

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ARASHI VISION (U.S.),	
LLC (d/b/a INSTA360),	Inter Partes Review
Petitioner,	IPR2024-01164
vs.	IPR2024-01186
GOPRO, INC.,	IPR2024-01165
Patent Owner.	

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DEPOSITION OF  
AGGELOS K. KATSAGGELOS

April 11, 2025  
9:12 AM Central

VERITEXT  
One North Franklin, Suite 2100  
Chicago, Illinois

Stenographically Reported By:  
Deanna Amore - CRR, RPR, CSR - 084-003999  
JOB No. 7277898

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I N D E X

WITNESS

EXAMINATION

AGGELOS K. KATSAGGELOS

EXAMINATION BY MR. HEFAZI

4

EXHIBITS

EXHIBITS PREVIOUSLY MARKED PAGE FIRST REFERRED TO

Exhibit 1001

41

Exhibit 1006

18

Exhibit 1007

65

1 (Whereupon, the witness was  
2 duly sworn.)

3 THE STENOGRAPHER: You may proceed.

4 AGGELOS K. KATSAGGELOS,  
5 called as a witness herein, having been first duly  
6 sworn, was examined and testified as follows:

7 EXAMINATION

8 BY MR. HEFAZI:

9 Q. Good morning, Dr. Katsaggelos. Thank you  
10 for being here. 09:13:07

11 A. Thank you.

12 Q. Now, I understand you have a Ph.D. in  
13 electrical and computer engineering; is that right?

14 A. The Ph.D. is in electrical engineering.

15 Q. Electrical engineering.

16 And I understand you have experience  
17 working in image and video processing; right?

18 A. That's correct.

19 Q. Have you ever worked on a commercial  
20 camera before? 09:13:27

21 MS. LI: Objection. Vague. Objection. Form.

22 THE WITNESS: The work I do applies -- the  
23 image processing computer vision work applies to  
24 any type of cameras.

25

Page 4

1 BY MR. HEFAZI:

2 Q. Have you ever worked on a camera that's  
3 been commercially released?

4 A. I've worked on data that are acquired by  
5 commercial cameras.

6 Q. Got it.

7 But you haven't worked on a product or  
8 camera that ultimately got released into the  
9 market?

10 A. I don't understand the term "worked on." 09:14:07

11 Q. You haven't worked on a project or camera  
12 where that project or camera was ultimately  
13 commercially released?

14 MS. LI: Objection. Form.

15 THE WITNESS: I'm at a university. I am not in  
16 the business of releasing commercial products. The  
17 work we have done has found its applications in  
18 commercial products.

19 BY MR. HEFAZI:

20 Q. Have you ever designed a system for 09:14:47  
21 horizon leveling?

22 MS. LI: Objection. Form.

23 THE WITNESS: As I mentioned, I'm in a  
24 university setting -- setting in my career, and we  
25 have designed components that have found their

Page 5

1 place in commercial products, and these components  
2 deal with all aspects of using motion information  
3 of cameras to perform various stances.

4 BY MR. HEFAZI:

5 Q. My question was a bit different.

6 Have you ever developed or worked on a  
7 system for horizon leveling in a camera?

8 MS. LI: Objection. Form.

9 THE WITNESS: There is work I have done that is  
10 very relevant to the horizon-leveling problem. 09:16:03

11 BY MR. HEFAZI:

12 Q. Okay. Well, let me ask you when did you  
13 do that work?

14 Let me take a step back.

15 What is that work?

16 A. There are so many projects that I have  
17 been involved in the 40 years that I've been a  
18 professor and the five years I was a Ph.D. student,  
19 that is not, like, one project I can just mention  
20 as you speak right here. 09:16:44

21 Q. When was the first time you heard of a  
22 camera that had horizon leveling?

23 A. I cannot really give you a date for that.  
24 I don't recall it.

25 Q. Have you used cameras throughout your

1 life?

2 A. Yes.

3 Q. When was the first time you recall  
4 using -- well, I guess, when was the first time you  
5 recall using a camera?

6 A. Probably 50 years ago or more.

7 Q. So you've used it many times over those  
8 50 years?

9 A. Yes, I've been using cameras since I was  
10 in high school. 09:17:34

11 Q. When was the first time you became aware  
12 of a camera that offered horizon leveling?

13 MS. LI: Objection. Form.

14 THE WITNESS: I can't really give you a  
15 specific date of that. It was a moment -- there  
16 were products, as I say in my declaration, products  
17 in the market, in the -- by the way, can I consult  
18 my declaration?

19 BY MR. HEFAZI:

20 Q. Sure. We'll get to that. I guess I'm 09:18:11  
21 just initially asking you personally, not what's in  
22 your declaration, when did you first become aware  
23 of a camera that had commercial -- a camera that  
24 had horizon leveling?

25 Let me ask the question again.

Page 7

1           When did you first become aware of a  
2 camera that had horizon leveling?

3           MS. LI: Objection. Form.

4           THE WITNESS: As I mentioned, I cannot give  
5 you -- I don't recall a specific date, year that  
6 this happened.

7 BY MR. HEFAZI:

8           Q. Prior to your declaration, can you name a  
9 single camera that you were aware of that had  
10 horizon leveling? 09:18:54

11          MS. LI: Objection. Form.

12          THE WITNESS: I don't recall. I don't know.

13 BY MR. HEFAZI:

14          Q. Do you have work -- sorry -- do you have  
15 experience working with position sensors?

16          A. Position sensors were involved in some of  
17 my work.

18          Q. Okay. So you're familiar with gyroscopes  
19 and accelerometers?

20          A. Yes. 09:19:26

21          Q. Are you familiar with how gyroscopes and  
22 accelerometers are used together to implement  
23 horizon leveling?

24          A. I include elements of that in my  
25 declaration, how the two can be combined to perform

Page 8

1 horizon leveling based on the prior art I reviewed.

2 Q. Can you explain to me what the role of  
3 each is in performing horizon leveling?

4 MS. LI: Objection. Form.

5 THE WITNESS: I'd have to consult my  
6 declaration to give you a specific answer on that.  
7 By and large, they provide position information of  
8 the camera which can be utilized to perform horizon  
9 leveling.

10 BY MR. HEFAZI: 09:20:33

11 Q. And why -- do you need both of them? Do  
12 you need one of them?

13 MS. LI: Objection. Form.

14 THE WITNESS: I haven't considered that  
15 question in my analysis.

16 BY MR. HEFAZI:

17 Q. So you don't know whether you can  
18 implement accelerometer only for horizon leveling?

19 MS. LI: Objection. Form.

20 THE WITNESS: I can look at the prior art in my 09:20:51  
21 analysis and declaration and see for which cases  
22 the acceleration data might have been used.

23 BY MR. HEFAZI:

24 Q. Well, I mean, I'm asking more not the  
25 prior art but your experience and expertise at this

Page 9

1 point.

2 As an expert in this field, I guess, do  
3 you have an understanding of why horizon leveling  
4 systems use both the accelerometer and the  
5 gyroscope?

6 MS. LI: Objection. Form.

7 THE WITNESS: That is not an  
8 analysis I considered if you need both or one.

9 BY MR. HEFAZI:

10 Q. So you didn't consider whether you're able 09:21:45  
11 to implement horizon leveling on a video using an  
12 accelerometer only?

13 MS. LI: Objection. Form.

14 THE WITNESS: In my declaration, I looked at  
15 what the claims and the limitations in the '832  
16 patent are and tried to address those  
17 considerations.

18 BY MR. HEFAZI:

19 Q. My question is a bit different.

20 So if you have a video and you're trying 09:22:16  
21 to do horizon leveling frame by frame, did you  
22 consider whether you can do that just with a  
23 gyroscope alone?

24 MS. LI: Objection. Form.

25 THE WITNESS: As I mentioned, this is not an

1 analysis I performed for this declaration.

2 BY MR. HEFAZI:

3 Q. And the same is true as whether you can do  
4 it with an accelerometer alone?

5 MS. LI: Objection. Form.

6 THE WITNESS: I did not consider this question  
7 in my analysis.

8 BY MR. HEFAZI:

9 Q. Now, let me ask, with regards to an  
10 accelerometer, that measures linear acceleration; 09:22:51  
11 right?

12 MS. LI: Objection. Form.

13 THE WITNESS: I did not perform an analysis of  
14 what each and every motion capture sensor is  
15 exactly doing. My analysis was to address, again,  
16 the claimed technology in '832 and see which of the  
17 prior art I relied on discloses these limitations.

18 BY MR. HEFAZI:

19 Q. As an expert in the field, do you have an  
20 understanding of whether a horizon-leveling 09:23:37  
21 algorithm that uses only an accelerometer would be  
22 able to detect -- let me strike that.

23 As an expert in the field, do you have an  
24 understanding -- if the camera were to free fall,  
25 what would the accelerometer read?

Page 11

1 MS. LI: Objection. Form.

2 THE WITNESS: I did not consider hypotheticals  
3 in my analysis. As I mentioned, I just addressed  
4 the limitations of the '832 patent.

5 BY MR. HEFAZI:

6 Q. Okay. So you didn't detect whether a  
7 horizon-leveling algorithm that uses only an  
8 accelerometer would be able to accurately detect  
9 orientation if the camera were in free fall?

10 MS. LI: Objection. Form. 09:24:37

11 THE WITNESS: I'm sorry. Can you repeat the  
12 question?

13 BY MR. HEFAZI:

14 Q. So if the camera were in free fall, as an  
15 expert, you don't know whether it would -- the  
16 horizon -- strike that.

17 Let me just ask about the accelerometer  
18 right now.

19 If the camera were in free fall, you don't  
20 know whether the accelerometer would be able to 09:24:54  
21 accurately register the orientation of the camera?

22 MS. LI: Objection. Form.

23 THE WITNESS: As I mentioned, I have not  
24 considered this in my analysis.

25

1 BY MR. HEFAZI:

2 Q. If a camera rotates just in the yaw  
3 direction, would the accelerometer be able to  
4 register that orientation change?

5 MS. LI: Objection. Form.

6 THE WITNESS: I didn't consider this in my  
7 analysis, this specific question.

8 BY MR. HEFAZI:

9 Q. So just overall, you haven't considered  
10 whether a horizon-leveling algorithm that uses only 09:25:36  
11 an accelerometer would be able to accurately  
12 measure rotation due to kind of movements of the  
13 camera throughout the video?

14 MS. LI: Objection. Form.

15 THE WITNESS: In my analysis, I looked at the  
16 claims, the specifications. They talk about  
17 accurate horizon leveling. They consider that if  
18 horizon leveling is a vague motion. I did not  
19 consider the particular question you are bringing  
20 up. 09:26:24

21 BY MR. HEFAZI:

22 Q. Are you familiar with a fisheye lens?

23 A. I'm unfamiliar.

24 Q. Images photographed using a fisheye lens  
25 introduce a barrel distortion; right?

1           A.    There are distortions that are used by  
2           wide angle lenses, and a fisheye lens is an example  
3           of a wide angle lens.

4           Q.    And barrel distortion is an example of one  
5           of the distortions that would be introduced?

6           A.    Yeah, barrel distortion is one of -- an  
7           example of such distortion introduced.

8           Q.    And when you have a barrel distortion,  
9           edges of an image can appear distorted or  
10          stretched? 09:27:18

11          A.    This sounds about right as a center based  
12          on which the barrel distortion can be defined, and  
13          as you move away from the center of the optical  
14          center, you start seeing distortions.

15          Q.    So if you capture an image and it  
16          introduces a barrel distortion, it's going to  
17          distort the reality of the world; right?

18          MS. LI:  Objection.  Form.

19          THE WITNESS:  Well, it's a complicated  
20          question.  The reality of the world, each camera 09:27:56  
21          has optics, has a sensor and the optics, the  
22          sensor, the quality may vary widely, but as you  
23          mentioned, the barrel distortion is introduced  
24          distortion as you move away from this optical  
25          center image.

Page 14

1 BY MR. HEFAZI:

2 Q. Objects or people within a photo can look  
3 distorted; right?

4 A. Which case are you --

5 Q. If you have a camera whose optical lens  
6 captures a barrel distortion.

7 A. Yes, as we mentioned, the barrel  
8 distortion introduces distortion as you move away  
9 from the optical center toward the edges.

10 Depending where the people or objects are located, 09:28:58  
11 may see very little or no distortion if they are  
12 not in the optical center and larger distortion as  
13 you move further away from the center.

14 Q. And so, I mean, I guess if you're taking a  
15 family photograph and you are using a camera that  
16 introduces barrel distortions, your family  
17 photograph could be distorted; right?

18 MS. LI: Objection. Form.

19 THE WITNESS: Yes. As I mentioned, parts of  
20 the image away from the optical center would see 09:29:37  
21 some amount of distortion and no matter what  
22 objects are depicted there, people or trees, will  
23 be subject to this distortion.

24 BY MR. HEFAZI:

25 Q. And if your goal is -- if you're -- strike

1       that.

2               If you're just trying to take general  
3       photography -- strike that.

4               You understand that, at the time of the  
5       '832 patent, introducing distortion into an image  
6       was generally not appropriate for general  
7       photographic use; right?

8               MS. LI: Objection. Form.

9       BY MR. HEFAZI:

10       Q.     Cameras from -- let me strike that               09:30:31  
11       question.

12               Cameras that were for general photographic  
13       use, like your Canon and Nikon camera, they tried  
14       to avoid having distortion in their images; right?

15               MS. LI: Objection. Form.

16       THE WITNESS: As I mentioned, some of the  
17       distortion is unavoidable due to a wide angle lens.  
18       Some of the distortion is unavoidable due to the  
19       low quality optics of the lens. Some might be even  
20       unavoidable due to the low resolution of the sensor     09:31:25  
21       that the camera is using. Of course, talking about  
22       digital cameras.

23       BY MR. HEFAZI:

24       Q.     Sorry.

25       A.     Yeah, there are approaches in image

1 processing that referred to as the masking effect  
2 where one quantity masks the presence of another  
3 quantity. So on that grounds, the use of  
4 distortion, what distortion is desirable,  
5 undesirable might one use it to perform this  
6 masking effect.

7 Q. Were you aware of any cameras for general  
8 photographic use that introduced distortion at the  
9 time of the '832 patent?

10 MS. LI: Objection. Form as to general 09:32:26  
11 photographic use.

12 THE WITNESS: I have not performed this  
13 analysis to be able to answer your question.

14 BY MR. HEFAZI:

15 Q. What type of cameras have you used in your  
16 life?

17 A. I've used Pentax, I've used Nikon, for  
18 example, some other brands.

19 Q. When you took pictures with your Nikon  
20 camera, did it introduce barrel distortions? 09:32:58

21 A. I'm sorry. If it did is the question?

22 Q. Yeah, did your Nikon camera introduce  
23 barrel distortion?

24 A. As you said, barrel distortion is a  
25 function of the lens. So if I use a wide angle

1 lens, I might see some barrel distortion.

2 Q. Okay. Did you use a wide angle lens when  
3 you were shooting?

4 A. Yes, I had a set of lenses.

5 Q. And when did you use the wide angle lens?

6 For what purposes?

7 MS. LI: Objection. Form.

8 THE WITNESS: It's very general generic  
9 question. Depending on the mood and subject,  
10 I was taking a picture just to check things out how 09:33:51  
11 they are going to look with a wide angle lens. It  
12 could be various motivations for using a wide  
13 angle.

14 BY MR. HEFAZI:

15 Q. But they were for specific purposes;  
16 correct?

17 A. It's hard to tell when and why anybody, a  
18 photographer, might use a certain lens, be it a  
19 zoom lens, a wide angle, a normal lens.

20 MR. HEFAZI: Okay. Let me introduce our first 09:34:21  
21 exhibit here. It is going to be Exhibit 1006,  
22 U.S. Patent Number 10,778,896, and this was filed  
23 in the IPR as Exhibit 1006.

24 Do you see that?

25 MS. LI: Counsel, can I have a copy?

1 MR. HEFAZI: Yes.

2 THE WITNESS: Yes, I see it.

3 BY MR. HEFAZI:

4 Q. This is the Watanabe reference; right?

5 A. Correct.

6 Q. This is one of the references you opined  
7 on?

8 A. That's correct.

9 Q. Can you read the abstract into the record?

10 A. Sure. 09:35:59

11 "Provided is an image-processing apparatus  
12 that generates a natural-looking image even from an  
13 image in which image shake has been corrected and  
14 distortion has been intensely added. A processor  
15 of this image-processing apparatus performs  
16 transformation processing on an image so as to  
17 generate an image having a point symmetric  
18 distortion centered on the center coordinates of  
19 the image even for an image in which the center  
20 position of aberration of an optical system and the 09:36:36  
21 center position of the image do not match."

22 Q. What does it mean when it says generates a  
23 natural-looking image?

24 A. I would need to look into the patent to  
25 see if this term is given any particular meaning.

Page 19

1 Q. Sitting here, you don't have an  
2 understanding of what the term "natural-looking  
3 image" means?

4 MS. LI: Objection. Form.

5 THE WITNESS: It's a very vague term but might  
6 be subject to various interpretations.

7 BY MR. HEFAZI:

8 Q. Okay. Do you have an understanding of  
9 what the goal of Watanabe is?

10 MS. LI: Objection. Form. 09:37:51

11 THE WITNESS: I have read the patent, and  
12 I offer an opinion in my declaration.

13 BY MR. HEFAZI:

14 Q. And so is it right that Watanabe is  
15 attempting to take an image that has, for example,  
16 a barrel distortion and then make sure that that  
17 barrel distortion remains center as you're moving  
18 the camera?

19 MS. LI: Objection. Form.

20 THE WITNESS: According to the abstract, their 09:38:20  
21 objective is to correct for the shake and then  
22 while, by and large, maintaining the barrel  
23 distortion in the image.

24 BY MR. HEFAZI:

25 Q. And not just maintaining the barrel

1 distortion but maintaining it center; right?

2 That's the fundamental purpose here, to center the  
3 barrel distortion?

4 MS. LI: Objection. Form.

5 THE WITNESS: The fundamental idea is to  
6 maintain the barrel distortion which is -- has as a  
7 characteristic that it has a symmetry around the  
8 center. So it wants to reserve that, not to  
9 further modify the barrel distortion.

10 BY MR. HEFAZI: 09:39:30

11 Q. So take a look at Figure 5 of Watanabe,  
12 which is on page -- and, actually, before we go  
13 there, you see Watanabe is assigned to Canon;  
14 right?

15 A. Yes, I see that.

16 Q. And Canon is a camera manufacturer?

17 A. Among many others, yes.

18 Q. They sell commercial cameras, amongst  
19 other things; correct?

20 A. They sell commercial cameras, among other 09:40:05  
21 things, yes.

22 Q. Have you ever used a Canon camera?

23 A. I'm not sure. I had many cameras over the  
24 years, but I know the brand is a camera brand, yes.

25 Q. Are you aware of any cameras on the market

Page 21

1 that use horizon leveling?

2 MS. LI: Objection. Form.

3 THE WITNESS: I have not considered this, this  
4 question.

5 BY MR. HEFAZI:

6 Q. Let's take a look at Figure 5.

7 A. Okay.

8 Q. So in Figure 5 the first image at the top,  
9 Number 51, that's the captured the image; right?

10 A. That's how it is labeled, yes. 09:40:56

11 Q. And consistent with Watanabe's kind of  
12 purpose about being -- strike that.

13 The captured image has a barrel  
14 distortion; right?

15 A. Can you point me to the patent where this  
16 is mentioned?

17 Q. The description of Figure 5?

18 A. Yes.

19 Q. So column 11.

20 A. Okay. Thank you. 09:42:14

21 Yes, according to the declaration, the  
22 barrel distortion is depicted in 51.

23 Q. Okay. And so this would be, for example,  
24 an image captured by a wide angle fisheye lens?

25 A. Can you point me to the specification

Page 22

1 where this is stated?

2 Q. The specification refers to it as a  
3 super -- talks about super wide angle lenses. Let  
4 me try to direct you to that.

5 So if you look, for example -- if you look  
6 at the description around -- I'm having trouble  
7 finding that, but let me ask more generally, do you  
8 have an understanding of what kind of lens would  
9 capture this barrel distortion 51?

10 MS. LI: Objection. Form. 09:45:28

11 THE WITNESS: Wide angle lenses introduce  
12 distortions and better distortion could be the  
13 result of a wide angle lens.

14 BY MR. HEFAZI:

15 Q. So Watanabe's initial image is captured  
16 using a wide angle lens like the fisheye lens;  
17 right?

18 A. We -- I will need to look at the  
19 specification to see what is the example of 51  
20 here, what cause this degradation. It's a barrel 09:46:05  
21 distortion. We saw that in the specification, but  
22 I want to see what the method says of what caused  
23 this barrel distortion.

24 Q. Sure. You have the reference in front of  
25 you. So take a look at what you need to look at,

Page 23

1 and my question, when you're ready, is Watanabe  
2 discloses capturing an image using a wide angle or  
3 fisheye lens; right?

4 MS. LI: Objection. Form.

5 BY MR. HEFAZI:

6 Q. Let me ask an even more fundamental  
7 question or simpler question.

8 In Watanabe, the image that's captured has  
9 a barrel distortion. Regardless of what the lens  
10 is, it has a barrel distortion; right? 09:47:25

11 MS. LI: Objection. Form.

12 THE WITNESS: Watanabe talks about image  
13 distortions caused by aberration, and examples are  
14 barrel distortion and inclusion distortion. So  
15 aberration is the main cause.

16 BY MR. HEFAZI:

17 Q. And what is aberration?

18 A. Is a property of the lens caused by the  
19 lens.

20 Q. Okay. So Watanabe is discussing cameras 09:48:21  
21 whose lenses cause distortions such as barrel  
22 distortions; correct?

23 MS. LI: Objection. Form.

24 THE WITNESS: That would be a fair statement.  
25 It looks at cameras that are distorted by

1 aberration and could be barrel or inclusion  
2 distortion, yes.

3 BY MR. HEFAZI:

4 Q. And what Watanabe does with that captured  
5 image is it applies a distortion correction circuit  
6 that results in, if you look back at Figure 5, that  
7 second image, 52; right?

8 MS. LI: Objection. Form.

9 THE WITNESS: Yes. So distortion correction is  
10 performed, and this results in Figure 52. 09:49:39

11 BY MR. HEFAZI:

12 Q. Okay. And then the next step in  
13 Watanabe's process is to crop an off-center region  
14 of the image; right?

15 MS. LI: Objection. Form.

16 BY MR. HEFAZI:

17 Q. That's Image 53.

18 A. So then image shake correction is  
19 performed, and this image shake correction  
20 processor circuits determines this cropping region 09:50:33  
21 so as to eliminate image shake resulting from the  
22 shake of the camera, and this is the region in  
23 Image 53.

24 Q. Okay. And that region that's in Image 53,  
25 that's off-center relative to the coordinates of

Page 25

1 the center of the initial image; right?

2 A. The center of the cropped region does not  
3 coincide with the center of the original image that  
4  $O(x,y)$  indicated in 53.

5 Q. And so what Watanabe is directed at is  
6 then reapplying that distortion so that it's  
7 symmetrical and centered; right?

8 MS. LI: Objection. Form.

9 THE WITNESS: So to generate Image 54, the  
10 barrel distortion is applied in symmetric fashion 09:52:37  
11 with respect to the center of the cropped region in  
12 53, which becomes 54, and this new center is that  
13  $O$  prime,  $X$  prime,  $Y$  prime.

14 BY MR. HEFAZI:

15 Q. And if you look at column 11, can you read  
16 lines 51 through 54?

17 A. Yes.

18 "Therefore, a distortion rate in a  
19 peripheral portion of a moving image ceases to  
20 change over time, and it is possible to generate a 09:53:24  
21 moving image that does not appear unnatural when  
22 observed."

23 Q. So when Watanabe is talking about a  
24 natural-looking image, it's talking about the fact  
25 that its camera is able to maintain the barrel

1 distortion symmetrically centered around the middle  
2 of the image; right?

3 MS. LI: Objection. Form.

4 THE WITNESS: Watanabe, yeah, pays attention to  
5 the fact that the distortion should be symmetrical  
6 around the center so that one edge of the image,  
7 let's say, on the right edge of the image, you  
8 don't have much higher distortion than on the left  
9 edge of the image or the other way around.

10 The unnatural part is a very subjective 09:54:30  
11 characterization in my mind, but it's clear that  
12 one wants to avoid having a different amount of  
13 distortion in the one side of the image than the  
14 other side of the image.

15 BY MR. HEFAZI:

16 Q. Do you have an understanding of what the  
17 word "unnatural" means in column 11?

18 Let me strike that question.

19 Do you have an understanding of what  
20 "natural" or "unnatural" as used by Watanabe means? 09:55:06

21 A. Unless Watanabe defines somewhere what  
22 this term means, it can be subject to many  
23 interpretations. Here it's talking about the  
24 distortion being symmetric. That's the objective  
25 of what we went through around the center of the

Page 27

1 image.

2 Q. So in the context of Figure 5, when it's  
3 using the word "natural" or "unnatural," that's  
4 referring to the fact that the image that has a  
5 barrel distortion can continue to have a barrel  
6 distortion appearing in the center even when the  
7 camera is moving; right?

8 MS. LI: Objection. Form.

9 THE WITNESS: The main objective could be  
10 barrel distortion, could be another distortion. 09:56:09

11 But the main point that Watanabe is making  
12 is that the symmetry -- I look at an image, and  
13 I don't want the right side of the image to be  
14 differently distorted than the left side of the  
15 image.

16 And "unnatural," in this context, that's  
17 what, according to Watanabe, is not natural. It's  
18 unnatural that I have different amounts of  
19 distortion.

20 BY MR. HEFAZI: 09:56:42

21 Q. Okay. And so the problem that Watanabe  
22 addresses, though, is not relevant to a camera that  
23 doesn't have distortion in its initial captured  
24 image; right?

25 MS. LI: Objection. Form.

1 THE WITNESS: Watanabe, as you read in the  
2 abstract, has multiple objectives in the  
3 disclosure, in the teaching.

4 BY MR. HEFAZI:

5 Q. I am referring to Figure 5. The process  
6 of Figure 5 is not relevant to a camera that  
7 doesn't have a captured image with an aberration in  
8 it?

9 MS. LI: Objection. Form.

10 THE WITNESS: Figure 5 is relevant to an image, 09:57:35  
11 a figure, that has distortion due to shaking.

12 BY MR. HEFAZI:

13 Q. It has a barrel distortion in the captured  
14 image -- strike that.

15 Figure 5 is relevant to a camera that has  
16 a captured image with a barrel distortion; right?

17 MS. LI: Objection. Form.

18 THE WITNESS: Figure 5 is relevant to an image  
19 that has distortion due to the shaking and also  
20 distortion due to barrel distortion. 09:58:19

21 BY MR. HEFAZI:

22 Q. So if you look at Figure 5, the anti-shake  
23 process is done at step 53; correct?

24 A. That's correct.

25 Q. And step 52 is a process of removing the

1 distortion from the captured image; correct?

2 A. Removing the barrel distortion. There are  
3 two distortions here we're talking about. There's  
4 not one distortion. There is barrel distortion,  
5 and there is distortion due to shaking the camera,  
6 and Watanabe tries to disentangle the two and deal  
7 with each of them separately.

8 Q. So if you have -- in Image 51, your  
9 captured image, is distortionless. It's not a  
10 barrel distortion? Do you follow me? 09:59:12

11 A. No distortion. No distortion, period.

12 Q. Let's take it that the image has no  
13 distortion. Okay? Let's take your input image has  
14 no distortion. It wouldn't be relevant to do  
15 step 52; right?

16 MS. LI: Objection. Form.

17 THE WITNESS: Again, Watanabe, in Figure 5,  
18 deals with two distortions. That's the main.  
19 One is desirable; the other is undesirable.

20 BY MR. HEFAZI: 09:59:44

21 Q. Which one is undesirable?

22 A. The shake distortion.

23 Q. Okay. And so with the desirable one,  
24 the -- so let's just say the barrel distortion, for  
25 a camera that doesn't have that, Watanabe's process

Page 30

1 in Figure 5 is irrelevant.

2 MS. LI: Objection. Form.

3 THE WITNESS: Watanabe shows us here a pipeline  
4 part of the teaching is how to disentangle the two  
5 distortions, and I want to keep the one, I want to  
6 remove the other one, and this is the pipeline that  
7 teaches us how to do it.

8 BY MR. HEFAZI:

9 Q. And if you don't have that first part, the  
10 barrel distortion, then there's nothing to 10:00:39  
11 disentangle; correct?

12 MS. LI: Objection. Form.

13 THE WITNESS: I haven't looked at Watanabe  
14 under different assumptions than what Watanabe  
15 teaches.

16 BY MR. HEFAZI:

17 Q. So when you looked at Watanabe, you  
18 considered it -- you considered Figure 5 only as to  
19 its applicability to cameras that have a barrel  
20 distortion. 10:01:10

21 MS. LI: Objection. Form.

22 THE WITNESS: Watanabe teaches multiple  
23 elements in this pipeline. It teaches the  
24 disentanglement. It teaches removing one. It  
25 teaches adding another one. Yeah, the specific

Page 31

1 pipeline and that's the pipeline. I used the  
2 teachings of this pipeline.

3 BY MR. HEFAZI:

4 Q. So we talked a moment ago about Watanabe's  
5 disclosure about having a natural image by keeping  
6 the distortion that's centered in the image; right?

7 A. (Witness nodding head.)

8 Q. And that distortion was the distortion  
9 related to the aberration -- correct? -- of the  
10 camera? 10:02:13

11 MS. LI: Objection. Form.

12 THE WITNESS: Yeah. Watanabe starts with  
13 aberrations caused by the lens and considers the  
14 case of distortions due to shaking of the camera  
15 and, again, teaches a pipeline and in this pipeline  
16 the elements that are useful for other purposes as  
17 well. Right? It teaches how to remove distortion  
18 inclusion, how to remove the shaking distortion,  
19 how to add the pincushion inclusion distortion.  
20 All of these are specific algorithmic steps that 10:03:00  
21 are important.

22 BY MR. HEFAZI:

23 Q. With respect to centering the distortion,  
24 the barrel distortion that's in the captured image,  
25 that process doesn't apply if there's no barrel

Page 32

1 distortion in the captured image.

2 MS. LI: Same objection.

3 THE WITNESS: This step by itself is a step  
4 that may not be trivial. You need the model of how  
5 to add the barrel distortion. The model includes  
6 the distance of the camera of the objects, the  
7 distance from the center and so on and so forth.  
8 So this is part of the teaching of Watanabe of how  
9 to -- how to do that.

10 BY MR. HEFAZI: 10:03:58

11 Q. Did you consider whether Figure 5 fits --  
12 algorithm shown here applies to a camera that  
13 doesn't have distortion?

14 A. Figure 5 applies to any camera that has  
15 distortion due to the movement of the camera.

16 Q. You keep saying "distortion due to the  
17 movement of the camera." Can you tell me where in  
18 Watanabe it discusses distortion as a result of  
19 anti-shake?

20 A. We looked at the abstract, and the 10:04:49  
21 abstract says that "Provided is an image-processing  
22 apparatus that generates a natural-looking image  
23 even from an image in which image shake has been  
24 corrected."

25 So there's image shake in Figure 5 type of

Page 33

1 thing.

2 Q. Can you tell me how that sentence  
3 discloses to you that the image shake is correcting  
4 distortion, and just -- strike that.

5 Do you see how the sentence you read  
6 continues with a conjunction. It says "and  
7 distortion has been intentionally added"; right?

8 A. Yes.

9 Q. So can you explain to me where or how that  
10 disclosure there indicates to you that Watanabe is 10:05:41  
11 about correcting distortion introduced by image  
12 shake?

13 A. I'm sorry. Can you repeat the question?

14 Q. Yeah. I guess I'm wondering where are you  
15 getting that the image -- strike that.

16 You talked about two types of distortion  
17 that Watanabe is trying to disentangle; correct?

18 A. That's correct.

19 Q. And the first one is what we see in  
20 Figure 5 with the barrel distortion at the input 10:06:09  
21 image; right?

22 A. The input image 51 has both the barrel  
23 distortion and the shake distortion.

24 Q. Okay. So can you tell me where in  
25 Watanabe it discusses that the distortion in 51 is

1 directed at the shake?

2 A. I'm sorry. I don't understand the  
3 question.

4 Q. Well, let me strike that.

5 So if you have an initial captured image  
6 and it doesn't have distortion, anti-shake  
7 distortion or barrel distortion, would you agree,  
8 then, that Watanabe is inapplicable?

9 MS. LI: Objection. Form.

10 THE WITNESS: Watanabe solves a problem. It 10:07:03  
11 tells us what problem he's solving. If there is no  
12 problem, there is no Watanabe. If I have an image  
13 that is distortion-free, I may not want to do  
14 anything to it. I may want to do anything to it.  
15 But Watanabe says that in 51 there's an image that  
16 has both shake distortion and barrel distortion.

17 BY MR. HEFAZI:

18 Q. And if those problems don't exist, then  
19 you wouldn't apply Watanabe; correct?

20 MS. LI: Objection. Form. 10:07:37

21 THE WITNESS: As I mentioned, Figure 5  
22 describes an algorithmic pipeline and an algorithm  
23 with steps, step 1, 2, 3, 4, and so on, and each of  
24 these steps brings something. The four each of  
25 these steps are valuable. It's a contribution.

1 It's the whole system and the individual steps.

2 So I cannot start now hypothesizing  
3 there's a different problem, but I can make use of  
4 individual steps. I can make use of the whole  
5 pipeline.

6 BY MR. HEFAZI:

7 Q. When you applied Watanabe in your  
8 declaration, what was the problem you were seeking  
9 to overcome?

10 A. Watanabe's relevant to my analysis because 10:08:33  
11 he's looking at distortions caused by the motion of  
12 the camera.

13 Q. Okay. And so if there are not distortions  
14 due to motions of the camera, then Watanabe is not  
15 relevant; correct?

16 MS. LI: Objection. Form.

17 THE WITNESS: As I mentioned, I considered  
18 Watanabe for what it is and not in the moving parts  
19 of the pipeline or this or that, and as  
20 I mentioned, there's the contribution of the whole 10:09:24  
21 pipeline. There are contributions of the specific  
22 algorithmic steps, but I can look at my declaration  
23 and look at all the reasons based on which Watanabe  
24 is combined with the other prior art references,  
25 but certainly, Watanabe is dealing with camera

Page 36

1 motion. We are interested in what happens when we  
2 have camera motion, and that's one of the reasons  
3 that make Watanabe relevant to my analysis.

4 BY MR. HEFAZI:

5 Q. Watanabe doesn't disclose a single  
6 embodiment where it's applying this process to an  
7 image without distortion; right?

8 MS. LI: Objection. Form.

9 THE WITNESS: Can I look at my declaration?

10 BY MR. HEFAZI: 10:10:39

11 Q. Sure. I mean, you can look at whatever  
12 you want. The patent is in front of you. So  
13 I guess I'm just asking about Watanabe, but feel  
14 free to consult whatever you need.

15 A. Can you repeat your question?

16 Q. Watanabe doesn't disclose a single  
17 embodiment where it's applying this process to an  
18 image without distortion.

19 MS. LI: Objection. Form.

20 THE WITNESS: An image with? 10:13:21

21 BY MR. HEFAZI:

22 Q. Without distortion.

23 MS. LI: Same objection.

24 THE WITNESS: I'm not sure if I understand the  
25 question.

Page 37

1           You mean that in 51 there is no barrel  
2       distortion, there's no shake distortion, there's  
3       nothing that's --

4       BY MR. HEFAZI:

5           Q.    Yeah, that's not disclosed in Watanabe,  
6       application of its process to a captured image that  
7       doesn't have distortion; right?

8           MS. LI:  Objection.  Form.

9           THE WITNESS:  We have that Watanabe is all  
10      about removing distortion.  It's -- right,                   10:14:15  
11      that's -- so Watanabe's image shake correction,  
12      crops out an image, changes the cropping position,  
13      that's an important part of Watanabe, and the other  
14      important part is maintaining and after removing,  
15      adding the barrel distortion.

16      BY MR. HEFAZI:

17           Q.    That doesn't answer my question.  Maybe  
18      you could focus on my question.

19                  My question is about the captured image,  
20      image 51.  Watanabe doesn't disclose a single               10:14:54  
21      embodiment where the captured image doesn't have  
22      distortion; correct?

23           MS. LI:  Same objection.

24           THE WITNESS:  And when you say "distortion,"  
25      you mean any type of distortion?  Barrel

Page 38

1 distortion? Shake distortion? Nothing; right?

2 BY MR. HEFAZI:

3 Q. I am just asking about distortion.

4 In Watanabe's image 51, the captured image  
5 has some sort of distortion in all embodiments;  
6 correct?

7 MS. LI: Objection. Form.

8 THE WITNESS: What type of distortion are you  
9 referring to?

10 BY MR. HEFAZI: 10:15:36

11 Q. Any type of distortion.

12 A. There's multiple distortions. Right? So  
13 you're saying there's no shake distortion. There's  
14 no barrel distortion; right?

15 Q. My question is very simple.

16 It's, in every single embodiment, Watanabe  
17 discloses that its captured image has some  
18 distortion.

19 MS. LI: Objection. Form.

20 THE WITNESS: Yeah, Watanabe talks about images 10:16:05  
21 that have two types of distortions, and the  
22 pipeline is the one we went through that. So it's  
23 -- Watanabe looks at removing distortion and looks  
24 at maintaining some natural appearance of the  
25 image. These are the teachings of Watanabe.

Page 39

1 BY MR. HEFAZI:

2 Q. And when you say "natural appearance," you  
3 mean centering that distortion in the input image?

4 MS. LI: Objection. Form.

5 THE WITNESS: As we saw in column 11,  
6 I believe, this was one of the interpretations of  
7 what the natural image could be, but it's just one  
8 of the interpretations.

9 BY MR. HEFAZI:

10 Q. Okay. And Watanabe doesn't discuss any 10:17:38  
11 off-axis horizon; right?

12 MS. LI: Objection. Form.

13 BY MR. HEFAZI:

14 Q. Let me -- in Figure 5 there is nothing  
15 about horizon leveling.

16 MS. LI: Objection. Form.

17 THE WITNESS: Figure 5 is one embodiment of  
18 Watanabe.

19 BY MR. HEFAZI:

20 Q. And in that embodiment, there's no 10:18:23  
21 discussion of horizon leveling?

22 MS. LI: Objection. Form.

23 Counsel, can we take a break after? It's  
24 been an hour.

25 THE WITNESS: We are looking at the

1 specification that addresses Figure 5. This is an  
2 embodiment of having barrel distortion and shake  
3 distortion.

4 BY MR. HEFAZI:

5 Q. Do you need my question again?

6 In this embodiment there's no discussion  
7 of horizon leveling; correct?

8 A. Yeah, based on my reading right now, I do  
9 not see horizon leveling. I'm not sure if it's  
10 mentioned somewhere else in the patent. 10:21:28

11 Q. Okay. We can take a break. Thank you.

12 (A short break was taken from  
13 10:21 AM to 10:36 PM.)

14 BY MR. HEFAZI:

15 Q. Let me introduce another exhibit. This is  
16 going to be Exhibit 1001, and this is the '832  
17 patent.

18 Okay. So this is the '832 patent. This  
19 is the patent that's the subject of this IPR;  
20 correct? 10:37:40

21 A. Correct.

22 Q. And you've obviously read this patent?

23 A. Yes.

24 Q. Now, I want to ask you a couple of  
25 questions about this patent.

Page 41

If you turn to column 21, do you see at line 21, starting at line 60, it says "An off-axis horizon may be less noticeable within visual content that includes a distortion than within visual content that does not include the distortion"?

A. Yes, I do see that.

Q. And we can see in Figure 7 that they give a few examples of distortion like barrel and pincushion distortions; correct?

10:38:55

A. That's correct.

Q. So, in '832 -- and I just want to confirm we are on the same page here -- that distortion that's being applied to reduce the off-axis horizon, that's in the final output image; right?

MS. LI: Objection. Form.

BY MR. HEFAZI:

Q. And maybe it's the output image that's drawing the objection.

So my question -- let me just rephrase it. 10:39:21

The '832 patent teaches applying a distortion in the image that is displayed to the user so that the off-axis horizon may be less noticeable within that visual content; correct?

MS. LI: Objection. Form.

Page 42

1 BY MR. HEFAZI:

2 Q. Feel free to look at your declaration, but  
3 this isn't intended to be a trick question.

4 A. Thanks.

5 Can you repeat your question?

6 Q. So in the '832 patent, the distortion that  
7 is displayed to make the off-axis horizon less  
8 noticeable appears in the image that's output and  
9 displayed to the user -- that is outputted and  
10 displayed to the user. 10:43:03

11 MS. LI: Objection. Form.

12 THE WITNESS: Can you point me to the  
13 specification where this is stated?

14 BY MR. HEFAZI:

15 Q. Well, this is discussed at column 21,  
16 line 60.

17 But, I guess, more generally, as a matter  
18 of common sense, to make the imperfections in the  
19 horizon leveling less noticeable to the user  
20 through a distortion, you would agree that that 10:43:41  
21 distortion is applied in what's displayed to the  
22 user; right?

23 MS. LI: Objection. Form.

24 BY MR. HEFAZI:

25 Q. Let me make it even simpler. The

1 distortion that reduces the impact of an off-axis  
2 horizon needs to appear in the output image; right?

3 MS. LI: Objection. Form.

4 THE WITNESS: The sentence that you asked me to  
5 look at here, 21, column 21, line 60, mentions that  
6 the "An off-axis horizon may be less noticeable  
7 within visual content" and so on.

8 So "may be less noticeable." One  
9 interpretation is that this is less noticeable by a  
10 human. So when a human view it, looks at it -- 10:45:03  
11 it's less noticeable. There might be another  
12 interpretation that's less noticeable to a machine  
13 that looks -- analyzes this image, but --

14 BY MR. HEFAZI:

15 Q. So sticking with that first one where it's  
16 less noticeable to a human, the understanding of a  
17 POSITA would be that that distortion is applied and  
18 displayed in the output image; right?

19 MS. LI: Objection. Form.

20 THE WITNESS: At which point it is applied, 10:45:45  
21 it's hard to tell from this, but, yeah, when -- if  
22 the human looks at this image, then, you know, if  
23 you compare one that is with and one without  
24 distortion, then with off-axis horizon, it's less  
25 noticeable when viewed. So when viewed by a human,

Page 44

1 it's in the image that the human is looking at.

2 BY MR. HEFAZI:

3 Q. Okay. So if we looked -- turn to claim 1,  
4 again. Do you see the limitation "The visual  
5 content viewable as a function of progress in the  
6 progress length"?

7 A. Can you point me to the line?

8 Q. This would be at line 37, these line  
9 numbers are a little hard to track but  
10 approximately 37. 10:46:47

11 A. I'm sorry. Which limitation?

12 Q. You see it says "The visual content  
13 viewable as a function of progress through the  
14 progress length"?

15 A. Yes, I see that.

16 Q. You didn't propose a claim construction  
17 for this term; right?

18 A. Which term?

19 Q. The -- I can use the word "phrase" but the  
20 one that we just discussed: "The visual content 10:47:28  
21 viewable as a function of progress through the  
22 progress length," you didn't propose a construction  
23 for that phrase?

24 A. So, as I state in my declaration, that in  
25 the context of this proceeding, petitioner did not

Page 45

1 propose terms for construction.

2 Q. So you're applying the plain meaning;  
3 right?

4 A. I apply the ordinary and customary meaning  
5 here.

6 Q. Okay. And what do you understand the  
7 ordinary and customary meaning of this term to be?

8 A. There are multiple elements in this  
9 sentence.

10 Q. Let me ask a more precise question then. 10:49:16

11 Did you interpret the ordinary and  
12 customary meaning of this term to mean that you  
13 have to be available to view the visual content  
14 prior to it being horizon leveling?

15 MS. LI: Objection. Form.

16 THE WITNESS: Can you repeat your question?

17 BY MR. HEFAZI:

18 Q. Did you interpret -- strike that.

19 Did you interpret the ordinary and  
20 customary meaning of this term to mean that you 10:54:12  
21 have to be able to view the visual content prior to  
22 it being horizon leveled?

23 MS. LI: Objection. Form.

24 BY MR. HEFAZI:

25 Q. It's been five or six minutes so let me

1 try rephrasing this. Maybe that will help.

2 I guess what I'm wondering is in your  
3 interpretation of this this phrase "the visual  
4 content viewable," that first part, is the visual  
5 content that is viewable, is that the  
6 non-horizon-leveled video that must be viewable or  
7 is it the horizon-leveled video?

8 MS. LI: Objection. Form.

9 BY MR. HEFAZI:

10 Q. Does that make sense? 10:55:59

11 A. Your question -- I hear your question,  
12 yes.

13 Q. Okay.

14 A. The sentence includes the progress length,  
15 which relates to the playback capability of the  
16 system, and, therefore, this sentence could be  
17 applicable in many scenarios, but the fact that  
18 we're playing back the process data in one  
19 interpretation applies to the process data as well.

20 Q. Okay. So let me just make sure 10:58:33

21 I understand your answer. So your understanding as  
22 an expert, your understanding of the plain meaning  
23 of the claim language is that what needs to be  
24 viewable can be either the horizon-leveled video or  
25 it could be the non-horizon-leveled video. Both of

Page 47

1       them are covered.

2           MS. LI: Objection. Form.

3       BY MR. HEFAZI:

4           Q. Let me rephrase the question just to  
5       address the objection.

6           The plain meaning of the claim language,  
7       in your view, is covering both a camera that --  
8       where the horizon-leveled video is viewable but not  
9       the non-horizon-leveled video and a camera where  
10      only the -- well, strike that. Let me --                      10:59:41

11          The plain meaning of the claim language,  
12      in your view, covers a camera where the  
13      horizon-leveled video is viewable but not the  
14      non-horizon-leveled video; is that right?

15          MS. LI: Objection. Form.

16          THE WITNESS: One interpretation of this  
17      sentence is because "viewable as a function of  
18      progress through the progress length," which means  
19      in a playback fashion this includes the already  
20      processed video.                                              11:02:44

21      BY MR. HEFAZI:

22          Q. Okay. And is that the interpretation you  
23      apply?

24          MS. LI: Objection. Form.

25

1 BY MR. HEFAZI:

2 Q. You've been thinking about this for 10,  
3 15 minutes. It's not supposed to be a trick  
4 question. I'm just asking the plain meaning that  
5 you apply if you can only view the horizon-leveled  
6 video, does that fall within the scope of the  
7 invention?

8 MS. LI: Objection. Form.

9 BY MR. HEFAZI:

10 Q. So four or five minutes have passed. Is 11:07:49  
11 this not something you considered before putting  
12 together your declaration? What the plain meaning  
13 of the claim language was?

14 A. I didn't consider all the contours of the  
15 plain meaning of specific terms. I just included  
16 what was disclosed in the prior art.

17 Q. So in the prior art, what -- strike that.  
18 So if the board concludes that only the  
19 horizon-leveled video is viewable within the prior  
20 art reference -- strike that. 11:08:55

21 If the board concludes that the prior art  
22 discloses that only the horizon-leveled video is  
23 viewable, as an expert in this field and under your  
24 understanding of the plain meaning, would that fall  
25 within the scope of the invention?

1 MS. LI: Objection. Form.

2 THE WITNESS: Can you give me the question,  
3 please?

4 BY MR. HEFAZI:

5 Q. So if the Patent Office concludes that the  
6 prior art discloses that only the horizon-leveled  
7 video is viewable in the prior art, as an expert in  
8 the field and under your understanding of the plain  
9 meaning, would that fall within the scope of the  
10 invention? 11:09:41

11 MS. LI: Objection. Form.

12 THE WITNESS: Has the board provided an opinion  
13 on this?

14 BY MR. HEFAZI:

15 Q. Well, obviously, the board is going to  
16 come down with a conclusion. I'm asking your view  
17 of the plain meaning here.

18 So let me repeat the question.

19 If the board were to conclude that the  
20 references that you rely on, Thomason and Voss, for 11:10:04  
21 example, disclose only the horizon-leveled video  
22 being viewable, as an expert in the field and under  
23 your understanding of the plain meaning, would that  
24 fall within the scope of the invention?

25 MS. LI: Objection. Form.

Page 50

1 THE WITNESS: The things that the board  
2 decision, you know, undertaking -- allowing the IPR  
3 to proceed and the documents, I'm wondering if  
4 you're referring to that document or not.

5 BY MR. HEFAZI:

6 Q. I'm referring to your opinions. So if  
7 Thomason -- if one was to conclude that Thomason  
8 only discloses that the horizon-leveled video is  
9 viewable and not the non-horizon-leveled video,  
10 would that fall within the scope of the invention 11:11:15  
11 under your understanding of the plain meaning?

12 MS. LI: Objection. Form.

13 THE WITNESS: Considering the prior art, this  
14 term, this limitation, could be applicable to both  
15 process data and raw data.

16 BY MR. HEFAZI:

17 Q. Okay. Let me ask you, eventually, after  
18 that took a little while, let's go to the next  
19 limitation is "obtain rotational position  
20 information for the video, the rotational position 11:14:15  
21 information characterizing rotational positions of  
22 the image capture device as a function of progress  
23 through the capture duration."

24 Do you see that?

25 A. Yes, I do.

1 Q. What do you understand the plain and  
2 ordinary meaning of "as a function of progress  
3 through the capture duration" to mean?

4 A. I did not consider the contour of the  
5 meaning of this term, "function of progress." At  
6 different points in time is a meaning that was also  
7 suggested by the board.

8 Q. I guess, my -- so it talks about  
9 "characterizing rotational position of the camera  
10 as a function of progress through the capture 11:16:43  
11 duration."

12 Do you read that to mean, for example,  
13 that you need to have -- strike that.

14 Do you read the limitation to require that  
15 you be able to characterize the rotational position  
16 information for each frame of the video?

17 MS. LI: Objection. Form.

18 THE WITNESS: As I mention, the "function of  
19 progress" construction would say that I applied was  
20 at different points in time. So every frame could 11:17:32  
21 be an example. Every other frame could be another  
22 example, and so on, as long as they are different  
23 points in time.

24 BY MR. HEFAZI:

25 Q. Are those different points in time the

1 points at which the frame is captured?

2 Do you see how -- I guess this is where  
3 I'm getting it, if you look a little bit up at the  
4 prior limitation it talks about the capture  
5 duration, and it talks about having different  
6 moments within the capture duration where the frame  
7 is captured.

8 So, I guess, I'm wondering when you say  
9 it's a function of the different moments in time,  
10 is it just any moment in time or is it the moments 11:18:16  
11 at which the frame is captured?

12 MS. LI: Objection. Form.

13 THE WITNESS: I didn't use the word "function"  
14 but "function of progress."

15 The way I read it is that at different  
16 points in time, I have the capture information,  
17 rotation information. At different points in time,  
18 I have the frame information.

19 BY MR. HEFAZI:

20 Q. And do those two have to be kind of 11:18:49  
21 aligned or associated in any way?

22 MS. LI: Objection. Form.

23 THE WITNESS: I don't see this limitation, this  
24 constraint, in the limitation language.

25

1 BY MR. HEFAZI:

2 Q. So if your frame value of video data is  
3 not aligned with your rotational data, doesn't that  
4 mean then that -- well, strike that.

5 So if you're on frame 1 but the rotational  
6 position information is not synchronized or aligned  
7 with frame one, doesn't that mean you're going to  
8 have an error when you go ahead and apply it to  
9 level the horizon?

10 MS. LI: Objection. Form. 11:19:59

11 THE WITNESS: Horizon leveling is defined very  
12 vaguely in the patent and in the claim language.  
13 There are no limitations on when horizon leveling  
14 is achieved, what are the error of tolerances, and  
15 so on. So I'm just reading the language of the  
16 limitations.

17 BY MR. HEFAZI:

18 Q. So let me just take a step back.

19 If time equals one, you capture frame one.

20 Are you following me? 11:20:44

21 A. Yes.

22 Q. Okay. And then you have a rotational  
23 position of the camera at time equals one and let's  
24 call that position R1. So you have frame one.  
25 We'll call that F1, and we'll have rotation 1.

Page 54

1 That's called R1.

2 Let's say at time 2, you capture frame 2,  
3 and then you have rotational position 2. If your  
4 rotational data is not aligned, if it's not as a  
5 function -- if these two functions are not matched  
6 up, won't you introduce errors when you go ahead  
7 and level because the position information is not  
8 accurate?

9 MS. LI: Objection. Form.

10 THE WITNESS: Again, I'm relating what the 11:21:42  
11 limitations are. There are no constraints of this  
12 nature. Time is discrete. It continues at the  
13 rate at which frames are acquired and the rate at  
14 which position information, rotation information is  
15 acquired can be different. It takes time to  
16 acquire a frame. Time is not discrete. Time is  
17 continuous. There are a lot of issues.

18 However, within the claim language, I'm  
19 required to have frame information at certain  
20 times. I'm required to have rotation information 11:22:36  
21 at certain times. That's how the limitations read.

22 BY MR. HEFAZI:

23 Q. Look at column 8.

24 A. 8?

25 Q. Uh-huh.

1           Do you see that at around line 10,  
2   I guess, 9 through 11, it says "The position" --  
3   "The position may include gyroscope data,  
4   accelerometer data per individual video frames  
5   captured by the image capture device."

6           Do you see that?

7           A.    I do.

8           Q.    That's talking about having position  
9   information that is aligned for each frame; right?

10          A.    Video frame, yes. 11:23:41

11          Q.    So in this case your position information  
12   is a function of progress through the capture  
13   duration meaning as a function of progress through  
14   each video frame; right?

15          MS. LI:  Objection.  Form.

16          BY MR. HEFAZI:

17          Q.    Let me rephrase that question.

18                So this disclosure is teaching that you're  
19   characterizing the position information as a  
20   function of a frame-by-frame nature; right? 11:24:13

21          MS. LI:  Same objection.

22          THE WITNESS:  Well, it says, "for example,"  
23   that sentence you pointed to.  So that's just one  
24   example.

25

1 BY MR. HEFAZI:

2 Q. Sure.

3 But in this example, it's talking about  
4 characterizing rotational information as a function  
5 of each of the frames; right?

6 MS. LI: Same objection.

7 THE WITNESS: Yeah, in this example, it says  
8 that position information is paired with video  
9 frame, yes.

10 BY MR. HEFAZI: 11:24:47

11 Q. Okay. And the patent also talks about,  
12 and the claims do as well, that you then use the  
13 rotational information as a function of progress  
14 through the capture duration to determine a viewing  
15 window as a function of progress through the  
16 progress length; correct?

17 MS. LI: Objection.

18 THE WITNESS: Again, this is one example where  
19 there's position information per frame. There are  
20 many other examples. The claims do not constrain 11:25:31  
21 this position information from information to  
22 follow this example.

23 BY MR. HEFAZI:

24 Q. Okay. If you go back to the claim  
25 language -- so I get that you say it's an example,

Page 57

1 but you would agree that the patent provides a  
2 disclosure where characterizing rotational position  
3 information at the image capture device as a  
4 function of progress through capture duration means  
5 that you're synchronizing the rotational  
6 information with each one of the frames in the  
7 video; correct?

8 MS. LI: Objection. Form.

9 THE WITNESS: I don't see the word

10 "synchronizing" in any of the claims. 11:26:43

11 BY MR. HEFAZI:

12 Q. You're associating it. Is that a --

13 A. I don't see that --

14 MS. LI: Same objection.

15 BY MR. HEFAZI:

16 Q. Sorry. You're saying you don't see it in  
17 the claims; right?

18 A. "Associated," yes.

19 Q. But we just saw an example, right, where

20 the patent is synchronizing the rotational 11:26:59

21 information with each of the frames in the video;  
22 correct?

23 MS. LI: Same objection.

24 THE WITNESS: Yes, this is an example. We saw  
25 that example but just one of many.

1 BY MR. HEFAZI:

2 Q. Okay. So, I guess, you would agree that  
3 that example falls within the scope of the claims;  
4 correct?

5 MS. LI: Same objection.

6 THE WITNESS: Yeah. The example of having the  
7 rotation information per frame falls within the  
8 claims, but that's not what the claims require.

9 BY MR. HEFAZI:

10 Q. Okay. Let me turn to this viewing window 11:27:48  
11 limitation. If you look at column 50. Do you see  
12 where it says --

13 A. I'm sorry. 50 column?

14 Q. Oh, sorry. Column 28, line 50.

15 A. Okay.

16 Q. It says "wherein determination of the  
17 viewing window includes determination of a  
18 placement of the viewing window."

19 A. Let me get there.

20 Yes, I saw that. 11:28:35

21 Q. Okay. And I guess I want to ask you, what  
22 do you understand to mean -- sorry.

23 What do you understand the plain meaning  
24 of "determining a placement of the viewing window"  
25 to mean?

Page 59

A. So meaning is that we have a -- the field of view of the visual content and inside this field of view we place a view window.

Q. Now, the word "determine," does that mean that the placement of the viewing window has to be -- strike that.

The word "determine," do you understand that to mean that the system or the camera has to be able to place the viewing window in different locations? It can't just be fixed in the same place?

MS. LI: Objection. Form.

THE WITNESS: Yeah, determination means the camera based on some logic -- the process of it is based on some logic will determine where this viewing window is placed. It could be that in multiple instances it is the same placement, but nevertheless, the processor is based again on some logic determines the placement of the viewing window.

BY MR. HEFAZI:

Q. But it has to be capable of being placed on a thing -- you're right. It might be the same for a number of frames, but it has to be capable -- strike that.

1           If the system can only place it in the  
2 center of the frame, there's no determination;  
3 right?

4           MS. LI: Objection.

5           THE WITNESS: It is just to be based on some  
6 algorithmic logic where this window is placed.

7 BY MR. HEFAZI:

8           Q. Does the window have to be capable of  
9 being placed in different locations?

10          MS. LI: Objection. Form. 11:32:15

11          THE WITNESS: Yeah. We have to determine the  
12 logic based on which the window is placed. There  
13 should be some algorithmic process, and based on  
14 this algorithmic process, yeah, this determination  
15 could potentially -- this -- the placement could  
16 potentially change, yes.

17 BY MR. HEFAZI:

18          Q. And so if the system is hardcoded, if the  
19 instructions are always set to place the window in  
20 the center of the image, that wouldn't be a 11:33:13  
21 determination of the placement, would it?

22          MS. LI: Objection. Form.

23          THE WITNESS: So a window of a fixed size and a  
24 fixed location, it's always the same.

25

1 BY MR. HEFAZI:

2 Q. Yeah, fixed size and fixed location.

3 MS. LI: So which one are we talking about?

4 THE WITNESS: It's 1, 50; right?

5 BY MR. HEFAZI:

6 Q. Yeah. So take a case where you have a  
7 fixed location, the location is in the center.

8 Would you agree with me if the system is  
9 hardcoded to always fix the location in the center,  
10 that that's not determining a location of the 11:34:23  
11 viewing window?

12 MS. LI: Objection. Form.

13 THE WITNESS: The determination -- we have to  
14 look at the whole limitation. So this  
15 determination based on the rotational positions of  
16 the image capture device as a function of progress  
17 of the captured duration; right?

18 BY MR. HEFAZI:

19 Q. Uh-huh.

20 A. I mean, the determination stand-alone 11:35:21  
21 could be a fixed window the way you describe it  
22 hardcoded, but if it's a determination based on the  
23 rotational positions, then --

24 Q. Well --

25 A. -- this has to be taken into account.

1 Right?

2 Q. Yeah. I mean, let's take a look at claim  
3 10 for a moment.

4 Do you see where it says "wherein the  
5 determination of placement of the viewing window  
6 within the field of view of the visual content  
7 includes determination of a location of the viewing  
8 window within the field of view"; right?

9 A. Uh-huh.

10 Q. So you would agree with me that 11:36:05  
11 determining the placement has to mean something  
12 different than determining the location; right?

13 MS. LI: Objection. Form.

14 THE WITNESS: Can you repeat your question?

15 BY MR. HEFAZI:

16 Q. So I'm just trying to -- so this question  
17 was just you would agree with me that the claim  
18 call for determining a placement, and that is  
19 broader in scope than determining a location of the  
20 viewing window; right? 11:41:01

21 A. Claim 10, as you pointed out, required  
22 that the determination of the placement and  
23 determination of the location.

24 Q. So what is the difference between  
25 placement and location in your opinion?

1           A.    Very closely related notions.  The  
2           placement may be a bit more general.  I have a  
3           field of view of the visual content, and I say  
4           something like "In here I am going to place a  
5           viewing window," and then determining the location  
6           of this viewing window means that it's going to be  
7           exactly here.

8           Q.    If you looked at claim 9, do you see that  
9           it talks about the placement can also be rotation  
10          of the viewing window? 11:42:14

11          A.    Yeah, I read that.

12          Q.    So does that suggest to you that maybe  
13          placement covers both kind of rotating the viewing  
14          window or moving it up or left or down or, you  
15          know, moving it around?

16          MS. LI:  Objection.  Form.

17          BY MR. HEFAZI:

18          Q.    So let me just strike that and maybe we  
19          can take that short break, and then I'll come back  
20          and ask more questions. 11:42:59

21          A.    Okay.

22                               (A lunch break was taken from  
23                               11:43 PM to 12:26 PM.)

24          BY MR. HEFAZI:

25          Q.    So, Dr. Katsaggelos --

1 A. Yes, thank you.

2 Q. Close enough.

3 -- welcome back.

4 A. Thank you.

5 Q. Did you discuss the substance of your  
6 testimony at any point today with your counsel?

7 A. No, I did not.

8 Q. Let me introduce Exhibit 1007.

9 Okay. So before the break we were talking  
10 about the limitations and the claims, the viewing 12:27:51  
11 window having a placement and then the placement  
12 including a location; correct?

13 A. I recall that, yes.

14 Q. Now, in Voss, if you take a look at the  
15 first page, there's an embodiment there that shows  
16 an insert rectangle. Do you see that?

17 A. Figure 2 on the cover?

18 Q. Correct. There's a square insert  
19 rectangle -- sorry -- "square."

20 There's an insert rectangle that's not 12:28:26  
21 really labeled. It's just that item that's in the  
22 middle of the clouds. Do you see that?

23 A. For each of the 220?

24 Q. Yeah, for 220, 230, 240. Actually, it  
25 looks like it might be labeled 225.

Page 65

1 Do you see that?

2 A. Yes.

3 Q. Now in each case the insert rectangle is  
4 rotating; right? It's rotating between 220 and 230  
5 and 240; correct?

6 A. So 220, 230, 240 show different amounts of  
7 rotation of the original frame, and this rectangle  
8 in the middle is -- yeah, is shown 225. I'm sorry.  
9 What was the question?

10 Q. Yeah. So the viewing window, the system 12:29:30  
11 is determining how much to rotate the viewing  
12 window; correct?

13 MS. LI: Objection. Form.

14 THE WITNESS: The system determines the viewing  
15 window.

16 BY MR. HEFAZI:

17 Q. And the determination has to include  
18 placement of the viewing window; correct?

19 That's claim 1.

20 A. Yeah, that's correct. 12:30:22

21 Q. Now, you see in claims 9 and 10 of the  
22 '832 patent, placement can include determining a  
23 rotation of the viewing window -- right? -- in  
24 claim 9?

25 A. Yes.

1 Q. And it can include determining a location  
2 of the viewing window in claim 10; right?

3 A. Yes.

4 Q. Okay. And those are two different things;  
5 right?

6 MS. LI: Objection. Form.

7 BY MR. HEFAZI:

8 Q. Let me just re-ask my question so that you  
9 have it.

10 Determining the rotation of the viewing 12:32:10  
11 window is distinct from determining the location of  
12 the viewing window; right?

13 MS. LI: Same objection.

14 THE WITNESS: I wouldn't necessarily call it  
15 distinct if the viewing window is rotated, and  
16 I need to know where it is, it can be one in the  
17 same process.

18 BY MR. HEFAZI:

19 Q. Is it your opinion that determining the  
20 amount the viewing window should be rotated 12:33:19  
21 discloses determining the location of the viewing  
22 window?

23 MS. LI: Objection. Form.

24 THE WITNESS: Claim 9 asks for the  
25 determination of the rotation of the viewing

1 window, which can be done in different ways, one of  
2 which is utilizing gyro data. So knowing gyro data  
3 you can determine the rotation of the viewing  
4 window. This rotation performed in the viewing  
5 window after the placement has been determined also  
6 is utilized to determine the location of the  
7 viewing window.

8 BY MR. HEFAZI:

9 Q. I'm not sure that answered my question.

10 So if you look at Voss, for example, a 12:34:53  
11 system of determining how much the viewing window  
12 should be rotated; correct?

13 MS. LI: Objection. Form.

14 THE WITNESS: Yeah. That inset rectangle in  
15 Voss that you are looking at, like 225, is  
16 transformed to compensate for the rotation of the  
17 camera by rotating in the inverse of the device's  
18 rotation.

19 BY MR. HEFAZI:

20 Q. Okay. And so you're pointing to that as 12:35:45  
21 determination of a rotation of the viewing window;  
22 correct?

23 A. Knowing the information about the rotation  
24 of the camera and doing this rotation of the camera  
25 determines the -- determines the rotation of the

1 viewing window.

2 Q. I can't say I followed that.

3 What are you pointing to as determining  
4 the rotation for Voss?

5 A. I'm looking at page 10 of Voss, line 5,  
6 which reads "The inset rectangle 225 is transformed  
7 to compensate for rotation 220, 230, 240 by  
8 essentially rotating the inverse of the device's  
9 own rotation, which is sampled from device's  
10 integrated gyroscope." 12:37:21

11 Q. I see.

12 So that's what we saw in Figure 2, right,  
13 that the -- as you went from 225 to 230 to 240 --  
14 sorry -- 220 to 230 to 240, the viewing window was  
15 rotated; correct?

16 A. No, this is the operation that is  
17 performed, again, knowing the -- having the  
18 information from the gyroscopes of how much a  
19 camera rotated, then if it rotated 60 degrees in a  
20 certain direction, rotating it 60 degrees in the 12:37:59  
21 opposite direction will undo the rotation of the  
22 camera. So that's the step that determines the  
23 rotation of the viewing window.

24 Q. Okay. What's the step that determines the  
25 rotation of the viewing window?

Page 69

1           A.    There might be different algorithmic steps  
2   to --

3           Q.    I'm not asking what might be.  I'm asking  
4   what in Voss discloses determining the location of  
5   viewing window.  Where do you point to that?

6           A.    Is to cover the maximum useful area of the  
7   rotated frame, for example.

8           Q.    So is there a disclosure in Voss that  
9   you're pointing to for that?

10          A.    I would have to look for it, but it's               12:39:16  
11   certainly here in Figure 2.

12          Q.    So if it's not the rotation, what is it  
13   that you're pointing to?

14          MS. LI:  Objection.  Form.

15          THE WITNESS:  In Figure 2, I'm pointing to the  
16   fact that the viewing window covers the maximum  
17   area on the sensor, if you wish.

18   BY MR. HEFAZI:

19          Q.    So you're pointing to the size of the  
20   viewing window changing?                                       12:39:43

21          A.    The size and the location is the  
22   determination that is coupled.

23          Q.    What's the difference between size and  
24   rotation?

25          MS. LI:  Objection.  Form.

1 THE WITNESS: Different consideration,  
2 different consideration goes into the size and  
3 different consideration to the location.

4 BY MR. HEFAZI:

5 Q. Okay. So if between 230 and 240, let's  
6 assume -- put aside the size -- what are you  
7 pointing to for the location?

8 A. The location is coupled with the size.  
9 If the algorithmic approach is that I want to cover  
10 the maximum useful area in the field of view on 12:40:32  
11 which view which I want to use as much data on the  
12 chip as possible -- on the sensor, I mean, then  
13 that determines at the same time the size and the  
14 location.

15 Q. Take a look at claim 8. Sorry. Claim 7.  
16 Let's start with that. Do you see how claim 7 says  
17 "determination of the viewing window further  
18 includes determination of a size"?

19 A. Yes.

20 Q. So determination of the size is recited as 12:41:16  
21 something different than determining the placement  
22 or location of the viewing window; right?

23 MS. LI: Objection. Form.

24 THE WITNESS: Yeah, the claims talk about size  
25 and --

1 BY MR. HEFAZI:

2 Q. And, in your opinion, you can double count  
3 the change in size as both the location and the  
4 size? That's what your opinion is?

5 MS. LI: Objection. Form.

6 THE WITNESS: I don't double count. I use --  
7 again, for doing all this determinations, it has to  
8 be an algorithmic process on conditions that need  
9 to be satisfied. So determining the size, the  
10 algorithmic process is that I want the maximum 12:42:12  
11 possible use of the visual content.

12 BY MR. HEFAZI:

13 Q. Okay. Can you point me to a disclosure in  
14 Voss, what line or page number or disclosure you're  
15 pointing to for determining the size of the viewing  
16 window?

17 MS. LI: Objection.

18 THE WITNESS: I would have to go through Voss,  
19 the whole disclosure right now to see if -- what  
20 was the appropriate place for that, but what is 12:42:54  
21 depicted in here to me visually is that, indeed,  
22 the maximum possible size of the visible window --  
23 viewing window -- sorry -- is utilized.

24 BY MR. HEFAZI:

25 Q. And do you see in your declaration, which

1 you're looking at right now, in your analysis of  
2 claim 10 regarding determining the location, in  
3 paragraph 218, and your analysis of claim 7,  
4 determining the size of the viewing window, in  
5 paragraph 213, you point to the same image  
6 annotated in the same exact way; correct?

7 MS. LI: Objection. Form.

8 THE WITNESS: So you're referring to  
9 paragraph 213 where I rely on Figure 2 and  
10 paragraph 218 where I rely on Figure 2 as well; 12:43:52  
11 right?

12 BY MR. HEFAZI:

13 Q. Correct.

14 A. Yeah.

15 Q. So you're pointing to the exact same  
16 disclosure for determining the size and determining  
17 the location; correct?

18 MS. LI: Objection. Form. Asked and answered.

19 THE WITNESS: As I already mentioned, there's  
20 two steps as depicted visually in Figure 2. 12:44:13  
21 There's an algorithmic process behind it, and the  
22 algorithmic process is, in determining the size,  
23 I want the maximum possible size of usable field of  
24 view visual content, which is a reasonable way to  
25 think about it.

1           I want to use as much data as I have, and  
2       then with this -- this is an algorithmic step.  
3       It's a condition. So based on this condition, you  
4       try to fit now a rectangle inside. That's the step  
5       of determining the placement, the rectangle that  
6       could fit into the rotated frame. That's the  
7       second algorithmic step.

8       BY MR. HEFAZI:

9           Q.    Okay. So let me ask you. The step of  
10       determining the size you pointed to as just the       12:45:11  
11       idea of coming up with a size, and you're saying  
12       that determining the location is the actual  
13       placement in that size; correct? Is that what  
14       you're looking at it as?

15       MS. LI:  Objection. Form.

16       THE WITNESS: Sorry. Can you repeat?

17       BY MR. HEFAZI:

18           Q.    Yeah. So if I understand your opinion  
19       correctly, you're saying Voss determines the size  
20       as the maximum boundaries of the sensor; correct?       12:45:37

21           A.    Yeah, the maximum viewing -- the maximum  
22       size viewing window to include visual content, yes.

23           Q.    And then what you're saying is that by  
24       punching out or cropping out that portion, that is  
25       determining a placement of the viewing window. Is

Page 74

1       that what your opinion is?

2           MS. LI:  Objection.  Form.

3           THE WITNESS:  My opinion is determining size,  
4       the condition in that step is I want the maximum  
5       size.  Determining the location, let's see now  
6       what's the maximum rectangle I can fit into the  
7       data, and that places it in the data.

8           Saying -- the first step saying I want the  
9       maximum size, it doesn't tell us what the maximum  
10      size is.  Right?  And how large -- yeah, it's two       12:46:35  
11      different steps.

12      BY MR. HEFAZI:

13          Q.    So your opinion for claim 7, right, what  
14      you're pointing to in paragraph 213 and 214 is that  
15      first step, that I want the maximum size before  
16      you've determined what the maximum size is;  
17      correct?  That's step 1?

18          MS. LI:  Objection.  Form.

19          THE WITNESS:  I'm saying this is the condition.  
20      I want the maximum size, that's the condition, and       12:47:08  
21      then by -- given the data, I can see what the  
22      maximum size is.  So I determine the -- I determine  
23      the size of the viewing window.

24      BY MR. HEFAZI:

25          Q.    So I'm trying to figure out which one

1 corresponds to which claim.

2 So with regards to claim 7, is it your  
3 opinion that -- strike that.

4 With regard to claim 7, in paragraph 220,  
5 is what your opinion or what you're pointing to  
6 the, I guess, first algorithmic deck that you  
7 described as I want the maximum size but I haven't  
8 yet determined what that is?

9 MS. LI: Objection. Asked and answered.

10 THE WITNESS: Yeah, what I said is that the 12:47:59  
11 condition for determining the size is that I want  
12 the maximum size, and then you go in there and see  
13 what the maximum size is.

14 So I want to determine the size. So I'm  
15 going to fit this rectangle there. I don't know  
16 what shape is going to have, but I want it to be  
17 inside the field of view, inscribed inside that red  
18 rectangle I have there and then this will give me  
19 the maximum size, but by taking that step, I have  
20 to also search where this maximum size is going to 12:48:40  
21 be achieved, and that's the determination of the  
22 placement.

23 BY MR. HEFAZI:

24 Q. Okay. I'm still having -- so, okay, the  
25 determination of the placement is determining the

1 size and -- I guess, of that red window?

2 I'm having trouble understanding you.

3 Can you maybe describe for me -- just  
4 let's just with the first step. What is the first  
5 step in the algorithmic process?

6 MS. LI: Objection. Asked and answered.

7 THE WITNESS: The red rectangle is the visual  
8 content, the field of view. Right? That's the  
9 useful part of the data, let's say.

10 And then the algorithmic determination is 12:49:35  
11 that I want to fit the rectangle, the blue  
12 rectangle, inside the red rectangle that would have  
13 the largest possible size, and that's the  
14 algorithm.

15 So you try different sizes of the blue  
16 rectangle. You see what's the maximum you can fit  
17 there, and by doing that, you've determined both  
18 the size of the viewing window and the placement.

19 BY MR. HEFAZI:

20 Q. Where is that disclosed in Voss? 12:50:14

21 A. As I mentioned, I'd have to look at Voss  
22 here page by page.

23 Q. That's not cited in your declaration --  
24 right? -- the step-by-step process? You didn't  
25 cite that in your declaration, did you?

Page 77

1           A.    I cite in my declaration what we went  
2 through as far as claiming the rotation.

3           Q.    And my question was did you describe  
4 that -- did you cite to anything or describe that  
5 algorithmic process in your declaration?

6           A.    Although I don't see right now in my  
7 declaration there's a cite to this process, to a  
8 person skilled in the art, that process is clearly  
9 depicted in this Figure 2.

10          Q.    And in Figure 2, you would agree with me,       12:51:57  
11 though, that Voss discloses that that inset  
12 rectangle is always fixed in the center of the  
13 screen; correct?

14          MS. LI:  Objection.  Form.

15          THE WITNESS:  There is a long description in  
16 Voss 9, 21 to 10, 11 of how this viewing window is  
17 defined to be the "best fit to the maximum  
18 boundaries of the sensor given the desired optimal  
19 aspect ratio for the given (current) orientation."

20                So this algorithmic step is -- that I was       12:55:20  
21 mentioning before, it's really spelled out.

22          BY MR. HEFAZI:

23          Q.    Yeah.  So my --

24          A.    -- in Voss.

25          Q.    My question was a bit different.  Does

1 Voss disclose the inset rectangle -- strike that.

2 Does Voss ever disclose the inset  
3 rectangle as off-center?

4 MS. LI: Objection. Form.

5 BY MR. HEFAZI:

6 Q. In every embodiment in Voss an inset  
7 rectangle is centered; correct?

8 MS. LI: Objection to form.

9 THE WITNESS: In the exemplary embodiment of  
10 Voss, as I mentioned, that the algorithmic process 12:56:15  
11 is to get this best fit to the maximum boundaries  
12 of the sensor. So with this algorithmic step,  
13 then, you just determine the placement of the  
14 window. There might be other embodiments which  
15 would result in different placement of the window.

16 BY MR. HEFAZI:

17 Q. But in that embodiment, the best fit  
18 embodiment that you're talking about, in each case,  
19 the placement is with the inset rectangle in a  
20 center; correct? 12:56:51

21 MS. LI: Same objection.

22 THE WITNESS: And this is, again, one  
23 embodiment that is determined by this best fit to  
24 the maximum boundaries. So this embodiment would  
25 have the appearance depicted in Figure 2.

1 BY MR. HEFAZI:

2 Q. Where the inset rectangle, i-n-s-e-t, is  
3 in the center, always in the center?

4 MS. LI: Objection. Form. Same objection.

5 THE WITNESS: Again, this is just an  
6 embodiment, and based on this embodiment, I would  
7 equate the best fit to the maximum boundaries, and  
8 we see examples of this best fit in Figure 2.

9 BY MR. HEFAZI:

10 Q. So the answer is in the embodiment that 12:57:46  
11 you cited, the placement is always going to be in  
12 the center; right?

13 MS. LI: Objection. Form.

14 THE WITNESS: I'm not certain if that needs to  
15 always be the case. Voss states that "Depending on  
16 the device's current most orientation, the  
17 dimensions of the transfer in the inner  
18 rectangle 225 are adjusted to interpolate between  
19 the two optimal aspect ratios relative to the  
20 amount of rotation." 12:58:46

21 So --

22 BY MR. HEFAZI:

23 Q. How does that disclose that it could be  
24 noncentered?

25 A. Well, it's an additional condition to the

1 best fit or to the maximum boundaries that this  
2 aspect ratio is interpolation between the two  
3 optimal ones. So every time you impose an  
4 additional constraint or problem might change the  
5 solution.

6 Q. There's no express disclosure there that  
7 teaches placing the inset rectangle anywhere other  
8 than the center?

9 MS. LI: Objection. Form.

10 THE WITNESS: Again, this is just one 12:59:27  
11 embodiment, and I mention that, in the original  
12 logic of this embodiment, we can add additional  
13 constraints such as the ones that I already  
14 mentioned, which might result in the viewing window  
15 being off-center, and the center is also not  
16 exactly clear what we mean in the center but,  
17 nevertheless, imposing additional constraints.

18 BY MR. HEFAZI:

19 Q. Nothing in that additional paragraph that  
20 you pointed to expressly discloses placing the 13:00:20  
21 inset rectangle somewhere other than the center?

22 MS. LI: Same objection.

23 THE WITNESS: What I read does not mention  
24 center. It is not a condition that's in the  
25 center. The conditions are "best fit to the

1 maximum boundaries" and "interpolate between two  
2 optimal dimensions." These are the --

3 BY MR. HEFAZI:

4 Q. And in Figure 2 that's shown as the inset  
5 rectangle always being fixed at a location in the  
6 center; right?

7 MS. LI: Same objection. Asked and answered.

8 THE WITNESS: Figure 2 is an example. Again,  
9 I couldn't say it's fixed, the window, the center.

10 (Stenographer clarification.) 13:01:17

11 THE WITNESS: I could not tell whether it is  
12 fixed in the center, but it's just an embodiment.  
13 It's just an example.

14 BY MR. HEFAZI:

15 Q. Why can't you tell that it's fixed?

16 A. I don't know what you mean by "fixed."

17 Q. In every single example that it is --  
18 inset rectangle never moves from the center.

19 MS. LI: Objection. Form.

20 THE WITNESS: Never moves from the center, does 13:01:46  
21 it mean the center of the rectangle? The viewing  
22 window? In the center? What is the center of  
23 the --

24 BY MR. HEFAZI:

25 Q. The center of the image.

1           A.    The center of the image.  How do you  
2   define the center of the image?  This is the red  
3   rectangle?  The blue rectangle?

4           This is just one embodiment that follows  
5   the best fit to the maximum boundaries.  As  
6   I mentioned, you impose an additional condition,  
7   you change the solution.  This is just one  
8   embodiment.  Another embodiment, if I change the  
9   condition based on which the determination of the  
10  size and placement is determined --

13:02:39

11          Q.    I understand that that's a --

12          A.    Yeah --

13          Q.    I understand that that's an embodiment,  
14  and I'm just asking, in that embodiment, the  
15  location of the viewing window is always in the  
16  center of that -- of that image?

17          MS. LI:  Objection.  Form.

18  BY MR. HEFAZI:

19          Q.    It rotates around the center.

20          A.    How is the center of the image defined?

13:03:07

21          Q.    You don't know what the word "center"  
22  means?

23          A.    I know in general, but if I give you an  
24  arbitrary polygon and ask you, find the center,  
25  you'd have a hard time doing that.  Right?

Page 83

1 Q. So what do you understand the center of  
2 that image to be?

3 A. This is not the analysis I performed.  
4 This is not something I discuss in my declaration.  
5 In my declaration, I use this example, uses the  
6 best fit to the maximum boundaries, and here is a  
7 depiction of what happens. I can impose additional  
8 conditions, the pictures will change. I change the  
9 condition, the size and the location of the viewing  
10 window can change. 13:04:14

11 Q. So in your declaration, you didn't  
12 consider whether the viewing window can move left,  
13 right, up, down, from the center of the image?

14 MS. LI: Objection. Form.

15 THE WITNESS: I considered in the sense that  
16 there's an algorithmic process in play that -- in  
17 place that, depending on what the conditions are  
18 that determine this window, I can have different  
19 embodiments. This is just one embodiment of --

20 BY MR. HEFAZI: 13:04:49

21 Q. Did you consider whether there's any  
22 express disclosure in Voss of the inset rectangle  
23 being able to move or be placed in a location other  
24 than the center?

25 MS. LI: Objection. Asked and answered.

1 THE WITNESS: The center is not something  
2 that's used in Voss. It's not a condition in Voss  
3 that the viewing window should be in the center.  
4 This is just one embodiment.

5 BY MR. HEFAZI:

6 Q. So I understand that. I'm asking you if  
7 you could point me to a single disclosure, single  
8 express disclosure of Voss teaching that the inset  
9 rectangle can be located off-center?

10 MS. LI: Same objection. Asked and answered. 13:05:39

11 THE WITNESS: I would have to go through the  
12 disclosure line by line, but the fact that nowhere  
13 is mentioning that this disclosure is constrained  
14 for the viewing window to be in the center, is no  
15 disclosure of that form in Voss.

16 BY MR. HEFAZI:

17 Q. That wasn't my question. So I -- sitting  
18 here right now, right, you can't point to any  
19 disclosure in Voss where it expressly teaches that  
20 the inset rectangle can take a position off-center? 13:06:26

21 MS. LI: Same objection. Asked and answered.

22 THE WITNESS: The fact that Voss does not  
23 constrain the viewing window to be at the center  
24 and instead can be determined based on various  
25 conditions, the POSITA would understand that if

1 I change the condition, the rotation, the size will  
2 change. There's nothing constraining in Voss that  
3 this viewing window has to be in the center.

4 BY MR. HEFAZI:

5 Q. So I understand your statement that  
6 there's nothing constraining it. My question is  
7 different.

8 Is there an express disclosure in Voss  
9 that you can point to, sitting here right now, that  
10 teaches any off-center inset rectangle? 13:07:19

11 MS. LI: Same objection. Asked and answered.

12 THE WITNESS: Yeah, my answer again is that  
13 nothing in Voss constrains this viewing window to  
14 be the center and would be clear to somebody  
15 skilled in the art that this viewing window can be  
16 placed anywhere in the visual point and by changing  
17 the condition based on which the determination of  
18 size and location is made.

19 BY MR. HEFAZI:

20 Q. Go look at paragraph 218 of your report. 13:08:18

21 In paragraph 218, do you discuss any  
22 disclosure in Voss that teaches placing the inset  
23 rectangle off-center?

24 MS. LI: Same objection. Asked and answered.

25 THE WITNESS: Yeah, what I discuss in 218 is

1 under the light of whatever dimension. Since  
2 there's no constraining condition that has to be  
3 the center, it's understood that changing the  
4 conditions based on which I determine the size and  
5 location of the window, I can place it anywhere.

6 BY MR. HEFAZI:

7 Q. And the only disclosure you're relying on  
8 for that position is Figure 2; right?

9 MS. LI: Objection. Form.

10 THE WITNESS: There is the part I read that 13:09:43  
11 tells us what -- that's 9, 21, to 10, 11 that gives  
12 the logic --

13 BY MR. HEFAZI:

14 Q. That's not cited in paragraph 218 of your  
15 report; right?

16 MS. LI: Objection.

17 THE WITNESS: I believe it's cited multiple  
18 times up to that point.

19 BY MR. HEFAZI:

20 Q. My question was that's not cited in 13:10:10  
21 paragraph 218 of your report; right?

22 A. Yeah, but it's cited many times before,  
23 and it's understood that --

24 Q. And you didn't discuss in 218 any instance  
25 or example of an inset rectangle that's located

Page 87

1 off-center; correct?

2 MS. LI: Objection. Form. Asked and answered.

3 THE WITNESS: Again, since it's not constrained  
4 by Voss's disclosures to be in the center, there is  
5 probably no need. It's understood -- well  
6 understood by somebody skilled in the art that it  
7 can be off-center.

8 BY MR. HEFAZI:

9 Q. And that's why you didn't discuss it in  
10 paragraph 218? 13:10:58

11 MS. LI: Objection. Form.

12 THE WITNESS: That might be one of the reasons.

13 MR. HEFAZI: No further questions. Thank you.

14 MS. LI: Pass the witness?

15 MR. HEFAZI: Yes.

16 MS. LI: No further questions.

17 (The proceedings concluded  
18 at 1:11 PM.)

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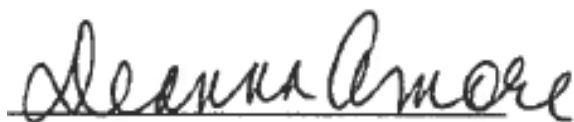
C E R T I F I C A T E

I, DEANNA AMORE, a Shorthand Reporter and  
notary public, within and for the State of  
Illinois, County of DuPage, do hereby certify:

That AGGELOS K. KATSAGGELOS, the witness  
whose examination is hereinbefore set forth, was  
first duly sworn by me and that this transcript of  
said testimony is a true record of the testimony  
given by said 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 13th day of April 2025.

A handwritten signature in dark ink, appearing to read "Deanna Amore", is written over a horizontal line.

Deanna M. Amore, CRR, RPR, CSR

Lily Yue Li  
YLi@mofo.com

April 15, 2025

RE: Arashi Vision Inc. v. GoPro Inc.

4/11/2025, Aggelos Katsaggelos , Ph.D. (#7277898)

The above-referenced transcript is available for  
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Within the applicable timeframe, the witness should  
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Page 90

1 Arashi Vision Inc. v. Gopro Inc.

2 Aggelos Katsaggelos, Ph.D. (#7277898)

3 E R R A T A S H E E T

4 PAGE\_\_\_\_\_ LINE\_\_\_\_\_ CHANGE\_\_\_\_\_

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6 REASON\_\_\_\_\_

7 PAGE\_\_\_\_\_ LINE\_\_\_\_\_ CHANGE\_\_\_\_\_

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9 REASON\_\_\_\_\_

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21 REASON\_\_\_\_\_

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24 Aggelos Katsaggelos, Ph.D. Date

25 \_\_\_\_\_

1 Arashi Vision Inc. v. Gopro Inc.

2 Aggelos Katsaggelos , Ph.D. (#7277898)

3 ACKNOWLEDGEMENT OF DEPONENT

4 I, Aggelos Katsaggelos , Ph.D., do hereby declare that I  
5 have read the foregoing transcript, I have made any  
6 corrections, additions, or changes I deemed necessary as  
7 noted above to be appended hereto, and that the same is  
8 a true, correct and complete transcript of the testimony  
9 given by me.

10

11 \_\_\_\_\_

12 Aggelos Katsaggelos, Ph.D.

Date

13 \*If notary is required

14 SUBSCRIBED AND SWORN TO BEFORE ME THIS  
15 \_\_\_\_\_ DAY OF \_\_\_\_\_, 20\_\_\_\_.

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[& - aberration]

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| <b>&amp;</b>           | <b>1:11</b> 88:18      | <b>28</b> 59:14        | <b>6</b>               |
| <b>&amp;</b> 2:5,12,19 | <b>2</b>               | <b>3</b>               | <b>60</b> 42:2 43:16   |
| <b>0</b>               | <b>2</b> 35:23 55:2,2  | <b>3</b> 35:23         | 44:5 69:19,20          |
| <b>084-003999</b>      | 55:3 65:17             | <b>30</b> 90:16        | <b>65</b> 3:15         |
| 1:23                   | 69:12 70:11,15         | <b>37</b> 45:8,10      | <b>7</b>               |
| <b>1</b>               | 73:9,10,20             | <b>4</b>               | <b>7</b> 42:8 71:15,16 |
| <b>1</b> 35:23 45:3    | 78:9,10 79:25          | <b>4</b> 3:5 35:23     | 73:3 75:13             |
| 54:5,25 62:4           | 80:8 82:4,8            | <b>4/11/2025</b> 90:5  | 76:2,4                 |
| 66:19 75:17            | 87:8                   | <b>40</b> 6:17         | <b>707</b> 2:8         |
| <b>10</b> 49:2 56:1    | <b>20</b> 92:15        | <b>41</b> 3:11         | <b>7277898</b> 1:24    |
| 63:3,21 66:21          | <b>2025</b> 1:15       | <b>5</b>               | 90:5 91:2 92:2         |
| 67:2 69:5 73:2         | 89:17 90:3             | <b>5</b> 21:11 22:6,8  | <b>755</b> 2:14        |
| 78:16 87:11            | <b>21</b> 42:1,2 43:15 | 22:17 25:6             | <b>8</b>               |
| <b>10,778,896</b>      | 44:5,5 78:16           | 28:2 29:5,6,10         | <b>8</b> 55:23,24      |
| 18:22                  | 87:11                  | 29:15,18,22            | 71:15                  |
| <b>1001</b> 3:11       | <b>2100</b> 1:19       | 30:17 31:1,18          | <b>832</b> 10:15       |
| 41:16                  | <b>213</b> 73:5,9      | 33:11,14,25            | 11:16 12:4             |
| <b>1006</b> 3:13       | 75:14                  | 34:20 35:21            | 16:5 17:9              |
| 18:21,23               | <b>214</b> 75:14       | 40:14,17 41:1          | 41:16,18 42:12         |
| <b>1007</b> 3:15 65:8  | <b>218</b> 73:3,10     | 69:5                   | 42:21 43:6             |
| <b>10:21</b> 41:13     | 86:20,21,25            | <b>50</b> 7:6,8 59:11  | 66:22                  |
| <b>10:36</b> 41:13     | 87:14,21,24            | 59:13,14 62:4          | <b>865</b> 2:21        |
| <b>10th</b> 2:22       | 88:10                  | <b>51</b> 22:9,22 23:9 | <b>9</b>               |
| <b>11</b> 1:15 22:19   | <b>220</b> 65:23,24    | 23:19 26:16            | <b>9</b> 56:2 64:8     |
| 26:15 27:17            | 66:4,6 69:7,14         | 30:8 34:22,25          | 66:21,24 67:24         |
| 40:5 56:2              | 76:4                   | 35:15 38:1,20          | 78:16 87:11            |
| 78:16 87:11            | <b>225</b> 65:25 66:8  | 39:4                   | <b>90017</b> 2:9,23    |
| <b>11:43</b> 64:23     | 68:15 69:6,13          | <b>52</b> 25:7,10      | <b>94304</b> 2:15      |
| <b>12384</b> 89:21     | 80:18                  | 29:25 30:15            | <b>9:12</b> 1:16       |
| <b>12:26</b> 64:23     | <b>230</b> 65:24 66:4  | <b>53</b> 25:17,23,24  | <b>a</b>               |
| <b>13th</b> 89:17      | 66:6 69:7,13           | 26:4,12 29:23          | <b>aberration</b>      |
| <b>15</b> 49:3 90:3    | 69:14 71:5             | <b>54</b> 26:9,12,16   | 19:20 24:13,15         |
| <b>18</b> 3:13         | <b>240</b> 65:24 66:5  |                        | 24:17 25:1             |
|                        | 66:6 69:7,13           |                        |                        |
|                        | 69:14 71:5             |                        |                        |

[aberration - applicability]

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| <p>29:7 32:9</p> <p><b>aberrations</b></p> <p>32:13</p> <p><b>able</b> 10:10</p> <p>11:22 12:8,20</p> <p>13:3,11 17:13</p> <p>26:25 46:21</p> <p>52:15 60:9</p> <p>84:23</p> <p><b>above</b> 90:6</p> <p>92:7</p> <p><b>abstract</b> 19:9</p> <p>20:20 29:2</p> <p>33:20,21</p> <p><b>acceleration</b></p> <p>9:22 11:10</p> <p><b>accelerometer</b></p> <p>9:18 10:4,12</p> <p>11:4,10,21,25</p> <p>12:8,17,20</p> <p>13:3,11 56:4</p> <p><b>accelerometers</b></p> <p>8:19,22</p> <p><b>account</b> 62:25</p> <p><b>accuracy</b> 90:9</p> <p><b>accurate</b> 13:17</p> <p>55:8</p> <p><b>accurately</b> 12:8</p> <p>12:21 13:11</p> <p><b>achieved</b> 54:14</p> <p>76:21</p> <p><b>acknowledge...</b></p> <p>92:3</p> <p><b>acknowledg...</b></p> <p>90:12</p> | <p><b>acquire</b> 55:16</p> <p><b>acquired</b> 5:4</p> <p>55:13,15</p> <p><b>action</b> 89:12</p> <p><b>actual</b> 74:12</p> <p><b>actually</b> 21:12</p> <p>65:24</p> <p><b>add</b> 32:19 33:5</p> <p>81:12</p> <p><b>added</b> 19:14</p> <p>34:7</p> <p><b>adding</b> 31:25</p> <p>38:15</p> <p><b>additional</b></p> <p>80:25 81:4,12</p> <p>81:17,19 83:6</p> <p>84:7</p> <p><b>additions</b> 92:6</p> <p><b>address</b> 10:16</p> <p>11:15 48:5</p> <p><b>addressed</b> 12:3</p> <p><b>addresses</b></p> <p>28:22 41:1</p> <p><b>adjusted</b> 80:18</p> <p><b>aggelos</b> 1:13</p> <p>3:4 4:4 89:6</p> <p>90:5 91:2,24</p> <p>92:2,4,12</p> <p><b>ago</b> 7:6 32:4</p> <p><b>agree</b> 35:7</p> <p>43:20 58:1</p> <p>59:2 62:8</p> <p>63:10,17 78:10</p> <p><b>ahead</b> 54:8</p> <p>55:6</p> | <p><b>algorithm</b></p> <p>11:21 12:7</p> <p>13:10 33:12</p> <p>35:22 77:14</p> <p><b>algorithmic</b></p> <p>32:20 35:22</p> <p>36:22 61:6,13</p> <p>61:14 70:1</p> <p>71:9 72:8,10</p> <p>73:21,22 74:2</p> <p>74:7 76:6 77:5</p> <p>77:10 78:5,20</p> <p>79:10,12 84:16</p> <p><b>aligned</b> 53:21</p> <p>54:3,6 55:4</p> <p>56:9</p> <p><b>allotted</b> 90:19</p> <p><b>allowing</b> 51:2</p> <p><b>alto</b> 2:15</p> <p><b>amore</b> 1:23</p> <p>89:3,22</p> <p><b>amount</b> 15:21</p> <p>27:12 67:20</p> <p>80:20</p> <p><b>amounts</b> 28:18</p> <p>66:6</p> <p><b>analysis</b> 9:15</p> <p>9:21 10:8 11:1</p> <p>11:7,13,15</p> <p>12:3,24 13:7</p> <p>13:15 17:13</p> <p>36:10 37:3</p> <p>73:1,3 84:3</p> <p><b>analyzes</b> 44:13</p> | <p><b>angeles</b> 2:9,23</p> <p><b>angle</b> 14:2,3</p> <p>16:17 17:25</p> <p>18:2,5,11,13,19</p> <p>22:24 23:3,11</p> <p>23:13,16 24:2</p> <p><b>anna</b> 2:6</p> <p><b>annotated</b> 73:6</p> <p><b>answer</b> 9:6</p> <p>17:13 38:17</p> <p>47:21 80:10</p> <p>86:12</p> <p><b>answered</b> 68:9</p> <p>73:18 76:9</p> <p>77:6 82:7</p> <p>84:25 85:10,21</p> <p>86:11,24 88:2</p> <p><b>anti</b> 29:22</p> <p>33:19 35:6</p> <p><b>anybody</b> 18:17</p> <p><b>apparatus</b></p> <p>19:11,15 33:22</p> <p><b>appeal</b> 1:1</p> <p><b>appear</b> 14:9</p> <p>26:21 44:2</p> <p><b>appearance</b></p> <p>39:24 40:2</p> <p>79:25</p> <p><b>appearances</b></p> <p>2:1</p> <p><b>appearing</b> 28:6</p> <p><b>appears</b> 43:8</p> <p><b>appended</b> 92:7</p> <p><b>applicability</b></p> <p>31:19</p> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

[applicable - boundaries]

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>applicable</b><br>47:17 51:14<br>90:8<br><b>application</b><br>38:6<br><b>applications</b><br>5:17<br><b>applied</b> 26:10<br>36:7 42:14<br>43:21 44:17,20<br>52:19<br><b>applies</b> 4:22,23<br>25:5 33:12,14<br>47:19<br><b>apply</b> 32:25<br>35:19 46:4<br>48:23 49:5<br>54:8<br><b>applying</b> 37:6<br>37:17 42:21<br>46:2<br><b>approach</b> 71:9<br><b>approaches</b><br>16:25<br><b>appropriate</b><br>16:6 72:20<br><b>approximately</b><br>45:10<br><b>april</b> 1:15<br>89:17 90:3<br><b>arashi</b> 1:3 2:3<br>90:4 91:1 92:1<br><b>arbitrary</b> 83:24<br><b>area</b> 70:6,17<br>71:10 | <b>arjomand</b> 2:7<br><b>art</b> 9:1,20,25<br>11:17 36:24<br>49:16,17,20,21<br>50:6,7 51:13<br>78:8 86:15<br>88:6<br><b>aside</b> 71:6<br><b>asked</b> 44:4<br>73:18 76:9<br>77:6 82:7<br>84:25 85:10,21<br>86:11,24 88:2<br><b>asking</b> 7:21<br>9:24 37:13<br>39:3 49:4<br>50:16 70:3,3<br>83:14 85:6<br><b>asks</b> 67:24<br><b>aspect</b> 78:19<br>80:19 81:2<br><b>aspects</b> 6:2<br><b>assigned</b> 21:13<br><b>associated</b><br>53:21 58:18<br><b>associating</b><br>58:12<br><b>assume</b> 71:6<br><b>assumptions</b><br>31:14<br><b>attached</b> 90:11<br><b>attempting</b><br>20:15<br><b>attention</b> 27:4 | <b>attorney</b> 90:13<br><b>available</b> 46:13<br>90:6<br><b>avoid</b> 16:14<br>27:12<br><b>aware</b> 7:11,22<br>8:1,9 17:7<br>21:25<br><b>axis</b> 40:11 42:2<br>42:14,23 43:7<br>44:1,6,24<br><b>ayuan</b> 2:10<br><b>b</b><br><b>b</b> 1:4 2:4<br><b>back</b> 6:14 25:6<br>47:18 54:18<br>57:24 64:19<br>65:3<br><b>barrel</b> 13:25<br>14:4,6,8,12,16<br>14:23 15:6,7<br>15:16 17:20,23<br>17:24 18:1<br>20:16,17,22,25<br>21:3,6,9 22:13<br>22:22 23:9,20<br>23:23 24:9,10<br>24:14,21 25:1<br>26:10,25 28:5<br>28:5,10 29:13<br>29:16,20 30:2<br>30:4,10,24<br>31:10,19 32:24<br>32:25 33:5<br>34:20,22 35:7 | 35:16 38:1,15<br>38:25 39:14<br>41:2 42:9<br><b>based</b> 9:1 14:11<br>36:23 41:8<br>60:14,15,18<br>61:5,12,13<br>62:15,22 74:3<br>80:6 83:9<br>85:24 86:17<br>87:4<br><b>behalf</b> 2:3,18<br><b>believe</b> 40:6<br>87:17<br><b>best</b> 78:17<br>79:11,17,23<br>80:7,8 81:1,25<br>83:5 84:6<br><b>better</b> 23:12<br><b>bit</b> 6:5 10:19<br>53:3 64:2<br>78:25<br><b>blood</b> 89:12<br><b>blue</b> 77:11,15<br>83:3<br><b>board</b> 1:1<br>49:18,21 50:12<br>50:15,19 51:1<br>52:7<br><b>boulevard</b> 2:8<br><b>boundaries</b><br>74:20 78:18<br>79:11,24 80:7<br>81:1 82:1 83:5<br>84:6 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

[brand - chicago]

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>brand</b> 21:24,24<br><b>brands</b> 17:18<br><b>break</b> 40:23<br>41:11,12 64:19<br>64:22 65:9<br><b>bringing</b> 13:19<br><b>brings</b> 35:24<br><b>broader</b> 63:19<br><b>business</b> 5:16                                                                                                                                                                                                                                                              | 54:23 60:8,14<br>68:17,24,24<br>69:19,22<br><b>cameras</b> 4:24<br>5:5 6:3,25 7:9<br>16:10,12,22<br>17:7,15 21:18<br>21:20,23,25<br>24:20,25 31:19<br><b>canon</b> 16:13<br>21:13,16,22<br><b>capability</b><br>47:15<br><b>capable</b> 60:22<br>60:25 61:8<br><b>capture</b> 11:14<br>14:15 23:9<br>51:22,23 52:3<br>52:10 53:4,6<br>53:16 54:19<br>55:2 56:5,12<br>57:14 58:3,4<br>62:16<br><b>captured</b> 22:9<br>22:13,24 23:15<br>24:8 25:4<br>28:23 29:7,13<br>29:16 30:1,9<br>32:24 33:1<br>35:5 38:6,19<br>38:21 39:4,17<br>53:1,7,11 56:5<br>62:17<br><b>captures</b> 15:6 | <b>capturing</b> 24:2<br><b>career</b> 5:24<br><b>case</b> 15:4 32:14<br>56:11 62:6<br>66:3 79:18<br>80:15<br><b>cases</b> 9:21<br><b>cause</b> 23:20<br>24:15,21<br><b>caused</b> 23:22<br>24:13,18 32:13<br>36:11<br><b>ceases</b> 26:19<br><b>center</b> 14:11,13<br>14:14,25 15:9<br>15:12,13,20<br>19:18,19,21<br>20:17 21:1,2,8<br>25:13,25 26:1<br>26:2,3,11,12<br>27:6,25 28:6<br>33:7 61:2,20<br>62:7,9 78:12<br>79:3,20 80:3,3<br>80:12 81:8,15<br>81:15,16,21,24<br>81:25 82:6,9<br>82:12,18,20,21<br>82:22,22,25<br>83:1,2,16,19,20<br>83:21,24 84:1<br>84:13,24 85:1<br>85:3,9,14,20,23<br>86:3,10,14,23<br>87:3 88:1,4,7 | <b>centered</b> 19:18<br>26:7 27:1 32:6<br>79:7<br><b>centering</b> 32:23<br>40:3<br><b>central</b> 1:16<br><b>certain</b> 18:18<br>55:19,21 69:20<br>80:14<br><b>certainly</b> 36:25<br>70:11<br><b>certify</b> 89:5,11<br><b>change</b> 13:4<br>26:20 61:16<br>72:3 81:4 83:7<br>83:8 84:8,8,10<br>86:1,2 91:4,7<br>91:10,13,16,19<br><b>changes</b> 38:12<br>90:10 92:6<br><b>changing</b> 70:20<br>86:16 87:3<br><b>characteristic</b><br>21:7<br><b>characterizati...</b><br>27:11<br><b>characterize</b><br>52:15<br><b>characterizing</b><br>51:21 52:9<br>56:19 57:4<br>58:2<br><b>check</b> 18:10<br><b>chicago</b> 1:20 |
| <b>c</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>c</b> 89:1,1<br><b>ca</b> 90:15<br><b>california</b> 2:9<br>2:15,23<br><b>call</b> 54:24,25<br>63:18 67:14<br><b>called</b> 4:5 55:1<br><b>camera</b> 4:20<br>5:2,8,11,12 6:7<br>6:22 7:5,12,23<br>7:23 8:2,9 9:8<br>11:24 12:9,14<br>12:19,21 13:2<br>13:13 14:20<br>15:5,15 16:13<br>16:21 17:20,22<br>20:18 21:16,22<br>21:24 25:22<br>26:25 28:7,22<br>29:6,15 30:5<br>30:25 32:10,14<br>33:6,12,14,15<br>33:17 36:12,14<br>36:25 37:2<br>48:7,9,12 52:9 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

[chip - continuous]

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|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>chip</b> 71:12<br><b>circuit</b> 25:5<br><b>circuits</b> 25:20<br><b>cite</b> 77:25 78:1<br>78:4,7<br><b>cited</b> 77:23<br>80:11 87:14,17<br>87:20,22<br><b>claim</b> 45:3,16<br>47:23 48:6,11<br>49:13 54:12<br>55:18 57:24<br>63:2,17,21<br>64:8 66:19,24<br>67:2,24 71:15<br>71:15,16 73:2<br>73:3 75:13<br>76:1,2,4<br><b>claimed</b> 11:16<br><b>claiming</b> 78:2<br><b>claims</b> 10:15<br>13:16 57:12,20<br>58:10,17 59:3<br>59:8,8 65:10<br>66:21 71:24<br><b>clarification</b><br>82:10<br><b>clear</b> 27:11<br>81:16 86:14<br><b>clearly</b> 78:8<br><b>close</b> 65:2<br><b>closely</b> 64:1<br><b>clouds</b> 65:22<br><b>coincide</b> 26:3 | <b>column</b> 22:19<br>26:15 27:17<br>40:5 42:1<br>43:15 44:5<br>55:23 59:11,13<br>59:14<br><b>combined</b> 8:25<br>36:24<br><b>come</b> 50:16<br>64:19<br><b>coming</b> 74:11<br><b>commercial</b><br>4:19 5:5,16,18<br>6:1 7:23 21:18<br>21:20<br><b>commercially</b><br>5:3,13<br><b>common</b> 43:18<br><b>compare</b> 44:23<br><b>compensate</b><br>68:16 69:7<br><b>complete</b> 92:8<br><b>completed</b><br>90:16<br><b>complicated</b><br>14:19<br><b>components</b><br>5:25 6:1<br><b>computer</b> 4:13<br>4:23<br><b>conclude</b> 50:19<br>51:7<br><b>concluded</b><br>88:17 | <b>concludes</b><br>49:18,21 50:5<br><b>conclusion</b><br>50:16<br><b>condition</b> 74:3<br>74:3 75:4,19<br>75:20 76:11<br>80:25 81:24<br>83:6,9 84:9<br>85:2 86:1,17<br>87:2<br><b>conditions</b> 72:8<br>81:25 84:8,17<br>85:25 87:4<br><b>confirm</b> 42:12<br><b>conjunction</b><br>34:6<br><b>consider</b> 10:10<br>10:22 11:6<br>12:2 13:6,17<br>13:19 33:11<br>49:14 52:4<br>84:12,21<br><b>consideration</b><br>71:1,2,3<br><b>considerations</b><br>10:17<br><b>considered</b><br>9:14 10:8<br>12:24 13:9<br>22:3 31:18,18<br>36:17 49:11<br>84:15<br><b>considering</b><br>51:13 | <b>considers</b> 32:13<br><b>consistent</b><br>22:11<br><b>constrain</b> 57:20<br>85:23<br><b>constrained</b><br>85:13 88:3<br><b>constraining</b><br>86:2,6 87:2<br><b>constrains</b><br>86:13<br><b>constraint</b><br>53:24 81:4<br><b>constraints</b><br>55:11 81:13,17<br><b>construction</b><br>45:16,22 46:1<br>52:19<br><b>consult</b> 7:17<br>9:5 37:14<br><b>content</b> 42:4,5<br>42:24 44:7<br>45:5,12,20<br>46:13,21 47:4<br>47:5 60:2 63:6<br>64:3 72:11<br>73:24 74:22<br>77:8<br><b>context</b> 28:2,16<br>45:25<br><b>continue</b> 28:5<br><b>continues</b> 34:6<br>55:12<br><b>continuous</b><br>55:17 |
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[contour - desired]

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>contour</b> 52:4<br><b>contours</b> 49:14<br><b>contribution</b><br>35:25 36:20<br><b>contributions</b><br>36:21<br><b>coordinates</b><br>19:18 25:25<br><b>copies</b> 90:14<br><b>copy</b> 18:25<br><b>correct</b> 4:18<br>18:16 19:5,8<br>20:21 21:19<br>24:22 29:23,24<br>30:1 31:11<br>32:9 34:17,18<br>35:19 36:15<br>38:22 39:6<br>41:7,20,21<br>42:10,11,24<br>57:16 58:7,22<br>59:4 65:12,18<br>66:5,12,18,20<br>68:12,22 69:15<br>73:6,13,17<br>74:13,20 75:17<br>78:13 79:7,20<br>88:1 92:8<br><b>corrected</b> 19:13<br>33:24<br><b>correcting</b> 34:3<br>34:11<br><b>correction</b> 25:5<br>25:9,18,19<br>38:11 | <b>corrections</b><br>92:6<br><b>correctly</b> 74:19<br><b>corresponds</b><br>76:1<br><b>counsel</b> 2:1<br>18:25 40:23<br>65:6 90:14<br><b>count</b> 72:2,6<br><b>county</b> 89:5<br><b>couple</b> 41:24<br><b>coupled</b> 70:22<br>71:8<br><b>course</b> 16:21<br><b>cover</b> 65:17<br>70:6 71:9<br><b>covered</b> 48:1<br><b>covering</b> 48:7<br><b>covers</b> 48:12<br>64:13 70:16<br><b>crop</b> 25:13<br><b>cropped</b> 26:2<br>26:11<br><b>cropping</b> 25:20<br>38:12 74:24<br><b>crops</b> 38:12<br><b>crr</b> 1:23 89:22<br><b>csr</b> 1:23 89:22<br><b>current</b> 78:19<br>80:16<br><b>customary</b> 46:4<br>46:7,12,20 | <b>d</b><br><b>d</b> 1:4 2:4 3:1<br><b>data</b> 5:4 9:22<br>47:18,19 51:15<br>51:15 54:2,3<br>55:4 56:3,4<br>68:2,2 71:11<br>74:1 75:7,7,21<br>77:9<br><b>date</b> 6:23 7:15<br>8:5 91:24<br>92:12<br><b>day</b> 89:17<br>92:15<br><b>days</b> 90:16<br><b>deal</b> 6:2 30:6<br><b>dealing</b> 36:25<br><b>deals</b> 30:18<br><b>deanna</b> 1:23<br>89:3,22<br><b>decision</b> 51:2<br><b>deck</b> 76:6<br><b>declaration</b><br>7:16,18,22 8:8<br>8:25 9:6,21<br>10:14 11:1<br>20:12 22:21<br>36:8,22 37:9<br>43:2 45:24<br>49:12 72:25<br>77:23,25 78:1<br>78:5,7 84:4,5<br>84:11<br><b>declare</b> 92:4 | <b>deemed</b> 92:6<br><b>define</b> 83:2<br><b>defined</b> 14:12<br>54:11 78:17<br>83:20<br><b>defines</b> 27:21<br><b>degradation</b><br>23:20<br><b>degrees</b> 69:19<br>69:20<br><b>depending</b><br>15:10 18:9<br>80:15 84:17<br><b>depicted</b> 15:22<br>22:22 72:21<br>73:20 78:9<br>79:25<br><b>depiction</b> 84:7<br><b>deponent</b> 90:13<br>92:3<br><b>deposing</b> 90:13<br><b>deposition</b> 1:12<br><b>describe</b> 62:21<br>77:3 78:3,4<br><b>described</b> 76:7<br><b>describes</b> 35:22<br><b>description</b><br>22:17 23:6<br>78:15<br><b>designed</b> 5:20<br>5:25<br><b>desirable</b> 17:4<br>30:19,23<br><b>desired</b> 78:18 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

[detect - distortion]

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>detect</b> 11:22<br/>12:6,8</p> <p><b>determination</b><br/>59:16,17 60:13<br/>61:2,14,21<br/>62:13,15,20,22<br/>63:5,7,22,23<br/>66:17 67:25<br/>68:21 70:22<br/>71:17,18,20<br/>76:21,25 77:10<br/>83:9 86:17</p> <p><b>determinations</b><br/>72:7</p> <p><b>determine</b><br/>57:14 60:4,7<br/>60:15 61:11<br/>68:3,6 75:22<br/>75:22 76:14<br/>79:13 84:18<br/>87:4</p> <p><b>determined</b><br/>68:5 75:16<br/>76:8 77:17<br/>79:23 83:10<br/>85:24</p> <p><b>determines</b><br/>25:20 60:19<br/>66:14 68:25,25<br/>69:22,24 71:13<br/>74:19</p> <p><b>determining</b><br/>59:24 62:10<br/>63:11,12,18,19<br/>64:5 66:11,22</p> | <p>67:1,10,11,19<br/>67:21 68:11<br/>69:3 70:4<br/>71:21 72:9,15<br/>73:2,4,16,16,22<br/>74:5,10,12,25<br/>75:3,5 76:11<br/>76:25</p> <p><b>developed</b> 6:6</p> <p><b>device</b> 51:22<br/>56:5 58:3<br/>62:16</p> <p><b>device's</b> 68:17<br/>69:8,9 80:16</p> <p><b>difference</b><br/>63:24 70:23</p> <p><b>different</b> 6:5<br/>10:19 27:12<br/>28:18 31:14<br/>36:3 52:6,20<br/>52:22,25 53:5<br/>53:9,15,17<br/>55:15 60:9<br/>61:9 63:12<br/>66:6 67:4 68:1<br/>70:1 71:1,2,3<br/>71:21 75:11<br/>77:15 78:25<br/>79:15 84:18<br/>86:7</p> <p><b>differently</b><br/>28:14</p> <p><b>digital</b> 16:22</p> <p><b>dimension</b> 87:1</p> | <p><b>dimensions</b><br/>80:17 82:2</p> <p><b>direct</b> 23:4</p> <p><b>directed</b> 26:5<br/>35:1</p> <p><b>direction</b> 13:3<br/>69:20,21</p> <p><b>disclose</b> 37:5,16<br/>38:20 50:21<br/>79:1,2 80:23</p> <p><b>disclosed</b> 38:5<br/>49:16 77:20</p> <p><b>discloses</b> 11:17<br/>24:2 34:3<br/>39:17 49:22<br/>50:6 51:8<br/>67:21 70:4<br/>78:11 81:20</p> <p><b>disclosure</b> 29:3<br/>32:5 34:10<br/>56:18 58:2<br/>70:8 72:13,14<br/>72:19 73:16<br/>81:6 84:22<br/>85:7,8,12,13,15<br/>85:19 86:8,22<br/>87:7</p> <p><b>disclosures</b><br/>88:4</p> <p><b>discrete</b> 55:12<br/>55:16</p> <p><b>discuss</b> 40:10<br/>65:5 84:4<br/>86:21,25 87:24<br/>88:9</p> | <p><b>discussed</b> 43:15<br/>45:20</p> <p><b>discusses</b> 33:18<br/>34:25</p> <p><b>discussing</b><br/>24:20</p> <p><b>discussion</b><br/>40:21 41:6</p> <p><b>disentangle</b><br/>30:6 31:4,11<br/>34:17</p> <p><b>disentangle...</b><br/>31:24</p> <p><b>displayed</b><br/>42:22 43:7,9<br/>43:10,21 44:18</p> <p><b>distance</b> 33:6,7</p> <p><b>distinct</b> 67:11<br/>67:15</p> <p><b>distort</b> 14:17</p> <p><b>distorted</b> 14:9<br/>15:3,17 24:25<br/>28:14</p> <p><b>distortion</b><br/>13:25 14:4,6,7<br/>14:8,12,16,23<br/>14:24 15:6,8,8<br/>15:11,12,21,23<br/>16:5,14,17,18<br/>17:4,4,8,23,24<br/>18:1 19:14,18<br/>20:16,17,23<br/>21:1,3,6,9<br/>22:14,22 23:9<br/>23:12,21,23</p> |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**[distortion - expressly]**

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 24:9,10,14,14<br>25:2,5,9 26:6<br>26:10,18 27:1<br>27:5,8,13,24<br>28:5,6,10,10,19<br>28:23 29:11,13<br>29:16,19,20,20<br>30:1,2,4,4,5,10<br>30:11,11,13,14<br>30:22,24 31:10<br>31:20 32:6,8,8<br>32:17,18,19,23<br>32:24 33:1,5<br>33:13,15,16,18<br>34:4,7,11,16,20<br>34:23,23,25<br>35:6,7,7,13,16<br>35:16 37:7,18<br>37:22 38:2,2,7<br>38:10,15,22,24<br>38:25 39:1,1,3<br>39:5,8,11,13,14<br>39:18,23 40:3<br>41:2,3 42:4,6,9<br>42:13,22 43:6<br>43:20,21 44:1<br>44:17,24<br><b>distortionless</b><br>30:9<br><b>distortions</b><br>14:1,5,14<br>15:16 17:20<br>23:12 24:13,21<br>24:22 30:3,18<br>31:5 32:14 | 36:11,13 39:12<br>39:21 42:10<br><b>document</b> 51:4<br><b>documents</b><br>51:3<br><b>doing</b> 11:15<br>68:24 72:7<br>77:17 83:25<br><b>double</b> 72:2,6<br><b>dr</b> 4:9 64:25<br><b>drawing</b> 42:19<br><b>due</b> 13:12<br>16:17,18,20<br>29:11,19,20<br>30:5 32:14<br>33:15,16 36:14<br><b>duly</b> 4:2,5 89:8<br><b>dupage</b> 89:5<br><b>duration</b> 51:23<br>52:3,11 53:5,6<br>56:13 57:14<br>58:4 62:17<br><br><b>e</b><br><br><b>e</b> 3:1 80:2 89:1<br>89:1 91:3,3,3<br><b>edge</b> 27:6,7,9<br><b>edges</b> 14:9 15:9<br><b>effect</b> 17:1,6<br><b>either</b> 47:24<br><b>electrical</b> 4:13<br>4:14,15<br><b>elements</b> 8:24<br>31:23 32:16<br>46:8 | <b>eliminate</b> 25:21<br><b>emanuel</b> 2:19<br><b>embodiment</b><br>37:6,17 38:21<br>39:16 40:17,20<br>41:2,6 65:15<br>79:6,9,17,18,23<br>79:24 80:6,6<br>80:10 81:11,12<br>82:12 83:4,8,8<br>83:13,14 84:19<br>85:4<br><b>embodiments</b><br>39:5 79:14<br>84:19<br><b>engineering</b><br>4:13,14,15<br><b>equals</b> 54:19,23<br><b>equate</b> 80:7<br><b>errata</b> 90:11,13<br>90:16<br><b>error</b> 54:8,14<br><b>errors</b> 55:6<br><b>essentially</b> 69:8<br><b>eventually</b><br>51:17<br><b>exact</b> 73:6,15<br><b>exactly</b> 11:15<br>64:7 81:16<br><b>examination</b><br>3:3,5 4:7 89:7<br><b>examined</b> 4:6<br><b>example</b> 14:2,4<br>14:7 17:18<br>20:15 22:23 | 23:5,19 50:21<br>52:12,21,22<br>56:22,24 57:3<br>57:7,18,22,25<br>58:19,24,25<br>59:3,6 68:10<br>70:7 82:8,13<br>82:17 84:5<br>87:25<br><b>examples</b> 24:13<br>42:9 57:20<br>80:8<br><b>exemplary</b> 79:9<br><b>exhibit</b> 3:11,13<br>3:15 18:21,21<br>18:23 41:15,16<br>65:8<br><b>exhibits</b> 3:8,9<br><b>exist</b> 35:18<br><b>experience</b> 4:16<br>8:15 9:25<br><b>expert</b> 10:2<br>11:19,23 12:15<br>47:22 49:23<br>50:7,22<br><b>expertise</b> 9:25<br><b>explain</b> 9:2<br>34:9<br><b>express</b> 81:6<br>84:22 85:8<br>86:8<br><b>expressly</b> 81:20<br>85:19 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

[f - frames]

|                         |                        |                        |                        |
|-------------------------|------------------------|------------------------|------------------------|
| <b>f</b>                | 41:1 42:8              | 62:2,7,21              | 43:23 44:3,19          |
| <b>f</b> 89:1           | 65:17 69:12            | 78:12 82:5,9           | 46:15,23 47:8          |
| <b>f1</b> 54:25         | 70:11,15 73:9          | 82:12,15,16            | 48:2,15,24             |
| <b>fact</b> 26:24 27:5  | 73:10,20 75:25         | <b>floor</b> 2:22      | 49:8 50:1,11           |
| 28:4 47:17              | 78:9,10 79:25          | <b>focus</b> 38:18     | 50:25 51:12            |
| 70:16 85:12,22          | 80:8 82:4,8            | <b>foerster</b> 2:5,12 | 52:17 53:12,22         |
| <b>fails</b> 90:18      | 87:8                   | <b>follow</b> 30:10    | 54:10 55:9             |
| <b>fair</b> 24:24       | <b>filed</b> 18:22     | 57:22                  | 56:15 58:8             |
| <b>fall</b> 11:24 12:9  | <b>final</b> 42:15     | <b>followed</b> 69:2   | 60:12 61:10,22         |
| 12:14,19 49:6           | <b>find</b> 83:24      | <b>following</b> 54:20 | 62:12 63:13            |
| 49:24 50:9,24           | <b>finding</b> 23:7    | <b>follows</b> 4:6     | 64:16 66:13            |
| 51:10                   | <b>first</b> 3:9 4:5   | 83:4                   | 67:6,23 68:13          |
| <b>falls</b> 59:3,7     | 6:21 7:3,4,11          | <b>foregoing</b> 92:5  | 70:14,25 71:23         |
| <b>familiar</b> 8:18    | 7:22 8:1 18:20         | <b>form</b> 4:21 5:14  | 72:5 73:7,18           |
| 8:21 13:22              | 22:8 31:9              | 5:22 6:8 7:13          | 74:15 75:2,18          |
| <b>family</b> 15:15,16  | 34:19 44:15            | 8:3,11 9:4,13          | 78:14 79:4,8           |
| <b>far</b> 78:2         | 47:4 65:15             | 9:19 10:6,13           | 80:4,13 81:9           |
| <b>fashion</b> 26:10    | 75:8,15 76:6           | 10:24 11:5,12          | 82:19 83:17            |
| 48:19                   | 77:4,4 89:8            | 12:1,10,22             | 84:14 85:15            |
| <b>feel</b> 37:13 43:2  | <b>fisheye</b> 13:22   | 13:5,14 14:18          | 87:9 88:2,11           |
| <b>field</b> 10:2 11:19 | 13:24 14:2             | 15:18 16:8,15          | <b>forth</b> 33:7 89:7 |
| 11:23 49:23             | 22:24 23:16            | 17:10 18:7             | <b>found</b> 5:17,25   |
| 50:8,22 60:1,2          | 24:3                   | 20:4,10,19             | <b>four</b> 35:24      |
| 63:6,8 64:3             | <b>fit</b> 74:4,6 75:6 | 21:4 22:2              | 49:10                  |
| 71:10 73:23             | 76:15 77:11,16         | 23:10 24:4,11          | <b>frame</b> 10:21,21  |
| 76:17 77:8              | 78:17 79:11,17         | 24:23 25:8,15          | 52:16,20,21            |
| <b>figueroa</b> 2:21    | 79:23 80:7,8           | 26:8 27:3 28:8         | 53:1,6,11,18           |
| <b>figure</b> 21:11     | 81:1,25 83:5           | 28:25 29:9,17          | 54:2,5,7,19,24         |
| 22:6,8,17 25:6          | 84:6                   | 30:16 31:2,12          | 55:2,16,19             |
| 25:10 28:2              | <b>fits</b> 33:11      | 31:21 32:11            | 56:9,10,14,20          |
| 29:5,6,10,11,15         | <b>five</b> 6:18 46:25 | 35:9,20 36:16          | 56:20 57:9,19          |
| 29:18,22 30:17          | 49:10                  | 37:8,19 38:8           | 59:7 61:2 66:7         |
| 31:1,18 33:11           | <b>fix</b> 62:9        | 39:7,19 40:4           | 70:7 74:6              |
| 33:14,25 34:20          | <b>fixed</b> 60:10     | 40:12,16,22            | <b>frames</b> 55:13    |
| 35:21 40:14,17          | 61:23,24 62:2          | 42:16,25 43:11         | 56:4 57:5 58:6         |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>58:21 60:24<br/> <b>franklin</b> 1:19<br/> <b>free</b> 11:24 12:9<br/> 12:14,19 35:13<br/> 37:14 43:2<br/> <b>front</b> 23:24<br/> 37:12<br/> <b>function</b> 17:25<br/> 45:5,13,21<br/> 48:17 51:22<br/> 52:2,5,10,18<br/> 53:9,13,14<br/> 55:5 56:12,13<br/> 56:20 57:4,13<br/> 57:15 58:4<br/> 62:16<br/> <b>functions</b> 55:5<br/> <b>fundamental</b><br/> 21:2,5 24:6<br/> <b>further</b> 15:13<br/> 21:9 71:17<br/> 88:13,16 89:11</p> | <p><b>getting</b> 34:15<br/> 53:3<br/> <b>give</b> 6:23 7:14<br/> 8:4 9:6 42:8<br/> 50:2 76:18<br/> 83:23<br/> <b>given</b> 19:25<br/> 75:21 78:18,19<br/> 89:10 92:9<br/> <b>gives</b> 87:11<br/> <b>go</b> 21:12 51:18<br/> 54:8 55:6<br/> 57:24 72:18<br/> 76:12 85:11<br/> 86:20<br/> <b>goal</b> 15:25 20:9<br/> <b>goes</b> 71:2<br/> <b>going</b> 14:16<br/> 18:11,21 41:16<br/> 50:15 54:7<br/> 64:4,6 76:15<br/> 76:16,20 80:11</p> | <p><b>gyroscope</b> 10:5<br/> 10:23 56:3<br/> 69:10<br/> <b>gyroscopes</b><br/> 8:18,21 69:18</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <p>29:4,12,21<br/> 30:20 31:8,16<br/> 32:3,22 33:10<br/> 35:17 36:6<br/> 37:4,10,21<br/> 38:4,16 39:2<br/> 39:10 40:1,9<br/> 40:13,19 41:4<br/> 41:14 42:17<br/> 43:1,14,24<br/> 44:14 45:2<br/> 46:17,24 47:9<br/> 48:3,21 49:1,9<br/> 50:4,14 51:5<br/> 51:16 52:24<br/> 53:19 54:1,17<br/> 55:22 56:16<br/> 57:1,10,23<br/> 58:11,15 59:1<br/> 59:9 60:21<br/> 61:7,17 62:1,5<br/> 62:18 63:15<br/> 64:17,24 66:16<br/> 67:7,18 68:8<br/> 68:19 70:18<br/> 71:4 72:1,12<br/> 72:24 73:12<br/> 74:8,17 75:12<br/> 75:24 76:23<br/> 77:19 78:22<br/> 79:5,16 80:1,9<br/> 80:22 81:18<br/> 82:3,14,24<br/> 83:18 84:20<br/> 85:5,16 86:4</p> |
| <b>g</b>                                                                                                                                                                                                                                                                                                                                                                                                                                         | <p><b>good</b> 4:9<br/> <b>gopro</b> 1:7 90:4<br/> 91:1 92:1<br/> <b>grounds</b> 17:3<br/> <b>guess</b> 7:4,20<br/> 10:2 15:14<br/> 34:14 37:13<br/> 43:17 47:2<br/> 52:8 53:2,8<br/> 56:2 59:2,21<br/> 76:6 77:1<br/> <b>gyro</b> 68:2,2</p>                                                                                                                                                                                                | <p><b>h</b></p> <p><b>h</b> 91:3<br/> <b>hand</b> 89:17<br/> <b>happened</b> 8:6<br/> <b>happens</b> 37:1<br/> 84:7<br/> <b>hard</b> 18:17<br/> 44:21 45:9<br/> 83:25<br/> <b>hardcoded</b><br/> 61:18 62:9,22<br/> <b>head</b> 32:7<br/> <b>hear</b> 47:11<br/> <b>heard</b> 6:21<br/> <b>hefazi</b> 2:20 3:5<br/> 4:8 5:1,19 6:4<br/> 6:11 7:19 8:7<br/> 8:13 9:10,16<br/> 9:23 10:9,18<br/> 11:2,8,18 12:5<br/> 12:13 13:1,8<br/> 13:21 15:1,24<br/> 16:9,23 17:14<br/> 18:14,20 19:1<br/> 19:3 20:7,13<br/> 20:24 21:10<br/> 22:5 23:14<br/> 24:5,16 25:3<br/> 25:11,16 26:14<br/> 27:15 28:20</p> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 86:19 87:6,13<br>87:19 88:8,13<br>88:15<br><b>help</b> 47:1<br><b>hereinbefore</b><br>89:7<br><b>hereto</b> 92:7<br><b>hereunto</b> 89:16<br><b>high</b> 7:10<br><b>higher</b> 27:8<br><b>horizon</b> 5:21<br>6:7,10,22 7:12<br>7:24 8:2,10,23<br>9:1,3,8,18 10:3<br>10:11,21 11:20<br>12:7,16 13:10<br>13:17,18 22:1<br>40:11,15,21<br>41:7,9 42:3,15<br>42:23 43:7,19<br>44:2,6,24<br>46:14,22 47:6<br>47:7,24,25<br>48:8,9,13,14<br>49:5,19,22<br>50:6,21 51:8,9<br>54:9,11,13<br><b>hour</b> 40:24<br><b>huh</b> 55:25<br>62:19 63:9<br><b>human</b> 44:10<br>44:10,16,22,25<br>45:1<br><b>hypothesizing</b><br>36:2 | <b>hypotheticals</b><br>12:2<br><b>i</b><br><b>idea</b> 21:5 74:11<br><b>illinois</b> 1:20<br>89:5<br><b>image</b> 4:17,23<br>14:9,15,25<br>15:20 16:5,25<br>19:11,12,13,13<br>19:15,16,17,19<br>19:19,21,23<br>20:3,15,23<br>22:8,9,13,24<br>23:15 24:2,8<br>24:12 25:5,7<br>25:14,17,18,19<br>25:21,23,24<br>26:1,3,9,19,21<br>26:24 27:2,6,7<br>27:9,13,14<br>28:1,4,12,13,15<br>28:24 29:7,10<br>29:14,16,18<br>30:1,8,9,12,13<br>32:5,6,24 33:1<br>33:21,22,23,23<br>33:25 34:3,11<br>34:15,21,22<br>35:5,12,15<br>37:7,18,20<br>38:6,11,12,19<br>38:20,21 39:4<br>39:4,17,25<br>40:3,7 42:15 | 42:18,22 43:8<br>44:2,13,18,22<br>45:1 51:22<br>56:5 58:3<br>61:20 62:16<br>73:5 82:25<br>83:1,2,16,20<br>84:2,13<br><b>images</b> 13:24<br>16:14 39:20<br><b>impact</b> 44:1<br><b>imperfections</b><br>43:18<br><b>implement</b> 8:22<br>9:18 10:11<br><b>important</b><br>32:21 38:13,14<br><b>impose</b> 81:3<br>83:6 84:7<br><b>imposing</b> 81:17<br><b>inapplicable</b><br>35:8<br><b>include</b> 8:24<br>42:5 56:3<br>66:17,22 67:1<br>74:22<br><b>included</b> 49:15<br><b>includes</b> 33:5<br>42:4 47:14<br>48:19 59:17<br>63:7 71:18<br><b>including</b> 65:12<br><b>inclusion</b> 24:14<br>25:1 32:18,19 | <b>indicated</b> 26:4<br><b>indicates</b> 34:10<br><b>individual</b> 36:1<br>36:4 56:4<br><b>information</b><br>6:2 9:7 51:20<br>51:21 52:16<br>53:16,17,18<br>54:6 55:7,14<br>55:14,19,20<br>56:9,11,19<br>57:4,8,13,19,21<br>57:21 58:3,6<br>58:21 59:7<br>68:23 69:18<br><b>initial</b> 23:15<br>26:1 28:23<br>35:5<br><b>initially</b> 7:21<br><b>inner</b> 80:17<br><b>input</b> 30:13<br>34:20,22 40:3<br><b>inscribed</b> 76:17<br><b>insert</b> 65:16,18<br>65:20 66:3<br><b>inset</b> 68:14<br>69:6 78:11<br>79:1,2,6,19<br>80:2 81:7,21<br>82:4,18 84:22<br>85:8,20 86:10<br>86:22 87:25<br><b>inside</b> 60:2<br>74:4 76:17,17<br>77:12 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>insta360</b> 1:4<br>2:4<br><b>instance</b> 87:24<br><b>instances</b> 60:17<br><b>instructions</b><br>61:19<br><b>integrated</b><br>69:10<br><b>intended</b> 43:3<br><b>intensely</b> 19:14<br><b>intentionally</b><br>34:7<br><b>inter</b> 1:4<br><b>interested</b> 37:1<br>89:13<br><b>interpolate</b><br>80:18 82:1<br><b>interpolation</b><br>81:2<br><b>interpret</b> 46:11<br>46:18,19<br><b>interpretation</b><br>44:9,12 47:3<br>47:19 48:16,22<br><b>interpretations</b><br>20:6 27:23<br>40:6,8<br><b>introduce</b><br>13:25 17:20,22<br>18:20 23:11<br>41:15 55:6<br>65:8<br><b>introduced</b><br>14:5,7,23 17:8<br>34:11 | <b>introduces</b><br>14:16 15:8,16<br><b>introducing</b><br>16:5<br><b>invention</b> 49:7<br>49:25 50:10,24<br>51:10<br><b>inverse</b> 68:17<br>69:8<br><b>involved</b> 6:17<br>8:16<br><b>ipr</b> 18:23 41:19<br>51:2<br><b>ipr2024-01164</b><br>1:5<br><b>ipr2024-01165</b><br>1:7<br><b>ipr2024-01186</b><br>1:6<br><b>irrelevant</b> 31:1<br><b>issues</b> 55:17<br><b>item</b> 65:21<br><b>j</b><br><b>job</b> 1:24<br><b>k</b><br><b>k</b> 1:13 3:4 4:4<br>89:6<br><b>katsaggelos</b><br>1:13 3:4 4:4,9<br>64:25 89:6<br>90:5 91:2,24<br>92:2,4,12<br><b>keep</b> 31:5 33:16 | <b>keeping</b> 32:5<br><b>kind</b> 13:12<br>22:11 23:8<br>53:20 64:13<br><b>know</b> 8:12 9:17<br>12:15,20 21:24<br>44:22 51:2<br>64:15 67:16<br>76:15 82:16<br>83:21,23<br><b>knowing</b> 68:2<br>68:23 69:17<br><b>l</b><br><b>labeled</b> 22:10<br>65:21,25<br><b>language</b> 47:23<br>48:6,11 49:13<br>53:24 54:12,15<br>55:18 57:25<br><b>large</b> 9:7 20:22<br>75:10<br><b>larger</b> 15:12<br><b>largest</b> 77:13<br><b>left</b> 27:8 28:14<br>64:14 84:12<br><b>legal</b> 90:23<br><b>length</b> 45:6,14<br>45:22 47:14<br>48:18 57:16<br><b>lens</b> 13:22,24<br>14:2,3 15:5<br>16:17,19 17:25<br>18:1,2,5,11,18<br>18:19,19 22:24<br>23:8,13,16,16 | 24:3,9,18,19<br>32:13<br><b>lenses</b> 14:2 18:4<br>23:3,11 24:21<br><b>level</b> 54:9 55:7<br><b>leveled</b> 46:22<br>47:6,7,24,25<br>48:8,9,13,14<br>49:5,19,22<br>50:6,21 51:8,9<br><b>leveling</b> 5:21<br>6:7,10,22 7:12<br>7:24 8:2,10,23<br>9:1,3,9,18 10:3<br>10:11,21 11:20<br>12:7 13:10,17<br>13:18 22:1<br>40:15,21 41:7<br>41:9 43:19<br>46:14 54:11,13<br><b>li</b> 2:13 4:21<br>5:14,22 6:8<br>7:13 8:3,11 9:4<br>9:13,19 10:6<br>10:13,24 11:5<br>11:12 12:1,10<br>12:22 13:5,14<br>14:18 15:18<br>16:8,15 17:10<br>18:7,25 20:4<br>20:10,19 21:4<br>22:2 23:10<br>24:4,11,23<br>25:8,15 26:8<br>27:3 28:8,25 |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

[li - market]

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 29:9,17 30:16<br>31:2,12,21<br>32:11 33:2<br>35:9,20 36:16<br>37:8,19,23<br>38:8,23 39:7<br>39:19 40:4,12<br>40:16,22 42:16<br>42:25 43:11,23<br>44:3,19 46:15<br>46:23 47:8<br>48:2,15,24<br>49:8 50:1,11<br>50:25 51:12<br>52:17 53:12,22<br>54:10 55:9<br>56:15,21 57:6<br>57:17 58:8,14<br>58:23 59:5<br>60:12 61:4,10<br>61:22 62:3,12<br>63:13 64:16<br>66:13 67:6,13<br>67:23 68:13<br>70:14,25 71:23<br>72:5,17 73:7<br>73:18 74:15<br>75:2,18 76:9<br>77:6 78:14<br>79:4,8,21 80:4<br>80:13 81:9,22<br>82:7,19 83:17<br>84:14,25 85:10<br>85:21 86:11,24<br>87:9,16 88:2 | 88:11,14,16<br>90:1<br><b>life</b> 7:1 17:16<br><b>light</b> 87:1<br><b>lily</b> 2:13 90:1<br><b>limitation</b> 45:4<br>45:11 51:14,19<br>52:14 53:4,23<br>53:24 59:11<br>62:14<br><b>limitations</b><br>10:15 11:17<br>12:4 54:13,16<br>55:11,21 65:10<br><b>line</b> 42:2,2<br>43:16 44:5<br>45:7,8,8 56:1<br>59:14 69:5<br>72:14 85:12,12<br>91:4,7,10,13,16<br>91:19<br><b>linear</b> 11:10<br><b>lines</b> 26:16<br><b>little</b> 15:11 45:9<br>51:18 53:3<br><b>llc</b> 1:4 2:4<br><b>located</b> 15:10<br>85:9 87:25<br><b>location</b> 61:24<br>62:2,7,7,9,10<br>63:7,12,19,23<br>63:25 64:5<br>65:12 67:1,11<br>67:21 68:6<br>70:4,21 71:3,7 | 71:8,14,22<br>72:3 73:2,17<br>74:12 75:5<br>82:5 83:15<br>84:9,23 86:18<br>87:5<br><b>locations</b> 60:10<br>61:9<br><b>logic</b> 60:14,15<br>60:19 61:6,12<br>81:12 87:12<br><b>long</b> 52:22<br>78:15<br><b>look</b> 9:20 15:2<br>18:11 19:24<br>21:11 22:6<br>23:5,5,18,25,25<br>25:6 26:15<br>28:12 29:22<br>36:22,23 37:9<br>37:11 43:2<br>44:5 53:3<br>55:23 59:11<br>62:14 63:2<br>65:14 68:10<br>70:10 71:15<br>77:21 86:20<br><b>looked</b> 10:14<br>13:15 31:13,17<br>33:20 45:3<br>64:8<br><b>looking</b> 19:12<br>19:23 20:2<br>26:24 33:22<br>36:11 40:25 | 45:1 68:15<br>69:5 73:1<br>74:14<br><b>looks</b> 24:25<br>39:23,23 44:10<br>44:13,22 65:25<br><b>los</b> 2:9,23<br><b>lot</b> 55:17<br><b>low</b> 16:19,20<br><b>lunch</b> 64:22                                                                                                                                                                                                                          |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>m</b>                                                                                                                                                                                                                                                                                                                                                                                                  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>m</b> 89:22<br><b>machine</b> 44:12<br><b>made</b> 86:18<br>92:5<br><b>main</b> 24:15<br>28:9,11 30:18<br><b>maintain</b> 21:6<br>26:25<br><b>maintaining</b><br>20:22,25 21:1<br>38:14 39:24<br><b>make</b> 20:16<br>36:3,4 37:3<br>43:7,18,25<br>47:10,20<br><b>making</b> 28:11<br><b>manufacturer</b><br>21:16<br><b>marjomand</b><br>2:11<br><b>marked</b> 3:9<br><b>market</b> 5:9<br>7:17 21:25 |

[marriage - note]

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>marriage</b> 89:13<br><b>masking</b> 17:1,6<br><b>masks</b> 17:2<br><b>match</b> 19:21<br><b>matched</b> 55:5<br><b>matter</b> 15:21<br>43:17 89:14<br><b>maximum</b> 70:6<br>70:16 71:10<br>72:10,22 73:23<br>74:20,21,21<br>75:4,6,9,9,15<br>75:16,20,22<br>76:7,12,13,19<br>76:20 77:16<br>78:17 79:11,24<br>80:7 81:1 82:1<br>83:5 84:6<br><b>mean</b> 9:24<br>15:14 19:22<br>37:11 38:1,25<br>40:3 46:12,20<br>52:3,12 54:4,7<br>59:22,25 60:4<br>60:8 62:20<br>63:2,11 71:12<br>81:16 82:16,21<br><b>meaning</b> 19:25<br>46:2,4,7,12,20<br>47:22 48:6,11<br>49:4,12,15,24<br>50:9,17,23<br>51:11 52:2,5,6<br>56:13 59:23<br>60:1 | <b>means</b> 20:3<br>27:17,20,22<br>48:18 58:4<br>60:13 64:6<br>83:22<br><b>measure</b> 13:12<br><b>measures</b> 11:10<br><b>mehran</b> 2:7<br><b>mention</b> 6:19<br>52:18 81:11,23<br><b>mentioned</b> 5:23<br>8:4 10:25 12:3<br>12:23 14:23<br>15:7,19 16:16<br>22:16 35:21<br>36:17,20 41:10<br>73:19 77:21<br>79:10 81:14<br>83:6<br><b>mentioning</b><br>78:21 85:13<br><b>mentions</b> 44:5<br><b>method</b> 23:22<br><b>middle</b> 27:1<br>65:22 66:8<br><b>mill</b> 2:14<br><b>mind</b> 27:11<br><b>minutes</b> 46:25<br>49:3,10<br><b>model</b> 33:4,5<br><b>modify</b> 21:9<br><b>mofo.com</b> 2:10<br>2:11,16 90:2<br><b>moment</b> 7:15<br>32:4 53:10 | 63:3<br><b>moments</b> 53:6<br>53:9,10<br><b>mood</b> 18:9<br><b>morning</b> 4:9<br><b>morrison</b> 2:5<br>2:12<br><b>motion</b> 6:2<br>11:14 13:18<br>36:11 37:1,2<br><b>motions</b> 36:14<br><b>motivations</b><br>18:12<br><b>move</b> 14:13,24<br>15:8,13 84:12<br>84:23<br><b>movement</b><br>33:15,17<br><b>movements</b><br>13:12<br><b>moves</b> 82:18,20<br><b>moving</b> 20:17<br>26:19,21 28:7<br>36:18 64:14,15<br><b>multiple</b> 29:2<br>31:22 39:12<br>46:8 60:17<br>87:17 | 33:22 39:24<br>40:2,7<br><b>nature</b> 55:12<br>56:20<br><b>necessarily</b><br>67:14<br><b>necessary</b> 92:6<br><b>need</b> 9:11,12<br>10:8 19:24<br>23:18,25 33:4<br>37:14 41:5<br>52:13 67:16<br>72:8 88:5<br><b>needs</b> 44:2<br>47:23 80:14<br><b>never</b> 82:18,20<br><b>nevertheless</b><br>60:18 81:17<br><b>new</b> 26:12<br><b>nikon</b> 16:13<br>17:17,19,22<br><b>nima</b> 2:20<br><b>nimahefazi</b><br>2:24<br><b>nodding</b> 32:7<br><b>non</b> 47:6,25<br>48:9,14 51:9<br><b>noncentered</b><br>80:24<br><b>normal</b> 18:19<br><b>north</b> 1:19<br><b>notary</b> 89:4<br>92:13,19<br><b>note</b> 90:10 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>n</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>n</b> 3:1 80:2<br><b>name</b> 8:8<br><b>natural</b> 19:12<br>19:23 20:2<br>26:24 27:20<br>28:3,17 32:5                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

[noted - palo]

|                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>noted</b> 92:7</p> <p><b>noticeable</b> 42:3<br/>42:24 43:8,19<br/>44:6,8,9,11,12<br/>44:16,25</p> <p><b>notions</b> 64:1</p> <p><b>number</b> 18:22<br/>22:9 60:24<br/>72:14</p> <p><b>numbers</b> 45:9</p>                                                                                                                                                                                                                          | <p>42:19,25 43:11<br/>43:23 44:3,19<br/>46:15,23 47:8<br/>48:2,5,15,24<br/>49:8 50:1,11<br/>50:25 51:12<br/>52:17 53:12,22<br/>54:10 55:9<br/>56:15,21 57:6<br/>57:17 58:8,14<br/>58:23 59:5<br/>60:12 61:4,10<br/>61:22 62:12<br/>63:13 64:16<br/>66:13 67:6,13<br/>67:23 68:13<br/>70:14,25 71:23<br/>72:5,17 73:7<br/>73:18 74:15<br/>75:2,18 76:9<br/>77:6 78:14<br/>79:4,8,21 80:4<br/>80:4,13 81:9<br/>81:22 82:7,19<br/>83:17 84:14,25<br/>85:10,21 86:11<br/>86:24 87:9,16<br/>88:2,11</p> <p><b>objective</b> 20:21<br/>27:24 28:9</p> <p><b>objectives</b> 29:2</p> <p><b>objects</b> 15:2,10<br/>15:22 33:6</p> <p><b>observed</b> 26:22</p> | <p><b>obtain</b> 51:19</p> <p><b>obviously</b><br/>41:22 50:15</p> <p><b>offer</b> 20:12</p> <p><b>offered</b> 7:12</p> <p><b>office</b> 50:5</p> <p><b>oh</b> 59:14</p> <p><b>okay</b> 6:12 8:18<br/>12:6 18:2,20<br/>20:8 22:7,20<br/>22:23 24:20<br/>25:12,24 28:21<br/>30:13,23 34:24<br/>36:13 40:10<br/>41:11,18 45:3<br/>46:6 47:13,20<br/>48:22 51:17<br/>54:22 57:11,24<br/>59:2,10,15,21<br/>64:21 65:9<br/>67:4 68:20<br/>69:24 71:5<br/>72:13 74:9<br/>76:24,24</p> <p><b>ones</b> 81:3,13</p> <p><b>operation</b><br/>69:16</p> <p><b>opined</b> 19:6</p> <p><b>opinion</b> 20:12<br/>50:12 63:25<br/>67:19 72:2,4<br/>74:18 75:1,3<br/>75:13 76:3,5</p> <p><b>opinions</b> 51:6</p> | <p><b>opposite</b> 69:21</p> <p><b>optical</b> 14:13<br/>14:24 15:5,9<br/>15:12,20 19:20</p> <p><b>optics</b> 14:21,21<br/>16:19</p> <p><b>optimal</b> 78:18<br/>80:19 81:3<br/>82:2</p> <p><b>ordinary</b> 46:4,7<br/>46:11,19 52:2</p> <p><b>orientation</b><br/>12:9,21 13:4<br/>78:19 80:16</p> <p><b>original</b> 26:3<br/>66:7 81:11</p> <p><b>outcome</b> 89:14</p> <p><b>output</b> 42:15<br/>42:18 43:8<br/>44:2,18</p> <p><b>outputted</b> 43:9</p> <p><b>overall</b> 13:9</p> <p><b>overcome</b> 36:9</p> <p><b>own</b> 69:9</p> <p><b>owner</b> 1:8 2:18</p> |
| <b>o</b>                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>p</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <p><b>o</b> 26:4,13</p> <p><b>objection</b> 4:21<br/>4:21 5:14,22<br/>6:8 7:13 8:3,11<br/>9:4,13,19 10:6<br/>10:13,24 11:5<br/>11:12 12:1,10<br/>12:22 13:5,14<br/>14:18 15:18<br/>16:8,15 17:10<br/>18:7 20:4,10<br/>20:19 21:4<br/>22:2 23:10<br/>24:4,11,23<br/>25:8,15 26:8<br/>27:3 28:8,25<br/>29:9,17 30:16<br/>31:2,12,21<br/>32:11 33:2<br/>35:9,20 36:16<br/>37:8,19,23<br/>38:8,23 39:7<br/>39:19 40:4,12<br/>40:16,22 42:16</p> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <p><b>page</b> 2:14 3:9<br/>21:12 42:13<br/>65:15 69:5<br/>72:14 77:22,22<br/>91:4,7,10,13,16<br/>91:19</p> <p><b>paired</b> 57:8</p> <p><b>palo</b> 2:15</p>                                                                                                                                                                                                                                                                                                                                                                                                            |

[paragraph - position]

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>paragraph</b><br/> 73:3,5,9,10<br/> 75:14 76:4<br/> 81:19 86:20,21<br/> 87:14,21 88:10<br/> <b>part</b> 27:10 31:4<br/> 31:9 33:8<br/> 38:13,14 47:4<br/> 77:9 87:10<br/> <b>partes</b> 1:4<br/> <b>particular</b><br/> 13:19 19:25<br/> <b>parties</b> 89:12<br/> <b>parts</b> 15:19<br/> 36:18<br/> <b>pass</b> 88:14<br/> <b>passed</b> 49:10<br/> <b>patent</b> 1:1,8<br/> 2:18 10:16<br/> 12:4 16:5 17:9<br/> 18:22 19:24<br/> 20:11 22:15<br/> 37:12 41:10,17<br/> 41:18,19,22,25<br/> 42:21 43:6<br/> 50:5 54:12<br/> 57:11 58:1,20<br/> 66:22<br/> <b>pays</b> 27:4<br/> <b>pentax</b> 17:17<br/> <b>people</b> 15:2,10<br/> 15:22<br/> <b>perform</b> 6:3<br/> 8:25 9:8 11:13<br/> 17:5</p> | <p><b>performed</b> 11:1<br/> 17:12 25:10,19<br/> 68:4 69:17<br/> 84:3<br/> <b>performing</b> 9:3<br/> <b>performs</b> 19:15<br/> <b>period</b> 30:11<br/> <b>peripheral</b><br/> 26:19<br/> <b>person</b> 78:8<br/> <b>personally</b> 7:21<br/> <b>petitioner</b> 1:5<br/> 2:3 45:25<br/> <b>ph.d.</b> 4:12,14<br/> 6:18 90:5 91:2<br/> 91:24 92:2,4<br/> 92:12<br/> <b>photo</b> 15:2<br/> <b>photograph</b><br/> 15:15,17<br/> <b>photographed</b><br/> 13:24<br/> <b>photographer</b><br/> 18:18<br/> <b>photographic</b><br/> 16:7,12 17:8<br/> 17:11<br/> <b>photography</b><br/> 16:3<br/> <b>phrase</b> 45:19<br/> 45:23 47:3<br/> <b>picture</b> 18:10<br/> <b>pictures</b> 17:19<br/> 84:8</p> | <p><b>pincushion</b><br/> 32:19 42:10<br/> <b>pipeline</b> 31:3,6<br/> 31:23 32:1,1,2<br/> 32:15,15 35:22<br/> 36:5,19,21<br/> 39:22<br/> <b>place</b> 6:1 60:3,9<br/> 60:11 61:1,19<br/> 64:4 72:20<br/> 84:17 87:5<br/> <b>placed</b> 60:16,23<br/> 61:6,9,12<br/> 84:23 86:16<br/> <b>placement</b><br/> 59:18,24 60:5<br/> 60:17,19 61:15<br/> 61:21 63:5,11<br/> 63:18,22,25<br/> 64:2,9,13<br/> 65:11,11 66:18<br/> 66:22 68:5<br/> 71:21 74:5,13<br/> 74:25 76:22,25<br/> 77:18 79:13,15<br/> 79:19 80:11<br/> 83:10<br/> <b>places</b> 75:7<br/> <b>placing</b> 81:7,20<br/> 86:22<br/> <b>plain</b> 46:2<br/> 47:22 48:6,11<br/> 49:4,12,15,24<br/> 50:8,17,23<br/> 51:11 52:1</p> | <p>59:23<br/> <b>play</b> 84:16<br/> <b>playback</b> 47:15<br/> 48:19<br/> <b>playing</b> 47:18<br/> <b>please</b> 50:3<br/> <b>pm</b> 41:13 64:23<br/> 64:23 88:18<br/> <b>point</b> 10:1<br/> 19:17 22:15,25<br/> 28:11 43:12<br/> 44:20 45:7<br/> 65:6 70:5<br/> 72:13 73:5<br/> 85:7,18 86:9<br/> 86:16 87:18<br/> <b>pointed</b> 56:23<br/> 63:21 74:10<br/> 81:20<br/> <b>pointing</b> 68:20<br/> 69:3 70:9,13<br/> 70:15,19 71:7<br/> 72:15 73:15<br/> 75:14 76:5<br/> <b>points</b> 52:6,20<br/> 52:23,25 53:1<br/> 53:16,17<br/> <b>polygon</b> 83:24<br/> <b>portion</b> 26:19<br/> 74:24<br/> <b>posita</b> 44:17<br/> 85:25<br/> <b>position</b> 8:15<br/> 8:16 9:7 19:20<br/> 19:21 38:12</p> |
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[position - reading]

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|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 51:19,20 52:9<br>52:15 54:6,23<br>54:24 55:3,7<br>55:14 56:2,3,8<br>56:11,19 57:8<br>57:19,21 58:2<br>85:20 87:8<br><b>positions</b> 51:21<br>62:15,23<br><b>possible</b> 26:20<br>71:12 72:11,22<br>73:23 77:13<br><b>potentially</b><br>61:15,16<br><b>precise</b> 46:10<br><b>presence</b> 17:2<br><b>previously</b> 3:9<br><b>prime</b> 26:13,13<br>26:13<br><b>prior</b> 8:8 9:1,20<br>9:25 11:17<br>36:24 46:14,21<br>49:16,17,19,21<br>50:6,7 51:13<br>53:4<br><b>probably</b> 7:6<br>88:5<br><b>problem</b> 6:10<br>28:21 35:10,11<br>35:12 36:3,8<br>81:4<br><b>problems</b> 35:18<br><b>proceed</b> 4:3<br>51:3 | <b>proceeding</b><br>45:25<br><b>proceedings</b><br>88:17<br><b>process</b> 25:13<br>29:5,23,25<br>30:25 32:25<br>37:6,17 38:6<br>47:18,19 51:15<br>60:14 61:13,14<br>67:17 72:8,10<br>73:21,22 77:5<br>77:24 78:5,7,8<br>79:10 84:16<br><b>processed</b><br>48:20<br><b>processing</b> 4:17<br>4:23 17:1<br>19:11,15,16<br>33:21<br><b>processor</b><br>19:14 25:20<br>60:18<br><b>product</b> 5:7<br><b>production</b><br>90:15<br><b>products</b> 5:16<br>5:18 6:1 7:16<br>7:16<br><b>professor</b> 6:18<br><b>progress</b> 45:5,6<br>45:13,14,21,22<br>47:14 48:18,18<br>51:22 52:2,5<br>52:10,19 53:14 | 56:12,13 57:13<br>57:15,16 58:4<br>62:16<br><b>project</b> 5:11,12<br>6:19<br><b>projects</b> 6:16<br><b>property</b> 24:18<br><b>propose</b> 45:16<br>45:22 46:1<br><b>provide</b> 9:7<br><b>provided</b> 19:11<br>33:21 50:12<br><b>provides</b> 58:1<br><b>public</b> 89:4<br>92:19<br><b>punching</b> 74:24<br><b>purpose</b> 21:2<br>22:12<br><b>purposes</b> 18:6<br>18:15 32:16<br><b>put</b> 71:6<br><b>putting</b> 49:11<br><b>q</b><br><b>quality</b> 14:22<br>16:19<br><b>quantity</b> 17:2,3<br><b>question</b> 6:5<br>7:25 9:15<br>10:19 11:6<br>12:12 13:7,19<br>14:20 16:11<br>17:13,21 18:9<br>22:4 24:1,7,7<br>27:18 34:13<br>35:3 37:15,25 | 38:17,18,19<br>39:15 41:5<br>42:20 43:3,5<br>46:10,16 47:11<br>47:11 48:4<br>49:4 50:2,18<br>56:17 63:14,16<br>66:9 67:8 68:9<br>78:3,25 85:17<br>86:6 87:20<br><b>questions</b> 41:25<br>64:20 88:13,16<br><b>quinn</b> 2:19<br><b>quinnemanue...</b><br>2:24<br><b>r</b><br><b>r</b> 89:1 91:3,3<br><b>r1</b> 54:24 55:1<br><b>rate</b> 26:18<br>55:13,13<br><b>ratio</b> 78:19<br>81:2<br><b>ratios</b> 80:19<br><b>raw</b> 51:15<br><b>read</b> 11:25 19:9<br>20:11 26:15<br>29:1 34:5<br>41:22 52:12,14<br>53:15 55:21<br>64:11 81:23<br>87:10 90:9<br>92:5<br><b>reading</b> 41:8<br>54:15 |
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|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
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| <p><b>reads</b> 69:6</p> <p><b>ready</b> 24:1</p> <p><b>reality</b> 14:17,20</p> <p><b>really</b> 6:23 7:14<br/>65:21 78:21</p> <p><b>reapplying</b><br/>26:6</p> <p><b>reason</b> 90:11<br/>91:6,9,12,15,18<br/>91:21</p> <p><b>reasonable</b><br/>73:24</p> <p><b>reasons</b> 36:23<br/>37:2 88:12</p> <p><b>recall</b> 6:24 7:3<br/>7:5 8:5,12<br/>65:13</p> <p><b>receipt</b> 90:17</p> <p><b>recited</b> 71:20</p> <p><b>record</b> 19:9<br/>89:9</p> <p><b>rectangle</b> 65:16<br/>65:19,20 66:3<br/>66:7 68:14<br/>69:6 74:4,5<br/>75:6 76:15,18<br/>77:7,11,12,12<br/>77:16 78:12<br/>79:1,3,7,19<br/>80:2,18 81:7<br/>81:21 82:5,18<br/>82:21 83:3,3<br/>84:22 85:9,20<br/>86:10,23 87:25</p> | <p><b>red</b> 76:17 77:1<br/>77:7,12 83:2</p> <p><b>reduce</b> 42:14</p> <p><b>reduces</b> 44:1</p> <p><b>reference</b> 19:4<br/>23:24 49:20</p> <p><b>referenced</b> 90:6</p> <p><b>references</b> 19:6<br/>36:24 50:20</p> <p><b>referred</b> 3:9<br/>17:1</p> <p><b>referring</b> 28:4<br/>29:5 39:9 51:4<br/>51:6 73:8</p> <p><b>refers</b> 23:2</p> <p><b>regard</b> 76:4</p> <p><b>regarding</b> 73:2</p> <p><b>regardless</b> 24:9</p> <p><b>regards</b> 11:9<br/>76:2</p> <p><b>region</b> 25:13,20<br/>25:22,24 26:2<br/>26:11</p> <p><b>register</b> 12:21<br/>13:4</p> <p><b>related</b> 32:9<br/>64:1 89:11</p> <p><b>relates</b> 47:15</p> <p><b>relating</b> 55:10</p> <p><b>relative</b> 25:25<br/>80:19</p> <p><b>released</b> 5:3,8<br/>5:13</p> <p><b>releasing</b> 5:16</p> | <p><b>relevant</b> 6:10<br/>28:22 29:6,10<br/>29:15,18 30:14<br/>36:10,15 37:3</p> <p><b>relied</b> 11:17</p> <p><b>rely</b> 50:20 73:9<br/>73:10</p> <p><b>relying</b> 87:7</p> <p><b>remains</b> 20:17</p> <p><b>remove</b> 31:6<br/>32:17,18</p> <p><b>removing</b><br/>29:25 30:2<br/>31:24 38:10,14<br/>39:23</p> <p><b>repeat</b> 12:11<br/>34:13 37:15<br/>43:5 46:16<br/>50:18 63:14<br/>74:16</p> <p><b>rephrase</b> 42:20<br/>48:4 56:17</p> <p><b>rephrasing</b><br/>47:1</p> <p><b>report</b> 86:20<br/>87:15,21</p> <p><b>reported</b> 1:22</p> <p><b>reporter</b> 89:3</p> <p><b>require</b> 52:14<br/>59:8</p> <p><b>required</b> 55:19<br/>55:20 63:21<br/>92:13</p> <p><b>reserve</b> 21:8</p> | <p><b>resolution</b><br/>16:20</p> <p><b>respect</b> 26:11<br/>32:23</p> <p><b>result</b> 23:13<br/>33:18 79:15<br/>81:14</p> <p><b>resulting</b> 25:21</p> <p><b>results</b> 25:6,10</p> <p><b>return</b> 90:13,16</p> <p><b>review</b> 1:4 90:7</p> <p><b>reviewed</b> 9:1</p> <p><b>right</b> 4:13,17<br/>6:20 11:11<br/>12:18 13:25<br/>14:11,17 15:3<br/>15:17 16:7,14<br/>19:4 20:14<br/>21:1,14 22:9<br/>22:14 23:17<br/>24:3,10 25:7<br/>25:14 26:1,7<br/>27:2,7 28:7,13<br/>28:24 29:16<br/>30:15 32:6,17<br/>34:7,21 37:7<br/>38:7,10 39:1<br/>39:12,14 40:11<br/>41:8 42:15<br/>43:22 44:2,18<br/>45:17 46:3<br/>48:14 56:9,14<br/>56:20 57:5<br/>58:17,19 60:23<br/>61:3 62:4,17</p> |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

[right - single]

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 63:1,8,12,20<br>66:4,23 67:2,5<br>67:12 69:12<br>71:22 72:19<br>73:1,11 75:10<br>75:13 77:8,24<br>78:6 80:12<br>82:6 83:25<br>84:13 85:18,18<br>86:9 87:8,15<br>87:21<br><b>road</b> 2:14<br><b>role</b> 9:2<br><b>rotate</b> 66:11<br><b>rotated</b> 67:15<br>67:20 68:12<br>69:15,19,19<br>70:7 74:6<br><b>rotates</b> 13:2<br>83:19<br><b>rotating</b> 64:13<br>66:4,4 68:17<br>69:8,20<br><b>rotation</b> 13:12<br>53:17 54:25<br>55:14,20 59:7<br>64:9 66:7,23<br>67:10,25 68:3<br>68:4,16,18,21<br>68:23,24,25<br>69:4,7,9,21,23<br>69:25 70:12,24<br>78:2 80:20<br>86:1 | <b>rotational</b><br>51:19,20,21<br>52:9,15 54:3,5<br>54:22 55:3,4<br>57:4,13 58:2,5<br>58:20 62:15,23<br><b>rpr</b> 1:23 89:22<br><b>s</b><br><b>s</b> 80:2 91:3<br><b>sampled</b> 69:9<br><b>satisfied</b> 72:9<br><b>saw</b> 23:21 40:5<br>58:19,24 59:20<br>69:12<br><b>saying</b> 33:16<br>39:13 58:16<br>74:11,19,23<br>75:8,8,19<br><b>says</b> 19:22<br>23:22 33:21<br>34:6 35:15<br>42:2 45:12<br>56:2,22 57:7<br>59:12,16 63:4<br>71:16<br><b>scenarios</b> 47:17<br><b>school</b> 7:10<br><b>scope</b> 49:6,25<br>50:9,24 51:10<br>59:3 63:19<br><b>screen</b> 78:13<br><b>search</b> 76:20<br><b>second</b> 25:7<br>74:7 | <b>see</b> 9:21 11:16<br>15:11,20 18:1<br>18:24 19:2,25<br>21:13,15 23:19<br>23:22 34:5,19<br>41:9 42:1,7,8<br>45:4,12,15<br>51:24 53:2,23<br>56:1,6 58:9,13<br>58:16 59:11<br>63:4 64:8<br>65:16,22 66:1<br>66:21 69:11<br>71:16 72:19,25<br>75:5,21 76:12<br>77:16 78:6<br>80:8<br><b>seeing</b> 14:14<br><b>seeking</b> 36:8<br><b>sell</b> 21:18,20<br><b>sense</b> 43:18<br>47:10 84:15<br><b>sensor</b> 11:14<br>14:21,22 16:20<br>70:17 71:12<br>74:20 78:18<br>79:12<br><b>sensors</b> 8:15,16<br><b>sent</b> 90:14<br><b>sentence</b> 34:2,5<br>44:4 46:9<br>47:14,16 48:17<br>56:23<br><b>separately</b> 30:7 | <b>set</b> 18:4 61:19<br>89:7,16<br><b>setting</b> 5:24,24<br><b>shake</b> 19:13<br>20:21 25:18,19<br>25:21,22 29:22<br>30:22 33:19,23<br>33:25 34:3,12<br>34:23 35:1,6<br>35:16 38:2,11<br>39:1,13 41:2<br><b>shaking</b> 29:11<br>29:19 30:5<br>32:14,18<br><b>shape</b> 76:16<br><b>sheet</b> 90:11<br><b>shooting</b> 18:3<br><b>short</b> 41:12<br>64:19<br><b>shorthand</b> 89:3<br><b>show</b> 66:6<br><b>shown</b> 33:12<br>66:8 82:4<br><b>shows</b> 31:3<br>65:15<br><b>side</b> 27:13,14<br>28:13,14<br><b>sign</b> 90:12<br><b>signature</b> 89:21<br><b>signed</b> 90:19<br><b>simple</b> 39:15<br><b>simpler</b> 24:7<br>43:25<br><b>single</b> 8:9 37:5<br>37:16 38:20 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

[single - system]

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>39:16 82:17<br/>85:7,7<br/><b>sitting</b> 20:1<br/>85:17 86:9<br/><b>six</b> 46:25<br/><b>size</b> 61:23 62:2<br/>70:19,21,23<br/>71:2,6,8,13,18<br/>71:20,24 72:3<br/>72:4,9,15,22<br/>73:4,16,22,23<br/>74:10,11,13,19<br/>74:22 75:3,5,9<br/>75:10,15,16,20<br/>75:22,23 76:7<br/>76:11,12,13,14<br/>76:19,20 77:1<br/>77:13,18 83:10<br/>84:9 86:1,18<br/>87:4<br/><b>sizes</b> 77:15<br/><b>skilled</b> 78:8<br/>86:15 88:6<br/><b>solution</b> 81:5<br/>83:7<br/><b>solutions</b> 90:23<br/><b>solves</b> 35:10<br/><b>solving</b> 35:11<br/><b>somebody</b><br/>86:14 88:6<br/><b>sorry</b> 8:14<br/>12:11 16:24<br/>17:21 34:13<br/>35:2 45:11<br/>58:16 59:13,14</p> | <p>59:22 65:19<br/>66:8 69:14<br/>71:15 72:23<br/>74:16<br/><b>sort</b> 39:5<br/><b>sounds</b> 14:11<br/><b>south</b> 2:21<br/><b>speak</b> 6:20<br/><b>specific</b> 7:15<br/>8:5 9:6 13:7<br/>18:15 31:25<br/>32:20 36:21<br/>49:15<br/><b>specification</b><br/>22:25 23:2,19<br/>23:21 41:1<br/>43:13<br/><b>specifications</b><br/>13:16<br/><b>spelled</b> 78:21<br/><b>square</b> 65:18<br/>65:19<br/><b>stances</b> 6:3<br/><b>stand</b> 62:20<br/><b>start</b> 14:14<br/>36:2 71:16<br/><b>starting</b> 42:2<br/><b>starts</b> 32:12<br/><b>state</b> 45:24<br/>89:4<br/><b>stated</b> 23:1<br/>43:13<br/><b>statement</b><br/>24:24 86:5</p> | <p><b>states</b> 80:15<br/><b>stenographer</b><br/>4:3 82:10<br/><b>stenographic...</b><br/>1:22<br/><b>step</b> 6:14 25:12<br/>29:23,25 30:15<br/>33:3,3 35:23<br/>54:18 69:22,24<br/>74:2,4,7,9 75:4<br/>75:8,15,17<br/>76:19 77:4,5<br/>77:24,24 78:20<br/>79:12<br/><b>steps</b> 32:20<br/>35:23,24,25<br/>36:1,4,22 70:1<br/>73:20 75:11<br/><b>sticking</b> 44:15<br/><b>street</b> 2:21<br/><b>stretched</b> 14:10<br/><b>strike</b> 11:22<br/>12:16 15:25<br/>16:3,10 22:12<br/>27:18 29:14<br/>34:4,15 35:4<br/>46:18 48:10<br/>49:17,20 52:13<br/>54:4 60:6,25<br/>64:18 76:3<br/>79:1<br/><b>student</b> 6:18<br/><b>subject</b> 15:23<br/>18:9 20:6<br/>27:22 41:19</p> | <p><b>subjective</b><br/>27:10<br/><b>subscribed</b><br/>92:14<br/><b>substance</b> 65:5<br/><b>suggest</b> 64:12<br/><b>suggested</b> 52:7<br/><b>suite</b> 1:19<br/><b>sullivan</b> 2:19<br/><b>super</b> 23:3,3<br/><b>supposed</b> 49:3<br/><b>sure</b> 7:20 19:10<br/>20:16 21:23<br/>23:24 37:11,24<br/>41:9 47:20<br/>57:2 68:9<br/><b>sworn</b> 4:2,6<br/>89:8 92:14<br/><b>symmetric</b><br/>19:17 26:10<br/>27:24<br/><b>symmetrical</b><br/>26:7 27:5<br/><b>symmetrically</b><br/>27:1<br/><b>symmetry</b> 21:7<br/>28:12<br/><b>synchronized</b><br/>54:6<br/><b>synchronizing</b><br/>58:5,10,20<br/><b>system</b> 5:20 6:7<br/>19:20 36:1<br/>47:16 60:8<br/>61:1,18 62:8</p> |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                             |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 66:10,14 68:11<br><b>systems</b> 10:4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <b>teaching</b> 29:3<br>31:4 33:8<br>56:18 85:8                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>thomason</b><br>50:20 51:7,7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>tried</b> 10:16<br>16:13                                                                                                                                                                                                                                                                                                                                 |
| <b>t</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>teachings</b> 32:2<br>39:25                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>time</b> 6:21 7:3,4<br>7:11 16:4 17:9<br>26:20 52:6,20<br>52:23,25 53:9<br>53:10,16,17<br>54:19,23 55:2<br>55:12,15,16,16<br>71:13 81:3<br>83:25 90:18                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <b>tries</b> 30:6<br><b>trivial</b> 33:4<br><b>trouble</b> 23:6<br>77:2                                                                                                                                                                                                                                                                                     |
| <b>t</b> 80:2 89:1,1<br>91:3,3<br><b>take</b> 6:14 16:2<br>20:15 21:11<br>22:6 23:25<br>30:12,13 40:23<br>41:11 54:18<br>62:6 63:2<br>64:19 65:14<br>71:15 85:20<br><b>taken</b> 41:12<br>62:25 64:22<br><b>takes</b> 55:15<br><b>talk</b> 13:16<br>71:24<br><b>talked</b> 32:4<br>34:16<br><b>talking</b> 16:21<br>26:23,24 27:23<br>30:3 56:8 57:3<br>62:3 65:9<br>79:18<br><b>talks</b> 23:3<br>24:12 39:20<br>52:8 53:4,5<br>57:11 64:9<br><b>teaches</b> 31:7,15<br>31:22,23,24,25<br>32:15,17 42:21<br>81:7 85:19<br>86:10,22 | <b>technology</b><br>11:16<br><b>tell</b> 18:17 33:17<br>34:2,24 44:21<br>75:9 82:11,15<br><b>tells</b> 35:11<br>87:11<br><b>term</b> 5:10<br>19:25 20:2,5<br>27:22 45:17,18<br>46:7,12,20<br>51:14 52:5<br><b>terms</b> 46:1<br>49:15<br><b>testified</b> 4:6<br><b>testimony</b> 65:6<br>89:9,9 90:9,17<br>92:8<br><b>thank</b> 4:9,11<br>22:20 41:11<br>65:1,4 88:13<br><b>thanks</b> 43:4<br><b>thing</b> 34:1<br>60:23<br><b>things</b> 18:10<br>21:19,21 51:1<br>67:4<br><b>think</b> 73:25<br><b>thinking</b> 49:2 | <b>thomason</b><br>50:20 51:7,7<br><b>time</b> 6:21 7:3,4<br>7:11 16:4 17:9<br>26:20 52:6,20<br>52:23,25 53:9<br>53:10,16,17<br>54:19,23 55:2<br>55:12,15,16,16<br>71:13 81:3<br>83:25 90:18<br><b>timeframe</b> 90:8<br><b>times</b> 7:7 55:20<br>55:21 87:18,22<br><b>today</b> 65:6<br><b>together</b> 8:22<br>49:12<br><b>tolerances</b><br>54:14<br><b>took</b> 17:19<br>51:18<br><b>top</b> 22:8<br><b>toward</b> 15:9<br><b>track</b> 45:9<br><b>transcript</b> 89:8<br>90:6,19 92:5,8<br><b>transfer</b> 80:17<br><b>transformation</b><br>19:16<br><b>transformed</b><br>68:16 69:6<br><b>trees</b> 15:22<br><b>trial</b> 1:1<br><b>trick</b> 43:3 49:3 | <b>true</b> 11:3 89:9<br>92:8<br><b>try</b> 23:4 47:1<br>74:4 77:15<br><b>trying</b> 10:20<br>16:2 34:17<br>63:16 75:25<br><b>turn</b> 42:1 45:3<br>59:10<br><b>two</b> 8:25 30:3,6<br>30:18 31:4<br>34:16 39:21<br>53:20 55:5<br>67:4 73:20<br>75:10 80:19<br>81:2 82:1<br><b>type</b> 4:24 17:15<br>33:25 38:25<br>39:8,11<br><b>types</b> 34:16<br>39:21 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>u</b>                                                                                                                                                                                                                                                                                                                                                    |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>u.s.</b> 1:3 2:3<br>18:22<br><b>uh</b> 55:25 62:19<br>63:9<br><b>ultimately</b> 5:8<br>5:12                                                                                                                                                                                                                                                              |

[unavoidable - vision]

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>unavoidable</b><br/>16:17,18,20<br/><b>under</b> 31:14<br/>49:23 50:8,22<br/>51:11 87:1<br/><b>understand</b><br/>4:12,16 5:10<br/>16:4 35:2<br/>37:24 46:6<br/>47:21 52:1<br/>59:22,23 60:7<br/>74:18 83:11,13<br/>84:1 85:6,25<br/>86:5<br/><b>understanding</b><br/>10:3 11:20,24<br/>20:2,8 23:8<br/>27:16,19 44:16<br/>47:21,22 49:24<br/>50:8,23 51:11<br/>77:2<br/><b>understood</b><br/>87:3,23 88:5,6<br/><b>undertaking</b><br/>51:2<br/><b>undesirable</b><br/>17:5 30:19,21<br/><b>undo</b> 69:21<br/><b>unfamiliar</b><br/>13:23<br/><b>university</b> 5:15<br/>5:24<br/><b>unnatural</b><br/>26:21 27:10,17<br/>27:20 28:3,16</p> | <p>28:18<br/><b>urquhardt</b> 2:19<br/><b>usable</b> 73:23<br/><b>use</b> 10:4 16:7<br/>16:13 17:3,5,8<br/>17:11,25 18:2<br/>18:5,18 22:1<br/>36:3,4 45:19<br/>53:13 57:12<br/>71:11 72:6,11<br/>74:1 84:5<br/><b>used</b> 6:25 7:7<br/>8:22 9:22 14:1<br/>17:15,17,17<br/>21:22 27:20<br/>32:1 85:2<br/>90:19<br/><b>useful</b> 32:16<br/>70:6 71:10<br/>77:9<br/><b>user</b> 42:23 43:9<br/>43:10,19,22<br/><b>uses</b> 11:21 12:7<br/>13:10 84:5<br/><b>using</b> 6:2 7:4,5<br/>7:9 10:11<br/>13:24 15:15<br/>16:21 18:12<br/>23:16 24:2<br/>28:3<br/><b>utilized</b> 9:8<br/>68:6 72:23<br/><b>utilizing</b> 68:2</p> | <p><b>v</b><br/><b>v</b> 90:4 91:1<br/>92:1<br/><b>vague</b> 4:21<br/>13:18 20:5<br/><b>vaguely</b> 54:12<br/><b>valuable</b> 35:25<br/><b>value</b> 54:2<br/><b>various</b> 6:3<br/>18:12 20:6<br/>85:24<br/><b>vary</b> 14:22<br/><b>verify</b> 90:9<br/><b>veritext</b> 1:18<br/>90:14,23<br/><b>veritext.com</b><br/>90:15<br/><b>video</b> 4:17<br/>10:11,20 13:13<br/>47:6,7,24,25<br/>48:8,9,13,14,20<br/>49:6,19,22<br/>50:7,21 51:8,9<br/>51:20 52:16<br/>54:2 56:4,10<br/>56:14 57:8<br/>58:7,21<br/><b>view</b> 44:10<br/>46:13,21 48:7<br/>48:12 49:5<br/>50:16 60:2,3,3<br/>63:6,8 64:3<br/>71:10,11 73:24<br/>76:17 77:8</p> | <p><b>viewable</b> 45:5<br/>45:13,21 47:4<br/>47:5,6,24 48:8<br/>48:13,17 49:19<br/>49:23 50:7,22<br/>51:9<br/><b>viewed</b> 44:25<br/>44:25<br/><b>viewing</b> 57:14<br/>59:10,17,18,24<br/>60:5,9,16,19<br/>62:11 63:5,7<br/>63:20 64:5,6<br/>64:10,13 65:10<br/>66:10,11,14,18<br/>66:23 67:2,10<br/>67:12,15,20,21<br/>67:25 68:3,4,7<br/>68:11,21 69:1<br/>69:14,23,25<br/>70:5,16,20<br/>71:17,22 72:15<br/>72:23 73:4<br/>74:21,22,25<br/>75:23 77:18<br/>78:16 81:14<br/>82:21 83:15<br/>84:9,12 85:3<br/>85:14,23 86:3<br/>86:13,15<br/><b>visible</b> 72:22<br/><b>vision</b> 1:3 2:3<br/>4:23 90:4 91:1<br/>92:1</p> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

[visual - witness]

|                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>visual</b> 42:3,5,24<br>44:7 45:4,12<br>45:20 46:13,21<br>47:3,4 60:2<br>63:6 64:3<br>72:11 73:24<br>74:22 77:7<br>86:16<br><b>visually</b> 72:21<br>73:20<br><b>voss</b> 50:20<br>65:14 68:10,15<br>69:4,5 70:4,8<br>72:14,18 74:19<br>77:20,21 78:11<br>78:16,24 79:1<br>79:2,6,10<br>80:15 84:22<br>85:2,2,8,15,19<br>85:22 86:2,8<br>86:13,22<br><b>voss's</b> 88:4<br><b>vs</b> 1:6 | <b>watanabe</b> 19:4<br>20:9,14 21:11<br>21:13 24:1,8<br>24:12,20 25:4<br>26:5,23 27:4<br>27:20,21 28:11<br>28:17,21 29:1<br>30:6,17 31:3<br>31:13,14,17,22<br>32:12 33:8,18<br>34:10,17,25<br>35:8,10,12,15<br>35:19 36:7,14<br>36:18,23,25<br>37:3,5,13,16<br>38:5,9,13,20<br>39:16,20,23,25<br>40:10,18<br><b>watanabe's</b><br>22:11 23:15<br>25:13 30:25<br>32:4 36:10<br>38:11 39:4 | 22:24 23:3,11<br>23:13,16 24:2<br><b>widely</b> 14:22<br><b>wilshire</b> 2:8<br><b>window</b> 57:15<br>59:10,17,18,24<br>60:3,5,9,16,20<br>61:6,8,12,19,23<br>62:11,21 63:5<br>63:8,20 64:5,6<br>64:10,14 65:11<br>66:10,12,15,18<br>66:23 67:2,11<br>67:12,15,20,22<br>68:1,4,5,7,11<br>68:21 69:1,14<br>69:23,25 70:5<br>70:16,20 71:17<br>71:22 72:16,22<br>72:23 73:4<br>74:22,25 75:23<br>77:1,18 78:16<br>79:14,15 81:14<br>82:9,22 83:15<br>84:10,12,18<br>85:3,14,23<br>86:3,13,15<br>87:5<br><b>wish</b> 70:17<br><b>witness</b> 3:3 4:1<br>4:5,22 5:15,23<br>6:9 7:14 8:4,12<br>9:5,14,20 10:7<br>10:14,25 11:6<br>11:13 12:2,11 | 12:23 13:6,15<br>14:19 15:19<br>16:16 17:12<br>18:8 19:2 20:5<br>20:11,20 21:5<br>22:3 23:11<br>24:12,24 25:9<br>26:9 27:4 28:9<br>29:1,10,18<br>30:17 31:3,13<br>31:22 32:7,12<br>33:3 35:10,21<br>36:17 37:9,20<br>37:24 38:9,24<br>39:8,20 40:5<br>40:17,25 43:12<br>44:4,20 46:16<br>48:16 50:2,12<br>51:1,13 52:18<br>53:13,23 54:11<br>55:10 56:22<br>57:7,18 58:9<br>58:24 59:6<br>60:13 61:5,11<br>61:23 62:4,13<br>63:14 66:14<br>67:14,24 68:14<br>70:15 71:1,24<br>72:6,18 73:8<br>73:19 74:16<br>75:3,19 76:10<br>77:7 78:15<br>79:9,22 80:5<br>80:14 81:10,23<br>82:8,11,20 |
| <b>w</b>                                                                                                                                                                                                                                                                                                                                                                                    | <b>way</b> 7:17 27:9<br>53:15,21 62:21<br>73:6,24 89:13<br><b>ways</b> 68:1<br><b>welcome</b> 65:3<br><b>went</b> 27:25<br>39:22 69:13<br>78:1<br><b>whereof</b> 89:16<br><b>wide</b> 14:2,3<br>16:17 17:25<br>18:2,5,11,12,19                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>want</b> 23:22<br>28:13 31:5,5<br>35:13,14 37:12<br>41:24 42:12<br>59:21 71:9,11<br>72:10 73:23<br>74:1 75:4,8,15<br>75:20 76:7,11<br>76:14,16 77:11<br><b>wants</b> 21:8<br>27:12                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

**[witness - zoom]**

|                                                                                                                                              |                                                                                                                                             |
|----------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| 84:15 85:1,11<br>85:22 86:12,25<br>87:10,17 88:3<br>88:12,14 89:6<br>89:10,16 90:8<br>90:10,12,18                                            | 60:13 61:11,14<br>62:2,6 63:2<br>64:11 65:24<br>66:8,10,20<br>68:14 71:24<br>73:14 74:18,21<br>75:10 76:10<br>78:23 83:12<br>86:12,25 87:22 |
| <b>wondering</b><br>34:14 47:2<br>51:3 53:8                                                                                                  | <b>year</b> 8:5<br><b>years</b> 6:17,18<br>7:6,8 21:24<br><b>yli</b> 2:16 90:2<br><b>yuan</b> 2:6<br><b>yue</b> 2:13 90:1                   |
| <b>word</b> 27:17<br>28:3 45:19<br>53:13 58:9<br>60:4,7 83:21<br><b>work</b> 4:22,23<br>5:17 6:9,13,15<br>8:14,17                            | <b>z</b>                                                                                                                                    |
| <b>worked</b> 4:19<br>5:2,4,7,10,11<br>6:6<br><b>working</b> 4:17<br>8:15<br><b>world</b> 14:17,20                                           | <b>zoom</b> 2:6,7<br>18:19                                                                                                                  |
| <b>x</b>                                                                                                                                     |                                                                                                                                             |
| <b>x</b> 3:1 26:4,13                                                                                                                         |                                                                                                                                             |
| <b>y</b>                                                                                                                                     |                                                                                                                                             |
| <b>y</b> 26:4,13<br><b>yaw</b> 13:2<br><b>yeah</b> 14:6<br>16:25 17:22<br>27:4 31:25<br>32:12 34:14<br>38:5 39:20<br>41:8 44:21<br>57:7 59:6 |                                                                                                                                             |