

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ALIGN TECHNOLOGY, INC,
Petitioner,

v.

DENTAL MONITORING SAS.
Patent Owner.

IPR2023-01369
Patent 10,755,409 B2

Record of Oral Hearing
Held: December 3, 2024

Before JEAN R. HOMERE, MICHAEL R. ZECHER, and
KARA L. SZPONDOWSKI, *Administrative Patent Judges*.

IPR2023-01369
Patent10,755,409 B2

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The above-entitled matter came on for hearing on Tuesday, December 3, 2024, commencing at 1:00 p.m., via video teleconference.

P R O C E E D I N G S

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JUDGE HOMERE: Good afternoon. We are convened for oral arguments in IPR2023-01369 which challenges the patentability of Claims 1 through 15 of U.S. Patent Number 10,755,409 B2. Petitioner is Align Technology, Inc. Patent Owner is Dental Monitoring SAS. I am Judge Homere, also appearing are Judge Zecher and Judge Szpondowski. Let us get started with appearances of the representatives who will be arguing today for both parties. If anyone else is attending remotely with you today but will not be speaking please identify them as well. For example, please state if your client is attending. We'll start with appearances for Petitioner.

MR. ARGENTI: Good afternoon, Your Honors. My name is Matt Argenti on behalf of Petitioner Align Technology. Also attending today I believe via the public line are my co-counsel Mike Rosato and Patrick Medley, as well as client representatives including Arthur Shea and Dennis Chang.

JUDGE HOMERE: Thank you. Now, Patent Owner.

MS. JACOBSEN: Thank you, Your Honor. This is Charlotte Jacobsen from Gibson Dunn on behalf of Patent Owner Dental Monitoring. And joining me today is my colleague Andrew Blythe who will be arguing on behalf of Dental Monitoring under the LEAP program. And joining on the line are client representatives from Dental Monitoring.

JUDGE HOMERE: Thank you. Before we begin, we'll remind the parties that guidance for this hearing was provided in an oral hearing order of October 24th, 2024, Paper number 33. As set forth in October 24th Oral Hearing Order, each side has been given up to 60 minutes total time for

1 oral arguments.

2 Because we granted Patent Owner's request for Mr. Andrew Blythe
3 to participate in the oral hearing as a LEAP practitioner, Patent Owner has
4 an additional 15 minutes of argument time. Patent Owner is reminded that
5 the LEAP practitioner is required to have a meaningful and substantive
6 opportunity to argue.

7 Petitioner will proceed first to present its case as to the challenged
8 claims of the challenged patent. Petitioner may reserve time for rebuttal.
9 Thereafter, Patent Owner will argue its opposition to Petitioner's case.
10 Patent Owner may also reserve time for sur-rebuttal. Absent special
11 circumstances, Petitioner may reserve no more than half its time for rebuttal,
12 and Patent Owner may reserve no more than half its time for sur-rebuttal.

13 We remind the parties that Petitioner has the ultimate burden of
14 establishing unpatentability by preponderance of the evidence. Additionally,
15 we provide the following reminders. First, recordings of any kind during
16 PTAB hearings are strictly prohibited. The court reporter will provide in
17 due course a full transcript of the hearing that will become part of the record
18 in the proceeding. To ensure that the transcript of this hearing is clear, we
19 ask you to identify yourselves before speaking, to speak directly into the
20 microphone, and to identify slide numbers, numbering, figures, and any
21 other pertinent identifying information when referring to demonstratives.
22 Please also pause a few seconds after identifying it to provide us time to find
23 it.

24 Please mute yourself when not speaking. If at any time during the
25 proceeding, you encounter any technical or audio difficulties that you feel
26 fundamentally undermines your ability to adequately represent the client, let

1 us know immediately, for example, by contacting the team members who
2 provided you with connection information. Second, we have reviewed the
3 entire record, including demonstratives, and we are prepared today with
4 questions. These questions and their answers will help us decide the issues
5 in the case. In the interest of fairness and due process, we limit our
6 consideration to the arguments and evidence already presented in the record.

7 Please note that we are paying close attention to your arguments
8 and carefully considering the case. And if we interrupt you, I apologize in
9 advance. We do so to be able to ask you questions that may be essential to a
10 resolution of the issues or keep the hearing on track with time.

11 Third, please make it clear which challenge and claims you are
12 addressing at all times. We ask that the parties hold any objections
13 regarding the parties' arguments until it is their time to speak. I will
14 maintain a clock and endeavor each party time warning as you near the end
15 of your allotted opening arguments and near the end of any reserved rebuttal
16 time. But it would be helpful for the party to also track their time.

17 Finally, please be aware that members of the public may be
18 listening to this oral hearing. So, following the hearing, please confirm with
19 the court reporter to ensure that there are no questions regarding the spelling
20 of names or terms. Are there any questions?

21 MR. ARGENTI: No, Your Honor.

22 MS. JACOBSEN: No, Your Honor. Thank you.

23 JUDGE HOMERE: Great. Petitioner, do you wish to reserve any
24 rebuttal time?

25 MR. ARGENTI: Yes, Your Honor, I'd like to reserve 10 minutes
26 for rebuttal.

1 JUDGE HOMERE: Very good. So, you have 50 minutes to
2 present your opening arguments. You can start at any time whenever you're
3 ready. So, it's now 1:07.

4 MR. ARGENTI: Thank you, Your Honor. Again, my name is
5 Matt Argenti on behalf of Petitioner Align Technology. Just one minor
6 preliminary matter before we get started. I was unfortunately having some
7 trouble connecting to this hearing. I got assistance from people on both your
8 end and my end. It looks like it's been resolved. But I'm also connected on
9 my cell phone at the advice of your tech support. So, hopefully it'll be
10 seamless. Hopefully, nothing happens at all. But if my video does cut out, I
11 should be able to jump right on via the audio, just to give everybody a little
12 bit of advance warning about that.

13 JUDGE HOMERE: Thank you for that.

14 MR. ARGENTI: So, with that I'll get into my presentation today.
15 I'm going to be referring to our demonstrative exhibits, which have been
16 filed as Exhibit 1051. My plan is to just refer to the copy that I have here on
17 my desk and let everybody refer to their own copies as they go through,
18 rather than put it on the screen.

19 So, turning to slide 2 of our demonstratives, we see the instituted
20 ground of challenge in this IPR. As I will explain, Patent Owner's own PCT
21 application discloses most of the subject matter claimed in the '409 patent.
22 And that's the Salah reference. There's no dispute that Patent Owner's Salah
23 application is prior art here. Like the '409 patent, Salah discloses capturing a
24 dental image using a computing device such as a mobile phone. Salah also
25 discloses analyzing the image to provide feedback to the user to help align
26 the camera to the mouth and to tell the user whether it's necessary to take

1 another photograph. To the extent the details of the claims of the '409 patent
2 go beyond what Salah describes, such as using deep learning for feedback
3 and comparing an attribute of an image to a set point, those effects would
4 have been obvious in view of other prior art, specifically Carrier, which is an
5 Align patent application, and the Maninis Paper.

6 Turning to slide 3, the '409 patent states that it is directed to a
7 method for requiring an image of a dental arch of a patient. But as to the
8 acquisition itself, the '409 patent basically just says, you use an image
9 acquisition apparatus, which is something like a camera. Then the '409
10 patent describes the analysis that takes place to determine whether the image
11 is acceptable. As we see on this slide, the '409 patent is directed to using
12 what it calls a deep learning device for that analysis. What is a deep
13 learning device? The '409 patent says it's preferably a neural network. And
14 the patent admits that neural networks were well known to POSAs. It even
15 lists many example neural networks known in the art, such as VGG Net and
16 Faster R-CNN. Those are some of the same neural networks used in the
17 prior art of record in this case. And we see at the bottom of the example
18 neural networks on the right of the slide that the '409 patent says that that list
19 isn't limiting. It's not about using a particular deep learning device in this
20 patent. Any known image classification neural network will do.

21 Now, if we turn to slide 4, consistent with that disclosure, we see
22 that Claim 1 broadly recites acquiring an image of a dental arch using an
23 image acquisition apparatus. That's at Step a). Then the next step is analysis
24 by means of a deep learning device trained by means of a learning base. No
25 details of that analysis are recited, just that in Step c, there is a subsequent
26 determination as a function of the deep learning analysis of a value for an

1 image attribute. In Step d, that image attribute is compared against the set
2 point, which results in sending an information message related to things like
3 image quality, position of the camera relative to the arch, or the opening of
4 the mouth. And then in the last step, it says that if the image doesn't respect
5 the set point, it guides the operator to take another image. So, what's really
6 happening in the claim is using something like a neural network to compare
7 the image against a target set point and give the user feedback based on that
8 comparison. But that was not inventive at the time.

9 Turning to slide 5 --

10 JUDGE ZECHER: Mr. Argenti, this is Judge Zecher. Sorry about
11 that. Quick question about Claim 1. Does the deep learning device need to
12 be part of the image acquisition apparatus?

13 MR. ARGENTI: No, it doesn't. You see that those are separately
14 recited elements, and there's no requirement that it be part of the image
15 acquisition apparatus.

16 JUDGE ZECHER: All right. Thank you.

17 MR. ARGENTI: Turning to slide 5, we see the claim
18 constructions from the Petition. We propose three construction for the terms
19 image attribute, tooth attribute, and analysis of the analysis image by means
20 of a deep learning device trained by means of a learning base. None of those
21 constructions are disputed.

22 So, if we're turning to slide 6, you see Patent Owner's claim
23 constructions. They had no response to our proposed constructions, but they
24 did propose three constructions of their own, but none of those constructions
25 affect the ground of the challenge. As we've explained in our reply, the
26 position that a deep learning device is software rather than a hardware

1 device such as in running an algorithm, that doesn't impact the obviousness
2 combination. Software runs on hardware. That's just the basic reality of
3 computing. The construction of real time as occurring while the image
4 process is underway is consistent with our obviousness theory for Claim 14,
5 where that term shows up. And their construction for tooth shape parameter
6 isn't relevant to any dispute because they have no arguments specific to
7 Claim 4 where that term appears. So, at the end of the day, none of the
8 disputed issues in this IPR turn on claim construction.

9 Turning to slide 7 and the prior art combination. As I mentioned,
10 the Salah reference is an earlier patent application from the same inventors
11 as the '409 patent with one additional inventor listed. A lot of Salah is
12 directed to analyzing an image after it's captured by a camera. It talks about
13 comparing that image to a three dimensional model of the teeth to track
14 treatment progress. But Salah also talks about how that image can be
15 captured. It uses some of the same terminology as the '409 patent, like
16 referring to an image acquisition apparatus that can be a mobile phone with a
17 camera. And it says feedback can be provided to guide image capture. It
18 can give visual prompts on the screen. It can give a line on the screen to
19 align with the teeth or an outline to position the mouth in. And it says, after
20 giving those visual prompts, it can also tell the user whether the photo is
21 acceptable or if it's necessary to take another photo, just like in the '409
22 patent. And then after the image is acquired, Salah describes a number of
23 ways to determine the edges of the teeth to make that comparison to the 3D
24 model, including using deep learning.

25 So if we turn to slide 8 --

26 JUDGE HOMERE: Counselor, this is Judge Homere. Is this your

1 position that Salah's alignment of the teeth to alignment technique disclosed,
2 is it your position that is to come up to performing an analysis of the image?
3 The acquired image?

4 MR. ARGENTI: In terms of the mapping to the claims, yes, I
5 would say that the recognition in some ways, Salah doesn't give a lot of
6 detail, which is where Carrier comes in, but the ability to give feedback
7 regarding the image is an analysis of the image.

8 JUDGE HOMERE: Okay. Now, is that something that happens in
9 real time as the image is captured or?

10 MR. ARGENTI: Yes, Salah discloses real-time feedback as does
11 Carrier.

12 JUDGE HOMERE: Thank you.

13 MR. ARGENTI: So, on slide 8, while Salah says that the image
14 acquisition apparatus can use lines or shapes on the screen to align the
15 camera with the user's mouth and give feedback regarding that alignment,
16 and then whether the image is acceptable or another needs to be required. It
17 doesn't give much detail, as I mentioned, about how that is accomplished,
18 but Carrier does. Like Salah, Carrier is also directed to capturing dental
19 images with a device such as a cell phone. Carrier describes using an
20 overlay on the screen to line up the camera with the teeth, and it says you
21 can use software to determine whether they are lined up within an acceptable
22 threshold. For example, are 90 percent of the teeth lined up within one
23 millimeter of the overlay. Carrier says that can be accomplished by any
24 appropriate technique, including edge detection image processing, which is
25 what we just saw Salah uses after an image is captured. Carrier also
26 separately explains that image quality can be evaluated after image capture.

1 One such evaluation is using image recognition algorithms to ensure that all
2 required teeth are visible.

3 Turning to slide 9, as to deep learning, while Salah talks about
4 using deep learning for its post-capture analysis, it would have been obvious
5 to use deep learning for image capture as well. When Carrier says to use
6 any appropriate technique, that would include (INDISCERNIBLE) analysis
7 by means of a neural network. As the '409 patent admits, use of deep
8 learning neural networks for image analysis was well-known by 2017. And
9 this is exemplified by Maninis.

10 Maninis describes an approach that it refers to as convolutional-
11 oriented boundaries, which is not itself a neural network, but rather a
12 modular technique that can be applied to a variety of neural networks to
13 improve their image processing results. Maninis explains that COB provides
14 state-of-the-art contours, which are the edges of an object in an image. It
15 also talks about coupling COB with well-known pipelines, showing that
16 injecting COB boundary detection leads to improved semantic segmentation,
17 which refers to classifying what an object is.

18 We turn to slide 10, as we see here on this slide, Maninis shows
19 that applying its deep learning COB technique improves results for both
20 boundary detection and object classification. The figures here provide
21 examples of those two types of analysis. First, in Figure 10, on the left of
22 the slide, Maninis illustrates object boundary detection. The first row in
23 Figure 10 has the original image. The second row, going down, shows
24 detection of the boundaries in the image. Those are the edges. And the third
25 row shows isolation of the boundaries corresponding to objects that fall into
26 certain classes of the learning base. You can see that the background

1 boundaries of objects outside those classes have been removed. As, for
2 example, if you look at the sheep on the far right of Figure 10, you can see
3 that the background lines have been removed in the last row, and only the
4 sheep remain. Maninis explains that this can be accomplished in a fraction
5 of the computational time as previous approaches.

6 Now, looking at Figure 16, on the right, Maninis shows how COB
7 improves object classification. The middle row in Figure 16 shows object
8 classification results obtained using the dilated convolution network. The
9 bottom row shows those results combined with the COB boundary
10 determinations, which leads to refined results. By combining classification
11 results with COB boundary determinations, Maninis says that results are
12 improved in all cases.

13 So, if we turn to slide 11.

14 JUDGE HOMERE: Counselor?

15 MR. ARGENTI: Yes.

16 JUDGE HOMERE: This is Judge Homere. Regarding Maninis, it
17 seems that when we spoke about Carrier and Salah, they're concerned with
18 capturing a picture and then performing some kind of image analysis to
19 determine the quality of the picture. So, these are things that happen before
20 the picture is actually captured. Well, it seems that Maninis itself is
21 concerned with once the picture has been captured then you're performing an
22 analysis of the picture to determine how to classify it. So, how do we
23 consult -- how do you combine these two, what's going on in Salah and in
24 Carrier, you know, when you have, you know, the first two references
25 concerning with, you know, determining the quality of a picture, what is
26 being taken, what is being captured. Whereas the other one, Maninis, you

1 have a picture that's already captured, now you're performing analysis of it
2 to classify it.

3 MR. ARGENTI: So, the combination, or in fact even just Salah
4 and Carrier individually, refer to both analyzing and providing feedback
5 during image capture as well as analyzing an image that has been captured to
6 determine whether it is sufficient for the later analysis purposes. And it can
7 give feedback if another image needs to be captured. So, I don't think it's
8 quite so clear cut a bifurcation between references that are talking about pre-
9 image capture and a reference that's talking about analyzing captured
10 images. The concepts are really similar. In addition, even that feedback
11 during image capture that's happening where, for example, both Salah and
12 Carrier talk about giving visual cues whether the phone is lined up, the way
13 that works with cell phones, as we know, is that that is a continuous series of
14 images that are being captured and analyzed to determine whether any
15 particular image or frame that's being shown on the video screen is
16 acceptable. So, even that involves image capture and analysis.

17 JUDGE HOMERE: Okay. Thank you.

18 MR. ARGENTI: So, to slide 11, the combination of our three
19 prior art references is straightforward. Salah teaches acquisition of dental
20 images, including providing feedback to the user during acquisition. Carrier
21 provides complimentary detail about how that feedback could be
22 accomplished using its edge detection and object recognition techniques to
23 align and overlay and ensure that all required teeth are visible. As we
24 explained in the Petition, Carrier's techniques are directly applicable for
25 supplement Salah's imaging methods. And a POSA would have
26 accomplished this using the Maninis' teachings regarding the state-of-the-art

1 in neural networks for edge detection and object recognition. Salah itself
2 suggests the use of deep learning when aligning its 2D image to a 3D model.
3 And this combination merely applies deep learning earlier in the process,
4 consistent with Carrier's teachings to use known image processing
5 techniques.

6 Now I'll turn to slide 12 and the disputed issues. First, Patent
7 Owner challenges the prior art status of the two references, Carrier and
8 Maninis. We don't think there's any reasonable dispute about those being
9 prior art and that their prior art disclosure was in the public domain as of the
10 time of the '409 priority date, but because Patent Owner has raised the
11 argument, I'm going to briefly address it.

12 As to Carrier on slide 12, under the Board's *Penumbra* decision,
13 which was designated precedential after we filed our Petition, Carrier is
14 undisputedly prior art. That's because there's no dispute that the disclosure
15 we relied on in our combination is found in the Carrier provisional. But
16 Patent Owner challenges our Petition showing under *Dynamic Drinkware*
17 that the Carrier provides -- Carrier provisional provides support for the
18 Carrier publication. That is no longer a requirement under *Penumbra*, but in
19 any event, they are substantively wrong. The issue turns on whether the
20 Carrier provisional discloses a patient taking photos of their teeth as opposed
21 to a dental professional taking the photos.

22 We turn to slide 13. There's no dispute that Carrier discloses a
23 user taking the photos. Dr. Kusnoto, Patent Owner's expert on dental
24 matters, also admits, as we see here, that the provisional discloses that the
25 user can be a patient. So, if the user can be a patient and the user takes the
26 photos. But despite that, he says his interpretation is that only the dental

1 professional takes the photos in the provisional. That is flatly at odds with
2 the provisional's disclosure that the overlay guiding image capture may be
3 customized to the user's teeth. We see that here in paragraph 15, sorry, 55 of
4 the Carrier provisional. It's also at odds with Carrier's disclosure that the
5 camera may image the user's teeth using a patient-specific overlay. That is
6 from paragraph 62 of the Carrier provisional.

7 Patent Owner has no response to this disclosure other than to say it
8 should be ignored because the provisional elsewhere describes a dental
9 professional taking the photos. But it's not an either or proposition just
10 because the provisional describes a dental professional taking the photos
11 doesn't eliminate its additional disclosure of the patient taking the photo.
12 (INDISCERNIBLE - TECHNICAL DIFFICULTY) contemplated both
13 options.

14 JUDGE HOMERE: Well, Counselor, this is Judge Homere again.
15 You referred to paragraph 51 of the provisional to support that a user is
16 actually taking the picture. But paragraph 51 of the provisional, it says the
17 examples that it illustrates for a user include dentists, orthodontists, and
18 technicians. All those are dental professionals, aren't they?

19 MR. ARGENTI: I would agree that those examples listed are
20 dental professionals. Just as a point of clarification, I initially misspoke and
21 referred to paragraph 15 of the provisional, and then I corrected myself in
22 paragraph 55, which is what we see on this slide. I apologize if I misspoke
23 when I said paragraph 55. I believe we do cite paragraph 51 in our papers as
24 well, but paragraph 55 and 62 provides the strongest support for the patient
25 being among the users that are disclosed as taking the photos.

26 JUDGE SZPONDOWSKI: Do the claims in the '409 patent even

1 recite who is taking the image, who is taking the picture?

2 MR. ARGENTI: No, they don't, Your Honor.

3 JUDGE SZPONDOWSKI: So, why does this even matter under
4 *Penumbra*, who is taking the picture?

5 MR. ARGENTI: It does not matter under *Penumbra*, Your Honor,
6 and Patent Owner hasn't argued otherwise. This is only about whether our
7 *Dynamic Drinkware* showing in the Petition is sufficient, not about whether
8 the precedential *Penumbra* decision somehow stands for this not being prior
9 art.

10 JUDGE ZECHER: Yeah, Mr. Argenti, this is Judge Zecher. Let
11 me just make sure I understand your position correctly. Your first position
12 is that, if we apply the holding in *Penumbra*, the only thing that needs to
13 have support in the provisional application, the Carrier provisional, is what
14 you relied on in the Carrier non-provisional. Is that correct?

15 MR. ARGENTI: That's correct.

16 JUDGE ZECHER: Okay. And then if we went a step further and
17 said, well, we don't think the holding in *Penumbra* applies here, we're going
18 to go ahead and apply *Dynamic Drinkware*, which will require you to find a
19 sufficient written description support for one claim in the Carrier non-
20 provisional and you need to find sufficient written subscription support,
21 sorry, I can't speak today, in the provisional application, that's when we
22 would go to these citations in the provisional 55, 62, so on and so forth,
23 correct?

24 MR. ARGENTI: That is also correct, Your Honor. Yeah. Which
25 was at the time --

26 JUDGE ZECHER: Your first position is we just apply the holding

1 in *Penumbra* and then we don't get to *Dynamic Drinkware* analysis.

2 MR. ARGENTI: That's correct, Your Honor. *Penumbra* was
3 designated precedential after we filed our Petition. It now controls and
4 Patent Owner has no dispute that under *Penumbra*, Carrier is not prior art.

5 JUDGE ZECHER: And is it fair to say in your Petition, every
6 citation you have to the Carrier non-provisional also has a corresponding
7 citation to the Carrier provisional?

8 MR. ARGENTI: That's correct, Your Honor.

9 JUDGE ZECHER: Thank you.

10 MR. ARGENTI: Turning to slide 14, I don't want to belabor
11 Carrier, so I'll just point out another argument they have regarding the
12 Carrier provisional is that the standard set of photos it describes couldn't be
13 taken by a patient user. Carrier is explicit though, that you don't need to take
14 a standard set of photos, a partial set suffices.

15 So, turning to slide 15, and the Maninis reference, where Patent
16 Owner also argues that Maninis isn't prior art, but the evidence shows that it
17 is. There's no dispute that Maninis was submitted to XARXIV.org for
18 publication nearly three months before the priority date. That submission
19 was on a Friday, and the evidence establishes, as we can see an example
20 here on the slide, that papers submitted on a Friday were published by the
21 following Tuesday. And it's confirmed not only by XARXIV.org's policy at
22 the time, but also our expert Dr. Foroosh's own personal experience as
23 someone who submitted papers to XARXIV.org to be disseminated, and also
24 as a subscriber who received papers via distribution by XARXIV.org.
25 Patent Owner has no basis to argue that XARXIV.org did not follow its
26 established routine practice. All they have to counter our evidence of

1 publication is a theory that an archived copy of the author's web page linked
2 to a previous version of Maninis. But even that supports Maninis' prior art
3 status, as we know from the Federal Circuit's *Valve v. Ironburg* decision.
4 There can be no reasonable dispute that Maninis is not prior art.

5 So, turning to slide --

6 JUDGE HOMERE: Counselor, this is Judge Homere. Regarding
7 Maninis, Patent Owner argued that PTAB, we have certain
8 (INDISCERNIBLE) PTAB specifically in the (INDISCERNIBLE) that
9 requires personal knowledge of the printouts were available, publicly
10 available at the time. Also, Patent Owner cites to the *Toshiba* case. Would
11 you care to comment about those regarding whether this reference itself was
12 authenticated?

13 MR. ARGENTI: So, as to the first issue, I'm not aware of any
14 requirement for personal knowledge explicitly as to publication that can be
15 established by record evidence, the sum total of the evidence under the
16 applicable legal standard. I don't think personal knowledge is a requirement
17 to the extent that we're looking for expert testimony with knowledge we
18 have that year. We have it not only from Dr. Foroosh, who testifies about
19 how XARXIV.org published his papers from his own personal experience
20 and their practice in his personal experience. We also have personal
21 knowledge as to these archived copies of web papers and what the
22 significance of those copies are, what the trustworthiness of those copies are
23 based on the declaration from the witness from the internet archive who
24 Patent Owner did not elect to cross-examine.

25 As to the *Toshiba* case, I don't want to misspeak as to that
26 particular case, but I believe that is the case that goes back to around 2015 or

1 2016 where there was a Board decision saying that some types of evidence
2 establishing prior art publication are belated if they're submitted with the
3 reply. That was before the Board changed its rules regarding sur-replies and
4 the types of evidence that can be submitted with the reply. And the Federal
5 Circuit decision that we cited that came after *Toshiba* is on point for saying
6 that *Toshiba* is now out of date and the Federal Circuit says this is entirely
7 proper reply evidence. Was that the issue that you were getting at, Your
8 Honor?

9 JUDGE HOMERE: Yes, yes, Counselor. Thank you for that.

10 JUDGE ZECHER: Yeah, can I follow up on that? I think we're
11 focusing in on the declaration of Nathaniel E. Frank-Wright. I believe it's
12 Exhibit 1031. Why didn't you submit that with the Petition?

13 MR. ARGENTI: We didn't have it available to us at the time. The
14 requests can take time and we weren't aware of the objections at that point.
15 We did submit evidence of the internet archives archival pages regarding
16 these policies and we diligently pursued the declaration as we saw that this
17 was becoming a disputed issue.

18 JUDGE ZECHER: Okay, so let's just kind of play this out. So, we
19 got the Institution Decision. We see some objections on some of these
20 exhibits that talk about the submission help pages from -- would you call it
21 XARXIV.org? Is that where you're --

22 MR. ARGENTI: I might have said as it's pronounced in the field
23 as XARXIV.org which is confusing with the internet archive as well, but
24 yeah.

25 JUDGE ZECHER: Okay, let's go with that. XARXIV.org pages
26 and then the objections come in post-institution. As we know, you know,

1 there's some things that go on behind the scenes here. You are pursuing the
2 declaration of Mr. Frank-Wright to authenticate these. The argument pops
3 up in the Patent Owner response that, man, this is not prior art, which of
4 course would trigger a response from you in the reply. In that reply, you
5 then file the Frank-Wright declaration. Correct?

6 MR. ARGENTI: That's correct. We filed Exhibit 1031, which is a
7 Frank- Wright declaration. We filed that with our reply. I will point out
8 though that we had also previously provided another declaration from Frank-
9 Wright, which I think is Exhibit 1030. I don't want to misspeak, but that
10 provides the same information as to the meaning of the URLs and the
11 archival policies at the Internet Archive.

12 JUDGE ZECHER: But it does not indicate the pages in question
13 that we're talking about.

14 MR. ARGENTI: It only specifically addresses, I believe Exhibit
15 1021, not the other three that were additionally addressed in Exhibit 1031.

16 JUDGE ZECHER: Okay. So, this is where I was getting to
17 because obviously this 1031 declaration is the subject of a motion to
18 exclude. And my understanding is they wanted it excluded because they're
19 saying that it's supplemental evidence, so you could not have submitted it
20 with your reply declaration because of the way it kind of worked out through
21 the objections. But correct me if I'm wrong, now that they filed that, even if
22 you didn't submit it with your reply declaration, and they filed the motion to
23 exclude to try to get rid of 1022, 1023, 1025, 1026, you then, in your
24 opposition to your motion to exclude, could have put in this declaration as
25 supplemental evidence. So, you got there a little earlier, but you could have
26 got there later. Am I wrong there?

1 MR. ARGENTI: I don't think so, Your Honor. I think there's a
2 pretty good latitude in terms of when we can submit this evidence.

3 JUDGE ZECHER: Okay. And I think where this comes up, and
4 I'm glad Judge Homere brought this up on some of the cases that were cited
5 earlier, which I think are cases in the 2014, 2015 time frame, may even go
6 back to 2016, but this all preceded the fact that we didn't allow Patent Owner
7 sur-replies back then. And so, there was a somewhat different dynamic
8 going on when evidence was introduced. But I will just say, it's an
9 interesting set of circumstances here. I appreciate your explanation. I'm
10 looking forward to hearing Patent Owner's explanation on it as well.

11 MR. ARGENTI: Thank you, Your Honor. I do agree, as I
12 mentioned earlier, that the timing is significant and meaningful here in terms
13 of previous IPRs and the way they were run, where briefing typically cut off
14 at the reply versus now where the sur-replies are standard.

15 So, I'll turn now to slide 16 and our rationale to combine. Patent
16 Owner argues that we've provided no rationale to combine and that our
17 theory is built on hindsight, but the rationale laid out in the Petition was
18 clear. As I already explained, Salah and Carrier provide complementary
19 teachings to acquire dental images. Carrier just provides more detail about
20 how to accomplish the on-screen guidance and feedback that Salah already
21 describes. And Carrier's techniques would be expected to ensure high
22 quality images which would benefit the subsequent analysis in Salah.

23 Turning to Maninis provides state-of-the-art techniques to
24 accomplish the edge and object detection that you get from the Salah-Carrier
25 combination. Maninis says that its techniques are improvements over prior
26 deep learning approaches, leading a POSA to apply it to image processing

1 applications like you have in Salah and Carrier.

2 Turning to slide 17. So, Patent Owner argues that Carrier's
3 techniques are inferior to Salah's registration marks, such that a POSA
4 would not substitute one for the other. There are a number of problems with
5 this argument. First, Patent Owner mischaracterizes the Petition when it
6 attacks a purported substitution. The Petition explained that Carrier's
7 teachings act as a supplement to Salah, providing specific details regarding
8 how to assess alignment. A combination is consistent with Salah's
9 disclosure regarding use of a verification means to assess the positioning in
10 the camera relative to the teeth, including use of a line on the screen to be
11 matched with tooth edges or a shape in which the patient's mouth is to be
12 positioned.

13 It is also consistent with Salah's discussion of providing user
14 feedback about camera positioning and whether another image needs to be
15 taken. So, the combination is not about moving away from Salah's approach
16 to do it Carrier's way instead. It's about Carrier providing helpful detail
17 about how to accomplish what Salah is already doing. And doing so in a
18 way that, as Patent Owner admits, we see here will capture high-quality
19 dental images.

20 And I'm going to turn to slide 18, but I want to briefly pause. I've
21 seen a couple of pop-up messages from my co-counsel. I believe the public
22 line has gone down. And so, they're not able to observe. That probably goes
23 for any clients attending as well, too. I'm fine proceeding. I just wanted to
24 flag that for Your Honors.

25 SPEAKER: Hello, this is Amit. Can you try it right now?

26 MR. ARGENTI: I can message them. I don't know if anybody

1 who's been cut off has access to know that they should try right now. Let
2 me see. I'm happy to take a brief break, Your Honors, or I could proceed.
3 How would you like to handle it?

4 SPEAKER: Can you try it again?

5 MR. ARGENTI: I messaged my colleague to let him know that he
6 should try and connect again. I haven't heard back from him.

7 JUDGE HOMERE: Okay. Counsel, we'll give you a couple of
8 minutes to work this out.

9 MR. ARGENTI: Okay.

10 JUDGE HOMERE: We'll go off record for a minute.

11 (Whereupon, the above-entitled matter went off the record briefly
12 and then resumed.)

13 JUDGE HOMERE: Okay. So, we're going to resume at this point
14 right now. So, Petitioner has about a bit more than 16 minutes, about 16
15 minutes to finish with opening arguments. So, go ahead and proceed.

16 MS. JACOBSEN: Thank you.

17 MR. ARGENTI: Thank you, Your Honor. So, turning to our
18 demonstrative slide 18 and continuing with the point I was making before
19 the break, Patent Owner's focus on Salah's registration marks is misplaced
20 because Salah itself teaches using lines to match the teeth edges and shapes
21 corresponding to the mouth for alignment not just dots on the retractor. But
22 beyond that they're wrong that those retractor registration marks are superior
23 to an overlay for the teeth. Patent Owner argues the registration marks are a
24 better guide for image alignment and teeth because the teeth move during
25 treatment. But teeth move small amounts over time and Carrier explains that
26 the overlay can be patient-specific and account for movement due to

1 treatment. In contrast, as Dr. Valley explains here, the location of
2 registration marks will vary by a greater amount depending on how the
3 retractor is placed in the mouth, making it a less reliable means of alignment.
4 So, from a dental perspective overlays corresponding to teeth are a more
5 reliable means for alignment than registration marks.

6 We turn to slide 19.

7 JUDGE ZECHER: Mr. Argenti, I was reading through your
8 Petition because I was wondering about this whole discussion about
9 registration marks. Is this something you rely upon in your kind of
10 obviousness case? Because I didn't see it cited in the Petition.

11 MR. ARGENTI: No, we do not, Your Honor. The registration
12 marks are outside the scope of the claims and not part of the -- they're not
13 required by Salah and they're not part of the combination.

14 JUDGE ZECHER: But am I correct you don't cite the registration
15 marks for any sort of limitation mapping or anything else such as rationale to
16 combine?

17 MR. ARGENTI: That is correct, which is not to say they couldn't
18 be part of the implementation. You could use them for some of the
19 downstream processing that's outside the scope of the claims. But when
20 we're looking at the claims, when we're looking at the image acquisition, we
21 do not cite to the registration marks for mapping to the claims.

22 JUDGE ZECHER: Thank you.

23 MR. ARGENTI: So, turning to slide 19 demonstrative, it's also
24 true from a computer science image processing perspective that registration
25 marks are not preferable to an overlay. As Dr. Foroosh explains, the more
26 pixels available for alignment, the better the results. So, small registration

1 marks on a retractor provide less information for alignment than an overlay
2 corresponding to the dental arch. At the end of the day, this boils down to a
3 simple proposition. When seeking to capture an image of an object, aligning
4 to that object itself is a more straightforward method than aligning to other
5 objects. So, even if Salah was limited to alignment using retractor and
6 registration marks instead of overlays based on the mouth or teeth, which it
7 isn't, Patent Owner is wrong that those registration marks would be better
8 than Carrier's overlays. Registration marks are not a better option than an
9 overlay.

10 And as for Salah's description of how those registration marks can
11 be used after image capture, as I just mentioned, that's outside the scope of
12 the claims and not relevant to the combination. But the fact of the matter is
13 that Salah teaches using the registration marks for an optional step to
14 perform rough alignment of the 2D image to the 3D model before
15 performing its more detailed registration comparison. But that's the same
16 thing that the free capture alignment achieves in our combination. So, you
17 don't need that optional step of Salah.

18 Turning to demonstrative slide 20 and Patent Owner's arguments
19 regarding Maninis. Much of Patent Owner's argument on the combination
20 centers on something they call the Maninis COB neural network. They
21 argue that our combination is inoperable because the Maninis COB neural
22 network is incapable of determining what objects in an image might be. In
23 other words, it's incapable of object classification. As an initial matter,
24 object classification was only one of the deep learning functionalities in our
25 combination. We also explained that a POSA would use Maninis' edge
26 detection techniques to accomplish the overlay matching in Carrier and

1 Salah. This issue doesn't touch that. Beyond that, our combination is not
2 limited to the Maninis COB neural network. In fact, neither our Petition nor
3 the reference itself ever uses that term. That is something that Patent
4 Owner's expert Dr. Mongan came up with. In contrast, the Petition
5 proposed using Maninis' deep learning architecture for improved contour
6 detection and object classification, which is what Maninis describes and our
7 combination would reasonably achieve.

8 Patent Owner doesn't dispute that we cited Maninis' teachings
9 regarding both of those functions, nor does it dispute that even the limited
10 portion of Maninis they refer to as the COB neural network is involved in
11 both of those functions. So, it's not really clear what their argument is.
12 There's no single algorithm for anything described in the Maninis. As we
13 explained in the Petition, it describes a flexible, modular approach that can
14 be applied to many different neural networks.

15 Turning to slide 21. Beyond Patent Owner's mischaracterization of
16 the Petition regarding the "COB neural network", they also argue that
17 running a neural network on a mobile device would be too slow, rendering
18 the combination unusable. But aside from a single dependent claim
19 requiring the analysis to happen in real time, none of the claims have any
20 speed requirement, nor do they require that the deep learning device be on
21 the image acquisition apparatus, as I mentioned earlier. Those are separately
22 recited elements. Because it's not a requirement of the claims, our Petition
23 did not limit the combination to a deep learning device running on a cell
24 phone. This is yet another strawman argument introduced by Patent Owner.

25 Turning to slide 22. There are quite a few other problems with
26 Patent Owner's argument that using a deep learning device as taught by

1 Maninis would be too slow in the combination. For example, our Petition
2 provided two different types of image attributes, each of which on its own
3 satisfies the claims, determining distances between teeth and overlays when
4 aligning and determining the presence of all required teeth. Patent Owner's
5 speed argument doesn't impact our required teeth mapping, which provides
6 feedback to retake photos. They have no argument that a neural network on
7 a mobile device would be unusable for that purpose.

8 In addition, Dr. Foroosh explained with corroborating evidence
9 that POSAs would have known how to implement a neural network to
10 minimize speed delays using available efficiency techniques for
11 implementation. Dr. Foroosh also explained that mobile computing devices
12 were rapidly advancing in 2017, a factor that POSAs took into account when
13 designing software to run on them. Given the use of neural networks for
14 image classification was also on the rise at the time, a POSA would have
15 found it obvious to combine the two with an eye to expected increases in
16 computing power.

17 Now on slide 23, there's a final point that really illustrates the
18 fallacy of Patent Owner's argument about the speed of neural networks and
19 their drain on processing resources. If this was really a problem, the '409
20 patent has no solution. All the '409 patent says is that you can use any
21 neural network specializing in the classification of images, which were well
22 known to a POSA at the time. It has no special solution to increased
23 processing speed. And it lists many examples that are also found in
24 Maninis, except Maninis improves them. It represents the state of the art at
25 the time and gets improved results in a fraction of the time that it took those
26 known neural networks to accomplish the same thing without applying

1 Maninis' approach. So, the '409 claims don't require running a neural
2 network on a cell phone and our combination isn't limited to that. But even
3 in that implementation, if there was any concern about speed requirements,
4 Maninis provides the solution to overcome them.

5 JUDGE ZECHER: Mr. Argenti, I don't remember seeing this
6 argument in your papers. Can you tell us where this argument was made?

7 MR. ARGENTI: The argument that the '409 patent doesn't provide
8 its own solution?

9 JUDGE ZECHER: No, that Maninis improves over the state of the
10 art and these networks that were already listed in the '409 patent, the neural
11 networks.

12 MR. ARGENTI: Oh, well, that's just in the overall summary of
13 Maninis, the introduction of Maninis. I would say it's pervasive throughout,
14 or citations to the fact that Maninis is saying we are applicable to image
15 classification neural networks and we provide improvements across the
16 board. We saw that in one of our earlier slides where it looks that results
17 were improved in all instances. And those are the neural networks that are
18 the same as the examples, many of them overlap with the examples in the
19 '409 patent.

20 JUDGE ZECHER: No, I get that, but I'm looking at slide 23 and
21 you're no efficiency improvement in the '409 patent. I'm just wondering
22 where that specific argument is in your papers. Can you point me to a
23 certain page?

24 MR. ARGENTI: I don't have it offhand, Your Honor. So, maybe
25 I'll be able to provide that during rebuttal.

26 JUDGE ZECHER: That would be helpful, thank you.

1 MR. ARGENTI: Thank you. So, turning to slide 24, Patent
2 Owner also argues that the time and expense of training in neural networks
3 to analyze dental images would have weighed against motivation to
4 combine. But as we explained in our reply, that argument is misplaced as a
5 matter of law. More than that, it's premised on an exaggeration of the
6 necessary costs. Patent Owner's expert Dr. Kusnoto estimated it would take
7 over \$1.5 million to put together the claimed learning base. But then during
8 cross-examination, he admitted that that estimate was based on factors that
9 just aren't relevant to the combination, like anonymizing photos of faces and
10 adding labels like tongue contours that we never proposed. That tanks his
11 theory and the alleged costs dropped by an order of magnitude. And
12 regardless of whether the learning base costs \$200,000 or a million and a
13 half dollars, Dr. Foroosh explained that that would be right in line with
14 academic research budgets in this field to say nothing of commercial
15 development. So, cost is not something that works against obviousness here.

16 Turning to slide 25 and Patent Owner's next argument where they
17 say that a POSA would not have been motivated to use Maninis' deep
18 learning approach in a combination to identify individual teeth because, in
19 their view, Carrier doesn't identify individual teeth in the first place. They
20 say that when Carrier talks about ensuring that all required teeth are visible,
21 that just means using an overlay to align the teeth. But that ignores what
22 Carrier says. Carrier says that the overlay can show what required teeth
23 should be visible. That's in paragraph 60. But Carrier also separately talks
24 about evaluating image quality after the image has been taken to determine
25 whether you need another one. As part of that quality evaluation, it says that
26 you can use image recognition algorithms to ensure that all required teeth

1 are visible. That's paragraph 81, as we have here on this slide. It's not just
2 about alignment. For example, Dr. Valley explained that you could have
3 something obscuring one or more teeth in the image. Carrier says what it
4 says. It's plain as day, and Patent Owner cannot rewrite it to say something
5 else.

6 JUDGE HOMER: Counselor, I just wanted to point out to you that
7 we have about four minutes remaining.

8 MR. ARGENTI: Thank you. Just enough time to turn to the
9 dependent claims, Your Honor. So, on slide 26, we address Claim 7, which
10 requires a learning base made up of historical images. Each historical image
11 comprising an attribute value for at least one image attribute or an image
12 attribute value.

13 As we explained in the Petition, in view of Maninis' teachings
14 regarding pixel-wise annotations, it would have been obvious to compile a
15 learning base with historical images with pixel-wise annotations, identifying
16 each attribute in the picture. The image attribute would then be the set of
17 teeth in the picture. It would further have been obvious in view of Carrier to
18 include annotations regarding whether all required teeth are present. In
19 response, Patent Owner says individual tooth numbering doesn't satisfy the
20 claim because the historical image isn't labeled with an image attribute
21 value. It's only labeled with two attribute values.

22 But nothing in the claim requires any labeling at all, let alone
23 labeling a historical image with an image attribute value just so that the
24 historical image must comprise that value. And our combination is
25 consistent with the '409 specification, which gives an example, as we see
26 here on the slide, where the image attribute value is the set of tooth attribute

1 values, indicating the specific individual teeth present in the image. Patent
2 Owner hasn't identified anything in the claims or the specification requiring
3 that the image attribute value be a single label applied to the image, as
4 opposed to a set of tooth attribute values, as we see in this example. Nor
5 have they responded to our additional argument in the Petition regarding
6 annotations identifying whether all required teeth are visible.

7 Turning to slide 27 and Claims 8 and 9, Patent Owner didn't
8 address these claims in their sur-reply nor did they address them in their
9 demonstrative exhibits. So, we understand them to have dropped their
10 arguments for these claims. But briefly, the arguments that were raised in
11 the Patent Owner response were non-responsive to the case presented in the
12 Petition, as we pointed out in our reply.

13 Turning to slide 28 and Claim 14, Patent Owner disputes whether
14 the combination would analyze images in real time as claimed, but both
15 Salah and Carrier explicitly teach analyzing images and providing feedback
16 in real time. So, the prior art support is expressly found in the references.

17 In addition, remember that Patent Owner's construction of real
18 time, their own construction, simply means that feedback occurs while the
19 image acquisition process is underway. Well, there's no dispute that our
20 combination satisfies that with respect to both the overlay alignment and
21 with the feedback to take another photo if needed. Those are both part of the
22 image acquisition process.

23 With that, I will reserve the remainder of my time for rebuttal
24 unless there are any questions.

25 JUDGE ZECHER: Counsel, I do have one question about this
26 motion to exclude because, obviously, it's pivotal to your case. If this whole

1 notion about what we talked about with declaration is Exhibit 1031,
2 assuming we keep that into the record, that would sufficiently authenticate
3 the other exhibits they're seeking to exclude, right? Exhibit 1022, 1023,
4 1025, 1026, correct?

5 MR. ARGENTI: That's correct. Their argument that it lacks
6 authentication doesn't even address Exhibit 1031.

7 JUDGE ZECHER: Okay. Thank you.

8 JUDGE HOMERE: All right, Counselor. Patent Owner, you
9 have -- and now to present the case, do you wish to reserve any rebuttal
10 time?

11 MS. JACOBSEN: I will hand over to my colleague, Andrew
12 Blythe, who will address that. Thank you, Your Honor.

13 MR. BLYTHE: One moment, Your Honor, while we adjust the
14 volume settings here. Am I coming through okay?

15 JUDGE HOMERE: Yes, yes.

16 MR. BLYTHE: Thank you. I would like to reserve 15 minutes for
17 a sur-rebuttal.

18 Okay. So, this is Andrew Blythe on behalf of Patent Owner,
19 Dental Monitoring, SAS. And I'd like to start by addressing the
20 inoperability of Petitioner's proposed combination and their reliance on the
21 Maninis COB neural network. And I want to start by looking at the
22 relationship between Petitioner's proposed combination and the limitations
23 of Independent Claim 1, then I want to get into the specifics of what Maninis
24 discloses and how the Petition maps that to the claim limitations.

25 So, I direct Your Honor's attention to Patent Owner's
26 demonstratives, slide 4. On slide 4, we have the language of Claim 1. And

1 Claim 1 is a method with five steps, and Step b) prime requires analysis of
2 the analysis image by means of a deep learning device trained by means of a
3 learning base. And it's important to note that deep learning devices are not
4 general purpose processors. A deep learning device has an architecture that
5 is specific to how it was trained and how it was trained dictates what
6 analysis it can perform. And not every deep learning architecture is capable
7 of training on all types of information. These are mathematical models,
8 they're algorithms, they're computer programs, and they have structures that
9 can only accept and output certain types of data. So, what Petitioner relies
10 on, the only combination sets forth as satisfying the limitation of Claim 1,
11 Step b) prime is a deep learning device that is trained on semantic contours
12 and whose analysis identifies semantic contours.

13 However, Petitioner only identifies the Maninis COB neural
14 network as satisfying the deep learning device limitation. And what is not
15 disputed is that the Maninis COB deep learning device, what the authors in
16 Maninis describe as convolutional oriented boundaries, produces only
17 generic contours and not semantic contours. And without the ability to
18 produce semantic contours, Petitioner has no ground that -- has no elements
19 that can meet the analysis that its combination relies on.

20 JUDGE ZECHER: So, Mr. Blythe, this is Judge Zecher. So, what
21 you're saying or asking us to do is to read in this Step b) here that talks about
22 analysis of the analysis image by means of a deep learning device, trained by
23 means of a learning base that must be able to determine semantic contours.
24 Is that what you're suggesting?

25 MR. BLYTHE: No, Your Honor. What I'm suggesting is that the
26 only evidence that Petitioner has set forward as satisfying the analysis

1 limitation is an analysis that identifies semantic contours. And that's
2 important because Petitioner's combination requires performing the analysis,
3 the alignment techniques in Carrier. And what Petitioner identified as those
4 alignment techniques involve determining the semantics of the image,
5 identifying what objects are being identified, not only their contours.

6 Now, I just heard counsel for Align indicate that they actually have
7 two combinations, that they could go without a system that determines the
8 semantics of contours in an image that cannot recognize what objects are
9 being detected. But that contradicts what their expert said on cross-
10 examination regarding what his proposed combination does and how it is
11 designed. I would direct Your Honors to Exhibit 2048.

12 JUDGE ZECHER: Mr. Blythe, can we take a step back because
13 I'm trying to understand the scope of this element and how it would or would
14 not encompass semantic contours and why that makes a difference.

15 MR. BLYTHE: Sure, Your Honor, I can back up. The Claim 1 in
16 the '409 patent does not require a specific analysis be performed. The
17 analysis that Claim 1 requires does have to be compatible with the
18 subsequent determination, comparison, and the resulting message. But
19 Claim 1 does not specify that the analysis has to (INDISCERNIBLE -
20 TECHNICAL DIFFICULTY). In fact, dependent claims like Claim 7 are
21 not even consistent with training on and determining semantic contours. But
22 Petitioner's combination requires that determination. If Petitioner's
23 combined device, if the deep learning device that they identified as
24 satisfying this claim limitation cannot determine semantic contours, then it
25 cannot perform the alignment techniques that it relies on from Carrier.
26 Specifically, the technique that they identify as identifying whether all the

1 required teeth are present in an image, requires identifying which tooth
2 numbers are present in an image, and then checking those against a list of
3 which teeth were required to be in the image. So, it's not the claim language
4 that brings the requirement that the deep learning device determines
5 semantic contours. That is the analysis that Petitioner has hung the ground
6 that it proposed on. Without those semantic contours, its proposed
7 combination does not operate.

8 JUDGE ZECHER: And hence your inoperability argument,
9 correct?

10 MR. BLYTHE: Yes, Your Honor.

11 JUDGE ZECHER: Okay, thank you.

12 MR. BLYTHE: And what I would add to that is that Petitioner's
13 expert has confirmed in his deposition, and as I was just mentioning, Exhibit
14 2048, page 53, lines 4 to 17, and we address this in Patent Owner's response
15 on page 38. Their expert confirmed that the analysis that is performed by
16 the deep learning device is not just the detection of generic contours. And
17 I'll say we will take a look at the difference between the generic and
18 semantic contours in the context of Maninis. But this is important that we
19 look at what Petitioner's expert confirmed the analysis to be. And on -- this
20 is coming from page, excuse me, 38 of Patent Owner's response. Bear with
21 me one moment.

22 What Petitioner's expert said when I asked whether the analysis
23 could be performed with only generic contours without identifying which
24 objects are being contoured, he said, the combination I am providing with
25 Maninis is actually making them category specific, those contours category
26 specific. We do not just identify contours. We are also identifying to which

1 contour, excuse me, to which tooth a contour belongs to. And that's because
2 the combination relies on having identified which teeth are present in an
3 image in order to compare that against which teeth were required to be in the
4 image. And in the Petition, Petitioner relies on the Maninis COB neural
5 network, which is a neural network incapable of performing that semantic
6 analysis, not only as disclosing the architecture of the deep learning device,
7 but also as disclosing the training by means of a learning base.

8 And furthermore, Petitioner relies on the advantages of the COB
9 neural network, not the COB neural network in combination with other
10 neural networks, in providing the motivation to combine. And what
11 Petitioner has argued in reply as I just heard Petitioner's counsel advance,
12 that the COB neural network is a technique or a general architecture that can
13 encompass other neural networks or other techniques, but the claim
14 limitations in Claim 1, and particularly its Step b) prime. These are
15 functionally related limitations. They cannot point to the training of one
16 deep learning device and then rely on the analysis of a different deep
17 learning device. The claim requires that the analysis of the analysis image
18 by means of a deep learning device trained by means of a learning base.
19 And Petitioner has failed to identify any such device that can both perform
20 their analysis and it can cite as providing the structure of the deep learning
21 device and as satisfyingly the trained by means of a learning-based elements.

22 So, I want to make sure we stop and address the distinction
23 between generic and semantic contours and specifically to do that in the
24 context of the Maninis reference.

25 JUDGE HOMERE: But Counselor, this is Judge Homere. I am
26 somewhat confused as to where this is going because I'm not exactly sure

1 what the basis is for that in the claim. Specifically, when you look at the
2 specification of the '409 patent, it talks about a deep learning device which is
3 preferably a neural network. And then the specification of the topic gives
4 example, a list examples of neural networks that can be used. So, is it your
5 position that the neural network that's described in Maninis does not comply
6 with one of the examples of neural networks provided in the patent?

7 MR. BLYTHE: No, Your Honor, that's not Patent Owner's
8 position. Again, the requirement about how the deep learning device is
9 trained and what analysis it does is not one that originates with the '409
10 patent claims, or the '409 patent specification. This comes down to what has
11 Petitioner identified as its ground in the Petition. It's undisputed that there
12 were no neural networks in the prior art trained on learning bases with dental
13 images and detecting teeth. So, what the Petitioner has identified in
14 reaching this combination is to say here are analyses from other references,
15 Salah, Carrier, that do not deploy deep learning to analyze images to
16 perform alignment. And what they're doing is they're going to the Maninis
17 reference and saying, here is a deep learning device that could be employed
18 to perform that alignment techniques in Carrier. That is the only ground that
19 they have set forth. And accordingly, the citations to the Maninis paper are
20 the only evidence that Petitioner has to satisfy each of these limitations of
21 Step b) prime.

22 JUDGE ZECHER: Mr. Blythe, this is Judge Zecher. Doesn't
23 Salah itself indicate that you can actually refer to a deep learning? It doesn't
24 say device. It's actually spelled incorrectly, and he communicates that. So,
25 isn't that kind of a strong indicator that you would look to something like
26 that to implement in Salah?

1 MR. BLYTHE: No, Your Honor. And I'm glad to talk about this.
2 In Petitioner's slide, if I can direct Your Honors back to Petitioner's
3 demonstrative slide number 7, Petitioner somewhat misleadingly has the
4 discussion of deep learning directly following the discussion in Salah of the
5 image acquisition process and the use of verification means. But these are
6 very distinct analyses within Salah. In fact, within Salah, there is only one
7 type of analysis that Salah describes as used to align the image before
8 acquisition, and that analysis is one that is performed on the acquisition
9 device itself on the cell phone, and it is one that compares registration marks
10 to verification means.

11 I also heard Petitioner refer to the checking of other verification
12 means, such as the shape of a mouth or a line. Salah makes clear that those
13 are not techniques that Salah uses to provide feedback. The algorithm, the
14 technique in Salah never actually compares the shape of a mouth or a line to
15 a set point in order to guide the user. As our expert has explained, and I
16 would direct you to Exhibit 2000, excuse me, 2028 at paragraph, I believe --
17 sorry, I have it on my other computer, Exhibit 2028, paragraph 77, and this
18 was discussed in Patent Owner's response at pages 20 to 21, the only
19 technique that Salah, excuse me, the verification means, which are, for
20 example, a line or a shape of the face, those are purely visual guides. When
21 Salah refers to providing feedback to the user, such as indicating move the
22 camera to the left or the alignment wasn't acceptable, there is only one
23 technique that Salah discloses as actually having that computer verification,
24 that programmatic feedback, and that's the analysis of the registration marks.

25 Now, the deep learning discussion in Salah regards a completely
26 different aspect of its process. Salah is directed to updating a three-

1 dimensional model of teeth. Salah begins with a very approximate
2 alignment technique to guide the user to grab the photo. That's using the
3 registration marks or just purely visual guidelines. After the photo is
4 captured, Salah analyzes that photo to extract information and align it and
5 update a 3D model. In that process, Salah identified a misspelling of deep
6 learning as a not preferred technique for accomplishing that. Not only does
7 Salah not connect deep learning to the detection of contours in particular, it
8 never connects the application of deep learning to guiding the acquisition of
9 an image. And that makes sense because that is a very burdensome process
10 for what in Salah only requires a very approximate alignment. And in the
11 Petition, Petitioner relies exclusively on the discussion of training and
12 analysis as coming from the Maninis reference because not only does Salah
13 not connect its reference to the un-preferable deep learning to contour
14 analysis, let alone object detection, it does not describe how that deep
15 learning device would be trained, what analysis it would perform, and it
16 certainly doesn't connect it to the alignment process that Petitioner is now
17 applying it to.

18 So, unless there's another question on that, I'd like to direct your
19 attention to Patent Owner's demonstrative slide number 34. And I will --

20 MS. JACOBSEN: Do you want me to jump in at some point?

21 MR. BLYTHE: Yes.

22 MS. JACOBSEN: Your Honors, can you hear me? Rather than
23 switching audio, I just want to jump in and make sure we're clear on one
24 point that was discussed just now. Your Honors pointed to the neural
25 networks in the '409 patent. What those are are neural network
26 architectures. Those are sort of known neural network architectures that can

1 be adapted to use in the methods in the '409 patent. They're not off the shelf
2 useful in and of themselves. Instead, what the '409 patent teaches is that you
3 can take one of these different neural networks and you can train them using
4 a particular learning base labeled in a particular way, so a particular set of
5 images with particular labels applied, and you can train the neural network
6 so that it learns to recognize patterns in those images. And so, that is an
7 iterative process that is discussed in the patent that through exposure to the
8 learning base and all of these images, the neural network learns to recognize
9 patterns in an image, and then it can perform the analysis on a new image to
10 recognize whatever it's been trained to find in the image.

11 So, you start with a neural network architecture, they were known,
12 but then the patent teaches you to do a specific type of training to train it on
13 the learning base, which is dental images that have been labeled with either
14 image attributes or tooth attributes, so that that neural network can recognize
15 in the historic images -- learns to recognize from historic images those
16 particular things it's being trained to recognize, and then once it's fully
17 trained it can be used in a method and to recognize those features in new
18 images it hasn't encountered before.

19 So, not all neural networks are interchangeable. They have to be
20 trained to be useful. And when you look at Claim 1 you see it requires an
21 analysis by a deep learning device that has been trained by means of a
22 learning base. And so, this is then -- well, the question of well what does
23 Petitioner say makes that step obvious? Okay. And when it -- in order for
24 that step to be obvious, Petitioner has to find prior art that discloses
25 something that meets that step. And what it says meets that step is the COB
26 neural network in Maninis which it says you would train in a particular way

1 to do a particular analysis. And the way that Petitioner said that you train
2 COB to do an analysis that falls within Step 1 is using semantic contours so
3 that it could do a semantic contour analysis.

4 And our position is that the COB neural network that Petitioner
5 relied on as rendering Step 1 b) prime obvious is inoperable as they
6 advanced in their ground. So, that is why the semantic contours are
7 absolutely central here because that is the only way in which Petitioner says
8 that claim element is satisfied by the prior art. And because what it pointed
9 to in the prior art cannot be trained in the way it said it would be and cannot
10 do the analysis that Petitioner said it would do, it has not identified anything
11 in the prior art that satisfies Step b) prime and that renders that step obvious.

12 JUDGE ZECHER: Ms. Jacobsen, this is Judge Zecher. Can we
13 follow up on this whole requirement of specialized training for a neural
14 network? Where does that come out in a claim? Is it just trained by means
15 of a learning base?

16 MS. JACOBSEN: So, in Claim 1, exactly, there is a requirement
17 that the deep learning device that you're using has been trained by a learning
18 base. And the dependent claims additional limitations are added about that.
19 But in order to work, in order to do a particular analysis, you don't just need
20 a neural network. You need a neural network that has been trained by means
21 of a learning base. And when you look in the Petition, the Petitioner says,
22 okay, well, the deep learning device that we're relying on is the COB neural
23 network in Maninis. They say we're going to train it according to the
24 teaching and training in Maninis, and we're going to train it on a database of
25 images that are dental images that have been labeled with semantic contours.
26 And they say, okay, well, if we do all that, then we render Step b) prime

1 obvious. And that's how we link the prior art to what's in our claims. And
2 we say that does not work. That is inoperable.

3 JUDGE ZECHER: Can I ask a follow-up question? Isn't just
4 trained by a learning base? I mean, I was reading through your spec.
5 Doesn't that just mean basically providing a certain number of maybe
6 historical images of dental images? I think in column 15 and 16 you talk
7 about the learning basis created by comprising 1,000, maybe 5,000, maybe
8 10,000 historical images. And that's how the neural network learns. Is
9 that -- is there anything more than that?

10 MS. JACOBSEN: There is, Your Honor, and the images have to
11 be labeled with a particular value, a particular attribute that you want the
12 neural network or the deep learning device to learn to recognize. And the
13 patent specification talks about the process of training being where you
14 present these images to the neural network so that it progressively learns to
15 recognize whatever the particular attribute is that you're interested in. And
16 the patent gives different examples of attributes that can be either tooth
17 attributes, like tooth number or image attributes, like whether or not the
18 mouth is open. And so, there are different attributes that could be on those
19 images and then labeled and then the neural network or the deep learning
20 device progressively learns to recognize them. And then you have a deep
21 learning device trained by means of a learning base that is useful in an
22 analysis to recognize whatever you have trained it to recognize.

23 JUDGE HOMERE: Counselor, this is Judge Homere. I want to be
24 sure I understand your arguments here. So, you are not disputing that the
25 neural network disclosed in Maninis, is capable of being trained with dental
26 images that have -- labeled as values and attributes, and then so that they can

1 identify a particular word and whether all the teeth are there in the picture.
2 That's not your argument. Your argument here, I want to be sure, your
3 argument here is that Petitioner's case is that it's not that the DLD is not
4 and -- and is capable of being trained, but the training of what's going to be
5 provided to train it in semantic contours, and that would not work. Is that
6 the argument?

7 MS. JACOBSEN: That's right. Their whole obviousness case
8 hinges on the neural network in Maninis being able to be trained on semantic
9 contours so as to recognize semantic contours. And that --

10 JUDGE HOMERE: So, but you're not arguing that what the neural
11 network that you have in Maninis is not capable of being trained with
12 (INDISCERNIBLE - TECHNICAL DIFFICULTY) images that have values.
13 That's not your argument. So, you're not disputing that it's capable of being
14 trained, you know, with those values. Because if you ever know where that
15 was, I think that whatever you provided, you know, training material
16 provides to the neural network, it should be able to learn it, right? I mean,
17 there's no dispute about that. Is that correct?

18 MS. JACOBSEN: Well, there is a dispute here because what they
19 say --

20 JUDGE HOMERE: No, no, that's not the question I'm asking.

21 MS. JACOBSEN: Oh, well, I --

22 MR. BLYTHE: May I address that Judge Homere?

23 JUDGE HOMERE: Yes.

24 MR. BLYTHE: In fact, we actually do dispute that strongly. The
25 Maninis COB neural network is incapable mathematically of accepting as
26 inputs as it's part of its training any value that would identify what teeth are

1 in the photo. In fact, the way that the Maninis COB neural network is
2 trained, and we have this on slide, excuse me one moment, it's on slide 43.
3 This is the training that Petitioner identifies as satisfying the train by means
4 of a learning base. And while their expert and the Petitioner appeared to
5 misunderstand what this disclosure was in the Petition, our expert has gone
6 through in detail and clarified what this training is capable of and what it's
7 not. And I think the easy way to see that it's not capable of recognizing
8 individual teeth is when you look at the training, and this is quoted on page
9 43 in the callout, the only input values that this COB neural network is
10 capable of dealing with are one and zero. And what that means is when it
11 looks at an image and it looks at it pixel by pixel, what the neural network is
12 being trained on and it's analyzing, those are one in the same in neural
13 networks because they are trained by doing and then getting feedback on
14 their output, what it is saying is for every pixel in the image, one, it's part of
15 a contour, two, it is not part of a contour, sorry, one, zero, it's either part of a
16 contour or it's not.

17 Those are the only two things it can learn. So, by the time it's
18 done, it has identified which pixels form the contour of an object. But there
19 is no room in that architecture mathematically in the equations for its
20 training, to accept information about which category of objects is in there.
21 So, it might put an outline around a cat because objects have outlines, cats
22 are objects, that is what it does. It recognizes where there are boundaries
23 within the image. But what it is not determining and cannot determine, or
24 even be trained to determine, is whether what it just put a contour around is
25 a cat, one tooth, a different tooth, a sheep. None of those are within the
26 capability of that entire architecture. That is what our dispute is with respect

1 to operability. And it is that determination of which objects are being
2 contoured and detected that's required for Petitioner's combination.

3 JUDGE HOMERE: Okay. So, if I understand your argument here
4 is that, I mean, there's no dispute that, you know, this COB learning device
5 disclosed by Maninis is utilized to identify or to classify certain images.
6 And it's using contours of the objects that are provided as a way to identify
7 whether the image is a cat or sheep, for that matter. Now, the question that I
8 asked you earlier, so essentially, your position is that if we were to see a
9 different type of data, for instance, image values, you know, image value
10 with numbers and attributes and everything, this particular neural network
11 would be incapable of handling that type of data, of being trained with that
12 type of data?

13 MR. BLYTHE: That's correct, Your Honor. A neural network is
14 essentially a collection of values that are multiplied and added and
15 subtracted against the values for pixels that go in. And Dr. Mongan actually
16 has a great example, simple example of this in his declaration, and Ms.
17 Jacobsen might be able to help me with the citation while I'm looking. But
18 that's right, the Maninis COB neural network cannot accept any of those as
19 inputs.

20 These are not, you know, as much as we think of these as related to
21 artificial intelligence, for example, they're not intelligent. It's surprising that
22 these are rote application of applying -- multiplying one number by another.
23 And what's required is there's only a certain set of values that can go in and
24 only a certain set of values that can go out. And what the only thing that this
25 entire mathematical structure can produce are whether some -- whether a
26 pixel is part of a contour or whether it's not. And I want to direct your

1 attention to one of the figures that Petitioner's counsel was just addressing,
2 which is Figure 10 in Maninis. And this is on Patent Owner's slide 35.

3 On slide 35, we have what is in Maninis as Figure 10. And as
4 Petitioner's counsel identified, in the top row, you have an image that's being
5 analyzed. In the second row, we can see what all the contours are within the
6 image, but in the third row, it appears that only the sheep, for example, in the
7 bottom right have been contoured. But as Dr. Mongan explained, and this is
8 on slide 36, as our expert explained, and there's no contrary explanation of
9 this or dispute, it's clear from the disclosure of Maninis itself. Just because it
10 has put a contour around the sheep and not the trees behind the sheep does
11 not mean that what Maninis COB was doing was recognizing that object as a
12 sheep. It's a difficult concept, but one way to think about it is Maninis COB
13 has learned this is what an object looks like. Right? It was trained in this
14 instance on 20 different classes of objects.

15 But as we detail, and as is described in Patent Owner's response
16 and in Dr. Mongan's declaration, when they trained Maninis on having put
17 boundaries around various objects, they extracted the part that was just the
18 contours, and they left out all of the semantics. So, while Maninis COB has
19 learned what an object looks like in general, it will put contours around
20 objects. What it can't do is output that the contours it has identified are
21 sheep. It can't even tell you that it put contours around two sheep. So, that
22 is when it comes to their proposed combination. What they need this
23 analysis to perform is to look at pictures of teeth and say, this one is tooth
24 number 13. This is tooth 14. This is tooth 15. And then check those against
25 a list.

26 But if you apply COB to that analysis, it may put contours around

1 teeth, but it won't know how many teeth it's contoured, whether there's more
2 than one, or which teeth were contoured. And without that analysis, their
3 combination does not function. In fact, what Maninis does disclose, as
4 capable of providing those contours, is shown in Figure 16. And to back up
5 one moment, the structure of the Maninis paper is such that, right, this is a --
6 it's titled convolutional-oriented boundaries. That is the architecture that the
7 authors are talking about. And it is a neural network that determines generic
8 contours. The first five sections out of six in Maninis discuss nothing but
9 the training, the background of, and the performance of the Maninis COB
10 neural network in computing generic contours.

11 And in Section 6, what the authors are saying is, well, if we have
12 these really nice generic contours, we could use those to improve semantic
13 contours identified by other networks. And in Figure 16, what you see, the
14 second row is the output of an entirely different neural network. In this case,
15 it's called dilated convolutions. So, if I refer to that as the dilated network,
16 that's what I'm talking about. The dilated network alone, with no connection
17 to Maninis COB, produced the output in that second row. And as you can
18 see from the coloring, not only has it identified where there are objects, it
19 went one step further. And it's represented here in colors, in the neural
20 network itself, it might be represented by different numbers for each pixel,
21 but you can see that it has identified in pink everywhere there's a person. Or
22 for example, that for green, that object is a train. And all that the Maninis
23 paper is saying is that because their network can detect really fine generic
24 contours, we can overlay that on top of the output of this other neural
25 network and sharpen up the edges.

26 So, when Maninis talks about improving semantic contour

1 detection, what they really are saying is we're going to improve the
2 sharpness of the boundaries by combining our completely generic contour
3 architecture with a different deep learning device, a different neural network
4 whose training is never discussed in the Maninis paper and that has to be run
5 separately, and the outputs combined after the fact. And what Petitioner has
6 never relied on is dilated network, for example, as meeting any of the
7 elements of the deep learning device trained by means of a learning base in
8 the Petition. There is no discussion of dilated network.

9 JUDGE ZECHER: Mr. Blythe, this is Judge Zecher. Can I ask a
10 follow up question? Let's just assume for a second we agree with you that
11 this neural network in Maninis doesn't -- is incapable of identifying specific
12 teeth. Let's just say teeth 4, 5, and 6. Why would that matter? I'm looking
13 at the claim here, and I'm seeing an analysis image by means of a deep
14 learning device trained by means of a learning base. And then we get down
15 to when we're sending information about the image capture and what that is.
16 And it talks about the image acquired, the position and the acquisition
17 apparatus in relation to said arch, the openness of the mouth, the wearing of
18 the dental appliance. So, why do we need that granularity in this neural
19 network to accept your argument?

20 MR. BLYTHE: Absolutely, Your Honor. The reason that it's
21 required for the rest of these steps is because the only way that the Petitioner
22 says those steps are satisfied is through the application of Carrier's alignment
23 techniques. So, Maninis, what Petitioner is relying on for this deep learning
24 device is performing the alignment techniques of Carrier. And one of those
25 techniques is to identify whether all the required teeth are present, and if
26 they're not present, so right, if we're looking at the limitations of Claim 1, in

1 Step c), there would be a determination of a value for an image attribute.

2 So for example, in Petitioner's combination, they are arguing that
3 the deep learning device from Maninis would identify which teeth are in the
4 image and where. You would produce semantic contours. In Step c), they're
5 arguing that, well, now that we have semantic contours, we can determine
6 which teeth were present. That's how you get to the image attribute in their
7 combination from Claim 1. This follows the detailed analysis in the patent.
8 In Step d), what's the comparison? Well, Petitioner says the comparison is,
9 is the comparison of that identified list of teeth to the required list of teeth.

10 So, if the deep learning device and its analysis can't produce
11 semantics to identify which teeth are present, then what Petitioner identifies
12 as satisfying the comparison step and then subsequently the sending of an
13 information message. You know, what it relies on for sending the
14 information message was that the required teeth weren't present. So, it's all
15 functionally connected such that without that ability, there is no other
16 disclosure that Petitioner has that would satisfy all these limitations. They
17 rise and fall together. There's only one combination.

18 JUDGE ZECHER: So, in other words, it's more about you're
19 taking issue with the formulation of the obvious ground that Petitioner
20 presented here and how it maps down through the different steps, not
21 necessarily the scope of what your claims requires?

22 MR. BLYTHE: That's right, Your Honor.

23 JUDGE ZECHER: Okay. Thank you.

24 JUDGE HOMERE: This is Judge Homere. Furthermore, though,
25 regarding Carrier itself, I mean, isn't it undisputed here, at least both parties
26 have stipulated that Carrier provides a need for acquiring an image, and then

1 also to determine, you know, to do some kind of analysis to determine
2 whether all the teeth are there. Is that correct?

3 MR. BLYTHE: Well, yes, Your Honor, Carrier does disclose a
4 technique for determining whether all the required teeth are there.

5 JUDGE HOMERE: And then Carrier also stipulates that one of
6 the methods to do that could be by using a, you know, a neural network.

7 MR. BLYTHE: No, Your Honor. Actually, Carrier does not refer
8 to the use of a neural network or any deep learning architecture. And to be
9 clear, the Carrier publication, which is from I believe 2020 or 2021, has far
10 more disclosure than the provisional. And as Mr. Argenti indicated, the
11 parties don't dispute that even under Penumbra, the requirement is that
12 Petitioner can only rely on the disclosure that was present in the provisional.
13 And what's not disputed is that in the provisional, where Carrier did not
14 expand on its application -- specification over the years, in the provisional
15 there is no reference to deep learning or to machine learning or the use of a
16 neural network. In fact, the way that Carrier proposes that its analysis is
17 carried out is on the device, on the acquisition device itself, on a cell phone.

18 And to be clear, it does not require the use of a neural network to
19 determine the presence of all required teeth. Both of Petitioner's experts,
20 both Dr. Foroosh and Dr. Valley, have agreed that if you're using Carrier's
21 overlay technique, which is where you have an outline of the teeth and
22 you're going to check for generic tooth contours and check whether they're
23 aligned with the teeth. When Carrier discusses doing that, if you have
24 aligned the outlines of a patient's teeth to an overlay of the patient's teeth,
25 you have confirmed that the teeth are present.

26 So, Carrier not only doesn't discuss using a neural network to

1 accomplish this, it's not something that's even required to do that. Petitioner
2 has injected -- has jumped from that disclosure in Carrier about finding the
3 required teeth, said, well, one way to do that would be to bring in a neural
4 network to perform object detection, which is a hugely burdensome
5 technique compared to the simple, long-existing optical image recognition
6 techniques that Carrier is contemplating. And then it had used that to meet
7 the limitations of the claim. But no, Carrier itself doesn't and not discuss the
8 use of any deep learning or neural architecture.

9 JUDGE HOMERE: Yes, but Carrier is concerned with acquiring
10 quality, high quality picture, dental pictures of a patient, right? And then
11 using overlay to detect that whether all the teeth are there. That's correct,
12 right?

13 MR. BLYTHE: Yes, Your Honor.

14 JUDGE HOMERE: And now that same overlay technique, when
15 you go to Salah, the Salah reference, it says that why Salah uses an overlay
16 technique to make sure that the picture is good quality, or at least that it's
17 satisfactory -- you have a satisfactory image. Is that correct?

18 MR. BLYTHE: That's not correct, Your Honor. And I want to
19 direct you to, in Salah, page 28 and 29. These are the two pages that are
20 cited throughout Petitioner's, throughout Petitioner's papers. Sorry, excuse
21 me, starting on page 27 of Salah. And starting on page 27 of Salah, which is
22 Exhibit 1008, Salah Translation, there's a section called Detection and
23 Acquisition Kit. And what Salah is teaching here is that there are ways to
24 allow the user to approximately align the image before acquisition. And
25 while Salah refers to verification means, this is at line 4 on page 28,
26 verification means can be used to visually align the photo. It's not saying

1 that it would recognize outlines within, you know, what the camera is
2 seeing, and in real time compare those to the expected, you know, overlay,
3 for example, and then make an automatic determination of alignment.

4 What Salah says, and this is explained by Dr. Mongan, I believe in
5 paragraph 77 of his declaration, Exhibit 2028, is that there is only one
6 technique that Salah is proposing for algorithmically confirming alignment
7 and guiding the patient. And that's the match between registration marks
8 and verification means. And the distinction is significant, right, because
9 registration marks are purpose-designed to be easy to detect by basic contour
10 recognition. We're not talking about neural networks. Long-standing
11 techniques, as Dr. Foroosh explains, for recognizing contours, even the
12 Maninis paper itself in its background describes a long history of
13 recognizing contours without employing deep learning architectures.

14 And what Salah is saying is if we apply to, for example, the tooth
15 retractors, or cheek retractors that hold back the patient's cheeks, you know,
16 let's say, for example, a standard set of squares. Then when we can easily
17 recognize where the squares are, get an approximate alignment, but not only
18 align them, after the image has been captured, these, for example, squares or
19 circles are now in the image. And that is valuable to Salah's process.

20 Because what Salah does is it actually aligns after the image has been
21 captured. So, Salah is basically saying, we can forego having to get very
22 precise alignment in advance. Because it already has a 3D model of the
23 patient's teeth. And by being able to analyze, well, from what angle was the
24 photo taken, then it can align the model to the picture rather than having to
25 pre-align the picture.

26 JUDGE HOMERE: Counsel, Counsel, let me direct you to pages

1 35 through 36 to 35 -- 34 through 36 of Salah. All right. So, starting on 34,
2 Salah states, these processes, specifically referred to what processes that one
3 of skill in the art would know, that's well known to perform a variety of
4 tooth identification or variety of processes. And from those processes you
5 have contour detection, right, at page 35. Salah says, it's also well-known at
6 page 36 that one familiar here would know to use a deep learning device,
7 deep learning at Salah, which, you know, it's, you know, misspelled here,
8 but deep learning as a way to identify the piece or, you know, to perform
9 that registration mark identification that's described in the Salah reference.

10 So, I'm not exactly sure why one of ordinary skill in the art having
11 Salah before then that teaches them how to capture a picture, dental arch, to
12 use registration mark, or alternatively use deep learning device to help
13 identify whether you have a satisfactory picture or not. And then you extend
14 that to what you have in Maninis, because one also skilled in the art would
15 also, I'm gathering from the record here that one also skilled in the art would
16 also know that if you have a deep learning device, well, the deep learning
17 device has to be trained.

18 Okay, I understand that the training is provided, but the deep
19 learning device now is not actual, then the image is by semantic contour.
20 But Salah talks about semantic contours here being used to identify these,
21 you know, within the picture. So, I sort of see the linkage between, you
22 know, what you have in Salah, and even if, you know, Maninis is not
23 actually taught to -- is not actually trained with, you know, actual devices,
24 actual images, but the contour map that you have in Salah, as it is instructive
25 as to, you know, what information would be provided to Maninis, deep
26 learning device to be trained. So, I'm wondering what's missing here.

1 MR. BLYTHE: So first, Your Honor, the Salah disclosure
2 nowhere, including at pages 34 to 36, ever addresses semantic contours.
3 What Salah is saying with a contour map, that is just generic contours, right?
4 Because in Salah's analysis it just needs to know where are the contours in
5 an image. And it takes the same generic contours from its 3D model and
6 lines them up to see how the teeth have changed. None of that analysis
7 requires any semantics. It's undisputed from our expert that there is no
8 discussion of semantic contour detection or object recognition in the Salah
9 reference. The only thing that Salah says is that deep learning is a technique
10 that can be used to extract discriminant information. And to be clear, that
11 doesn't even have to be contours, right. But it definitely does not disclose
12 determining semantic contours or performing any type of object recognition.
13 What's valuable for the Salah technique in updating the model only requires
14 generic outlines from an image. It's not even limited to the teeth, per se. I
15 think that's even reflected in Figure 6B from Salah. If you look at Figure
16 6B, you can actually see one piece of contour in between the sets of teeth
17 that must correspond to the tongue, for example. But that's not what Salah
18 depends on for updating its model.

19 The other thing is that there is no dispute that Salah does not
20 disclose applying -- well, not only applying deep learning, it doesn't disclose
21 applying any of these updated map techniques in the acquisition process.
22 And that, in particular, with respect to deep learning, is because the
23 acquisition process, it's something that happens in real time. This is
24 happening on a mobile device. And it's undisputed that in both Salah and
25 Carrier, the only disclosure is that the analysis that guides alignment during
26 image acquisition is run by software on the mobile device. And there's a

1 good reason for that. It's because that analysis needs to be done fast enough
2 to tell a user that their phone, that the cell phone, is in alignment and they
3 need to capture the photo right then.

4 So, the idea that you would use deep learning to accomplish that is
5 foreign to all of these base references, to Salah and to Maninis, because this
6 is in 2016, 2017, cell phones did not have the capability -- they didn't have
7 the capability to run something as burdensome as Maninis. We're not
8 saying, you know, Petitioner referred to the patent disclosure as not, you
9 know, as referring to the general state of neural network architecture. But to
10 be clear, in this case, the question is, can it perform this analysis that
11 Petitioner has proposed using the neural networks that Petitioner has
12 proposed? And in this case, we know how long it takes to run the Maninis
13 COB architecture on a cutting edge desktop graphics card. We don't even
14 know how long it would take to run the other neural networks that would be
15 required to arrive at semantic contours. But either way, that type of analysis
16 from two neural networks that are meant to run on cutting edge desktop
17 computers are not performing this analysis in real time on a cell phone. And
18 that is not what Salah or Carrier suggests either.

19 JUDGE ZECHER: Mr. Blythe, we've spent a lot of time on this in
20 inoperability the argument. You've probably eaten into most of your time.
21 So, I just want to flag that for you to give you an opportunity to address
22 some other issues.

23 MR. BLYTHE: I would like to move to another issue, Your
24 Honors. If I could direct you to Patent Owner's demonstrative 79, I'd like to
25 address Claim 7 and the issue regarding Petitioner's failure to identify image
26 attributes. And I want to start by pointing out that this dispute is entirely

1 independent of the other disputes in this case. Whether or not Petitioner
2 relies on the Maninis COB neural network or a combination with other
3 neural network architectures.

4 What Claim 7 requires, I have the claim language on slide 79, is it
5 specifies how the analysis training and learning base in Step b) prime of
6 Claim 1 has to be performed. And what it requires is creation of a learning
7 base with historical images comprising image attribute values. And the
8 parties agree that image attribute values are attributes that relate to the image
9 as a whole and not to a part of the image.

10 We have on slide 80 what Petitioner put forward as the
11 construction of image attribute value in the Petition. And it's a direct quote
12 from the '409 patent in column 3, lines 23 to 37. And that is that an image
13 attribute value is an attribute that has a value that relates to the whole image
14 and not to part of the image. And as we've discussed, and as Petitioner's
15 expert has confirmed, and this is what they put forward in arguing Claim 7,
16 they say that the learning base that satisfies the limitation that the learning
17 base comprised image attributes is pixel-wise annotations of semantic
18 contours.

19 But semantic contours address what appears in part of an image,
20 not what the whole image -- they don't relate to the whole image. And this
21 dichotomy between training a deep learning device to recognize the details
22 of an image, to recognize regional attributes versus recognizing global
23 attributes or image attributes is one that's set out throughout the entirety of
24 the '409 patent. And if you look at slide 81, we've called out that one of the
25 discussions in the '409 patent regarding the detailed image analysis method.
26 And what the patent is saying is that if you're performing a detailed image

1 analysis method, then you're training your deep learning device on images
2 that have descriptions, which is one of the words that the '409 patent uses.
3 And Dr. Foroosh has confirmed that the lingo for persons of ordinary skill,
4 that the terminology is this is called labeling.

5 If you have a historical image of a patient's mouth, it's just an
6 image. Until you go into it and you draw the lines around a tooth and
7 identify that as a certain tooth number, there's nothing to train on. So, what
8 you train a deep learning device on are annotations or labels that are applied
9 to images. Without labeling, without the application of attributes, there is
10 nothing to train on, and there is no analysis for the deep learning device to
11 perform. And the dichotomy in this patent is between deep learning
12 architectures that can train on tooth attributes associated with tooth analysis
13 zones that corresponds to what Petitioner has advanced, right, determining
14 contours that are tooth analysis zones and identifying which tooth is present
15 versus training on attributes that relates to the whole image.

16 And if you look on slide 82, the patent expressly distinguishes
17 between these two types of training and the two analyses that result. It says,
18 referring to the global image analysis method they say the method is similar
19 to the detailed analysis method described above, apart from the fact that
20 according to the global analysis, it is not necessary to analyze the individual
21 situation of each tooth. In other words, the deep learning device determines
22 a value of an image attribute without having to previously determine tooth
23 attribute values.

24 JUDGE HOMERE: I'm sorry, Judge Homere. I just want to point
25 out that you have four minutes remaining.

26 MR. BLYTHE: Thank you, Your Honor.

1 JUDGE HOMERE: Okay. Thank you.

2 MR. BLYTHE: So, I want to flag one other thing in this dispute,
3 two others. The first is that these two types of analyses are claimed
4 separately. One is claimed in Claim 3, that's the detailed analysis method.
5 Claim 7 claims the global analysis method. And what both parties' experts
6 agree is that training a deep learning device on tooth attributes values is
7 distinct, or regional values, is distinct from training on image attribute
8 values. And I would direct you to Patent Owner's sur-reply, paper 29 at
9 page 25. And there we discuss what Dr. Foroosh described in his deposition
10 about the terminology about labeling these types of attributes in historical
11 images, and also the distinction between pixel-wise labels and what Dr.
12 Foroosh described as what would just be a label to the entire image overall.

13 And before I run out of time, I do want to go back and address
14 some of the questions that came up around the Maninis reference as prior
15 art, and specifically with respect to Exhibit 1031. What I heard one of the
16 questions to Petitioner's counsel was, could they have submitted this exhibit
17 as supplemental evidence in response to our motion to exclude? And the
18 answer to that under the Board's rules is no because Exhibit 1031 was never
19 timely served as supplemental evidence. Petitioner did not serve Exhibit
20 1031 in response to Patent Owner's objections. And what the *Toshiba* and
21 the *Standard Innovation* cases, both discussed in our motion to exclude.

22 What they're about is that if a party fails to submit supplemental
23 evidence in response to an objection, then filing it along with a substantive
24 paper and tying it to a substantive argument is essentially a complete
25 circumvention of the Board's rules around serving supplemental evidence in
26 response to objections. And what the Federal Circuit case is that Petitioner

1 has cited is about submitting reply evidence that's in support of the merits of
2 whether prior art -- or ground reference is prior art. But what standard
3 innovation distinguished between was there is proper reply evidence that
4 goes to the merits of is this prior art. And then there is evidence that goes
5 purely to authenticity. The Exhibit 1031 exclusively addresses the
6 authenticity of those exhibits and because it was never time we serve as
7 supplemental evidence it wasn't available to file as supplemental evidence in
8 response to our motion to exclude, and it wasn't properly submitted in reply.

9 JUDGE ZECHER: So, that's -- let me just clarify, that's your
10 reasons for excluding it. Is that correct?

11 MR. BLYTHE: Well, yes, Your Honor. But also we preserve --
12 well, we had we had asked for permission to file a motion to strike on that
13 basis and Your Honor had declined and offered up for us to identify in a
14 chart, improper new reply evidence. This is one of those pieces of evidence.
15 I would submit that even if not excluded or struck, that it should not be
16 relied on as having circumvented the rules requiring the submission of
17 supplemental evidence.

18 JUDGE ZECHER: In those two cases you referenced, *Standard*
19 and what was the other one? Excuse me.

20 MR. BLYTHE: Toshiba with the other section.

21 JUDGE ZECHER: What were the dates on those two cases?
22 When were those papers issued? I believe it was pre-2016.

23 MR. BLYTHE: I believe that's correct for Toshiba. Let me
24 confirm quickly with respect to *Standard Innovation*. I'm not sure that one
25 was as early, but I think I have my table of authorities here.

26 JUDGE ZECHER: And they're both non-precedential cases. Is

1 that correct?

2 MR. BLYTHE: Yes, you're correct. They are from 2015 and
3 2016. I don't believe either has been designated as precedential.

4 JUDGE ZECHER: Okay. But your main reason is that effectively
5 the supplemental evidence wasn't served to you. That's your primary
6 reason?

7 MR. BLYTHE: That's correct, Your Honor. Exhibit 1031 is
8 supplemental evidence untimely served or filed.

9 JUDGE ZECHER: Thank you.

10 MR. BLYTHE: I'll reserve any remaining time for sur-rebuttal.

11 JUDGE HOMERE: Thank you. Counselor, Petitioner's Counsel,
12 you have 10 minutes to present your rebuttal arguments.

13 MR. ARGENTI: Thank you, Your Honor. I want to first address
14 an open issue from the last time I was speaking with respect to slide I
15 believe it was 23, where we talk about efficiency improvements in the '409
16 patent or the lack thereof relative to Maninis. Judge Zecher had asked for
17 support in the record for that. I would direct Your Honors to page 23 of the
18 Petition, where we were quoting Maninis' improved performance, including
19 its examples of performing operations in a fraction of the time. At, let's see,
20 page 30, we discussed that the same neural networks are at issue in the '409
21 patent and Maninis. At page 69, for example, we discussed the fast,
22 efficient, and the highly accurate results provided with respect to Claim 14.
23 And then in our reply at pages 17 and 18, we note, again, that the '409 patent
24 offers no particular speed improvement in the context of its application of
25 neural networks.

26 I also want to briefly address one -- I think at one point I heard

1 counsel assert that the Salah reference doesn't connect deep learning to
2 contour analysis. I would take issue with that. As we note on our slide 7,
3 Salah says that such processes can be used, for example, to detect high
4 contrast regions and determine contours. That's from page 34, lines 13 and
5 14 of Salah, and it goes on to provide lists of preferred and non-preferred
6 approaches that include deep learning or deep learning as it actually says
7 with the typo.

8 Now I want to address what took up most of Dental Monitoring's
9 time, which is this argument with respect to the Maninis COB neural
10 network. Again, as I pointed out when I first spoke, that is not a term that
11 Maninis uses. It is not a term that we use in the Petition. This entire issue is
12 predicated on Patent Owner's willful refusal to acknowledge the case that's
13 laid out in our Petition. And the admissions that we heard today repeatedly
14 are completely at odds with this argument that they have. They repeatedly
15 admitted that we have argued both in the Petition as well as through expert
16 testimony that our combination can involve and be trained on semantic
17 contours. There's no dispute that the disclosure in Maninis section 6
18 describes training on semantic contours. There is no dispute that we cited
19 the disclosure in Maninis section 6 regarding training on semantic contours.

20 In fact, if we look at Figure 16, which counsel addressed of
21 Maninis, for example, let me get our -- find that in the slides to refer to. So,
22 if we look at our slide 10, we see Figure 16 from Maninis. Counsel
23 addressed this when they were speaking saying that the middle row involves
24 object classification using dilated convolution. The third row, as I pointed
25 out the first time I was speaking, involves combining those results with what
26 it calls the COB super pixels and presenting improved semantic contour or

1 object recognition results. There's no dispute about that. COB is involved,
2 and we cited this content in our Petition. So, the only way that they can say,
3 well, we didn't rely on that is by this misguided theory that our Petition is
4 limited to the COB neural network, which it absolutely is not.

5 Then when we turn to their arguments regarding the training of the
6 neural network, in particular in the learning base, it seems predicated on an
7 argument that the training of the learning base in Section 5 of Maninis,
8 which is talking about boundary detection, is framed on a different learning
9 base than what's going on in Section 6 of Maninis, which involves semantic
10 segmentation or object recognition. That is not true. Maninis describes, and
11 this is cited in our Petition, Maninis describes using a common learning base
12 for both boundary detection and object classification. In our Petition, for
13 example, we cited what's referred to as the Pascal context learning base. At
14 page 5, Maninis refers to that as involving pixel-wise semantic annotations.
15 You can see that, for example, cited at page 30 of our Petition, where we're
16 citing pages 5 and 6 of Maninis. And that same Pascal context learning base
17 is used for the training in Maninis that is involved in Section 6. That's seen
18 at page 11 of Maninis, where it's still referring to the Pascal context learning
19 base. That's in the second paragraph under the heading 6.1, object
20 proposals.

21 As another example, we cited Maninis' page 6 when discussing the
22 learning base, which has Table 1, where VOC-12 segmentation can be seen
23 to be used for both detecting object contours and semantic segmentation.
24 So, this argument that are you have to use two distinct learning bases is
25 completely false. And we showed that in the Petition. And in any event, our
26 Petition proposed modifying the training set described in Maninis to be

1 apparent appropriately annotated to provide object identifications for tooth
2 numbering. That's at pages 34 to 35 of our Petition. So, their argument is
3 disconnected from the obviousness challenge.

4 I would also point out that their slide, for example, slide 43, where
5 they are creating a strawman argument saying this is the specific training
6 that we relied on in our Petition, that's on page 7 of Maninis, and if you look
7 in our discussion of element B5, we did not discuss or cite page 7. We cited
8 pages 3, 5, and 6. So, again, they are not responding to the challenge that
9 was actually presented in the Petition. I would also note that in that
10 discussion of b) prime in our Petition, we also explained that as discussed in
11 more detail for Step c) prime, Maninis' object and contour detection enabled
12 both detection of teeth edges and recognition of individual teeth as taught by
13 Carrier. We were in no way limiting ourselves to the particular aspect of
14 Maninis that they are alleging we did.

15 They argued a couple of times that Salah's feedback techniques are
16 limited to registration marks and do not extend to the overlays. Salah never
17 said that. While it may give you registration marks as an example, he never
18 said that it's limited in that way. And again, that argument is attacking the
19 references individually and not responsive to the obviousness challenge
20 where we're turning to the teachings of Carrier. So, they're wrong about the
21 limitations of Salah, but it's also really irrelevant in view of the combination.

22 JUDGE ZECHER: Mr. Argenti, this is Judge Zecher. I do have
23 two questions. The first one is, this last thing we got into with Mr. Blythe
24 about whether or not Exhibit 1031 was timely served as supplemental
25 evidence. Can you respond to that?

26 MR. ARGENTI: We do not allege that we served it as

1 supplemental evidence. My response to your earlier question was
2 understanding it to be, are there these alternative avenues for submitting this
3 evidence to the Board? So, I was focusing more on the time of filing. The
4 avenue that we chose was an appropriate avenue. The Federal Circuit's
5 *VidStream* decision says that *Toshiba*, the non-precedential Board decision
6 no longer holds up in view of *VidStream*, and then there would have been
7 the alternative path had we served it as supplemental evidence to submit it.

8 JUDGE ZECHER: Last question I have is it appears that Claim 12
9 was selected as a showdown claim in District Court, and that the District
10 Court found that that claim and its underlying independent claim, which I
11 understand to be Independent Claim 1, to be patent ineligible under 101.
12 What is the status of that District Court litigation?

13 MR. ARGENTI: I will say that I do not represent Align in that
14 case, so I might not be the most knowledgeable about it, but my
15 understanding is that the District Court litigation has been dismissed by
16 stipulation so that that 101 decision can be appealed to the Federal Circuit.
17 So, as it stands, that decision for Claim 12, I believe, also extends to Claims
18 1 and 7 by agreement of the parties, and that those claims are all currently
19 ineligible as it stands with appeal pending by Dental Monitoring to the
20 Federal Circuit.

21 JUDGE ZECHER: Okay. Maybe Mr. Blythe or Ms. Jacobsen can
22 respond to that when they get up for sur-rebuttal just to give us an accurate
23 status update, but I appreciate that. Thank you.

24 JUDGE HOMERE: Thank you, Counsel. You are out of time.

25 MR. ARGENTI: Your Honor, if I could, could I address Claim 7
26 very briefly?

1 JUDGE HOMERE: Yeah, I guess we can give you a couple
2 minutes to do that.

3 MR. ARGENTI: Thank you, Your Honor. I just want to respond
4 to some arguments that we heard about Claim 7. They're predicated on this
5 understanding. based on certain portions of the specification that the
6 historical image must be labeled with an image attribute value, that's not
7 what the claim says, and that understanding is at odds with the example in
8 the specification that is cited in our slide which is slide 26, where we see that
9 it's the tooth attribute values that are used to determine the image attribute
10 values. And that's part of the analysis after the training takes place. Thank
11 you, Your Honor.

12 JUDGE HOMERE: Counsel for Patent Owner, you had 15
13 minutes initially, but because we gave Petitioner's representative an
14 additional two minutes, so we'll extend your sur-rebuttal down by two
15 minutes as well, so you have 17 minutes total. It's now 3:15. You can
16 proceed with your arguments when you're ready.

17 MR. BLYTHE: Thank you, Your Honors. I want to start by
18 addressing what Petitioner's counsel just mentioned about Claim 7. And in
19 particular, I want to address the example that Petitioner referred to in the
20 specification of a set of required, excuse me, of tooth numbers. And I would
21 direct your attention to Patent Owner's demonstrative slide number 85. This
22 has the full quotation from the patent where they give an example of using a
23 set of the list of tooth numbers represented in an image as an image attribute
24 value. That's entirely consistent with there being a real distinction between
25 tooth attributes and image attributes.

26 In fact, the patent recognizes that the same values can be either an

1 image attribute or a tooth attribute. What matters is what they relate to. And
2 for example, in the patent there's a disclosure of a tooth attribute value
3 being, for example, tooth decayed, right? So, you could identify that in one
4 region of the image, a tooth has decay. Decayed could also be an image
5 attribute value if it were describing the dental situation in the image as a
6 whole. So, it's not just our values inherently image or tooth attributes. What
7 matters is how they are used to train the deep learning device. And what's
8 inherent to a tooth attribute is that it is specific to where a region in the
9 image, called an analysis tooth zone, whereas the image attributes are
10 holistic to the image.

11 And I would direct your attention to slide 86, where we've
12 included, this is from Patent Owner's sur-reply, paper 29, beginning at page
13 26, kind of just an exemplary embodiment. This is not from the patent. This
14 is just purely illustrative. And just to give an example of how this would
15 practically look different, what you can see on slide 86 is that if you apply
16 pixelized semantic annotations as Petitioner proposes for meeting this
17 limitation, you would have for every pixel an indication. Is it background?
18 Is it, for example, 26, 27? You see from this image where we've depicted 26
19 and 27.

20 If you're applying an image attribute value, as Dr. Foroosh says,
21 that isn't a value for the image as a whole. That's how the patent describes it.
22 And it matters how that image description, how that attribute is applied in
23 the historical image. Because as you can see in slides 87 and 88, deep
24 learning devices that have been trained on these distinct types of attributes
25 perform different analyses. And that's what the patent discloses when it
26 talks about the detailed analysis method and the global analysis method.

1 This is not a word game about whether you could view tooth attributes
2 holistically as adding up to an image attribute value. That type of analysis
3 would completely erase the distinction not only between Claims 3 and 7, but
4 between the detailed and global analyses that this patent teaches as distinct
5 methods of analysis.

6 So, I'd like to also turn back to Petitioner's statements just now
7 regarding the COB neural network and their reliance on Maninis in the
8 Petition. And I want to be clear that when we talk about what Petitioner
9 identified for the training in the Petition, for meeting the limitation of trained
10 by means of a learning base, our point is not that Petitioner relied on that
11 particular learning base. As Petitioner identifies, they are proposing that you
12 would perform that training with teeth images instead. But what is critical is
13 that there is only one training disclosed in Maninis. And if Petitioner's
14 combination relies on the COB neural network, and a different neural
15 network, one that can do generic contours, and one that can do semantic. As
16 Dr. Mongan has explained, there is -- you cannot have the same training
17 base do both of those.

18 So, if Petitioner cited to Maninis' COB training, which as we have
19 called out on slide, excuse me, 45, so Patent Owner's slide 45, as we
20 identify, Maninis, what it actually discloses is that they're only using the
21 contours from that database. The VOC-12 segmentation database is a
22 publicly available database. It's used for image analysis competitions. And
23 what Maninis and its authors did is they took the contours out of it and
24 ignored the semantics. That is what was capable of training the COB neural
25 network. If it's Petitioner's position, as they put forward in the Petition, that
26 they're actually relying on the semantics, whether that's from that network or

1 as modified to be part of T, that cannot train Maninis' COB. So, whichever
2 way it is, either they're relying on Maninis' COB and it can't be trained with
3 their semantic training base, or they are relying on the training that was
4 actually disclosed in Maninis, which has no semantics. And that training
5 base can't teach the deep learning device like dilated network to detect
6 semantic contours.

7 So, their post hoc reliance on multiple neural networks in Maninis
8 causes the Petition to become inoperable. And it's clear from the Petition, as
9 we've discussed extensively in Patent Owner's response and sur-reply, that
10 what's more consistent with what's disclosed in the Petition is that Petitioner
11 had simply misunderstood what Maninis' COB was capable of. And I want
12 to clarify that Petitioner, as we looked at, relies on the speed of calculation
13 from Maninis' COB. And in particular, when and they apply that to Claim
14 14, that is the only speed that they rely on.

15 So, if Petitioner was relying on more than Maninis' COB, which is
16 not what is disclosed in the Petition, there is multiple evidentiary failures in
17 actually meeting the limitations of the claims.

18 I also want to correct that when counsel for Petitioner identified
19 that the training called out on slides 42 and 43 is labeled as Exhibit 1007,
20 page 7, the 7 there is actually a typo. That is very much the training from
21 page 3 as casual reference to the Exhibit 1007 would demonstrate. And
22 when the Patent Owner's expert identified this problem in the, along with
23 Patent Owner's response, Petitioner's reply is not, yes, Maninis' COB
24 actually can be trained on that. It's we're actually relying on multiple
25 networks. And in sum, the failure is that in relying on multiple networks
26 there is not a learning base or a training that can actually train both of the

1 required networks for analysis.

2 Lastly, I want to address briefly what Petitioner's counsel just
3 mentioned about Salah and attacking the references individually with respect
4 to what its registration marks are doing. I want to clarify that our argument
5 is that there is no reason to apply a more precise alignment technique in a
6 base reference in Salah, whose analysis is designed to avoid that exact type
7 of precise analysis. And if you look at Exhibit 1008 on page 31, and this is
8 called out extensively in Patent Owner's response and sur-reply, page 31 of
9 Exhibit 1008 actually addresses the exact combination that Petitioner has
10 proposed. Salah recognizes that registration marks on retractors are not
11 going to be as precise. But what Salah says is the ability to acquire images
12 with limited precision is a considerable advantage, that preferably no
13 measurements are taken on the teeth to bring the acquisition apparatus into
14 alignment. And the reason for that is because Salah doesn't need that type of
15 alignment. What Salah is achieving that alignment in its subsequent analysis
16 that takes place after image acquisition and does not need to be calculated in
17 real time before that image is captured.

18 Did you want to address the appeal of summons?

19 MS. JACOBSEN: No, it's a direct (INDISCERNIBLE).

20 MR. BLYTHE: Okay. I just want to confirm that Petitioner's
21 representation is accurate that the appeal from the District Court decision,
22 101 decision, is still pending at this time.

23 JUDGE ZECHER: Great. Thank you.

24 MR. BLYTHE: Okay. With that, Patent Owner rests.

25 JUDGE HOMERE: Thank you. Any questions from the panel?

26 JUDGE ZECHER: Nothing more for me. Thank you.

1 JUDGE SZPONDOWSKI: Nothing from me. Thanks.

2 JUDGE HOMERE: Okay. Thank you. Well, thank you for
3 appearing today and for answering questions. Please stay on the line in case
4 the court reporter has any questions or needs any spelling. Court Reporter,
5 do you have any questions for?

6 COURT REPORTER: No, sir, I was able to follow along with
7 everything. Thank you very much.

8 JUDGE HOMERE: Thank you. The hearing in the IPR2023-
9 01369 is concluded. We are adjourned. Thank you.

10 (Whereupon the above-entitled matter went off the record at 3:22
11 p.m.)

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