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Transcript of Jason A. Janet, Ph.D.

Date: August 30, 2024

Case: Hesai Technology Co., Ltd. -v- Ouster, Inc. (PTAB)

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2 (5 to 8)

5 1 PROCEEDINGS 2 3 JASON ANDRE JANÉT, PH.D., 4 being first duly sworn or affirmed by the Notary, 5 testifies as follows: 6 EXAMINATION 7 BY MR. HAGIZ: 8 Q Good morning, Dr. Janét. My name is Ron 9 Hagiz. I am counsel for Hesai in this proceeding. 10 Have you been deposed before? 11 A Yes, I have. 12 Q And roughly how many times? 13 A I think it's close to 50. It might be -- 14 might be more than 50. 15 Q Okay. So you know how it works. I'll 16 just kind of briefly reiterate the procedure, just 17 for the record. 18 So you understand I'll be asking you 19 questions today and you'll provide answers to my 20 questions? 21 A Yes, sir. 22 Q And your counsel may object from time to	7 1 Q And I'll just ask other than 2 communications on the record -- sorry, other than 3 communications in the Zoom itself while we are on 4 the record, you don't kind of separately communicate 5 with your counsel, or with anyone else, for that 6 matter. Is that okay? 7 A Yes, sir. 8 Q Okay. Is there any reason why you can't 9 provide complete and honest testimony today? 10 A No, sir. 11 Q One last thing, I'll try to take a break 12 probably every hour or so. If you need a break 13 earlier than that, let me know. I'll just ask if 14 there's a question pending, that you answer the 15 question before we take a break. 16 Is that okay? 17 A Yes, sir. 18 Q So let's get started. 19 I'm going to upload into the chat what has 20 been marked -- here we go. So I've uploaded into 21 the chat what was marked as Exhibit 2010, which is 22 the corrected Janét declaration. Let me know when
6 1 time. But unless you're instructed not to answer, 2 you should still answer my question after the 3 objection. 4 Do you understand? 5 A Yes, sir. 6 Q I'll try my best not to talk over you so 7 that our court reporter can get a clear record. 8 I'll just ask that you do the same and wait for me 9 to finish my question before you begin your answer. 10 Is that okay? 11 A Absolutely. 12 Q Because we're doing things remotely via 13 Zoom, I just want to double-check a few things. 14 Do you have any materials in front of you 15 that you're referring to or plan to be referring to 16 during the deposition? 17 A No. I just have my computer up and 18 running and my email. 19 Q Okay. And do you have any kind of 20 communications, whether it's email or chat or 21 instant message, open with your counsel right now? 22 A No.	8 1 you've had a chance to download it and open it up. 2 A Sorry. I'm setting up a folder on my 3 desktop for that. 4 Q Sure. 5 A Okay. I have that. 6 Q And this is the declaration that you 7 submitted in this proceeding relating to the '405 8 patent? 9 A Yes, sir. 10 Q And are the -- are there any errors 11 anywhere in your declaration that you feel you need 12 to correct? 13 MR. LAUPPE: Object to form. 14 A I don't know the full extent. I'm aware 15 of a couple of grammatical errors here and there. 16 But nothing substantive that I can recall. We may 17 discover something as we're talking today, and if a 18 correction is needed, we'll certainly put that in 19 the errata. 20 Q Sounds good. 21 I want to ask a little bit about some of 22 your background and work experience. If you could

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9 1 turn to your -- your CV, which is on PDF page 103 of 2 your declaration. Let me know when you're there. 3 A I'm there. 4 Q So let me just start with your 5 undergraduate is in mechanical engineering. Is that 6 right? 7 A Yes, sir. 8 Q Do you have a particular focus or 9 specialization? 10 A It would have probably been on -- well, 11 there was no particular concentration. I would say 12 it was a good cross-section of mechanical 13 engineering, everything from thermodynamics to 14 vibrations, controls, electronics, to the extent 15 of -- to a limited extent, to the extent of what 16 would be in a Bachelor of Science mechanical 17 engineering curriculum, I think just a couple of 18 classes on electronics. And then, let's see, 19 probably a fair amount on the sensors is where I 20 would have put an emphasis during that time. 21 Q And what types of sensors were you -- did 22 you put an emphasis with during your undergraduate	11 1 the curriculum, were the courses you took focusing 2 on how to build or design those types of sensors, or 3 how to use or apply those types of sensors? 4 MR. LAUPPE: Object to form. 5 A Well, initially it would be how to use 6 them, and usually in the process of using them or 7 applying them, you would find limitations. 8 And as an adjunct to my Bachelor of 9 Science curriculum, I was also a machinist. I 10 wouldn't put myself in the master machinist 11 category, probably more in the journeyman level, but 12 or at least a machinist, and so I was really 13 unafraid to take things apart and build them. 14 But I also had some great mentors that had 15 a similar dauntless approach to -- and they taught 16 myself and others in these practical classes that we 17 took, practical meaning that they were very lab 18 intensive. We would set up everything from 19 thermocouples to, you know, accelerometers to optics 20 to, you know, when we could get our hands on them in 21 those days, laser systems. And if we didn't find 22 that it was working the way we needed it to, and
10 1 curriculum? 2 MR. LAUPPE: Object to form. 3 A I would not consider this limiting as I 4 describe it. But sensors included, you know, type 5 of sensors that could be used for detecting strain 6 and stress and vibrations, optical sensors that 7 would be used for ranging and proximity sensing, 8 tactile sensors, gate sensors. 9 I realized towards the end of my Bachelor 10 of Science degree that I was -- I was discovering an 11 interest in robotics and automation and -- and so 12 it's -- I guess it's a -- this is just the way 13 things go sometimes, you find out, you know, in the 14 last maybe year and a half of your curriculum what 15 you really are passionate about. And so that last 16 year and a half, two years, that's where I threw 17 myself into sensors and kinematics and stuff like 18 that. 19 Q I understand that. That's how I ended up 20 in law school, so. 21 When you say -- the different sensors that 22 you mentioned that kind of was part of the focus of	12 1 sometimes these things were part of the lab, we 2 would take them apart, understand the anatomy of 3 them, and switch out parts, and in a couple of cases 4 before I finished my undergrad, building from the 5 ground up. 6 Q Let me ask a little more specifically. 7 You mentioned optical sensors before. As part of 8 your -- as part of the work that you just mentioned 9 during your undergraduate curriculum, did you build 10 or take apart any optical sensors? 11 MR. LAUPPE: Object to form. 12 THE WITNESS: Sorry, did I cut you off, 13 Patrick? 14 MR. LAUPPE: All good. It registered on 15 the realtime. 16 THE WITNESS: Okay. 17 A Yes. One of probably half a dozen 18 examples was we used a laser to evaluate how 19 different things at a distance would vibrate. And 20 I'm picturing, among other things, we had this 21 elaborate fluid control thermal control system on a 22 wall, it was a very big practical lab, if you will,

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13 1 and we wanted to see how fluid that was passing 2 through these passageways would cause vibration in 3 the conduits. 4 And we had a couple of ways of evaluating 5 that. One was with accelerometers. Another one was 6 just simple acoustic sensors. And the third was 7 with an optic sensor that we would set it up, and as 8 it vibrated even in imperceptible ways, we could see 9 the deflection as the light was either hitting a 10 sensor that was directly on it, or when we did it 11 remotely and tried to -- tried to get some distance 12 between us and the -- and the system, we would also 13 notice the flutter as the light pattern returned. 14 Q So how did that involve building or taking 15 apart an optical sensor? 16 MR. LAUPPE: Object to form. 17 A Well, we had to put the right lensing in 18 there to filter out the noisy elements and ambient 19 light. Sometimes it took the shade on the window to 20 just be partly open a sliver and it would affect the 21 readings. So we wanted to tune right into the -- in 22 that situation I think we were using a visible red	15 1 robotics. I just wasn't sure what major discipline 2 of robotics I wanted to focus on. 3 So when I had the option of going to grad 4 school, I explored a couple of different places. 5 And when I spoke with folks at NC State, obviously 6 one option was mechanical engineering, the other was 7 electrical engineering, I should say a third was 8 computer science, and then a fourth was the 9 integrated manufacturing systems. 10 And to me, IMSEI was a good middle ground, 11 it gave me the option of working in a 12 multidisciplinary field and in a multidisciplinary 13 academic program to then decide where I really 14 wanted to focus. And my concentration during that 15 time was mobile robot motion planning, sensing, 16 perception, and self-localization. 17 Q All right. Let me -- let me just go 18 through each of those. 19 What is mobile robot motion planning? 20 A Mobile robot motion planning relates to 21 mobile robots being able to plan their trajectories 22 through space. I think at the time I mostly just
14 1 laser, and so we had to get into some optical 2 filters, started with cellophane, you know, the 3 colored cellophane, but graduated to, you know, 4 other types of glass-like or plastic-like filters. 5 And, again, we were just looking for very minor 6 deflections in what was being returned. But we 7 wanted to amplify that so then we would also have 8 optics that would do a visual amplification and then 9 we could use a camera. In some cases it was pretty 10 crude, we would literally stand there with a pen and 11 we would look at the peak and valley and make a 12 mark. But when we could use a video camera, and, 13 you know, again, this was using kind of crude VHS 14 type of recording mechanisms back then, we did it 15 for that. 16 Q Let me move on to your master's degree. 17 That said it's in integrated manufacturing systems 18 engineering. What is that exactly? 19 A Well, the Integrated Manufacturing Systems 20 Engineering Institute, or IMSEI, is a program at 21 North Carolina State University that is 22 multidisciplinary. I knew I was interested in	16 1 focused on ground vehicles. So planning motion 2 around obstacles both known and unknown, static and 3 moving. 4 Q And when you said -- when you said sensing 5 among the things that you focused on during your 6 master's, what -- what kind of sensing? 7 MR. LAUPPE: Object to form. 8 A That's a very long list, because, as you 9 can imagine again, robotics is inherently a 10 multidisciplinary field. I can list a few sensors 11 but they're not going to be exhaustive. But the 12 sensors included the very early stage commercial 13 LiDAR systems like from SICK, tactile sensors like 14 whiskers and impact sensors, date sensors, acoustic 15 sensors, ranging sensors like infrared, proximity 16 sensors, computer vision. 17 I'm sure there are other things I'm 18 leaving off, but that's a decent example set of the 19 types of sensors I dealt with. 20 Q Were you building any of these sensors 21 yourself, or were you kind of purchasing or 22 acquiring off-the-shelf components?

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17 1 MR. LAUPPE: Object to form. 2 A The -- it really was a mixture of both. 3 If we couldn't get -- if I couldn't get a sensor off 4 the shelf, which, unfortunately, was more times the 5 case than I had wanted, but you're talking about the 6 early '90s, early to mid '90s, then I would endeavor 7 to build it or to get the core components and do an 8 assembly and build the support circuitry and the 9 signal processing and -- signal processing on the 10 back end and the front end, and then ingesting that 11 information and putting that into some sort of 12 actionable format. For example, the maps that would 13 be created for motion planning, or the algorithms 14 that would be used for motion planning, or the 15 algorithms that would be used for self-localization, 16 just to say figuring out where you are in the 17 environment, oftentimes building a map. 18 Q You mentioned perception as one of the 19 other focuses during your master's degree. What 20 does that refer to? 21 MR. LAUPPE: Object to form. 22 A That really goes hand in hand with the	19 1 very, very sensor intensive. 2 Q In any of the work or research that you 3 did both in your undergraduate career and your 4 master's career, did any of that involve designing 5 or building LiDAR systems? 6 MR. LAUPPE: Object to form. 7 A Not in my undergrad. My master's and 8 Ph.D. overlapped, so it's difficult for me to 9 remember exactly the specific time frame when I 10 started getting my hands dirty with building a LiDAR 11 type of system. 12 One of the things that we noticed with the 13 SICK LiDAR system was it was strictly a 2-D plane, 14 the refresh rate or the scan cycle wasn't always 15 very quick, had a very limited field of view, and it 16 was highly susceptible to ambient light. And so put 17 a couple of -- well, put a single motor with an 18 encoder, had it controlled by I think an HC11 at the 19 time and a grabbed -- fortunately, I didn't have to 20 buy a brand new laser, for this, we had several 21 already in the center. And it was a bit bulky, I 22 would say it was very bulky.
18 1 sensing. Perception is -- it really is hand in hand 2 with -- with sensing. Just I would say it's more 3 fundamental, you're kind of at the transducer level 4 oftentimes, but you will -- you know, perception is 5 also from the perspective of the, in my situation, 6 the mobile robots, can they perceive the environment 7 and extract important information and fulfill some 8 sort of mission on the basis of that information and 9 preferably do it in realtime. 10 Q And the last one you had mentioned was 11 self-localization. What is that? 12 MR. LAUPPE: Object to form. 13 A Self-localization is -- and, by the way, 14 I'll put self-referencing in with that bucket. But 15 self-referencing is -- is being able to use features 16 of the environment to figure out where you are, and 17 localization is essentially the same thing. I think 18 some people would look at it as having a more 19 precise I'm at this position and at this 20 orientation, sometimes referred to as pose. 21 And self-localization is not a simple 22 process, it continues to be a challenge, but it's	20 1 And then we set up a couple of photocells, 2 I think we started with the cadmium sulfides and 3 then we graduated to photodiodes, and I believe we 4 had avalanche photodiodes around that time, if I'm 5 not mistaken. Anyway, we tried several different 6 photo sensors. 7 I think one of the biggest challenges that 8 we had was the timing of it all. The HC11 wasn't a 9 fast enough processor. So then we graduated to a -- 10 well, let me just say the HC11 was not fast enough 11 for doing time of flight for light. 12 We could -- we could do a couple of other 13 things with it. We could -- not with the HC11 14 necessarily processing, but we could come up with a 15 structured light approach where we would look at 16 triangulation or how the projected signal would get 17 distorted. We tried to slow, obviously, the light 18 down a little bit with the optics, and but -- then 19 we had to use a digital signal processor, which was 20 very power intensive, and I can't remember -- it's 21 right on the tip of my tongue -- the specific DSP 22 suite that we used. And ultimately, I don't think

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21 1 we ever got to a point where we could do time of 2 flight, but we did sort of a triangulation approach. 3 Q And you mentioned -- one of the problems 4 that you mentioned with the SICK sensor that led to 5 the work you described was that it had -- it was 6 highly susceptible to ambient light. Was that a 7 problem that you were able to solve in your design? 8 MR. LAUPPE: Object to form, scope. 9 A I don't know that we ever fully solved it. 10 I think that we were able to make it less 11 susceptible to ambient light. If we were indoors, 12 the windows were shut, and when I say shut, I mean 13 light tight, you know, nothing was getting in. The 14 SICK was fine. And that was our baseline. And so, 15 you know, and we got our stuff to be -- to be fine 16 at that level, and then we would basically let open 17 these covers that we put over the windows to just 18 see how the performance degraded. 19 So I feel like at some -- and I wouldn't 20 consider this production grade or product grade. 21 But at a fundamental research level, it looked 22 encouraging at the time.	23 1 room to room doing certain tasks, and we were very 2 hopeful that -- that the LiDAR systems could 3 complement the suite of sensors. 4 At the end of the day, even though we had 5 encouraging results, to my previous point, we just 6 had to not use the LiDAR systems, whether it was our 7 home-brewed system or the SICK, and -- and went 8 instead to computer vision with a structured laser 9 light grid projected onto the floor or, you know, 10 kind of in front of the robot. 11 Q Got it. And the project you were just 12 describing involving building a LiDAR system during 13 your master's Ph.D., that would have been in the mid 14 to late 1990s. Is that right? 15 MR. LAUPPE: Object to form. 16 THE WITNESS: Sorry, I didn't mean to talk 17 over you, Patrick. 18 A Yes, that would have been in the '96 to 19 '98 time frame, maybe '95 -- 20 Q And do you recall -- sorry, go ahead. 21 A Maybe '95 to '98. 22 Q Do you recall roughly how much time you
22 1 I think the thing to remember is that when 2 you're in the robotics and automation space, because 3 it's multidisciplinary, and because rarely do you 4 find something commercial off-the-shelf that you can 5 just plug and play and it worked seamlessly the way 6 that you need it to, you get into a mode where you 7 anticipate having to tear things down, modify them 8 or build them from scratch. 9 And by the way, that's beyond the sensors, 10 I've built many robotic limbs and actuators and 11 mobile vehicles from scratch as well. 12 So the overarching point of that is to 13 build a system that does a particular task, does a 14 particular set of tasks. And in that endeavor, 15 particularly related to the LiDAR system, we were 16 preparing for a couple of competitions. One of them 17 was the name is IJCAI, but I think it's I-J-C-A-I. 18 And, gosh, I'm trying to remember a couple of the 19 other organizations. But we needed to have the 20 ability to figure out, for the robot to be able to 21 figure out autonomously where it is in the 22 environment, try and map that environment, going	24 1 spent building that LiDAR device? 2 MR. LAUPPE: Object to form, scope. 3 A I couldn't tell you precisely how many 4 man-hours were put into it. 5 I can tell you this. I didn't have a 6 social life when I was doing my grad school. So 7 I -- we had a machine shop and electronics assembly 8 shop, the -- the electronics inventory. And I had a 9 very large center with open space all in one area in 10 a place called Daniels Hall at North Carolina State 11 University, and I also had a cot and a refrigerator 12 and a microwave. And you can ask people I went to 13 school with and they'll tell you I was pretty much 14 around the clock there. 15 Q Well, setting aside the specific 16 man-hours, do you know if that LiDAR design or LiDAR 17 building project, was that something you worked on 18 over the span of weeks? Months? Years? 19 MR. LAUPPE: Object to form, scope. 20 A I would say it spanned at least a year. I 21 don't know if it crossed the two-year threshold at 22 that point.

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25 1 Q Other than that project, is there anything 2 else during your education, whether it's bachelor's, 3 master's or Ph.D., where you were building or 4 designing a LiDAR system? 5 MR. LAUPPE: Object to form. 6 A That example is the one that stands out 7 the most. 8 I was very motivated during that time 9 and – and dove into various technologies on an 10 as-needed basis. And I'm not sure that I remember 11 everything, but I would say that's the one that 12 stands out the most. 13 Q And there's no other project specifically 14 that comes to mind right now? 15 MR. LAUPPE: Object to form. 16 A Not at this point. That doesn't mean it 17 didn't happen, but not at this point. 18 Q Let's shift to kind of your post -- 19 post-Ph.D. work and professional work. And I think 20 you discussed some of that in paragraphs 4 through 21 22, I think, in your declaration. Is that right? 22 MR. LAUPPE: Object to form.	27 1 discussed in paragraph 17 of your declaration, is 2 there any other work that you did in your employment 3 or professional career involving LiDAR devices? 4 MR. LAUPPE: Object to form. 5 A Well, if you'll notice, I was an adjunct 6 professor both at Duke University and at North 7 Carolina State University for a couple of decades, 8 and during the time that I served as an adjunct 9 professor there, I taught various classes mostly in 10 the engineering technology space, and for that 11 matter, mostly in the controls, robotics and 12 automation space, and LiDAR is a common sensor in 13 the mobile robotics world. And, you know, it 14 started to really kind of take off in the -- I want 15 to say in the, I don't know, 2010-ish time frame, 16 2012-ish time frame. 17 But not everything is listed of the 18 projects that I oversaw. But you may notice under 19 Duke University and possibly at NC State University 20 it's listed. But at both places the courses that I 21 taught were project intensive, building, operating, 22 utilizing in some way, shape or form robotics, and
26 1 A You're referring to the section in my 2 declaration Background and Qualifications. Is that 3 correct? 4 Q That's right. 5 A Okay. I'm there. 6 Q So reading through this section, I see in 7 paragraph 17 you refer to some work that you did 8 with LiDAR systems when you were at Teledyne 9 Technologies. Do you see that? 10 A Which paragraph did you say? 17? 11 Q 17. 12 A Yes. 13 Q And just before -- before we talk about 14 that, is there anything else, any other kind of 15 position work that you did post-Ph.D. where you were 16 working with LiDAR systems specifically? 17 MR. LAUPPE: Object to form. 18 A Could you ask your question again? Are 19 you -- did you refer to work or are you referring to 20 academia? 21 Q So post -- post-academia, after your 22 Ph.D., other than the work at Teledyne Technologies	28 1 that included, I would say, a good portion of those 2 were mobile robots and a good portion of those 3 mobile robots had LiDAR systems on them of various 4 types. Again, some were your bigger kind of 5 off-the-shelf systems that came along I would say 6 later in the 2010s time frame. Some of them were 7 just early stage laser range finder bolted on 8 something that scans and try to extract meaningful 9 information from it. 10 But I would -- I would just say that given 11 that you're simply asking me post my Ph.D., I just 12 noticed that I taught both at Duke and at NC State 13 University, and a lot of those projects involved 14 LiDAR systems. 15 At Nekton I would probably -- I can't 16 really recall anything specific with LiDAR systems 17 while was at Nekton, which later became iRobot. 18 While at Vortex HC, which was a spinout 19 from Avionic Instruments post-acquisition by 20 TransDigm, we built a lot of mobile robotic systems. 21 The hook, I guess, for our company was a wall 22 climbing technology based on something referred to

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29 1 as vortex regenerative air movement or aqueous 2 movement, it enabled robots to attract to surfaces 3 so that they could climb walls, and if they're under 4 water, you got even more attraction. 5 And so our wheeled systems when they were 6 navigating were supposed to do a variety of things. 7 We didn't get very far using lasers under water, I'm 8 sure you can imagine, particularly in saltwater. 9 But I just remembered something about 10 Nekton. But let me -- let me continue with Vortex. 11 So, again, we tried to utilize a real simple 12 lightweight laser range finders to enable the robots 13 as they're maneuvering up the surfaces to know the 14 best path to take. At that point, if they were 15 operating in the air on a wall or a ceiling, it 16 sounds cool, and it is, but it didn't take a whole 17 lot for the attractor to get disrupted, take 18 something, you know, a protrusion at about a 19 centimeter if it crossed a wide -- if it crossed the 20 width of the robot, and so it could traverse over 21 that, but it sort of disrupted the vortex, and it 22 wouldn't fall off the wall necessarily, but the	31 1 was an applied research program, and we used a 2 blue-green type of laser for tracking multiple 3 vehicles that swam in a formation, and we tried to 4 use that also so that they could triangulate off of 5 each other and that they could communicate with each 6 other. Highly directional, I'm sure you can 7 imagine. 8 And but it was -- we were motivated to do 9 it for a variety of reasons. One, we needed to stay 10 quiet, and you're talking about an array formation 11 that could change its shape to vary the aperture in 12 a passive acoustic way to prevent what was referred 13 to at the time as close encounters of the unexpected 14 kind. 15 So the front end of a sub does a really 16 bad job of scanning, just very difficult for it to 17 scan where it's going. They can see things beside 18 it really well. They used to have towed arrays like 19 TB29s and what have you. But it couldn't really 20 tell what was in front of it very well. 21 So the idea was that a larger unmanned 22 underwater vehicle or uncrewed underwater vehicle
30 1 ideal situation was to avoid those sort of things. 2 And so we had a really basic laser range 3 finder which made it so that we didn't have to do 4 image processing. So it minimized the burden on the 5 processor, this vehicle -- I don't think I have one 6 with me, but the vehicle is -- was only about maybe 7 10 inches wide and about 8 inches in length, and, 8 you know, about 3 or 4 inches high. And so you can 9 imagine it's battery-operated and size, weight and 10 power per swap was a really big deal. So the laser 11 range finder put in sometimes a static position, but 12 sometimes in a sweeping position. We did have a pan 13 and tilt unit on there. So that's where we used it. 14 Let me go back to Nekton, if I could. Let 15 me see if I can find the specific project. So some 16 of these things were classified and I don't know 17 that I can talk about them at all. But let me just 18 find -- okay. It is on here, I think. 19 The I guess second bullet down under 20 Principal Investigator and Program Manager says 21 "DARPA Distributed Micro-Robotics Swimming Arrays 22 for Anti-Submarine Warfare," we -- we used a -- this	32 1 would be deployed, in some cases two of them would 2 be deployed, and these larger UUVs being able to go 3 in and out of the submarine were actually validated, 4 and I think in that situation the contractor for 5 that was Northrop Grumman. 6 But inside those larger UUVs would be our 7 smaller UUVs, and the UUVs would have to swim in a 8 formation, and they had to swim in a pretty tight 9 formation so that they could control the -- the, you 10 know, the spectral range, again, varying the 11 collective aperture, and you can do array 12 beamforming, that sort of thing. But we were using 13 a blue-green laser variant, I say a green laser 14 variant because that penetrated the water really 15 well. 16 Q Let me ask a little more simply, during 17 your academic career at -- during your academic 18 career at Duke and NC State, was there any work or 19 research that you personally were involved in that 20 included building or designing a LiDAR device or 21 system? 22 MR. LAUPPE: Object to form.

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33 1 A I would have to take some time to generate 2 a comprehensive list. 3 But among other things, we participated in 4 the DARPA Grand and Urban Challenge, challenges 5 plural I should say. And I believe the first one 6 that we participated in the Grand Challenge we 7 didn't really have a commercial off-the-shelf LiDAR 8 option. But subsequent challenges, especially and 9 including the Urban Challenge, we did. When we 10 could buy them off-the-shelf we did, so it was more 11 of an integration and an application and a 12 post-signal processing effort, not necessarily 13 working at the optics and emitter detector level. 14 But when we were looking at fielding both 15 of the red team vehicles for the Grand Challenge, 16 the first Grand Challenge, we fitted one with a 17 radar system and we made efforts to fit the other 18 with a LiDAR variant. And I'm trying to remember 19 what was around at the time, I think it was called 20 Regal. I could have the name wrong. And but -- but 21 didn't get great results from that. 22 So once again, you know, blew the dust off	35 1 options that we were aware of didn't work. And so, 2 again, you know, being a machinist and having the 3 equipment there and having, you know, a budget, 4 which oftentimes came out of my pocket, but that's 5 where I got more hands-on with the intended 6 replacement option. 7 I will say that's not the only sensor that 8 we evaluated and in some cases built or modified 9 significantly that didn't get deployed in the 10 ultimate competition. Just kind of how that works, 11 you funnel down. 12 Q Any other projects in your academic career 13 where you were personally involved with building or 14 designing a LiDAR system? 15 MR. LAUPPE: Object to form. 16 A I wouldn't say no. You know, I could 17 certainly think more on other examples. I've been 18 pretty blessed with opportunities and passion and 19 skills to tackle these things, so they start to 20 stack up after a while, and some become easier to 21 remember than others. 22 Q How much time across your academic and
34 1 of the getting some laser. You can imagine we had 2 some in-house expertise that helped us on the 3 optics. At the end of the day, we didn't feel like 4 we could put that on the vehicle to operate in the 5 desert, and so it just wasn't fielded. 6 Q You referred to "we" just now. Who does 7 that include? 8 MR. LAUPPE: Object to form, scope. 9 A "We" would be myself and the students, and 10 then our partners in that situation, which would 11 have been Carnegie Mellon, and I want to say there 12 might have been another partner. We deployed two 13 Hummers or Humvee vehicles. 14 Q I guess let me be a little more specific. 15 As part of the DARPA Grand -- the DARPA Grand 16 Challenge that you were discussing, were you 17 personally involved in building or designing any 18 LiDAR devices or systems? 19 MR. LAUPPE: Object to form. 20 THE WITNESS: Sorry, Patrick. 21 MR. LAUPPE: That's fine. 22 A I got involved hands-on when our -- the	36 1 professional career, how much time would you say you 2 spent building or designing LiDAR systems? 3 MR. LAUPPE: Object to form. 4 A I couldn't tell you the specific amount of 5 time. And I don't know that we got to all of the 6 other postgraduate work either that involved LiDAR 7 systems, including at Teledyne. But I would say if 8 you add it all up, I wouldn't be surprised if it's 9 in the -- I wouldn't be surprised if it's in the 10 thousands of hours. 11 It's just one of those sensors that a lot 12 of times we try to design around and you realize 13 that you -- you just can't, the computer vision, 14 best of intentions, and we've had so many great 15 successes over the years, myself and various teams, 16 teammates with computer vision. 17 But at the end of the day, the LiDAR 18 system is a low-powered, robust ranging system for 19 building point clouds that is very difficult to 20 operate without. So I would be surprised if it's 21 less than a couple thousand hours, man-hours. 22 Q And are there any projects, whether in

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37 1 your academic or professional career, where you were 2 involved in designing or building a production grade 3 or commercial grade LiDAR system? 4 MR. LAUPPE: Object to form. 5 A I guess that depends on your definition of 6 production grade and commercial grade. Every LiDAR 7 system I've had my hands on has been embedded in 8 a -- in some other system. So it hasn't really been 9 sold as a stand-alone ranging point cloud-generating 10 type of system. It's been more of an essential 11 building block to a larger system that was deployed. 12 And so, yes, there were, you know, the 13 VMRP was a deployed system that had the range, the 14 laser ranging capability on it with the pan tilt, 15 the micro UAVs have been deployed. 16 And, you know, I would have to think hard 17 about a couple of other systems, but -- oh, well, 18 when I was at DeltaFive, we had -- and the company 19 still exists. I just left as CEO in 2018, I 20 believe. But the major intent of that company was 21 to have automated systems to enhance the hospitality 22 space, not from an entertainment perspective, but	39 1 had gotten better and so did slip rings and a few 2 other things that enabled the full rotation, and on 3 that robot we had -- we had LiDAR systems. 4 Q And were you -- did you design and build 5 that LiDAR system at the optics and emitter detector 6 level? 7 MR. LAUPPE: Object to form. 8 A I -- first of all, I wouldn't be able to 9 claim personal credit for everything. But in that 10 situation it's, unfortunately, a repeated and 11 classic example of hoping that something commercial 12 off-the-shelf would do the trick, hoping that 13 computer vision would do the trick. 14 And computer vision went a very long way 15 in the types of environments these robots operated 16 in. You know, it's indoor, it's structured, it's 17 repetitive in a lot of ways. You could tell what 18 room you're in just by looking at the door. 19 But, once again, the LiDAR systems just 20 didn't do the trick. And so in that situation, 21 we -- gosh, we bought so many different ones and 22 took them apart and reassembled and played with the
38 1 from a back-end operations and maintenance 2 perspective. At the end of the day trying to make 3 sure that guests would have a good experience but 4 not -- but be kind of oblivious as to how. 5 And so DeltaFive, the five elements -- and 6 I'm probably going to forget one, but there are two 7 different types of cleanliness, there's inventory 8 and there's positioning, and I'm blanking on the 9 fifth one. But, anyway, there were five major 10 things. 11 So we had robots that would enter rooms, 12 and sometimes referred to as cobots, would work 13 alongside the housekeeping staff or sometimes alone 14 and monitor for cleanliness and all these other 15 things, is the lamp working, is the picture hung on 16 the wall properly, is everything made, are there 17 enough towels. And we used LiDAR systems on that 18 vehicle and we had to do a home brew with those 19 because at that point there was a cost threshold 20 above which it just didn't make economic sense to 21 purchase the robot or deploy that robot. And so we 22 -- we took -- fortunately, the laser range finders	40 1 optics and played with integrating SPADs. But, you 2 know, among others we looked at, at the inexpensive 3 range, we looked at one from a company I think 4 called Neato, but that was a single line type of 5 sensor. Now, it had a good refresh rate, I want to 6 say it was somewhere in 4, 5 hertz, but I could be 7 wrong. It might have been closer to 2 hertz. And, 8 you know, generally pretty good ratings. 9 But we needed to be able to speed up the 10 refresh or the suite, and so we used the basic 11 actuation and then tried to put our own optics, and 12 started with APDs and then dabbled a little bit in 13 SPADs. And then we tried to change it from a single 14 line to a three line suite. And so in that regard, 15 yes, I was very hands-on at that. 16 MR. HAGIZ: All right. Why don't we take 17 our first break. 18 (Recess 10:00 a.m. - 10:13 a.m.) 19 BY MR. HAGIZ: 20 Q So, Doctor, I want to turn to your 21 opinions on the Hall, Borowski, Spector combination, 22 and that starts in page 63 of your declaration,

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41 1 paragraph 123. Just let me know when you're there. 2 A Okay. 3 Q And I want to focus on the Hall, Spector 4 part of the combination and make sure I understand 5 your opinions there. 6 So your understanding is that in the Hall 7 and Spector combinations specifically, Spector's 8 arrayed micro-optics and aperture array would be 9 incorporated into Hall's system. Is that right? 10 MR. LAUPPE: Object to form and scope. 11 Q And for reference, I'm looking at 12 paragraph 124 of your declaration. 13 MR. LAUPPE: Same objections. 14 A So what was your question again? 15 Q I want to make sure I understand your 16 understanding of the proposed combination of Hall 17 and Spector is that Spector's arrayed micro-optics 18 and aperture array would be incorporated into Hall's 19 system. Is that right? 20 MR. LAUPPE: And again, object to form and 21 scope. 22 A It's my understanding that Dr. Shanley	43 1 motivation essentially for better power management 2 and high levels of imaging resolution and range. 3 Dr. Shanley goes on to say that "Borowski 4 teaches that its SPAD arrays can provide detection 5 at lower light intensities because SPADs 'provide 6 significant carrier amplification.'" 7 And Dr. Shanley concludes in this 8 paragraph that a person of ordinary skill would have 9 been motivated to incorporate the SPAD arrays into 10 Hall's LiDAR sensor for the benefits of SPADs, and 11 more specifically, that they address a problem 12 identified by Hall. 13 The next paragraph refers to -- or the 14 next paragraph in Dr. Shanley's declaration goes on 15 to say that a person of ordinary skill would have 16 been motivated to combine Hall and Spector to 17 incorporate the arrayed micro-optic at Hall's light 18 emission module, and an aperture array at Hall's 19 light detection module. 20 So to your question, I believe I am simply 21 quoting in that paragraph Dr. Shanley's declaration. 22 Q Well, what you say in your declaration in
42 1 states that it would have been obvious to 2 incorporate the SPADs, or single photon avalanche 3 detectors, from Borowski into Hall's spinning LiDAR 4 system, and to incorporate Spector's arrayed 5 micro-optics at the -- well, into Hall, and an 6 aperture array from Spector and Hall's light 7 detection module. 8 And I wonder if it's possible to bring up, 9 just to kind of ground through this, I believe this 10 is Dr. Shanley's report, Exhibit 1003. 11 Q Let me just upload that to the chat. So 12 that's -- okay. I've uploaded and you should now 13 have accessible Exhibit 1003, which is Dr. Shanley's 14 declaration. 15 Let me know if you need me to repeat the 16 question. It seemed like you were still working on 17 your answer. 18 A So just quoting from Dr. Shanley's 19 declaration, starting at paragraph 190 he writes 20 that Borowski's -- or Borowski's SPAD arrays address 21 a problem identified in Hall, specifically, that 22 they rely on laser pulse intensity, and there's a	44 1 paragraph 124 is that "Dr. Shanley asserts that it 2 would have been obvious to incorporate the SPADs 3 disclosed by Borowski into Hall's spinning LiDAR 4 system, and to incorporate Spector's arrayed 5 micro-optics at the light emission module of Hall 6 and an aperture array from Spector at Hall's light 7 detection module." 8 Did I read that correctly? 9 A You read that correctly, yes, sir. 10 Q And in paragraph 191 of -- of Dr. 11 Shanley's declaration, he does not use the phrase 12 "Spector's arrayed micro-optics" or "an aperture 13 array from Spector," right? 14 MR. LAUPPE: Object to form. 15 A Well, in paragraph 191 he does mention 16 Spector's arrayed micro-optic and aperture layer. 17 And then goes to say that the implementation of 18 which displays and spacial separation used by Hall, 19 and at the same time reduce cross-talk. 20 Q I just want to be clear because I heard 21 you say that you were quoting Dr. Shanley, and I 22 just wanted to be sure we're on the same page.

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45 1 The language that you use in paragraph 124 2 of your declaration, that's not a direct quote from 3 paragraph 191 of Dr. Shanley's declaration, right? 4 MR. LAUPPE: Object to form. 5 A It's a citation to paragraphs 190, 191, 6 and I agree, it's not a verbatim quote. It's 7 intended to summarize. 8 Q Okay. And again, I just want to make sure 9 that I understand how you're reading Dr. Shanley's 10 declaration. Your understanding is that Dr. Shanley 11 is proposing taking the specific arrayed micro-optic 12 and aperture array from Spector and inserting them 13 into Hall's light emission module and light 14 detection module respectively. Is that right? 15 MR. LAUPPE: Object to form and scope. 16 A I -- I'm not sure how else to describe 17 this other than how it's written, and, you know, my 18 interpretation of what Dr. Shanley had written. 19 I understand that -- that there were 20 aspects, I believe, of Spector that were presumed to 21 not be included. However, I think, at a minimum, 22 the receiving optoelectronics from Spector was	47 1 Q Okay. In paragraph 1 -- let me turn next 2 -- let's turn next to paragraph 145 in your 3 declaration. Let me know when you're there. 4 A You said 135? 5 Q 145. 6 A Oh, 145. I'm sorry. Yeah. Okay. I'm 7 there. 8 Q And in paragraph 145 you're referring to 9 an article by someone named Sergey Vinogradov. 10 A You say that name more fluidly than I do. 11 Yes. 12 Q I could be butchering it, but I'm trying 13 my best. So let me just have it available while 14 we're talking about it. Let me upload this to the 15 chat, this was Exhibit 2014, and let me know when 16 you have that available. 17 A Okay. 18 Q The Vinogradov article, I'm just going to 19 refer to it as Exhibit 2014 so I don't have to keep 20 saying that name. Exhibit 2014, is that a document 21 that you were familiar with or had come across 22 before your work on this proceeding?
46 1 envisioned or proffered by Dr. Shanley as being 2 placed on Hall. Otherwise the gimbal, if I 3 understand correctly, was presumed I believe by the 4 PTAB as to not being used, and I'm not entirely sure 5 that -- that Dr. Shanley was pushing for the gimbal 6 itself. 7 Q I just want to make sure I understand. 8 With respect to the receiving electronics, or more 9 specifically, the aperture array, your understanding 10 is that Dr. Shanley is proposing taking the specific 11 aperture array in Spector and inserting that into 12 Hall's light detection module. Is that right? 13 MR. LAUPPE: Object to form, scope, and 14 asked and answered. 15 A Yeah, I'm just not sure how else to state 16 what's in that paragraph. I'm hesitant to go off 17 the rails or try to redescribe it. 18 Again, there's some ambiguity as to what 19 exactly is being advocated, or at least the extent 20 to which it's being advocated by Dr. Shanley. But, 21 you know, I kind of feel that the paragraph speaks 22 for itself.	48 1 MR. LAUPPE: Object to form and scope. 2 A I actually had seen, whether it was this 3 specific one or something else from him in the -- 4 during the time when I was at DeltaFive, because, as 5 I mentioned, we were trying to integrate SPADs, and 6 just having a devil of a time with the circuitry to 7 support the quenching and just the sequencing 8 basically that each one of those sensor arrays 9 needed. And so this was -- this and/or something 10 very similar to this I had seen somewhere in the 11 2017-ish, 2018-ish time frame. 12 Q And do you know who Sergey Vinogradov is? 13 MR. LAUPPE: Object to form and scope. 14 A Well, I mean, as it says here, he -- well, 15 my understanding is that he's with the -- I'm 16 probably not going to say this very fluidly either 17 -- the Lebedev Physical Institute, Russian Academy 18 of Sciences, and I don't remember much else about 19 his credentials. But in below the title there are 20 footnotes associated with his name and the other 21 co-authors, including -- no, I'm sorry, it was just 22 him, yeah.

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49 1 Q So other than what's referenced in Exhibit 2 2014 itself, do you have any understanding of Sergey 3 Vinogradov's background or experience with LiDAR 4 systems? 5 MR. LAUPPE: Object to form and scope. 6 A Did you say 2014? 7 Q Exhibit 2014 is the exhibit number. Other 8 than what's described or included in Exhibit 2014, 9 you don't have any -- any other knowledge or 10 understanding of Sergey Vinogradov's background or 11 experience with LiDAR systems? 12 MR. LAUPPE: And same objections. 13 A I know that I've seen the name. I've not 14 met him in person. But I would say that if you had 15 asked me this in the 2018 time frame, I probably 16 would have a better memory of his credentials. 17 But -- but, anyway, you know, beyond that, I -- it 18 would take me a little time, I think, to recall the 19 specifics of my familiarity with him. 20 Q Sitting here today, you can't recall 21 anything about him beyond what was indicated in 22 Exhibit 2014 itself?	51 1 in the bracketed numbers 20 to 21, 22, 23 and 24. 2 Do you see that? 3 A Yes, sir, I pulled those over, yes. 4 Q And if you turn to the last page of 5 Exhibit 2014, that includes the authors and titles 6 of those papers numbers 20 to 24. Do you see that? 7 A Yes. The references? 8 Q That's right. 9 A Yes. 10 Q And so my question is did you read or 11 review those five references numbered 20 to 24 in 12 Exhibit 2014 in preparing your declaration? 13 MR. LAUPPE: Object to form and scope. 14 A The reference from Zappa from SPIE, I 15 don't recall the extent to which and how deep I went 16 into that reference. From Frach looks familiar, 17 because around that time and prior to that time I 18 was also doing work for -- well, we were delivering 19 products to GE Nuclear Hitachi -- GE Hitachi 20 Nuclear, Framatome and Areva, and so those are the 21 most familiar ones as I look at those. 22 You know, if you were to ask me to recite
50 1 MR. LAUPPE: Object to form and scope. 2 A I would have to go back and look at some 3 notes from that time frame to be sure. 4 Q My question is sitting here today, you 5 can't recall anything specific about him beyond 6 what's indicated in Exhibit 2014. Is that fair? 7 MR. LAUPPE: Same objections and asked and 8 answered. 9 A The only thing that I can recall is that I 10 gave credence to his research and reporting at the 11 time, and that I would have to go back and take a 12 look at my notes to have more details. 13 Q And in -- in paragraphs 145 and 146 of 14 your declaration, you quote from some passages in 15 the Vinogradov paper Exhibit 2014 on pages 3 and 4. 16 Do you see that? 17 A Yes. 18 Q And specifically -- let me start that 19 over. 20 The portions of Exhibit 2014 that you 21 quote in paragraphs 145 and 146, those include 22 citations to several other papers that are indicated	52 1 for you the specifics of those documents, I would 2 have to go back and do some homework, but -- and 3 then the others may or may not have drilled down 4 that deep. But, you know, again, I gave credence to 5 the author that the research was done in a proper 6 manner. 7 Q I'm not sure I understood your answer. 8 Let me -- let me see if I can clarify. 9 You mentioned some of these papers look 10 familiar. Let me take them one by one. 11 Did you review the Zappa paper reference 12 number 20 in Exhibit 2014, did you review that when 13 you were preparing your declaration in this 14 proceeding? 15 MR. LAUPPE: Object to form and scope. 16 A As I was writing this -- well, let me just 17 I guess kind of say at the outset, I'm not really 18 sure as it relates to fill factor and integration of 19 SPADs that Dr. Shanley put forth anything specific 20 to fill factor. So the, you know, the depth of 21 research into teaching references, or references 22 that give a perspective of a person of ordinary

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53 1 skill at or around that time, particularly one that 2 had credibility, you know, probably dictated what 3 might have been a perceived need to drill down. 4 But that being said, again, those 5 references look familiar to me. During the 6 composition of my declaration, I may or may not have 7 glanced at them. But -- but I believe historically 8 I did at least to the extent to make sure that they 9 squared with the authors' positions. 10 Q I didn't hear a clear answer there. 11 Do you not recall whether you reviewed the 12 Zappa reference, reference number 20 in Exhibit 13 2014, specifically for the purposes of preparing 14 your declaration Exhibit 2010? 15 MR. LAUPPE: Object to form and scope. 16 A I try to be a good steward of listing the 17 materials that I utilized, and I'll defer to that. 18 Whether I went back and looked at it during the 19 composition, I don't exactly recall. But, again, 20 looks familiar from at least prior review. 21 Q When you say you try to be a good steward 22 of listing the materials that you utilized, do you	55 1 of reviewing the Zappa reference, which is reference 2 number 20 to Exhibit 2014, when you were preparing 3 your declaration in this action? 4 MR. LAUPPE: Object to form, scope, and 5 asked and answered. 6 A I would not rule it out. Recognize Zappa 7 and the other one that I mentioned, exactly when I 8 last looked at them is not really coming to mind 9 right now. Again, it's a reference within a 10 reference, and it's included, and, you know, I'll 11 just kind of restate here, I just don't recall, and 12 I'm happy to look at it if he did, where Dr. Shanley 13 put forth anything related to fill factor 14 modification. 15 Q My question was just you do not 16 specifically recall reviewing the Zappa reference 17 when you were preparing your declaration in this 18 action. Is that right? 19 MR. LAUPPE: Object to form, scope, and 20 asked and answered. 21 A With respect, my answer will be the same. 22 I can't rule it out. I look at a lot of things when
54 1 mean if you relied on particular materials, you 2 would have identified it in your declaration? 3 A I do make that effort. That doesn't mean 4 it's -- 5 MR. LAUPPE: Just object to form and 6 scope. 7 You can proceed. I'm sorry to interrupt 8 you. 9 THE WITNESS: No. I apologize. 10 A I do make that effort. It doesn't mean 11 that things are always included to the nth degree. 12 In this situation it's a reference that's included 13 in a reference. And so if it's not listed, it 14 doesn't mean I didn't necessarily glance at it, or 15 didn't necessarily remember it to any particular 16 extent. 17 But I -- as I'm here today, I can't recall 18 the extent to which I went back and looked at the 19 citations in the Vinogradov reference while 20 composing this declaration. 21 Q All right. Let me -- let me ask more 22 specifically, do you have any specific recollection	56 1 I put together declarations. If it's a significant 2 reference, or if it's a stand-alone reference, which 3 is to say not included in another citation, then I 4 make the effort to be a good steward and list it. 5 If it's included by reference, then, again, I can't 6 rule it out that I reviewed that at least in part or 7 as a refresher, if only to refresh my memory that 8 that's the same reference I looked at in the late 9 2010s time frame. That's really as far as I would 10 go. I can't rule it out. I can't say definitively. 11 Q And so that's my question, you don't have 12 a specific recollection that you did review the 13 Zappa reference in Exhibit 2014? I'm not asking if 14 you can rule it out or not. I'm asking do you have 15 a specific recollection that you reviewed that 16 reference in preparing your declaration in this 17 action? 18 MR. LAUPPE: And again, object to form, 19 scope, asked and answered. 20 A It's entirely possible that I looked at it 21 if only briefly to refresh my memory of that 22 particular reference --

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57 1 (Simultaneous speaking.) 2 Q I'm not asking -- Doctor, I need an answer 3 to my question. I'm not asking if it's possible. 4 I'm asking do you have a specific 5 recollection of reviewing the Zappa reference when 6 you prepared your declaration? 7 MR. LAUPPE: Again, object to form, scope, 8 asked and answered. Also, I would just -- if you 9 could keep from interrupting the witness, please, 10 Ron. 11 MR. HAGIZ: I need -- I need an answer to 12 my question, so I'm going to make sure that I get 13 it. 14 BY MR. HAGIZ: 15 Q Doctor, do you have a specific 16 recollection of reviewing the reference -- the Zappa 17 reference when you were preparing your declaration? 18 MR. LAUPPE: Same objections. And also, I 19 mean, if you want an answer, you need to stop 20 interrupting the witness. 21 MR. HAGIZ: We don't need the colloquy on 22 the record.	59 1 things sometimes ever so briefly just to make sure 2 that it's what I thought it was to ground truth it. 3 That one is -- is I can only say less clear than the 4 Zappa reference. 5 Q Okay. But my question is not about ruling 6 out. You don't have an affirmative recollection 7 that you reviewed the Durini reference when you 8 prepared your declaration. Is that right? 9 MR. LAUPPE: Object to form and scope. 10 A I would not go that far. I would have to 11 go back and look at my notes. 12 Q Okay. So you can tell me sitting here 13 right now that you reviewed the Durini reference 14 when you were preparing your declaration. Is that 15 your testimony today? 16 MR. LAUPPE: Object to form and scope. 17 A I would have to go back and look at my 18 notes. 19 Q So you don't recall? 20 MR. LAUPPE: Object to form and scope. 21 A Is this a memory test or, you know, would 22 I be able to go back and look at my notes?
58 1 Q Doctor, can you answer my question? 2 A With respect, Counsel, I would say it the 3 exact same way. I can't rule out the possibility. 4 I do recall looking at that reference somewhat 5 recently, whether that was while working on the IPR 6 or just refreshing my memory on other matters, I 7 can't say exactly. But it's fairly recent that I 8 looked at it, and I would have to go back and see if 9 I have some notes specific to that. 10 Q What is fairly recent? Is that in the 11 past year? 12 MR. LAUPPE: Object to form. 13 A Well, I would say definitely within the 14 past year. But which specific month, I would have 15 to go back and look at my notes. 16 Q But with respect to the Durini reference, 17 reference 21 in Exhibit 2014, did you have a 18 specific recollection of reviewing that in preparing 19 your declaration in this proceeding? 20 MR. LAUPPE: Object to form and scope. 21 A That one is less clear to me. Again, I'm 22 sorry, but I can't rule it out. I look at a lot of	60 1 Q I'm asking if you recall whether you 2 reviewed the Durini reference when you were 3 preparing your declaration. That's my question. 4 Can you answer that question? 5 MR. LAUPPE: Same objections. 6 A Yeah, I would have to go back and look at 7 my notes. 8 Q Do you have an affirmative recollection of 9 reviewing the Zou reference, reference 22 cited in 10 the Vinogradov paper Exhibit 2014, when you were 11 preparing your declaration in this proceeding? 12 MR. LAUPPE: Object to form and scope. 13 A That fits into the Zappa category, that 14 seems more fresh to me. I have a -- you know, a 15 similarly -- a similar recollection of looking at it 16 to ground truth. But as with all of these, I would 17 have to go back and look at my notes. 18 Q Do you have an affirmative recollection of 19 reviewing the first Frach reference, reference 20 number 23 cited in the Vinogradov article Exhibit 21 2014, when you were preparing your declaration in 22 this proceeding?

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61 1 MR. LAUPPE: Object to form and scope. 2 A That I would put in the same category as 3 the Durini reference, I believe. But again, I would 4 have to go back and look at my records. 5 Q And same question, do you have an 6 affirmative recollection of reviewing the second 7 Frach reference, reference number 24 cited in the 8 Vinogradov article Exhibit 2014, when you were 9 preparing your declaration for this proceeding? 10 MR. LAUPPE: Object to form and scope. 11 A That fits into the category of the Durini 12 one, where it's less clear to me. But with respect, 13 I would probably have to go back and look at my 14 records to see the last time I took a look at those. 15 MR. HAGIZ: Okay. I think I'm almost 16 done. Why don't we take a five-minute break, let me 17 just collect my notes and see if we can wrap this 18 up. 19 MR. LAUPPE: Thanks, Ron. 20 (Recess 10:49 a.m. - 10:52 a.m.) 21 MR. HAGIZ: Thanks for your time today, 22 Dr. Janét. That's all the questions I have for you.	63 1 CERTIFICATE OF CERTIFIED SHORTHAND REPORTER 2 NOTARY PUBLIC 3 4 I, MONIQUE VOUTHOURIS, Certified Court Reporter 5 and Notary Public within and for the State of New 6 Jersey, do hereby certify: 7 That JASON A. JANÉT, PH.D., the witness whose 8 remote deposition is hereinbefore set forth, was 9 duly sworn by me before the commencement of such 10 deposition, and that such deposition was taken 11 before me and is a true record of the testimony 12 given by such witness. 13 I further certify that the adverse party, 14 OUSTER, INC., was represented by counsel at the 15 deposition. 16 I further certify that the remote deposition of 17 JASON A. JANÉT, PH.D. occurred on Friday, August 30, 18 2024, commencing at 9:02 a.m. to 10:52 a.m. 19 I further certify that I am not related to any 20 of the parties to this action by blood or marriage, 21 I am not employed by or an attorney to any of the 22 parties to this action, and that I am in no way
62 1 MR. LAUPPE: And no questions from me at 2 this point. 3 (Time noted: 10:52 a.m.) 4 5 ***** 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22	64 1 interested, financially or otherwise, in the outcome 2 of this matter. 3 IN WITNESS WHEREOF, I have hereunto set my hand 4 this 4th day of September 2024. 5 6 7 8  9 Monique Vouthouris, CCR, RPR, CRR 10 Notary Public of the State of New Jersey 11 My commission expires: April 8, 2029 12 13 14 15 16 17 18 19 20 21 22

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