANIGAN: Same objection. Lack of foundation. Calls for speculation.

THE WITNESS: I do not know.

BY MR. McDEVITT:

Q. Okay. Am I correct that, from your experience working at Tesla, that video, Exhibit 113, would not have been published on Tesla's website without Elon Musk's approval? True?

MR. BRANIGAN: Same objection. Lack of foundation. Calls for speculation.

THE WITNESS: I would not be able to comment.

BY MR. McDEVITT:

Q. You indicated that Elon Musk was one -- was -- had asked for the video to be created; right?

A. That is my understanding.

Q. Okay. So am I correct that your understanding is that Elon Musk reviewed the end product that the team generated?

MR. BRANIGAN: Objection. Form. Lack of foundation. Calls for speculation.

THE WITNESS: Like I mentioned earlier, I do not know if he reviewed or not -- if he did not review.

///

BY MR. McDEVITT:

Q. I'm sorry?

A. As mentioned earlier, I do not know if he reviewed or he did not review.

Q. Okay. And that video, Exhibit 113, that's -- remains on Tesla's website today; correct?

A. I'd have to check.

MR. BRANIGAN: Objection. Lack of foundation.

(Exhibit Number 180, Screenshot of Web Page for Self-Driving Video, was marked for identification.)

BY MR. McDEVITT:

Q. Let me show you Exhibit 180. Okay. Do you see Exhibit 180?

A. Yeah.

Q. Do you see it's dated Novem- -- there's a -- it says "Videos," and then under "Tesla Self-Driving Demonstration," it says "November 18, 2016."

Do you see that?

A. Yes.

Q. And then in the bottom left, we see "Tesla Motors ©2016"?

A. Yes.

Q. Okay. And then if we go to the next page,

you see it says "Tesla 2022"?

A. Yeah.

Q. Okay. So at no point, as far as you are aware, has the video been removed from Tesla's website; correct?

MR. BRANIGAN: Objection. Form. Lack of foundation. Asked and answered.

THE WITNESS: Yeah, I believe (indiscernible) --

(Stenographer requests clarification.)

THE WITNESS: I see the same dates that Mr. McDevitt pointed out, and I have not checked the website rigorously to know whether it was -- it's always been there or not.

BY MR. McDEVITT:

Q. Okay. You recognize the -- the format of the first page of Exhibit 180 to be the format layout of Tesla's website; right?

A. Roughly.

Q. All right. And then for page 2 of Exhibit 180, you recognize this to be the format and layout of Tesla's website?

A. I believe so.

Q. Okay. And there's a section of the Tesla website that has videos. There's a button where you

can look at videos. True?

A. If you say so. I haven't, you know, tried myself, but I can believe you.

Q. Okay. I'm going to show you now -- before I do that, you have a LinkedIn page; correct?

A. Yes.

Q. And you've added information to your LinkedIn profile at various different times?

A. Yes.

(Exhibit Number 178, LinkedIn Profile of Ashok Elluswamy, was marked for identification.)

BY MR. McDEVITT:

Q. Let me show you -- okay. Do you see this is actually -- this is Exhibit 178. Do you recognize this to be the content of your LinkedIn page?

A. Yeah.

Q. And on your LinkedIn page, it says you started as a software engineer for Tesla in January 2014.

Is that accurate?

A. Yes.

Q. And it indicates you were a software engineer from January 2014 through June 2016; is that true?

A. Yes.

Q. And during that time you worked on things such as velocity planning and control, automatic lane change, etc., for the first generation Autopilot; is that true?

A. Yes.

Q. When you say "first generation Autopilot," can you -- are you referring to -- what are you referring to when you say "first generation Autopilot"?

A. The Hardware 1 system.

Q. Okay. So you spent some time working on the Autopilot that was associated with the Mobileye hardware. True?

A. Yes.

Q. Okay. Then you also worked on the second generation of Autopilot; correct?

A. Yes.

Q. And on your LinkedIn, you say: "Worked on various systems needed to ship Tesla's in-house computer vision system, that was developed from scratch, for second generation Autopilot."

Is that accurate?

A. Yes.

Q. What is -- when there's references within the Tesla documents to having feature parody between

the second generation Autopilot and the Hardware 1, what does that mean?

A. Means that the new system needs to have the same level of functionality or similar level of functionality as the previous system that we have shipped.

Q. Initially, the second generation of Autopilot, the in-house developed one, had some regressions as compared to the Mobileye version of Autopilot. True?

A. Yes.

MR. BRANIGAN: Objection. Form.

BY MR. McDEVITT:

Q. And that was something that Elon Musk announced, that there was going to be a period of time where the in-house Tesla-developed version of Autopilot with the Tesla hardware was not going to perform as well as the Mobileye version; correct?

MR. BRANIGAN: Objection to the extent it mischaracterizes the statement of another witness, but go ahead.

THE WITNESS: I don't recall the precise wording of what he said.

BY MR. McDEVITT:

Q. Well, internally within the Tesla Autopilot

software development team, there was an awareness that moving to the Tesla in-house system with Tesla-developed hardware initially was going to be a step backwards as compared to the Mobileye system; correct?

MR. BRANIGAN: Objection. Form. Foundation. Calls for speculation.

THE WITNESS: I wouldn't say it was a step backwards in some soft -- in the software quality step. It's lack of functionality for some amount of time when we ship -- shipped it.

BY MR. McDEVITT:

Q. Okay. Your LinkedIn also indicates that you became a senior staff software engineer in September 2017.

Is that accurate?

A. I think I might have skipped a couple steps in between. There was, like, one more level, but I didn't bother to put it in here.

Q. Okay. Nevertheless, is it accurate to say that you became a senior staff software engineer in September 2017?

A. That's what I'm trying to say. I am not sure if the dates are correct. It might be later.

Q. Okay. Understood.

The description indicates:

"Worked on geometric scene understanding to significantly improve the performance of Autopilot using fleet learning techniques?"

Is that an accurate description?

A. Yes.

Q. What is -- and what does that mean?

A. It means that I worked on -- it literally means what it says there.

Q. Okay. When you're referring to the fleet, you mean the -- the production versions of Autopilot -- or Tesla vehicles with Autopilot that are owned or operated by customers; right?

A. The fleet refers to customer vehicles.

Q. Okay. And am I correct that customer vehicles have been a source of feedback for the Autopilot software development team?

A. Yes.

Q. The customer vehicles have provided a method for Tesla to identify bugs in the Autopilot software. True?

MR. BRANIGAN: Objection. Form. Vague.

THE WITNESS: We generally study the fleet for data from the fleet, things like harsh braking, harsh steering. We do check those, and that helps

us guide the priorities of what to include next.
BY MR. McDEVITT:
Q. The statement that I just said, though, that the Tesla customer fleet is one source for Tesla to identify bugs in Autopilot software, that is a true statement; correct?
MR. BRANIGAN: Objection. Form. Vague.
THE WITNESS: It's possible that we can find bugs from the fleet.
BY MR. McDEVITT:
Q. Well, beyond being possible, you know as a matter of fact that bugs have been developed from information discovered within the Autopilot -- or the Tesla customer fleet; right?
MR. BRANIGAN: Same objection. Form. Vague.
THE WITNESS: Typically, it's -- you know, it's improvement track, especially bugs that are not -- they are some known -- it's only a bug in a sense that it's some known level of performance that we ship, and every release aims to improve the performance, and we can get feedback from the fleet as to does the improvement -- or if the fleet didn't match our expectation of the performance.
///

BY MR. McDEVITT:

Q. Well, okay. In addition to utilizing information from the customer fleet to improve the software, the customer fleet also is one source of information for Tesla to identify bugs in the Autopilot software; correct?

MR. BRANIGAN: Same objection. Form. Vague.

THE WITNESS: It's possible to find bugs, and people -- customers can report bugs to us by, you know, taking screenshots or pressing a clip recording button to report bugs.

Whether they're actually bugs or not, you know, the engineers have to triage issue and see, you know, is it actually a bug or is it some -- any -- yeah. Or is it general improvement. And majority of the time, it's just some general improvement that needs to happen in what people call as bugs.

BY MR. McDEVITT:

Q. Autopilot software engineers, including yourself, are amongst the people that test Autopilot. True?

A. They can also test their own software, but there's dedicated QA organizations inside Autopilot

that test a system, in addition to a lot of automated tests in terms of unit test, open-loop replay test, integration test, closed-loop simulation tests --

(Stenographer requests clarification.)

THE WITNESS: In addition to the engineers testing themselves, we have a dedicated QA organization that tests the system. Separate from the QA organization, we have a lot of tests defined in software. In the bottom there's a unit test which tests a specific module, and there are indication tests that test a combination of modules. And there are open-loop replay tests that test the system end to end by replaying sensor data that were previously captured to measure the performance.

There are also closed-loop simulation tests where we run simulations of real-world scenarios recreated in our simulator world and see how some reacts to that. We have QA track tests where the QA operators take the car to track tests and set up scenarios and test using those. And then there are general driving on real-road situations from the QA org again, and those engineers -- the QA engineers flag issues in addition to developers driving their own software.

And then we can do shadow modes at different levels to identify the performance where the system is running in the background and sending telemetry information on how it's performing. And once we are gaining confidence and there's like 8, 9 levels of testing, then we ship the software to customers.

And even that is done slow -- gradually. We will ship it to employee customers and be like in the few hundreds and then get telemetry back from them and see if the software is performing as designed. And then even -- only after all of those things are all passed, only then we expand to general customer base.

BY MR. McDEVITT:

Q. Are you saying that all of the actions that you just described are performed before every single public release version of Autopilot is pushed to the fleet?

A. Or any middle release, yes. A couple steps. For example, the -- yeah, shadow mode might not be needed if there's, like, a minor point release that doesn't change anything functionally. Sometimes there can be cosmetic releases. Those ones don't require such extensive variation. But for any important release, we go through the full steps

before releasing to customers.

Q. Has that always been true, that every time any version of -- released version of Autopilot has been shipped to the public, all the steps that you identified have been completed?

A. The tests have been measuring over a large amount time, but generally it has been true. The size of the test sets obviously grow over time. As we get more exposure, more clips, the size of the test sets grow. But it has generally been the same process, just the magnitude to which each step grows -- yeah, it grew over time. It's -- because you can't unveil one, have, you know, 100,000 curated clips of difficult situations to test against. You start with, like, a thousand, a few thousand, and slowly when you find more and more test cases, you add them to the test scenarios. And once you document sufficiently, now you have a really big set of test cases to test against. So it's an ever-growing set of test cases.

Q. Okay. And real quick, in your prior response -- I just want to make sure the court reporter gets it -- you were saying QA team, not QR team; right?

A. QA. Quality assurance.

Q. Okay. The customer fleet has been one source of the data that's used in the unit test for the Vision. True?

A. We can use data from the customer fleet to create a test.

Q. And, in fact, Tesla has used data from the customer fleet either when a customer intervened or when the system triggered a "takeover immediately" command to add to its unit test database. True?

A. Yes.

Q. Getting back to my prior question, the Autopilot software engineers are amongst the people that test the development versions of the Autopilot software; correct?

A. Yes.

Q. Elon Musk is also one of the people that has historically tested the development versions of Autopilot. True?

A. Yes.

Q. The customers and the customer fleet are also amongst the group that is testing Autopilot; correct?

MR. BRANIGAN: Objection. Form.

THE WITNESS: I don't recall them as testing Autopilot. They are consumers of the software, and

we can use data from them to help us improve the system.

BY MR. McDEVITT:

Q. Can you identify for us -- well, strike that.

Before a release candidate is -- for -- an Autopilot release candidate is shipped, the Autopilot engineers maintain a list of known issues and bugs; correct?

A. Yeah, before any release, we can identify the list of the issues. And if they are issues that are still acceptable, then we can, yes, have these sorts of issues and then still ship them.

Q. Elon Musk, at least during the year 2017 and 2018, was provided with a list of outstanding or known issues prior to a release candidate being shipped; right?

MR. BRANIGAN: Object to the form. Foundation.

THE WITNESS: I'm not --

MR. BRANIGAN: Calls for speculation.

THE WITNESS: I'm not aware of whether he was shown or not shown in 2017-2018.

BY MR. McDEVITT:

Q. Okay. There have been periods of time where

you know that Elon Musk has been presented with a list of outstanding or known issues associated with Autopilot before a release candidate was shipped to customers; correct?

A. In 2020, for example, we are shown the top issues. It's obviously not an exhaustive list of issues, but we are shown some of the top issues before release.

Q. And part of the reason for that is because Elon is one of the ultimate decision-makers as to whether a release candidate will be shipped to the customer with the known issues that still remain; correct?

MR. BRANIGAN: Objection. Form. Argumentative.

THE WITNESS: Sometimes it is to just explain why or, like, to help and time the release as opposed to make a decision on whether to ship with the issue or not, and it's really more for communication as opposed to any other specification.

BY MR. McDEVITT:

Q. Okay. Well, in addition to sometimes it being for -- you know, for information or for awareness, there have been periods of time where the known outstanding unresolved issues have been sent

to Elon Musk that are associated with a release candidate so that he can provide input as to whether it's okay to still ship the version of Autopilot to customers; correct?

A. Typically the process is we show him some of the top issues, and we have recommendations for whether we need more time or if these are acceptable things to be present in the software that is released. We try to ensure that the essentials of safety of the software are always present. We -- and we would not release something that is, in a sense, unsafe.

And there are -- there can be other cosmetic issues, other issues that are not blocking the release and can be a net safety improvement. And when we believe it's a net safety improvement in the previous release we then take steps to release the software.

(Stenographer requests clarification.)

THE WITNESS: The general philosophy for any release is to check -- is to test if the net safety of the system is better than the previous release. And when we, internally using our metrics in our tests, believe that the new software is safer in total compared to the previous one, we then release

the software.
BY MR. McDEVITT:
Q. There are issues or -- there can be issues that are characterized or qualified as release blockers; right?
A. It's possible, yes.
Q. Explain to us what a release blocker is, just generally.
A. Release blocker is an issue that must be solved before the release.
Q. When you talk about the Autopilot being safer, that does not necessarily mean it is completely free of known bugs. True?
MR. BRANIGAN: Objection. Form. Calls for speculation. Lack of foundation.
THE WITNESS: Like I mentioned earlier, any software version can improve some aspects of the software, readdress other aspects of the software. We evaluate the net -- the total system performance and then compare that against the previous release. And if the total system performance is better than the previous release, then we are obligated to release it because it's net safer.
And some of these release-blocking issues are in the sense that they're -- they make the net

lower than the previous release, and that's why they are release blocking. Once these issues are resolved or mitigated in some manner, then the net safety improves, and then we release it.

BY MR. McDEVITT:

Q. How does the Autopilot safety team evaluate the net safety of a particular release candidate of Autopilot?

A. I think I mentioned earlier in the deposition today that there is no such team as a safety team.

Q. I'm sorry. I didn't mean to say that. I meant to say --

MR. BRANIGAN: Objection to form.

BY MR. McDEVITT:

Q. Okay. I misspoke. I apologize.

How does the Autopilot software team evaluate the net safety of a particular release candidate of Autopilot?

A. It's using the test framework that I had explained earlier. There's many tests. There's the open-loop test, simulations, unit test, integration test, QA tests, real-world miles from the QA organization, to whether they inform the overall safety of the product.

Q. One of the ways that the Autopilot software team evaluates the safety of a particular release is by its performance on particular predefined routes or drives; correct?

A. Yes.

Q. And in connection with those predefined routes or drives, there are criteria that the Autopilot software team utilizes to evaluate the performance of Autopilot; correct?

A. Yes.

Q. One example that has been included is Autopilot performance at gores. True?

A. As part of the Navigator and Autopilot feature set in the end of 2018 or something, we started doing lane changes to follow the route. And as part of that exercise, we expanded the test criteria to include gores.

Q. Okay. So at the beginning of the year 2018 through March of 2018, the test criteria you're referring to did not evaluate whether there was, quote/unquote, a gore entry by Autopilot on a particular drive; right?

MR. BRANIGAN: Objection. Form. Mischaracterizes the witness's testimony.

THE WITNESS: I do not recall when the code

metrics were introduced, but I do know they were introduced in the context of the Navigator and Autopilot feature set, which should perform lane changes on the highway and also a time to exit the highway. And all of the cases that it would need to do is lane change from one lane from the right side on the rightmost exit lane, for example, and if that happens too late, then it can intrude into the gore. As part of that feature development, we introduced these metrics to study the lane changes that are happening prior to that or why they're intruding into the gore. But I do not recall the precise timing of when it was introduced.

BY MR. McDEVITT:

Q. With respect to the test metric relating to gore entry, gore entry in the test metric is considered to be a negative behavior; correct?

MR. BRANIGAN: Objection. Form. Incomplete hypothetical.

THE WITNESS: The test-passing condition was that the vehicle must not enter the gore region.

BY MR. McDEVITT:

Q. Explain for us why the Autopilot software team did not want Teslas to enter gore areas.

A. If generally possible, it's better to do the

lane changes earlier than later. And gore is like the last moment that you can do the lane change. So it's kind of testing how early does the system perform the lane changes.

Q. Okay. Do you agree one reason that the Autopilot software team did not want Teslas to enter gore areas is because they recognized that could lead to a crash?

A. I do not know what was the intention when they designed these metrics, but my understanding, main reason was to study the behavior of lane changes as they pertain to when they happen when trying to exit the highway.

Q. Has it ever been your understanding that Tesla does not want Tesla vehicles to enter gore areas because Tesla recognizes that the -- if Tesla Autopilot steers a vehicle into a gore area, that could lead to a crash?

MR. BRANIGAN: Objection. Form. Incomplete hypothetical. Calls for speculation.

THE WITNESS: I do not know if I can answer for Tesla on the whole.

BY MR. McDEVITT:

Q. How about for you? Has it ever been your understanding that one reason you don't want a Tesla

vehicle to enter a gore area is because you recognize that if Autopilot steers a vehicle into a gore area, that could lead to a crash?

MR. BRANIGAN: Same objection. Incomplete hypothetical. Calls for speculation.

THE WITNESS: My general belief is that if there's no reason to enter the gore, then there is no reason to enter the gore. The car must just stay on the regular lanes. But if there is some reason to enter the gore, then the car can enter the gore region.

BY MR. McDEVITT:

Q. Okay. To be clear, am I correct you do not appreciate that a Tesla steering the vehicle into a gore area is a potential safety issue? Is that true?

MR. BRANIGAN: Same objection. Incomplete hypothetical.

THE WITNESS: Well, it depends on the situation. If the situation demands that, say, entering a gore is better, then that is better objective. I am not able to comment on the general motion of entering gores or not.

BY MR. McDEVITT:

Q. Okay. Well, you recognize that if Autosteer

steers a vehicle into a gore area, that could lead to a crash; right?

MR. BRANIGAN: Objection. Form. Incomplete hypothetical. Calls for speculation.

THE WITNESS: In a vehicle, anything is possible. So I'm not sure what I'm supposed to answer this question.

BY MR. McDEVITT:

Q. Okay. What I'm asking, for the benefit of the jurors, is whether you as director for Autopilot software have an appreciation that if Autosteer steers a Tesla into a gore area, that could lead to a crash?

MR. BRANIGAN: Same objection. Asked and answered. Incomplete hypothetical. Calls for speculation. And it's overly broad and vague.

THE WITNESS: Like I mentioned earlier, the safety of the gore region depends on the situation. Some situations might require that the vehicle be in the gore to avoid some other collision. In that case, gore would be preferable to something else. I am not able to make a general statement about gore regions.

BY MR. McDEVITT:

Q. Okay. Well, you indicated sometimes it

might be safer to enter the gore. You also appreciate that there are other times when the Autosteer steering the Tesla into the gore could lead to a crash or an unsafe scenario. True?

A. It would only lead to a crash if the driver was also not run into and not paying attention to the road.

Q. All right. Well, let me show you Exhibit 194 [sic] and see if that is of any benefit to you.

MR. BRANIGAN: 194?

MR. McDEVITT: No, no. 94.

MR. BRANIGAN: 94. Thank you.

BY MR. McDEVITT:

Q. All right. Do you see the video window displayed?

A. Yes.

Q. All right. I'm going to -- it's at four seconds. I'm going to push play on Exhibit 94. Okay?

(Video playing.)

BY MR. McDEVITT:

[redacted]

[redacted]

BY MR. McDEVITT:

Q. Has -- have you, during your time with Tesla, been present for any discussions or evaluations regarding the amount of time that is necessary for a driver to recognize that Autosteer is not performing appropriately and to take over, how much time is needed?

A. I do not recall being in such discussions.

Q. Okay. So do you know -- you indicated you don't -- you don't have any familiarity with the concept of perception-reaction time?

MR. BRANIGAN: Objection. Form. Mischaracterizes the witness's earlier testimony.

THE WITNESS: I mentioned that I was -- I do not recall being involved in such discussions.

BY MR. McDEVITT:

Q. What is the range of perception-reaction time for the general public?

MR. BRANIGAN: Objection. Form. Incomplete hypothetical.

THE WITNESS: I do not know.

BY MR. McDEVITT:

Q. Do you know what the perception-reaction time -- do you know if the perception-reaction time is longer for an older driver versus a younger driver?

MR. BRANIGAN: Same objection. Incomplete hypothetical.

THE WITNESS: I do not know.

BY MR. McDEVITT:

Q. In Exhibit 94 -- or Exhibit 94, do you know if a driver with an average perception-reaction time would actually have time to intervene and avoid the collision?

MR. BRANIGAN: Objection. Form.

THE WITNESS: I do not know.

BY MR. McDEVITT:

Q. Are you familiar with the concept of minimal risk condition?

A. No.

Q. Have you ever heard in the context of automated driving systems the notion that when a automated driving system is outside of its operational design domain that it should transition to a minimal risk condition?

A. I'm not aware.

Q. Have you, during your time with Tesla, ever been a part of meetings or discussions that address the topic of transitioning to a minimal risk condition?

A. Not to my recollection.

Q. Is it your understanding that the portion of the road that, in Exhibit 94, the vehicle crashed into, that's considered a dangerous area to drive in?

MR. BRANIGAN: Objection. Form. Call -- calls for speculation. We don't even know where the road is.

THE WITNESS: Will you please repeat the question?

BY MR. McDEVITT:

Q. Has it been your understanding, during your time with Tesla, that Tesla considers the area within a gore, a gore area, to be a dangerous area to drive in?

MR. BRANIGAN: Objection. Form. Incomplete hypothetical.

THE WITNESS: I cannot speak for Tesla's consideration.

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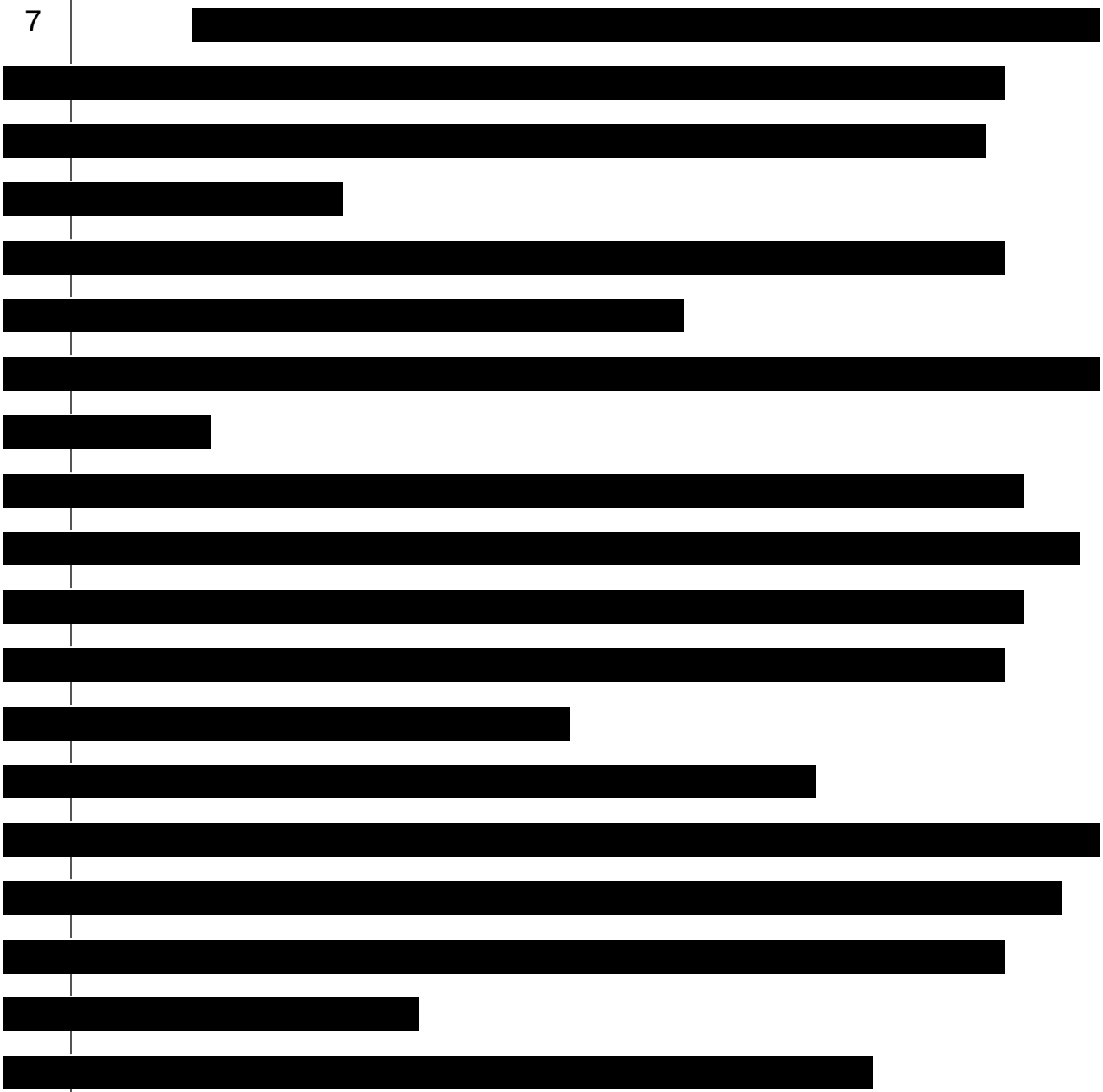
BY MR. McDEVITT:

Q. Well, have you ever been provided documents that were generated by Tesla indicating that the area within a gore is a dangerous area for the vehicle to drive in?

A. Not to my recollection.



[redacted]

BY MR. McDEVITT:

Q. And can you tell us all the reasons that you understand for there to be a reason for the car to enter the gore?

A. Humans enter the gore for many different reasons, like to avoid a crash. Say someone in front of you brakes hard and they can swerve into the gore region or pull onto the gore region in case

there is some other accident happening. I can come up with more reasons if you're interested, but, yeah, there are some reasons why that region can be used to, you know, drive.

Q. Okay. In normal, ordinary driving circumstances where there's no hazard in the lane or there's no -- nothing blocking the travel lane for the Tesla, can -- in those circumstances, can you identify for us reasons why Autosteer should enter a gore area?

MR. BRANIGAN: Objection. Form. Incomplete hypothetical.

THE WITNESS: The design is for Autopilot to not enter this region until it's -- unless it senses it for some reason.

BY MR. McDEVITT:

Q. Okay. You worked or spent some time working on Autopilot Vision; correct?

A. Yes.

Q. Did you spend some time working with Mr. Karpathy on that?

A. Yes.

Q. Did you, during your time with Tesla, have any interaction with the Samasource data labelers?

(Stenographer requests clarification.)

MR. McDEVITT: S-a-m-a-s-o-u-r-c-e.

THE WITNESS: I had minimal interaction with them.

MR. BRANIGAN: I'm sorry. Did you say minimal?

THE WITNESS: Minimal.

MR. BRANIGAN: Thank you.

BY MR. McDEVITT:

Q. The Autopilot Vision system has -- well, strike that.

Are you familiar with the phrase "object and event detection and response"?

A. No.

Q. The Autopilot Vision system over time has been trained to detect objects; correct?

A. What do you mean by "objects"?

Q. What?

A. What do you mean by "objects"?

Q. Let me show you. So I'm going to go back to Exhibit 71.

All right. Are you able to see page 58625 of Exhibit 71?

A. Yes.

[redacted]

[redacted]

BY MR. McDEVITT:

Q. Have you ever heard Elon Musk state that Autopilot should be able to detect and brake for any object in the Tesla's path even if it's a UFO?

A. Yes.

Q. In 2018 did Autopilot have the capability to detect and brake for any object in a Tesla's path even if it was a UFO?

MR. BRANIGAN: Objection. Form. Incomplete hypothetical. Calls for speculation.

THE WITNESS: I can't comment whether it would react well for a UFO or not. We haven't do the test. It was primarily designed for nominal objects in the scene, like vehicles, motor bikes, trucks, buses, pedestrians, some construction

vehicles. So whether some object falls into this ontology or not, it's hard to exactly determine.

BY MR. McDEVITT:

Q. All right. Well, let's go back to Exhibit 115A.

[redacted]

BY MR. McDEVITT:

Q. What do you mean, there are some other ways to determine a gore region?

A. When you approach this region, you can see

that there's a gore region starting, and then you can mark the start of that region as the start of a gore region.

Q. The gore point?

A. Yeah. It's like all -- you can't see it in this image, but on the approach to this where the lanes kind of diverge away, the starting point of that is the starting point of the gore region.

Q. Okay. So in 2018, Autopilot was supposed to be able to identify the start of a gore region?

A. I think in late 2018, as part of the Navigate on Autopilot feature, that's when we added this gore -- start of gore region, I think in context to lane changes to exit the highway.

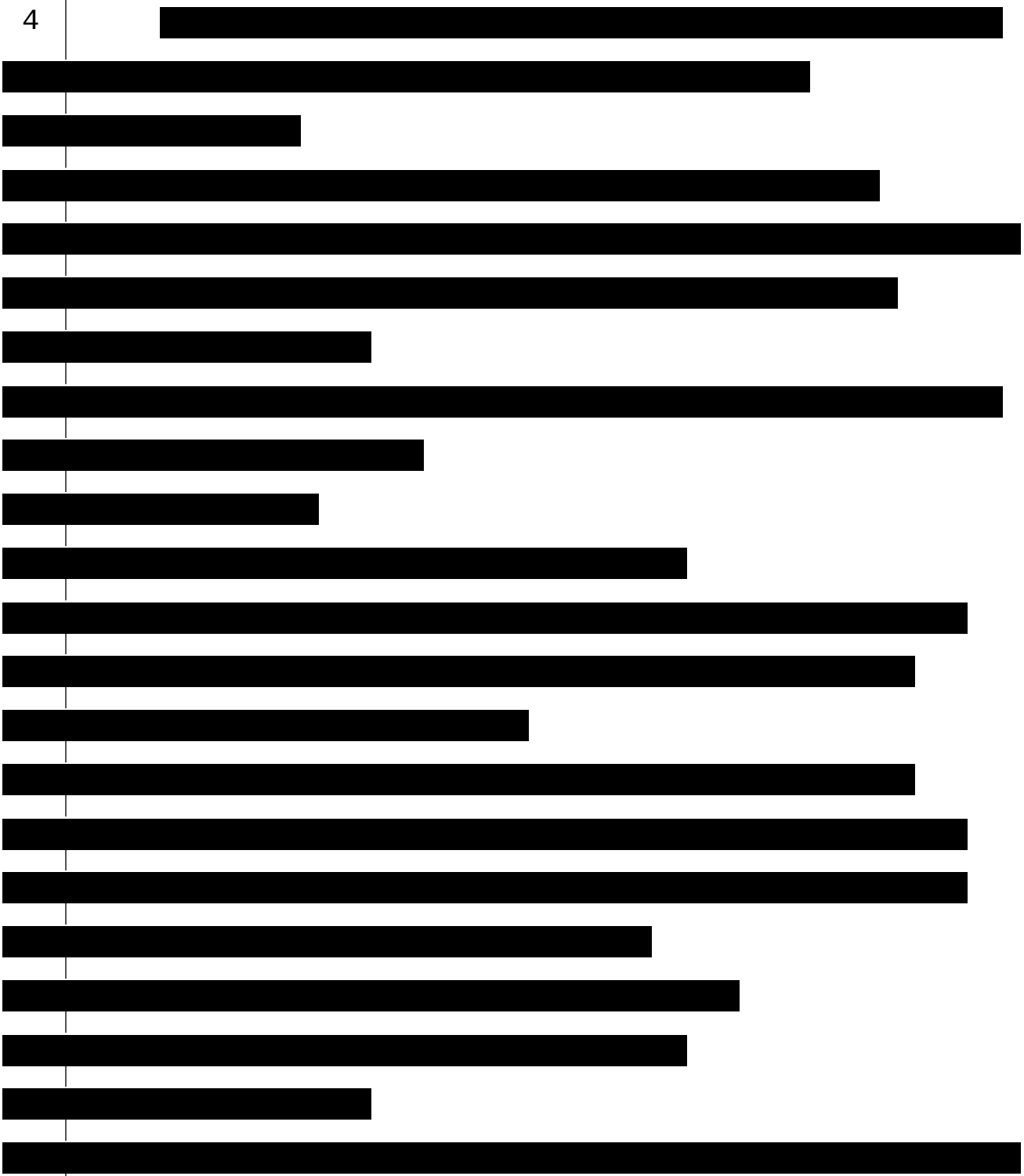
Q. Okay. Well, what about for, let's say, April 2018 and earlier?

A. I do not precisely recall when the gore -- start of the gore region was introduced.

Q. What is your understanding of why Tesla added the capability -- or included the capability of Autopilot to detect a gore point?

A. Like I mentioned earlier, we wanted to make sure that the lane changes were happening early on for the Navigate on Autopilot feature. And as part of that, the gore point detection would help the

planner make the decision as to whether it must do the lane change or if it should avoid doing the lane change if it's too late.



[redacted]

Q. Yeah. It might help if I just show you an exhibit; so I'm going to display Exhibit 111, and I'm going to the internally marked page 7.

So do you see that there's one highlighted sentence in the second paragraph under bullet -- or under heading "3"?

A. I see the highlighted section.

Q. Okay. The sentence preceding that says:

"Entities are encouraged to have a documented process for assessment, testing, and validation of their ADS's OEDR capabilities," and the first sentence of this document -- or first sentence of this page defines "OEDR" as "object and event detection and response."

So my question is, does Autopilot -- or does Tesla have a documented process for assessment, testing, and validation of Autopilot's object detection capabilities?

MR. BRANIGAN: Counsel, just for reference, is this from the same exhibit that you used before lunch from NHTSA, the NHTSA document?

MR. McDEVITT: Yeah.

THE WITNESS: I'm not aware of OEDR. But that said, we do have ontology for the objects that we recognize, and we have documentation for it. We have tests for it. And, yeah, that is present.

BY MR. McDEVITT:

Q. Okay. So the documentation for the objects that it does recognize is the documentation, is that the ontology documents?

A. Yeah, that's one of the documents.

Q. What are the other documents?

A. There are, like, test reports that measure position recall. And I'm not sure what time frame you're referring to based on that, like, the amount of documents that are available --

(Stenographer requests clarification.)

THE WITNESS: Yeah, I'm not sure what time frame you're referring to. As the team has

progressed, we have had more and more documentation of the different things that the system detects, and we have metrics around those things.

BY MR. McDEVITT:

Q. Okay. So for the Autopilot, the Vision system, am I correct that Tesla maintains a collection of what are called "unit tests"?

A. Yeah.

Q. And then there's a subset of images that are referred to as "VIP unit tests"?

A. Yes.

Q. And for each -- or for a particular iteration of the Vision component of the software, are you saying that when a test is run to see how well the particular iteration of the Vision software recognizes defined things within the unit test, there's a test report created?

A. When we evaluate the Vision system, we run tests against BAP sets, and there we can get metrics around position and recall of detecting these various things.

Q. What's the software tool that's used to run that test?

A. The software is usually run in Python; so there's, like, Python scripts that run and produces

metrics and can be visualized in some web tools that Tesla has created.

(Stenographer requests clarification.)

THE WITNESS: Some of the web tools that Tesla has created.

BY MR. McDEVITT:

Q. All right. So going back to Exhibit 111, in let's say -- let's go with January of 2018. Did the version of Autopilot that was the public released version at that time, was it expected to be able to detect and to respond to objects in its path that could affect its safe operation of the vehicle?

A. Will you please repeat?

MR. BRANIGAN: Objection. Let me just object to the form of the question. It's an incomplete hypothetical.

But go ahead.

THE WITNESS: Will you please repeat the question?

BY MR. McDEVITT:

Q. Yeah.

With the version of Autopilot that was the public release version in January of 2018, was that version of Autopilot expected to be able to detect and to respond to objects in its path that could

affect the safe operation of the Tesla?

MR. BRANIGAN: Same objection. Incomplete hypothetical.

THE WITNESS: It's still hard to follow the question. If you could break it down, that's probably easier.

BY MR. McDEVITT:

Q. Okay. Sure.

So I'm focusing on the January 2018 time frame. At that point in time, there was a public release version of Autopilot; correct?

A. Yes.

Q. For the public release version of Autopilot as of January 2018, was that version of Autopilot expected to be able to detect and to respond to objects in the Tesla's path when Autopilot was enabled, to the extent those objects could affect the safe operation of the Tesla?

MR. BRANIGAN: Same objection. Incomplete hypothetical.

THE WITNESS: The software at the time had some ontology of objects that it responds to, and for those ones, the design intent was to respond to those objects.

///

BY MR. McDEVITT:

Q. At that point in time, were crash cushions that existed on the road, either within a gore area or elsewhere, within the ontology of objects?

A. I do not think so.

Q. This -- I asked you earlier about behavioral competency, and I'm -- do you see under the "Normal Driving" heading there -- there's a heading "Normal Driving." Do you see that?

A. I see that heading.

Q. Okay. There's a sentence that begins with "Behavioral competency."

Do you see that?

A. I see the sentence.

Q. Okay. It says:

"Behavioral competency refers to the ability of an ADS to operate in the traffic conditions that it will regularly encounter, including keeping the vehicle in a lane, obeying traffic laws, following reasonable road etiquette, and responding to other vehicles or hazards."

So having now read that, the behavioral competency explanation, does that refresh your memory as to whether you've ever heard that?

A. No. I've never -- I don't think I've heard

that.

Q. Under the -- on this same page of the document, "Crash Avoidance Capability – Hazards," there's text that says:

"Entities are encouraged to have a documented process for assessment, testing, and validation of their crash avoidance capabilities and design choices."

As of March 2018, did Tesla have a documented process for assessment, testing, and validation of its crash avoidance capabilities and design choices?

MR. BRANIGAN: Do you mean for the version of Autopilot that was in your client's vehicle?

MR. McDEVITT: No. This was -- this is more about a process. This is not about a particular iteration of the software.

MR. BRANIGAN: Yeah, I understand, but the reason I'm asking you is because you've been referring to a document that, by its -- by its own terms, relates to a Level 3 to Level 5 system. So that's why I'm asking you why or whether your question relates to the version of Autopilot in your client's vehicle or some future version that might be related to this document that doesn't relate to

your client's version.

MR. McDEVITT: Okay. Well, that's an interesting argument, but I disagree that the Autopilot system as Tesla released it would have fit within a clear Level 2. The way that they released it to the public without having any restraints on the opposite -- operational design domain I think blurs the line as to whether it's Level 2 or Level 3. So I don't agree with you.

MR. BRANIGAN: I know you don't, but I'm telling you that the document that you're showing the witness speaks for itself. And when you read it earlier today, you stopped short of reading to him that it applies to a Level 3 to Level 5 system. So that's why I asked you to clarify your question, because you keep asking him questions about a document that, by its own terms, doesn't relate to our product.

MR. McDEVITT: Oh, okay. So if it's a Level 2, then you shouldn't have any documented processes and you shouldn't do any of these things? I disagree.

MR. BRANIGAN: No. No, I -- we're just arguing with each other. I object to the form of the question --

MR. McDEVITT: Okay.

MR. BRANIGAN: -- for the reasons I said.

MR. McDEVITT: All right. Well, in any event, he had -- okay. Well, yeah. I just don't think we are on the same page on that. So let me go back to my question.

BY MR. McDEVITT:

Q. Did Tesla have a documented process for assessment, testing, and validation of its crash avoidance capabilities and its design choices related to those capabilities?

MR. BRANIGAN: Same objection. Overly broad. Vague.

THE WITNESS: 2018, I believe we had a process where we would test the system, and then there are validation documents and there are design documents.

BY MR. McDEVITT:

Q. Where -- as you understand it, where are those documents kept? Are those in Confluence? Are those in some database? Where were they?

A. Some of it was on Jira. Some of it was on Confluence.

Q. Can you tell us your role with respect to automatic emergency braking in Autopilot?

A. In what time frame?
Q. Well, let me just start in general. What -- what is -- what has been the extent of your involvement in automatic emergency braking?
A. Over the time, I have been involved in different aspects of it.
Q. Okay. Let's focus on the time period from March 2018 and earlier. What was the nature of your involvement in automatic emergency braking during that period of time?
A. I was working on improving the Vision system to have higher position and recall in the emergency braking situation.
Q. Were you involved in field testing or actually real-world tests of automatic emergency braking for Tesla prior to March of 2018?
A. To some extent, yes.
Q. Where are the locations where that was performed?
A. Some of it was performed at the Moffett Airfield. Some of it was performed in Alameda, I believe, but there could have been more. That's -- that's what I remember.
Q. Was any of it done in Arizona?
A. It's possible.

Q. When -- for the tests that you were involved in for the automatic emergency braking, was the typical practice to videotape the tests?

A. We would record internal data -- data clips that have information.

Q. Do you mean you'd use the cameras that were incorporated into the vehicle, or do you mean you'd mount a camera or something else?

A. No. The Autopilot cameras, I think the internal -- the vehicle cameras would be used to record some data. Probably not every test is recorded, but some tests are recorded that are of interest.

Q. Okay. And then after the facts -- after the fact, was there a capability to review the clips with the Augmented Vision overlaid so that you could evaluate when the system detected an object or the accuracy of the system in predicting the distance to the object and evaluating when the system decided to either present a warning or apply the brakes?

A. Yeah. We'd use Augmented Vision combined with other signals to determine those things.

Q. And what -- amongst the different tools that Tesla developed in-house, which tool would be used to do that?

A. I don't recall the name of the tools in 2018. Most recently, we used our internal web tools to do that.

Q. Okay. Was TIDE one of the tools or Apviz? What were the tool names?

A. Yeah, Apviz is one of the -- recently, the last few years, we have been using Apviz. I do not recall when it became the main tool. Before that, there was Tclips.

Q. And for the court reporter, Apviz is A-p-v-i-z; correct?

A. That's correct.

MR. BRANIGAN: Hey, Andrew, are we getting to a point where we can take a break? We've been going for about an hour and 20 --

MR. McDEVITT: Sure.

MR. BRANIGAN: -- 25.

MR. McDEVITT: Yeah, let's take a break. Yeah.

MR. BRANIGAN: Okay.

THE VIDEOGRAPHER: We are off the record. The time is 3:05 p.m. Pacific Time.

(Break taken from 3:05 p.m. to 3:28 p.m.)

THE VIDEOGRAPHER: We are back on the record. The time is 3:28 p.m. Pacific Time.

BY MR. McDEVITT:

Q. So I have a few follow-up questions on the video that was marked as Exhibit 113. I'm going to show you Exhibit 192 -- which I realize I've skipped a bunch of numbers, but I'm going to go to 192 and come back.

(Exhibit Number 192, Email from Jason Kong to Ashok Elluswamy, dated 10/17/16, Bates-stamped TESLA-00105249 - 105250, was marked for identification.)

BY MR. McDEVITT:

[redacted]

[redacted]

Q. When you were working at Tesla in 2018, I presume you learned of the March collision involving a Model X on Highway 101; is that true?

A. Is it this case?

Q. Yes.

A. Okay. Yeah, I heard of it.

Q. How did you learn about it?

A. From the news.

Q. And at any point within the week of the collision did you go to the area where the collision occurred specifically to follow up on the collision?

A. I did not specifically go to follow up on the collision.

Q. Okay. Did you, as just part of your commute, pass that area?

A. Yes.

Q. Do you -- as a matter of your normal habit, when you commute to -- commuted to work past that location, did you utilize Autopilot?

A. Yeah.

Q. And did you ever have an occasion where the Tesla vehicle that you were in with Autopilot engaged, pulled, or veered toward the gore area where the crash occurred?

A. Not to my recollection.

Q. Did you -- following the crash involving Walter, did you attempt to drive by that location with Autopilot activated, in the same lane that he was in to see if the Autopilot would pull toward the gore?

A. I don't recall trying to do that.

Q. All right. I just want to make sure I'm understanding you accurately. Did you actually do it or -- whether or not you were doing it intentionally for that reason?

A. I don't recall actually doing it.

Q. Okay. Did you ever learn that there had been a -- another Tesla customer that wanted to see if his vehicle would do the same thing -- and by that, I mean veer into the gore area -- and that the other Tesla customer did experience the same phenomenon?

A. I don't recall this anecdote.

Q. Okay. Were you asked, following the fatal crash involving Mr. Huang, to review data that Tesla

had relating to previous vehicle trips by Teslas with Autopilot engaged through that area?

A. I don't think I was asked.

Q. Were you -- was it your understanding that somebody within the team was asked?

A. I do not recall.

Q. Okay. Did you -- were you present for any meetings or occasions where the crash involved -- the fatal crash involving Mr. Huang was discussed or referenced?

A. I don't recall being in any formal meetings.

Q. Okay. And setting aside formal meetings, did you -- did you participate in any conversations or discussions that related in any way to the crash involving Mr. Huang?

A. I mean, there were casual discussions amongst engineers. I think I was involved in those discussions.

Q. Okay. And did -- at any point did you hear that the Vision system had erroneously labeled one of the stripes of the gore area as a lane boundary?

MR. BRANIGAN: Objection. Form.

THE WITNESS: I don't recall what we discussed.

///

BY MR. McDEVITT:

Q. Okay. At any point did you hear that Autosteer directed the Tesla to steer into the gore area prior to the crash?

A. I don't precisely recall what we discussed.

Q. Okay. Well, did anybody within the Autopilot software team, as best you can recall, try to figure out how it was that the Model X with Autopilot engaged ended up in the gore area?

A. I do not know who investigated that.

Q. Did you ever learn that somebody had made an effort to determine why the Model X was in the gore area when it had Autopilot engaged?

A. My rough understanding of the overall situation was we did not get telemetry from the actual car that was involved. And then Tesla sent QA operators to reproduce the issue, and they were unable to do so.

Q. Did -- who were the QA operators that were sent out?

A. I do not know.

Q. Do you know if the QA operators had the same development version of Autopilot that was in Mr. Huang's vehicle?

A. I do not know.

Q. Did you learn that the version of Autopilot that Mr. Huang had on his vehicle was the development version?

A. Will you please repeat the question?

Q. Yeah. Did you learn at some point that the version of Autopilot Mr. Huang had on his vehicle was the development version?

A. What do you mean by "development version"?

Q. The version was an internal development version as opposed to a authorized release candidate.

MR. BRANIGAN: Objection. Form. Vague.

Go ahead.

THE WITNESS: I don't recall, nor do I -- yeah, I don't -- I don't think that Mr. Huang's vehicle had a development version, at least to what I can recall.

BY MR. McDEVITT:

Q. Okay. Am I correct that development versions of the Autopilot, the hash will have the suffix "dev" at the end?

A. I do not know.

Q. Is that -- has it been your experience that the development versions of Autopilot will have the suffix of "dev"?

A. Nowadays, I don't see that suffix. I don't know which version you're referring to.

Q. Was there ever a period of time when development versions of Autopilot had a suffix of "dev"?

A. If you're referring to the hash, it does not have it because it's like a (indiscernible) --

(Stenographer requests clarification.)

THE WITNESS: It's a hexadecimal code. It cannot have the letter V, for example. And typically they are not -- the hash is like a function that's computed based on the code and everything else. It cannot be -- you cannot add a name to it. I'm not sure if you're referring to some of the tags or some build artifacts, but the hash does not -- it's not possible to have this forever.

Q. Okay. I'm sorry. Then the -- I guess the firmware designation -- or no. That's not it. Hold on. Oh, sorry.

So for the different iterations of the Autopilot, is there something referred to as a package directory or a package path?

A. Yeah, the build is a package, but I'm not the person who worked on build systems. So,

honestly, I do not know much about this.

Q. Okay. If the -- so do you know whether -- was it your understanding that if the build or the package had the word "develop" in it that that referred to a development version?

A. I mean, it makes sense, but I don't know if it was called that.

Q. Okay. Fair enough.

And when did you first, in connection with this case, speak with any attorneys?

A. Couple weeks back.

Q. Okay. So let me -- I'm going to just exclude the time period starting from when you first talked to an attorney. So keep that out of here.

Prior to when you first spoke with an attorney in this case, what did you learn about what had occurred in Walter Huang's crash?

MR. BRANIGAN: Let me just -- let me just interject that to the extent that you learned anything before speaking with your counsel related to this deposition from lawyers at Tesla, I'm instructing you not to answer that question that would include that information.

Do you understand what I'm saying?

THE WITNESS: Yeah.

MR. BRANIGAN: Okay.

THE WITNESS: What is the question again?

BY MR. McDEVITT:

Q. Yes. Prior to when you first spoke with attorneys about this case, what did you learn about what had occurred in Walter Huang's crash?

MR. BRANIGAN: Same objection.

THE WITNESS: My general understanding is that the Tesla somehow entered the gore region and crashed into the crash barrier.

BY MR. McDEVITT:

Q. And did you learn of anybody trying to figure out why it was or how it was that the Tesla entered the gore region?

A. I don't recall. I don't recall, no.

Q. Okay. Am I correct that as of March 2018, Autosteer, by design, was not supposed to steer Tesla vehicles into gore areas.

Is that true?

A. The intent of the design was to stay in the lane.

Q. Okay. So what I said was accurate, that as of March 2018, Autosteer, by design, was not supposed to steer Tesla vehicles into gore areas; correct?

A. Yes.

Q. And am I correct that in March of 2018, the Traffic-Aware Cruise Control, by design, was not supposed to accelerate Tesla vehicles into fixed objects?

A. Will you please repeat the question?

Q. Yes. As of March 2018, the Traffic-Aware Cruise Control feature, by design, was not supposed to accelerate Tesla vehicles into fixed objects. True?

A. The design of the Traffic-Aware Cruise Control is to follow vehicles and, like, reduce speed if the vehicles in front of us are braking; and then when they are leaving, it will, you know, accelerate back up. It has -- I do not know if it has any control for other objects.

Q. Okay. As of March 2018, was the Forward Collision Warning supposed to trigger in response to a fixed object in the path of the Tesla?

MR. BRANIGAN: Objection. Form. Incomplete hypothetical.

THE WITNESS: What is a fixed object?

BY MR. McDEVITT:

Q. Well, does it depend on what the fixed object is?

A. Yes.

MR. BRANIGAN: Same objections.

BY MR. McDEVITT:

Q. Okay. So as of March 2018, the Forward Collision Warning in Teslas was supposed to trigger in response to some fixed objects in the path of the Tesla but not all of them?

MR. BRANIGAN: Objection. Form. Incomplete hypothetical.

THE WITNESS: The Forward Collision Warning and the emergency braking are primarily -- are initial designed for vehicle-like objects, so sedans, SUVs, trucks, buses, bicyclists, you know, so on.

And then I also think at some point we added general drivable space, base collision warnings. And any such system that depends on computer Vision has some sort of precision and recall.

So it would not, you know, get every possible object. There's some things that it doesn't get, and it's a statistical metric on, like, what fraction of things it gets or not.

But, yeah, it's -- we can always relate on the whole but not, you know, on -- it would depend on the situation or the type of object and data set

and things like those.
BY MR. McDEVITT:
Q. Okay. So would it be accurate to say that as of March 2018, a Tesla should almost always hit the brakes if an object is in its path, regardless of visibility conditions?
MR. BRANIGAN: Objection. Form. Incomplete hypothetical. Vague. Calls for speculation.
THE WITNESS: I do not know if it would hit the brakes or -- yeah, I do not know what the software configuration was at that point in time.
BY MR. McDEVITT:
Q. Okay. Let me show you what was previously marked as Exhibit 152. This is blog post dated September 11, 2016. It says, "Upgrading Autopilot: Seeing the World in Radar."
Do you see that --
A. I see this document.
Q. -- title?
Okay. And this indicates:
"After careful consideration, we now believe it" -- referring to radar -- "can be used as a primary control sensor without requiring the camera to confirm visual image recognition."
Do you recall a point in time when that was

the belief of the Autopilot team?

A. Will you please repeat the question?

Q. Yeah. Do you recall, as of September 2016, Tesla, within the Autopilot team, the belief was that radar could be used as a primary control sensor without requiring the camera to confirm visual image recognition?

A. My understanding is that we worked on radar-only braking. But like the other systems, it also had its own, you know, precision and recall metrics. So it would not get every obstacle, but, you know, it would trade off true braking. Some -- in some cases, there are actual obstacles and we integrate. In other cases, the system thinks there's an obstacle, but, in reality, there is no obstacle. And the system would brake, and that's known as "false braking."

Typically, it's a very careful and delicate balance to set the threshold in a manner that you want some of the true braking; but if you go too much to that extreme, then you're going to have a lot of false braking, which you don't want -- do not want either.

These systems, you know, when you tune them, you have set the balance in such a manner that, you

know, it's not too bad in either way. If you only have to miss for false braking, then you might miss out on some of the true braking. And if you do too much of the true braking, then you could miss out on some -- or, like, you could have a lot of false braking.

And that's why any of the systems have this precision recall balance, and then they set a threshold based on oral considerations of the system.

Q. Okay. As of September 2016, did the Autopilot team conclude that by using radar as a primary control sensor, quote, the -- Tesla, quote, car should almost always hit the brakes correctly even if a UFO were to land on the freeway in zero-visibility conditions?

A. That's what it says here.

Q. Okay. And is that accurate?

MR. BRANIGAN: Objection. Form. Incomplete hypothetical.

THE WITNESS: Again, like I mentioned earlier, there is the precision recall to this argument. Like, it's -- you have to measure, okay, how many instances of this UFO was the system able to avoid? And I would probably guess that not

100 percent, but also it was from zero percent. So somewhere in between.

BY MR. McDEVITT:

Q. Okay. I guess my question is, as of September 2016, by utilizing the sensors and -- that existed on the vehicles at the time and the software in its state at that time, was it true to say that a Tesla should almost always hit the brakes correctly even if a UFO were to land on the freeway in zero-visibility conditions?

MR. BRANIGAN: Same objections.

Go ahead, sir.

THE WITNESS: I did not work on the system. So I cannot answer this question.

BY MR. McDEVITT:

Q. Okay. Well, in your experience, is the description I just read consistent with your observations of its performance capabilities?

A. Like I mentioned earlier, the system has the precision recall. So it will not get every UFO, but it also, you know, doesn't fail at every one of them. It's somewhere in between.

Q. Okay. And would -- in terms of that scale of in between, is it accurate to say that it would be closer to almost always correctly braking versus

not?

A. I do not know.

MR. BRANIGAN: Objection. Form.

BY MR. McDEVITT:

Q. All right. I'm going to now show you Exhibit 184.

(Exhibit Number 184, Video, was marked for identification.)

MR. McDEVITT: All right. I'm going to hit play.

(Video playing.)

BY MR. McDEVITT:

Q. Okay. Did you hear -- did you recognize Elon Musk in that clip?

A. Yes.

Q. And you heard him describe the prime directive for Autopilot?

A. Yeah.

Q. And that's -- what he said there is the prime directive for Autopilot is "do not crash"; correct?

A. Yeah.

Q. And that's consistent with what you've heard Elon Musk say during your time at Tesla?

A. Yeah.

Q. And then did you hear his reference to a UFO landing on the road and not crashing?

MR. BRANIGAN: Objection. Form. It mischaracterizes the totality of what Mr. Musk actually said on the tape. So the question is misleading.

THE WITNESS: I heard the videotape.

BY MR. McDEVITT:

Q. Okay. And, actually, independent of that video clip, you've actually heard Elon Musk use the UFO -- use a UFO example of a scenario that Autopilot should be able to encounter and react to without crashing; correct?

A. Yes.

Q. I'm going to now show you --

MR. McDEVITT: Just for the record, Exhibit 181 is a New York Times article. Exhibit 179 is the deposition notice.

BY MR. McDEVITT:

Q. Let me just ask you this: Did you -- prior to your deposition today, did you make an effort to search for and locate documents that matched the description in the deposition notice?

A. No.

Q. I'm going to now show you Exhibit --

MR. BRANIGAN: Counsel, for the record, the deposition notice was served on Tesla's counsel. So Tesla's counsel responded to the deposition notice. I think you know that.

MR. McDEVITT: And my question was whether he made an effort to search for documents. It has nothing to do with -- both those -- there's nothing inconsistent about those two things.

MR. BRANIGAN: That's true, but to the extent that you're trying to create the implication it was his obligation to do so, that wouldn't be right either.

MR. McDEVITT: Well, no, my intention is to -- just to create a record that the witness didn't search for any document, and that was because he was -- well, because of the position that has been articulated and communicated to us.

MR. BRANIGAN: Well, that's not right either. It's because we didn't ask him to search for any documents. It wasn't incumbent upon him. He's not here as a corporate representative. You served a notice not on him; you served it on the company. And we responded on behalf of the company, and you know our position.

So all I'm saying is, to the extent that

you're trying to create the implication that he was under some obligation to do so through that question, that's an unfair and misleading question.

MR. McDEVITT: No. Actually, what you just said is a mischaracterization of California law. Actually, as the witness, the service of the deposition on the employer of the witness is equivalent to serving him with a subpoena. So he actually was required to look for documents. It was not the company.

And, actually, that's the reverse of the position I always hear in these depositions, that, "Oh, this is a deposition notice to a person, not the corporate entity; so the documents weren't searched for."

I mean regardless, I don't think we need to belabor this. I only had one question about it.

BY MR. McDEVITT:

[redacted]

[redacted]

Q. Okay. And even if you can't give us the specific names, can you just generally describe, would those be the documents that contained the results from various different unit test for vision?

A. Yeah, would be one source, but also be, you know, some video replays how maybe the car drives even.

Q. Okay. At any point in time when you've been employed by Tesla, has Tesla had a document that's identified as a functional safety plan?

A. I'm not aware of such a document.

Q. All right. There's -- I have a few more documents that I'm going to try to go through as quickly as I can, but do you -- do we want to take a five-minute break, or do you want to just charge on?

MR. BRANIGAN: If you're going to be five, ten minutes -- well, first of all, I defer to the witness. If he wants to take a break now, we'll take a break now.

THE WITNESS: If we can likely go for the finish, that's better than taking a break.

MR. BRANIGAN: Well, I agree with that, but our understanding of what going through the finish is may not match Mr. McDevitt's.

So that's why I'm saying, if you're talking about finishing up in about five to ten minutes, then I think the witness and everybody else here can say, yeah, let's do it. If you think you're going to be another 30 to 45 or another 60, then we'll take you up on the offer to have a break.

MR. McDEVITT: I can tell you for sure it's not going to be 30, 45. I'm running out of gas for sure.

I'm just going to try to -- I mean, I just have -- why don't we just take five minutes, and then I'll just -- that'll give me a chance to organize my thoughts, and I'll be more efficient. And I'll go as fast as I can here.

MR. BRANIGAN: Okay.

THE WITNESS: Okay.

MR. BRANIGAN: All right. We'll take five.
MR. McDEVITT: All right.
THE VIDEOGRAPHER: We are off the record. The time is 4:34 p.m. Pacific Time.
(Break taken from 4:34 p.m. to 4:43 p.m.)
THE VIDEOGRAPHER: We are back on the record. The time is 4:43 p.m. Pacific Time.
BY MR. McDEVITT:
Q. Has Tesla used LIDAR as part of the development of Autopilot?
A. What do you mean by "development"?
Q. For instance, has Tesla used LIDAR technology to generate ground-truth information that's then used to train the neural networks?
A. Yes.
Q. Can you tell us all the different ways that you're familiar with that Tesla has used LIDAR in the development of Autopilot.
A. We use 3-D sensors -- LIDAR's one of them -- to help provide ground-truth data for training the neural networks. We also used it, it for evaluation where we can measure the overall system performance compared to LIDAR, for example.
Q. How come Tesla doesn't use cameras to get the ground-truth information?

A. Tesla uses cameras to get ground-truth information.

Q. Okay. I'm going to show you Exhibit 194.

And before -- actually, before I do that, am I correct that during your time at Tesla you have been aware of Elon Musk's representations in the public regarding when Tesla full self-driving will be feature complete?

MR. BRANIGAN: Objection. Form. Relevance.

THE WITNESS: Will you please repeat the question?

BY MR. McDEVITT:

Q. During your time at Tesla, have you been aware of Elon Musk's tweets or public statements about when Tesla will have a feature-complete version of full self-driving?

MR. BRANIGAN: Same objections.

THE WITNESS: I'm aware that he has tweet4ed about that topic.

BY MR. McDEVITT:

Q. Okay. Am I correct that over the years you've been with Tesla, Elon Musk has pressured the Autopilot software development team to get the software out to the public as fast as possible?

MR. BRANIGAN: Objection. Form.

THE WITNESS: I would not agree with the precise wording of the statement.

BY MR. McDEVITT:

Q. Okay. Can you tell -- if you have to rephrase it in a way that is more accurate to you, can you do that, please.

A. What I've heard from him is that it matters how early or how late we get autonomy done. Obviously earlier is better because there are crashes happening in the real world, and Autopilot has the potential to save them. So it's important to do it earlier than later.

Q. Okay. Have you, during your time at Tesla, heard of Autopilot software engineers feel like they need to convince Elon Musk to devote resources towards features that just make Autopilot safer as opposed to more convenient?

MR. BRANIGAN: Objection. Form. Foundation.

THE WITNESS: For a practical Autopilot system, you want us to balance safety and comfort. So if you're talking about trading off, you know, the position recall for true braking versus false braking, we do communicate our choices to Elon, but we do make a lot of revisions on our own based on,

you know, engineering reviews.
BY MR. McDEVITT:
Q. And during the time you've been with Tesla, there have been Autopilot software team meetings where Elon Musk has called in from his Tesla while using Autopilot to provide his feedback on how the Autopilot is functioning; correct?
A. Yes.
Q. And can you tell us how many times that has occurred or how often?
A. I can't count. I can't give you a specific count.
Q. Is that something that has been a pretty regular occurrence, for Elon Musk to call in to a meeting and to provide feedback to the team based on his evaluation of the particular build of Autopilot?
MR. BRANIGAN: Objection. Form. Vague.
THE WITNESS: Yeah, I think you had a couple of questions in your statement.
BY MR. McDEVITT:
Q. Okay. Well, let me -- let me back up.
As a starting point, during the time you've been with Tesla, there have been numerous occasions where the engineering team has pushed a development version of Autopilot to a vehicle that Elon Musk

drives; correct?

A. Yes.

Q. And there have been numerous occasions where Elon Musk has called in to a team meeting while drive -- while in a Tesla with that particular development version of Autopilot in use for the purpose of providing feedback to the team on how it's functioning; correct?

A. I wouldn't say it's numerous times.

Q. Okay. Well, do you agree it's more than three?

A. Sure. It's, yeah, somewhere around there.

Q. Okay. And there have been at least some occasions where Elon Musk has -- the feedback that he's provided to the Autopilot software team is along the lines of something like, "This build is shit"; correct?

A. Yeah.

Q. There's also been occasions where Elon Musk has provided the feedback to the Autopilot software team that "This build sucks"?

A. Yes.

Q. And am I correct that Elon Musk was the person -- or he decided that the feature Navigate on Autopilot shouldn't be called "Drive on Navigation";

instead, it should be called "Navigate on Autopilot"?

A. I do not know.

Q. There -- during your time with Tesla, it has been normal or usual for Elon Musk to make decisions about the Autopilot software; correct?

MR. BRANIGAN: Objection. Form. Vague.

THE WITNESS: He's the CEO of the company. He can make whatever decisions he wants about the company.

BY MR. McDEVITT:

Q. Okay. And that would include with respect to Autopilot?

A. Yeah.

Q. Let me show you Exhibit 194.

(Exhibit Number 194, Document Titled "Peer Review of Behavioral Competencies for AVs, University of California PATH Program," dated February 2016, Bates-stamped TESLA-00182382 - 182429, was marked for identification.)

BY MR. McDEVITT:

Q. This document's called "Peer Review of Behavioral Competencies for AVs, University of California PATH Program," from February 2016.

Are you familiar with this document?

A. No.

Q. And I appreciate that you are not familiar, but there's -- there's some descriptions in here that I just want to see if you've heard in a different context or, without knowing the source, you became aware of during your time at Tesla.

MR. BRANIGAN: What's the exhibit number again, please?

MR. McDEVITT: 194.

MR. BRANIGAN: Thank you.

BY MR. McDEVITT:

Q. And this is Bates TESLA-182382.

I'm showing you Bates 182402 -- or strike that.

I'm going to go to 182403. On this page, you see there's a table that has a column labeled "Behavioral Competency"?

A. Sure.

Q. And then it says "Behavioral Competency, Detect and respond to system engagement and disengagement restrictions"?

A. I see that.

Q. The -- in the second column, "Description of Behavioral Competency," I'm going to direct your attention to the second bullet.

You see that?

MR. BRANIGAN: Can -- is it possible to make it larger?

MR. McDEVITT: Yeah. Absolutely.

BY MR. McDEVITT:

Q. All right. Are you able to see the sentence that begins with "Detects"?

A. I see some sentence there, yes.

Q. Okay. So it says:

"Detects any restricted condition under which the vehicle is not intended to operate and: If autonomous mode is not already engaged, prohibits the operator from engaging autonomous mode." Let me pause there.

Does Autopilot -- or has Autopilot had a function that detects whether there's a restricted condition under which Autopilot's not intended to operate and prohibit the operator from engaging Autopilot in that instance?

MR. BRANIGAN: Objection. Form. Foundation. Incomplete hypothetical.

THE WITNESS: Like I mentioned earlier in the deposition, Autopilot, the production version of it, has some conditions to enable just presence of lane lines and a few other conditions. So one can

interpret that as conditions that, you know, enable -- enabling the system.

BY MR. McDEVITT:

Q. Okay. Then the second part of it is:

"Detects any restricted condition under which the vehicle is not intended to operate and: If autonomous mode is already engaged, responds to disengagement condition by either transferring control to the operator, switching to a reduced performance operating mode to ensure safety, or coming to complete stop."

Do you see that language there?

A. Yes.

Q. And as of March 2018, did Autopilot have that functionality?

MR. BRANIGAN: Objection. Form. Foundation.

THE WITNESS: Autopilot had something similar. It's called "take over immediately." The system triggers that under certain circumstances.

BY MR. McDEVITT:

Q. With respect to the take-over-immediately feature, as it relates to the Tesla being within a gore area with Autopilot engaged, take over immediately did not apply to that situation until

after March of 2018; correct?

A. I do not know.

Q. Okay. Let me show you -- I'm going to go through just a series of Jira tickets, and that's -- I don't have any other questions after that.

(Exhibit Number 188, Jira Ticket SW-133126, Bates-stamped TESLA-00062119 - 00062120, was marked for identification.)

BY MR. McDEVITT:

[redacted]

[redacted]

Q. Okay. I don't have any other questions for you. I don't know if anybody from Caltrans -- actually, I apologize. There is one -- I just wanted to ask you if you've seen this article.

(Exhibit Number 181, New York Times Article Titled "Inside Tesla a Elon Musk Pushed an Unflinching Vision for Self-Driving Cars," was marked for identification.)

BY MR. McDEVITT:

Q. I'm going to show you Exhibit 181. This is a New York Times article titled "Inside Tesla as Elon Musk Pushed an Unflinching Vision for

Self-Driving Cars."

Did you -- did you ever read this particular article?

A. I don't recall reading this article.

Q. Okay. And you had told us -- I'm just going to show you some -- this is -- well, I guess I'll just make it an exhibit. This is an Excel sheet Bates-stamped HUANG-163, and that'll become Exhibit 195.

[redacted]

[redacted]

MR. McDEVITT: All right. Okay. So I don't have any other questions. Like I said, I don't know if anybody from Caltrans has questions.

MS. LOVE: This is Rosemary. I have no questions.

MR. BRANIGAN: Mr. Elluswamy, we have no questions for you. So the deposition is over. A copy of the transcript will be provided for you, once it's available, for you to review and sign.

THE WITNESS: Understood.

MR. BRANIGAN: All right.

THE WITNESS: Thank you.

MR. BRANIGAN: Thank you.

THE VIDEOGRAPHER: Before we go off the record, do you want to get your order on the record?

CERTIFIED STENOGRAPHER: Yes. Mr. Branigan or Ms. Love, do you need copies of the transcript?

MR. BRANIGAN: Yes.

MS. LOVE: Yes. This is --

MR. BRANIGAN: I think we --

MS. MILLER: Yes, and video.
MR. BRANIGAN: Yes, and video, please.
MS. LOVE: Same.
THE VIDEOGRAPHER: Video for both?
MS. LOVE: Yes, please.
THE VIDEOGRAPHER: All right. Is that synced with the transcript?
MS. MILLER: Yes.
MS. LOVE: Yes.
MR. BRANIGAN: Yes, please.
THE VIDEOGRAPHER: Mr. McDevitt, you have a standing order; correct?
MR. McDEVITT: I don't think we do yet; so we'll take a synced transcript as well.
THE VIDEOGRAPHER: Okay. Anything else before we go off? Got everything?
All right. Then we are --
MR. McDEVITT: That's it.
THE VIDEOGRAPHER: -- off the record. The time is 5:20 p.m. Pacific Time.
(Concluded at 5:20 p.m.)

_____

ASHOK ELLUSWAMY

Subscribed and sworn to before me
this 15th day of July, 2022.

_____

(Notary Public)

My Commission expires:_____

C E R T I F I C A T E

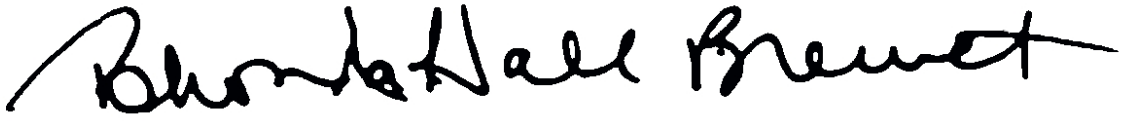
STATE OF CALIFORNIA:

I, RHONDA HALL-BREUWET, RDR, CRR, CSR, LCR, CCR, FPR, NCRA Realtime Systems Administrator, shorthand reporter, do hereby certify:

That the witness whose deposition is hereinbefore set forth was duly sworn, and that such deposition is a true record of the testimony given by such witness.

I further certify that I am not related to any of the parties to this action by blood or marriage, and that I am in no way interested in the outcome of this matter.

IN WITNESS WHEREOF, I have hereunto set my hand this 15th day of July, 2022.



RHONDA HALL-BREUWET, RDR, CRR, CSR, LCR, CCR, FPR,
NCRA Realtime Systems Administrator
Shorthand Reporter

ERRATA SHEET FOR THE TRANSCRIPT OF:

Case Name: SZ HUA HUANG, et al., v. TESLA INC. dba TESLA MOTORS, INC., THE STATE OF CALIFORNIA, and DOES 1 through 100
Dep. Date: June 30, 2022
Deponent: ASHOK ELLUSWAMY

CORRECTIONS:

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Signature of Deponent

SUBSCRIBED AND SWORN BEFORE ME

THIS _____ DAY OF _____, 2022

_____

(Notary Public) MY COMMISSION EXPIRES: _____