

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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3SHAPE A/S and 3SHAPE INC.,  
Petitioner,

v.

ALIGN TECHNOLOGY, INC.,  
Patent Owner.

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Case IPR2019-00156  
Patent 8,675,207 B2

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Before BRIAN J. McNAMARA, NEIL T. POWELL, and  
ELIZABETH M. ROESEL, *Administrative Patent Judges*.

ROESEL, *Administrative Patent Judge*.

DECISION  
Instituting *Inter Partes* Review  
*35 U.S.C. § 314*

3Shape A/S and 3Shape Inc. (“Petitioner”) filed a Petition (Paper 3, “Pet.”) seeking *inter partes* review of claims 1–21 (“the challenged claims”) of U.S. Patent No. 8,675,207 B2 (Ex. 1001, “the ’207 patent”). Align Technology, Inc. (“Patent Owner”) filed a Preliminary Response. Paper 8 (“Prelim. Resp.”).

We have authority to determine whether to institute an *inter partes* review. 35 U.S.C. § 314; 37 C.F.R. § 42.4(a). An *inter partes* review may not be instituted “unless . . . there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314(a). Applying that standard and considering the arguments and evidence presented in the Petition and Preliminary Response, we institute an *inter partes* review. As discussed below, we determine that Petitioner has established a reasonable likelihood that, as properly construed, the challenged claims are not entitled to an effective filing date that pre-dates publication of the asserted references, one of which has essentially the same disclosure as the challenged patent.

The following findings of fact and conclusions of law are not final, but are made for the sole purpose of determining whether Petitioner meets the threshold for instituting review. Any final decision will be based on the full trial record, including any response timely filed by Patent Owner.

## I. BACKGROUND

### A. *Related Matters*

Pursuant to 37 C.F.R. § 42.8(b)(2), the parties identify the following matters:

*Align Technology, Inc. v. 3Shape A/S*, No. 1:17-cv-01649 (D. Del., filed Nov. 14, 2017) (“Delaware litigation”); and

*In the Matter of Certain Intraoral Scanners and Related Hardware and Software, Inv. No. 337-TA-1091 (U.S. Int'l Trade Comm'n, complaint filed Nov. 14, 2017) ("ITC investigation").*  
Pet. 2; Paper 5, 1 (Patent Owner's Mandatory Notices).

The parties identify the following *inter partes* review proceedings in which Petitioner challenges the '207 patent or related patents:

Case No. IPR2019-00154, involving U.S. Patent No. 8,363,228 ("the '228 patent");

Case No. IPR2019-00155, involving U.S. Patent No. 8,451,456 ("the '456 patent");

Case No. IPR2019-00157, involving the '228 patent;

Case No. IPR2019-00159, involving the '456 patent;

Case No. IPR2019-00160, involving the '207 patent; and

Case No. IPR2019-00163, involving U.S. Patent No. 9,101,433.

Pet. 2-3; Paper 5, 1-2.

*B. Asserted Grounds of Unpatentability*

Petitioner asserts the following grounds of unpatentability under 35 U.S.C. § 103: (1) Babayoff<sup>1</sup> and Petersen;<sup>2</sup> (2) Babayoff and Fisker;<sup>3</sup> and

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<sup>1</sup> U.S. Patent Publication No. 2006/0001739, published January 5, 2006, Ex. 1034 ("Babayoff").

<sup>2</sup> PCT International Publication No. WO 02/056756, published July 25, 2002, Ex. 1035 ("Petersen")

<sup>3</sup> PCT International Publication No. WO 2010/145669, published December 23, 2010, Ex. 1037 ("Fisker").

(3) Babayoff and Engelhardt.<sup>4</sup> Each of these grounds challenges claims 1–21 of the '207 patent. Pet. 7.

Petitioner supports its challenges with a Declaration of Sohail Dianat, Ph.D. Ex. 1026 (“Dianat Declaration”). Patent Owner supports its opposition with a Declaration of Chandrajit L. Bajaj, Ph.D. Ex. 2001 (“Bajaj Declaration”).

*C. The '207 Patent (Ex. 1001)*

The title of the '207 patent is “Method and apparatus for colour imaging a three-dimensional structure.” Ex. 1001, (54). The patent discloses a device for determining the surface topology and associated color of a three-dimensional structure, such as a teeth segment. *Id.* at (57), 2:54–60. The resulting data can be used for design and manufacture of a dental prosthesis, such as a crown, bridge, restoration, or filling. *Id.* at 2:60–64. The device includes a scanner for providing depth data and a color imager for providing color data. *Id.* at (57), 4:61–5:3. A processor combines the color data and depth data to provide a three-dimensional color virtual model of the surface of the structure. *Id.* at (57), 5:23–25.

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<sup>4</sup> U.S. Patent No. 6,263,234, issued July 17, 2001, Ex. 1005 (“Engelhardt”).

Figure 1 of the '207 patent is reproduced below:

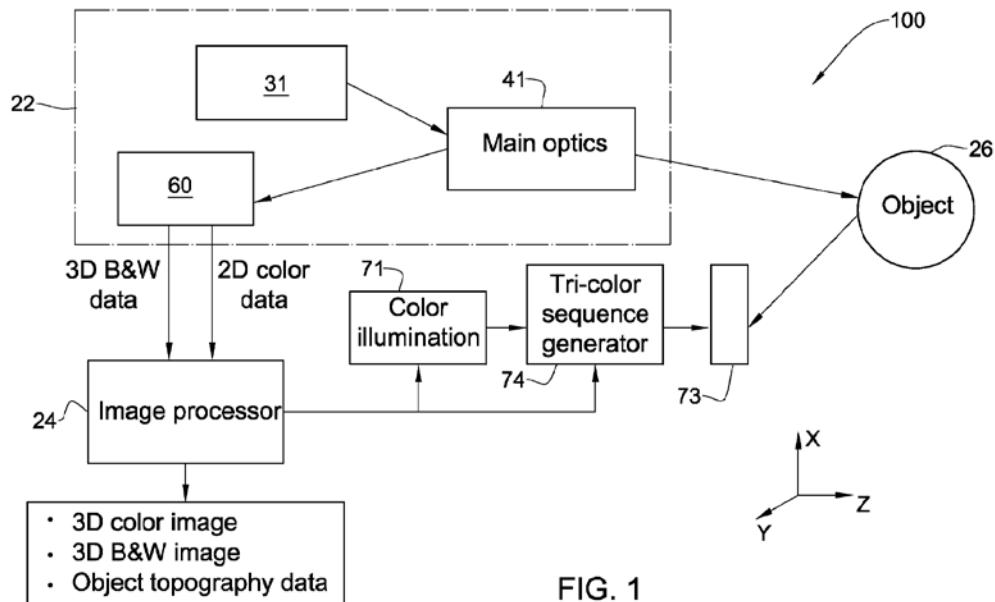


Figure 1 is a block diagram illustrating the relationship among various elements of the imaging device according to the '207 patent. Ex. 1001, 12:33–34, 13:10–13. As shown in Figure 1, device 100 includes optical device 22, which in turn includes main illumination source 31, main optics 41, and detection optics 60, which together provide a three-dimensional (“3D”) numerical entity comprising the surface coordinates of object 26. *Id.* at 13:14–28, Fig. 1. Device 100 also includes tri-color light sources 71, tri-color sequence generator 74, and delivery optics 73, which together illuminate object 26 with suitable colors, typically green, red and blue, allowing a two-dimensional (“2D”) color image of object 26 to be captured by detection optics 60. *Id.* at 13:29–34, 16:61–67. Device 100 further includes processor 24, which aligns the 2D color image with the 3D entity and maps color values to the 3D entity at aligned X-Y points. *Id.* at 13:41–44, 14:47–56, Fig. 1.

Figures 4A and 4B of the '207 patent are reproduced below:

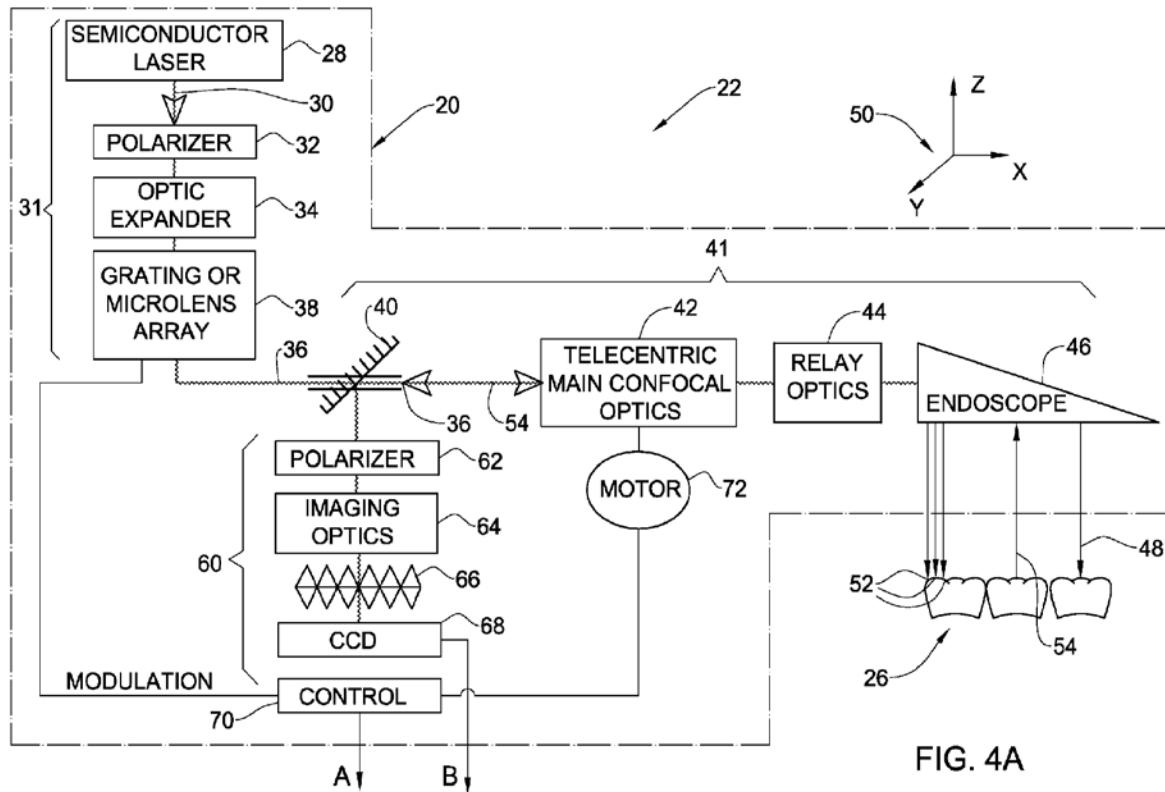


FIG. 4A

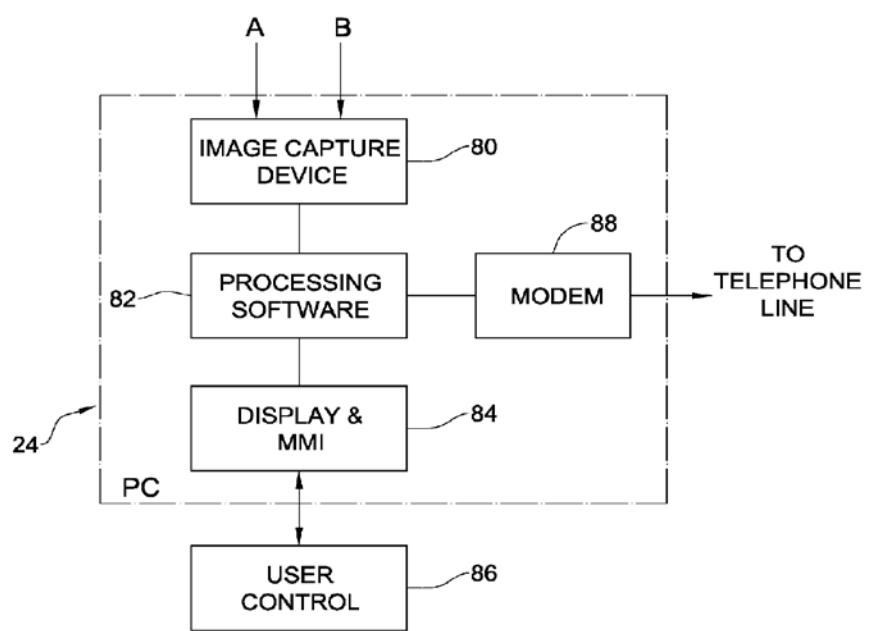


FIG. 4B

Figures 4A and 4B are block diagrams illustrating system 20 for confocal imaging of a 3D structure and providing a 3D monochrome entity.

Ex. 1001, 12:42–44, 14:59–61. As shown in Figures 4A and 4B, system 20 comprises optical device 22 coupled to processor 24. *Id.* at 14:66–67.

Optical device 22 comprises main illumination source 31, main optics 41, detection optics 60, control module 70, and motor 72. *Id.* at 14:57–59, 16:24–26, Fig. 4A. Main illumination source 31 includes semiconductor laser unit 28, polarizer 32, optic expander 34, and module 38, e.g., a grating or micro lens array. *Id.* at 14:67–15:8, Fig. 4A. Main optics 41 includes punctured mirror 40, confocal optics 42, relay optics 44, and endoscope 46. *Id.* at 15:13–14, 15:31–33, 15:66, Fig. 4A. Detection optics 60 comprises polarizer 62, imaging optic 64, array of pinholes 66, and charge coupled device (“CCD”) 68. *Id.* at 16:11–18, 16:60, Fig. 4A. Processor 24 includes image capturing module 80, a central processing unit (“CPU”) with processing software 82, and display 84. *Id.* at 16:19–20, 16:39, 16:49–50, 17:5, Fig. 4B. Processor 24 is connected to user control module 86, typically a computer keyboard. *Id.* at 16:50–52, Fig. 4B.

The ’207 patent discloses and illustrates seven embodiments of device 100, each of which has a different configuration for obtaining a 2D color image. Ex. 1001, 12:45–13:6, 17:9–24:44, Figs. 5A–13. In a first embodiment, delivery optics 73 is integral with endoscope 46, which is in the form of probing member 90, as illustrated in FIGS. 5A–5C. *Id.* at 17:9–12.

#### *D. Illustrative Claim*

The ’207 patent includes 26 claims, all of which are challenged by Petitioner. Claim 1 is the sole independent claim and is reproduced below,

with paragraphs adjusted and bracketed identifiers added to correspond with Petitioner's identification of claim elements:

1. [Preamble] A method for determining the surface topology and associated color of at least a portion of a three-dimensional dental structure, the method comprising:

[1.1] providing a hand-held device comprising:

[1.2] (a) a scanning system configured to provide depth data of the portion, the depth data corresponding to a plurality of data points defined on a plane substantially orthogonal to a depth direction;

[1.3] (b) an imaging system configured to provide color image data of the portion associated with said plurality of data points; and

[1.4] (c) a processor configured to associate the depth data with the color image data,

[1.5] wherein the depth data and the color image data represent the surface topology and the color of the portion of the three-dimensional dental structure; and

[1.6] operating the hand-held device.

Ex. 1001, 26:19–35; *see* Pet. 34–38 (headings identify elements of claim 1).

## II. DISCUSSION

### A. *Claim Construction*

Because the Petition was filed before November 13, 2018, and the '207 patent has not yet expired, claim terms are to be given their broadest reasonable interpretation in light of the specification. 37 C.F.R. § 42.100(b) (2018).<sup>5</sup> Under that standard, we generally give claim terms their ordinary

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<sup>5</sup> A recent amendment to this rule does not apply here. *See* Changes to the Claim Construction Standard for Interpreting Claims in Trial Proceedings

and customary meaning, as would be understood by a person of ordinary skill in the art, in the context of the entire patent disclosure. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007).

Petitioner proposes constructions for a number of claim terms, including “a handheld device comprising . . . a processor . . .,” which appears in claim 1. Pet. 25–32. Patent Owner opposes Petitioner’s proposed construction for this term and asserts that no other claim term needs to be construed for purposes of deciding whether to institute trial. Prelim. Resp. 11–25.

Below we address the parties’ dispute regarding “a handheld device comprising . . . a processor . . .” After considering the Petition and the Preliminary Response, we determine that no other claim term requires express construction for purposes of this Decision. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (“[W]e need only construe terms ‘that are in controversy, and only to the extent necessary to resolve the controversy.’”) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

*“a hand-held device comprising: . . . a processor . . .”*

Petitioner contends that the phrase “***a handheld device comprising . . . (c) a processor*** configured to associate the depth data with the color image data, wherein the depth data and the color image data represent the surface topology and the color of the portion of the three-dimensional dental structure” should be construed as “***a unitary device that can be held in a***

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Before the Patent Trial and Appeal Board, 83 Fed. Reg. 51,340 (Oct. 11, 2018) (amending 37 C.F.R. § 42.100(b) effective November 13, 2018).

***user's hand and includes a processor*** configured to associate the depth data with the color image data, wherein the depth data and the color image data represent the surface topology and the color of a portion of a three-dimensional dental structure.” Pet. 30 (emphasis added).<sup>6</sup> According to Petitioner, “this phrase does not encompass a unitary device that can be held in a user's hand wherein the processor is physically separated from such unitary device.” *Id.* at 30–31 (emphasis omitted).

Patent Owner opposes Petitioner's construction, arguing that “nothing in the claim language itself or the specification *requires* the processor to be physically incorporated into a hand-held device.” Prelim. Resp. 15. According to Patent Owner, “the claimed ‘processor’ may be at a communicatively coupled location other than the hand-held portion.” *Id.* at 24.

The critical issue at this stage is whether the claim language, “a hand-held device comprising . . . a processor,” requires that the processor be physically incorporated into the hand-held device. After considering the Petition and the Preliminary Response and for purposes of this Decision, we construe claim 1 as requiring a hand-held device that physically incorporates

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<sup>6</sup> The portion of Petitioner's proposed construction that states “configured to associate the depth data with the color image data, wherein the depth data and the color image data represent the surface topology and the color of a portion of a three-dimensional dental structure” is essentially the same as the claim language. We have highlighted the remainder of Petitioner's proposed construction and the corresponding claim language to emphasize how Petitioner construes the claim.

a processor.<sup>7</sup> Our construction is not final and may be changed based on arguments and evidence presented by the parties at trial.

Our construction is based on the plain and unambiguous language of claim 1, which recites: “A method . . . comprising: providing a hand-held device comprising . . . a processor . . .” Ex. 1001, 26:19–35. Our reviewing court has consistently interpreted “comprising” to mean that the listed elements are essential but other elements may be added. *Lucent Techs., Inc. v. Gateway, Inc.*, 525 F.3d 1200, 1214 (Fed. Cir. 2008). In claim 1, the transitional word “comprising” appears twice. In the first instance, it is a transition from the “method” to the steps of the method. In the second instance, it is a transition from the “hand-held device” to the components of the hand-held device. The processor is recited as a component of the hand-held device, not merely a component provided by the method. The claim does not, for example, recite: “A method . . . comprising: providing a hand-held device . . . **and providing** a processor . . .” *ChefAm., Inc. v. Lamb-Weston, Inc.*, 358 F.3d 1371, 1374 (Fed. Cir. 2004) (“in accord with our settled practice we construe the claim as written, not as the patentees wish they had written it”).

Our construction is further supported by the plain and unambiguous language of claim 1 of the ’456 patent and claim 1 of the ’228 patent,<sup>8</sup> each of which recites the same claim term at issue here: “a hand-held device comprising . . . a processor . . .” *NTP, Inc. v. Research in Motion, Ltd.*, 418

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<sup>7</sup> Of course, the processor must be configured as recited in the claim.

<sup>8</sup> The ’207 patent issued on a continuation of the application that issued as the ’456 patent, which issued on a continuation of the application that issued as the ’228 patent. *See* Ex. 1001, (63).

F.3d 1282, 1293 (Fed. Cir. 2005) (“Because NTP’s patents all derive from the same parent application and share many common terms, we must interpret the claims consistently across all asserted patents.”); *Omega Eng’g, Inc, v. Raytek Corp.*, 334 F.3d 1314, 1334 (Fed. Cir. 2003) (“we presume, unless otherwise compelled, that the same claim term in the same patent or related patents carries the same construed meaning.”). Similar to claim 1 of the ’207 patent, the transitional word “comprising” appears twice in claim 1 of the ’456 patent and twice in claim 1 of the ’228 patent. *See* Case No. IPR2019-00154, Ex. 1001, 25:40–52; Case No. IPR2019-00155, Ex. 1001, 25:55–26:3. In the first instance, it is a transition from the “system” to the components of the system. In the second instance, it is a transition from the “hand-held device” to the components of the hand-held device. The processor is recited as a component of the hand-held device, not merely a component of the system.

We have considered the case law relied upon by Patent Owner,<sup>9</sup> but neither case persuades us that the phrase “a hand-held device comprising . . . a processor . . .” encompasses a hand-held device that does not contain a processor. Prelim. Resp. 14. The issue in *Papst* was whether an “interface device” was limited to a “stand-alone device,” not whether the recited elements of the interface device were necessary components of that device. *Papst*, 778 F.3d at 1262.

*Server Technology* is also distinguishable. There, the claim recited:

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<sup>9</sup> *In re Papst Licensing Digital Camera Patent Litig.*, 778 F.3d 1255, 1262 (Fed. Cir. 2015); *Server Tech., Inc. v. Am. Power Conversion Corp.*, 657 F. App’x 1030, 1034 (Fed. Cir. 2016).

An electrical power distribution plugstrip . . . comprising in combination:

A. a vertical strip enclosure . . . and

F. a plugstrip current reporting system (i) associated with the vertical strip enclosure . . .

*Server Tech.*, 657 F. App’x at 1032. The Court relied upon the “associated with” language to hold that the claim does not require that Element F. “be lodged on or within the one-piece enclosure.” *Id.* at 1033. Claim 1 of the ’207 patent is substantially different. It does not recite an enclosure or housing as a component of the hand-held device, nor does it recite that the processor is associated with, coupled to, or otherwise not necessarily included within the hand-held device.

We have considered the parties’ arguments regarding the specification of the ’207 patent. A hand-held device is mentioned only once in the specification. Ex. 1001, 25:8–11. Both parties rely on the following passage from the specification:

The endoscope 46, the illumination unit 31, the main optics 41, color illumination 71 and tri-color sequence generator [74] are preferably included together in a unitary device, typically a hand-held device. The device preferably includes also the detector optics 60, though the latter may be connected to the remainder of the device via a suitable optical link such as a fibre optics cable.

*Id.* at 25:8–14. Petitioner relies on the first sentence to argue that a hand-held device is a unitary device. Pet. 30. For purposes of determining whether to institute an *inter partes* review, it is not necessary to decide whether a hand-held device is a “unitary device,” as set forth in Petitioner’s proposed construction. Patent Owner relies on the second sentence, emphasizing the words “remainder of the device” (Prelim. Resp. 16) to

argue “the claimed handheld device has a portion capable of being handheld, and includes a processor that is located in another portion” (*id.* at 18). On the record now before us, we disagree with Patent Owner for the following reasons. First, the sentence relied upon by Patent Owner pertains to detector optics, not a processor. Second, the sentence sets forth two distinct options: (1) the detector optics may be included in the hand-held device, or (2) the detector optics may be connected to the hand-held device via a fiber optic cable. The sentence does not suggest that the detector optics is part of the hand-held device under the second option.

The parties agree that, in the embodiment of the ’207 patent shown in Figures 4A and 4B, the processor is physically separate from the handheld device. Pet. 19–20; Prelim. Resp. 15, 18, 30. Petitioner states that, in Figure 4B, “the physically separate image processor 24” is “located in a personal computer (PC).” Pet. 20. Agreeing with Petitioner, Patent Owner asserts that Figures 4A and 4B “show the processor to be located on a PC that is remote from the rest of the system.” Prelim. Resp. 30 (citing Ex. 1001, Figs. 4A, 4B, 24:40–44). In related cases, Patent Owner asserted that the embodiment of Figures 4A and 4B shows a hand-held device “communicatively coupled to a processor that is physically remote from the device.” Case IPR2019-00154, Paper 8, 13; Case IPR2019-00155, Paper 7, 13. Here, Patent Owner modifies that contention, asserting that the embodiment of Figures 4A and 4B shows “the processor is communicatively coupled to ***the remainder of*** the hand-held device.” Prelim. Resp. 15 (emphasis added). Patent Owner identifies no difference between the ’207 patent’s disclosure and the disclosure of the related patents that justifies this modification.

Patent Owner argues “[i]t is rare that a claim construction will exclude a preferred embodiment.” Prelim. Resp. 15 (citing *Phillips v. AWH Corp.*, 415 F.3d 1303, 1323 (Fed. Cir. 2005) (en banc)); *see also* Prelim. Resp. 11, 17 (same argument, citing *On-Line Techs., Inc. v. Bodenseewerk Perkin-Elmer GmbH*, 386 F.3d 1133, 1138 (Fed. Cir. 2004)). On this record, it appears that Petitioner’s proposed construction excludes the embodiment of Figures 4A and 4B of the ’207 patent. Pet. 19–20; Prelim. Resp. 15, 18, 30 (parties agree that, in the embodiment disclosed in Figures 4A and 4B of the ’207 patent, the processor is physically separate from the handheld device).

Where the claim language is unambiguous and the specification does not redefine the claim term to have an alternative meaning, it is not improper to construe the claims to exclude all disclosed embodiments. *Lucent*, 525 F.3d at 1213–16 (affirming claim construction that was clearly supported by the claim language, even though it was not supported by the sole embodiment described in the specification); *see also Transperfect Global, Inc. v. Matal*, 703 F. App’x 953, 960 (Fed. Cir. 2017), *cert. denied sub nom. TransPerfect Glob., Inc. v. Iancu*, 138 S. Ct. 1715 (2018) (“It is true that claims typically cover embodiments disclosed in the specification, . . . , but here, nothing in the specification requires a re-understanding of the claim language to encompass the disclosed embodiment . . . .”) (citations omitted).

In our preliminary view based on the current record, the claim language “a hand-held device comprising . . . a processor . . . .” is unambiguous and requires a hand-held device that physically incorporates a processor. Furthermore, based on the parties’ arguments at this stage of the proceeding, we do not see anything in the specification that redefines “a

hand-held device comprising . . . a processor” to a have a meaning different from the claim language.

Patent Owner directs us to the specification passage that discloses: “[t]he [hand-held] device preferably includes also the detector optics 60, though the latter may be connected to the remainder of the device via a suitable optical link such as a fibre optics cable.” Ex. 1001, 25:11–14; *see* Prelim. Resp. 16–17. In our view based on the current record, this passage does not suggest that claim 1 encompasses a hand-held device that is communicatively coupled to a remote processor. As discussed above, the passage does not suggest that detector optics that are connected to a hand-held device via a fiber optic cable are nevertheless part of the hand-held device. On the contrary, the use of the word “though” suggests that what follows it is not the same as what precedes it. In other words, a hand-held device including detector optics is different from a hand-held device connected to detector optics via a fiber optic cable.

Patent Owner additionally argues that Petitioner’s proposed construction is “unmoored from” the ’207 patent’s “advance over the prior art,” which relates to mapping color data to depth data and does not exclude “a processor that is connected to, but not physically included in, the hand-held device.” Prelim. Resp. 18–20 (citing Ex. 1001, 1:59–63, 1:67–2:3, 4:28–60, 14:54–56). We have considered Patent Owner’s argument and the cited portions of the specification and are not persuaded at this stage that “a hand-held device comprising . . . a processor” should be construed more broadly than the unambiguous claim language allows.

We have also considered Patent Owner’s arguments regarding the prosecution history. As noted by the parties, the claim language, “a hand-

held device comprising . . . a processor . . .” was added by amendment during prosecution of the parent and grandparent applications and included in the claims originally filed in the application that issued as the ’207 patent. Ex. 1002, 214; Ex. 1032, 104; Ex. 1040, 87; Pet. 11–12; Prelim. Resp. 5, 20–21. Patent Owner argues that this prosecution history supports Patent Owner’s claim construction because the Examiner made no mention of a hand-held device in multiple Office communications, including the Reasons for Allowance. Prelim. Resp. 5–6, 20–21; Ex. 1002, 31–33; 104–109; Ex. 1032, 31–32; Ex. 1040, 28–29. Patent Owner asserts, “nothing in the prosecution history . . . justifies interpreting the processor to be integral with the handheld device.” Prelim. Resp. 22.

The absence of any mention of a hand-held device in the Examiner’s Office Action and Reasons for Allowance does not convince us to deviate from the ordinary meaning of “a hand-held device comprising . . . a processor.” Patent Owner cites no authority supporting that limitations not mentioned in the reasons for allowance can be construed more broadly than the claim language otherwise permits.

Patent Owner additionally relies on extrinsic evidence, namely U.S. Patent No. 6,263,233 (Ex. 1073). Prelim. Resp. 22–24. After considering Patent Owner’s argument, we are not persuaded that the specification and claims of an unrelated prior art patent are probative of how the claims of the ’207 patent should be construed.

*B. Principles of Law*

A claim is unpatentable under 35 U.S.C. § 103(a) if “the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and, when introduced, (4) objective indicia of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

The first three *Graham* factors are discussed in Sections II.D, E, and F below. Regarding the fourth factor, neither party presents arguments or evidence regarding objective indicia at this stage of the proceeding. Before addressing the *Graham* factors, however, we must first address the parties’ dispute regarding the effective filing date of the ’207 patent.

“[A] patent application is entitled to the benefit of the filing date of an earlier filed application only if the disclosure of the earlier application provides support for the claims of the later application, as required by 35 U.S.C. § 112.” *PowerOasis, Inc. v. T-Mobile USA, Inc.*, 522 F.3d 1299, 1306 (Fed. Cir. 2008) (quoting *In re Chu*, 66 F.3d 292, 297 (Fed. Cir. 1995)). “To satisfy the written description requirement the disclosure of the prior application must ‘convey with reasonable clarity to those skilled in the art that, as of the filing date sought, [the inventor] was in possession of the invention.’” *Id.* (quoting *Vas-Cath Inc. v. Mahurkar*, 935 F.2d 1555, 1563–64 (Fed. Cir. 1991)).

“In an [*inter partes* review], the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016). The burden of persuasion never shifts to Patent Owner.

*Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015). Where the only question presented is whether due consideration of the *Graham* factors renders the challenged claims obvious, no burden shifts from the patent challenger to the patentee. *In re Magnum Oil Tools Int'l, Ltd.*, 829 F.3d 1364, 1376 (Fed. Cir. 2016).

On the issue of priority, however, the burdens of production may shift. Petitioner has the initial burden of going forward with evidence of unpatentability based on one or more prior art references. *Magnum Oil*, 829 F.3d at 1376; *Dynamic Drinkware*, 800 F.3d at 1379 (discussing *Tech. Licensing Corp. v. Videotek, Inc.*, 545 F.3d 1316, 1327 (Fed. Cir. 2008)). Patent Owner then has the burden of going forward with evidence that the challenged claim is entitled, under 35 U.S.C. § 119(e)(1) or § 120, to the benefit of a filing date prior to the alleged prior art. *Magnum Oil*, 829 F.3d at 1376; *Dynamic Drinkware*, 800 F.3d at 1379. This requires Patent Owner to show “not only the existence of the earlier application, but why the written description in the earlier application supports the claim.” *Dynamic Drinkware*, 800 F.3d at 1379 (quoting *Tech Licensing*, 545 F.3d at 1327). The burden of going forward again shifts to Petitioner to persuade the Board that the challenged patent is not entitled to the benefit of the earlier filing date. *Id.*

### C. Effective Filing Date of the '207 Patent

The '207 patent was issued March 18, 2014, from Application No. 13/868,926, filed April 23, 2013 (Ex. 1041, “the '926 application”), and claims the benefit of a series of non-provisional applications beginning with Application No. 11/154,520, filed June 17, 2005 (“the '520 application”). Ex. 1001, (21), (22), (63), 1:7–18. The '207 patent also claims the benefit of

provisional Application Nos. 60/580,108 and 60/580,109, both filed June 17, 2004. *Id.* at (60), 1:18–23.

Petitioner contends that claims 1–21 of the '207 patent are not entitled to an effective filing date of earlier than April 23, 2013. Pet. 8, 15, 21, 24, 33. On that basis, Petitioner contends that Babayoff, Petersen, Fisker, and Engelhardt qualify as prior art to the '207 patent under 35 U.S.C. § 102(b). *Id.* at 8, 33. Patent Owner argues that Babayoff is not prior art to the challenged claims of the '207 patent. Prelim. Resp. 1. We address the parties' arguments below.

Petitioner contends that the '926 application and the provisional and non-provisional priority applications do not provide written description support for claims 1–21 of the '207 patent. Pet. 13–23 (citing Ex. 1026 ¶¶ 5, 31, 32, 35–49). Specifically, Petitioner contends that none of these applications discloses a hand-held device comprising a processor. *Id.* at 11, 22. Petitioner represents that the specifications of the '926 application and the non-provisional applications (*see* Ex. 1001, (63), 1:5–12) are “nearly identical” and refers to these specifications as the “common specification.” *Id.* at 16. Petitioner asserts:

While the common specification indicates that “[t]he endoscope 46, the illumination unit 31, the main optics 41, color illumination 71 and tri-color sequence generator are preferably included together in a unitary device, typically a hand-held device,” the common specification, does not provide express or implied disclosure that the processor, processing means, or processing unit are included in such hand-held (unitary) device. Pet. 17–18 (quoting Ex. 1041 ¶ 183). Petitioner asserts that Figures 1, 4A, and 4B of the '207 patent show image processor 24 physically separated from the other system components. *Id.* at 18–21. According to Petitioner,

the common specification does “not explicitly or implicitly disclose the image processor 24, much less any processor, in any hand-held (unitary) device.” *Id.* at 18.

Patent Owner argues that the challenged claims are supported by the written description of the ’207 patent “irrespective” of how the claims are construed. Prelim. Resp. 22, 28. Patent Owner argues that, under its proposed claim construction, Figures 4A and 4B of the ’207 patent provide written description support for the challenged claims. *Id.* at 29–30. Patent Owner argues that the ’207 patent provides sufficient disclosure for a person of ordinary skill in the art (“POSITA”) reasonably to conclude that the inventor had possession of the claimed invention, including a hand-held device comprising a processor configured to associate the depth data with the color image data. *Id.* at 30–38. Patent Owner presents this argument in two parts.

First, Patent Owner argues that a POSITA would have recognized that the ’207 patent discloses a hand-held device having a processor. *Id.* at 31–34. Patent Owner relies on Figure 1 of the ’207 patent, the list of elements that are “preferably” included in a hand-held device (Ex. 1001, 25:8–14),<sup>10</sup> the function of processor 24 to control tri-color light sources 71 and tri-color sequence generator 74 (*id.* at 16:61–67), and the ’207 patent’s disclosure that “[t]ypically, the image processor, or another computer, will attempt to align . . .” (*id.* at 14:47–50). Prelim. Resp. 31–33. Patent Owner also relies on the Bajaj Declaration that a POSITA would have understood that the list of elements “preferably” included in a handheld device is not an exclusive list.

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<sup>10</sup> This passage from the ’207 patent is quoted at page 13 above.

Ex. 2001 ¶ 58; Prelim. Resp. 32. Citing the Bajaj Declaration, Patent Owner argues that a POSITA would have realized and appreciated it would have been inconvenient to send control signals from a handheld device to a PC and that including the processor 24 as part of the handheld device would have facilitated more efficient color data processing and feedback. Prelim. Resp. 32–33, 36; Ex. 2001 ¶¶ 59, 76. Again relying on the Bajaj Declaration, Patent Owner argues that “[i]t is common in the dental arts for practitioners to consider devices as ‘handheld’ even though supporting equipment is on a cart, for example, next to the dentist.” Prelim. Resp. 34 (citing Ex. 2001 ¶ 60).

Second, Patent Owner argues that hand-held scanners having onboard processors were well known in the art at the time of the invention. Prelim. Resp. 34–38. Patent Owner relies on two prior art references disclosed in the background section of the ’207 patent, one directed to a handheld device in communication with a separate processor and the other directed to a handheld device having an onboard processor. *Id.* at 6, 35 (citing Ex. 1001, 1:55–2:50; Ex. 2001 ¶¶ 44, 70; Ex. 2007, 5:50–59; Ex. 2008, 3:32–62). Patent Owner also relies on the Bajaj Declaration concerning image processing chips that were available before Babayoff’s filing date. *Id.* at 36–37 (citing Ex. 2001 ¶¶ 62–79). Dr. Bajaj, in turn, relies on National Semiconductor’s LM9704 digital image processor for use, e.g., in cell phone cameras. Ex. 2001 ¶¶ 70–74 (citing Ex. 2006). Citing the Bajaj Declaration, Patent Owner argues “a POSITA would have readily recognized and understood that processors having the appropriate size to be placed anywhere within hand-held devices and the appropriate processing power to associate depth data with color image data of a three-dimensional object **was**

**very common.”** Prelim. Resp. 37–38 (citing Ex. 2001 ¶ 74) (emphasis added).

To satisfy the written description requirement of 35 U.S.C. § 112 ¶ 1, a patent application “must clearly allow [a POSITA] to recognize that the inventor invented what is claimed,” such that “the disclosure of the application relied upon reasonably conveys to [a POSITA] that the inventor had possession of the claimed subject matter as of the filing date.” *Ariad Pharm., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (en banc) (emphasis added) (internal quotation marks, brackets, and citations omitted). “[T]he hallmark of written description is disclosure.” *Id.*

Our reviewing court instructs that “[a] disclosure in a parent application is not sufficient if it ‘merely renders the later-claimed invention obvious . . . ; the disclosure must describe the claimed invention with all its limitations.’” *Los Angeles Biomedical Research Inst. at Harbor-UCLA Med. Ctr. v. Eli Lilly & Co.*, 849 F.3d 1049, 1057 (Fed. Cir. 2017) (quoting *Tronzo v. Biomet, Inc.*, 156 F.3d 1154, 1158 (Fed. Cir. 1998)). Similarly, “[i]t is not sufficient for purposes of the written description requirement of § 112 that the disclosure, when combined with the knowledge in the art, would lead one to speculate as to the modifications that the inventor might have envisioned, but failed to disclose.” *D Three Enterprises, LLC v. SunModo Corp.*, 890 F.3d 1042, 1050 (Fed. Cir. 2018) (quoting *Lockwood v. Am. Airlines, Inc.*, 107 F.3d 1565, 1572 (Fed. Cir. 1997)).

For the reasons discussed in Section II.F below, we determine that Petitioner has met its initial burden of going forward with evidence of unpatentability based on Babayoff in combination with Petersen, Fisker, or Engelhardt. In view of Petitioner’s evidence, the burden of production shifts

to Patent Owner to present evidence that the challenged claims are supported by the written description of an application filed earlier than Babayoff’s publication date. *See Magnum Oil*, 829 F.3d at 1376; *Dynamic Drinkware*, 800 F.3d at 1379 (discussing shifting burdens). After reviewing the evidence and argument presented by Patent Owner in the Preliminary Response, we determine, on this record, that Patent Owner has not met its burden of producing evidence that the challenged claims are supported by the written description. Our reasoning is two-fold.

First, for the reasons discussed in Section II.A above and for purposes of this Decision, we construe claim 1 as requiring a hand-held device that physically incorporates a processor. Although Patent Owner argues that the challenged claims are supported by the written description “irrespective” of how the claims are construed (Prelim. Resp. 22, 28), we determine that Patent Owner does not present sufficient evidence showing written description support under Petitioner’s proposed claim construction. Instead, both the Preliminary Response and the Bajaj Declaration rely on Patent Owner’s proposed construction, which does not require that a processor be physically incorporated in a hand-held device. Prelim. Resp. 29–30, 33–34; Ex. 2001 ¶¶ 60, 61.

Second, Patent Owner’s arguments and evidence rely on an obviousness standard, rather than the legal standard applicable when determining whether a claim has adequate written description support. *See, e.g., Los Angeles*, 849 F.3d at 1057. For example, Patent Owner argues that the ’207 patent’s list of elements preferably included in a handheld device is “not . . . an exclusive list,” that sending control signals to a separate processor “would have been inconvenient,” and that an onboard processor

“would have facilitated more efficient color data processing and feedback.” Prelim. Resp. 32–33, 36; Ex. 2001 ¶¶ 58, 59, 76. Similarly, Patent Owner argues that it is “common in the dental arts” to consider equipment on a cart as “handheld” and that processors having the appropriate size and processing power were “very common.” Prelim. Resp. 34, 37–38; Ex. 2001 ¶¶ 60, 73. In our view, Patent Owner’s arguments and the cited portions of the Bajaj Declaration might support that a hand-held device physically incorporating a processor would have been obvious based on the disclosure of the ’207 patent, but they are not likely to be sufficient to discharge Patent Owner’s burden to produce evidence that the inventor had possession of such a hand-held device.

Accordingly, after considering the Petition and the Preliminary Response and for purposes of deciding whether to institute review, we determine that the challenged claims are not entitled to their claimed priority date because the specification lacks adequate written description support for “a hand-held device comprising . . . a processor,” as recited in claim 1.

*D. Level of Ordinary Skill in the Art*

Relying on the Dianat Declaration, Petitioner asserts that POSITA would have at least (1) a bachelor’s degree in electrical engineering, optical engineering, or physics (or equivalent course work) and three to four years of work experience in the areas of optical imaging systems and image processing or (2) a master’s degree in electrical engineering or physics (or equivalent course work) with a focus in the area of optical imaging systems and image processing. Pet. 24 (citing Ex. 1026 ¶ 28). Patent Owner does not dispute Petitioner’s definition of a POSITA.

For purposes of determining whether to institute review, we accept Petitioner’s definition of a POSITA.

*E. Asserted Prior Art References*

Below we provide an overview of the references asserted by Petitioner.

*1. Babayoff (Ex. 1034)*

Babayoff is a publication of the ’520 application, which is the earliest non-provisional application to which the ’207 patent claims a benefit. Ex. 1001, (63); Ex. 1034, (21); *see* Pet. 8; Prelim. Resp. 1 (Babayoff “sits early within an unbroken chain of continuation applications to which the challenged ’207 patent claims priority”). The parties agree that “Babayoff’s disclosure . . . is effectively identical to the disclosure in the ’207 patent.” Prelim. Resp. 28; Pet. 8 (“Babayoff has a specification that is nearly identical to the ’207 Patent”).

*2. Petersen (Ex. 1035)*

Petersen discloses “a wireless hand-held digital imaging diagnostic instrument for medical treatment of patient.” Ex. 1035, 1:5–6. Petersen states that “[h]and-held diagnostic instrument[s] for medical treatment of patients are commonly known.” *Id.* at 1:9–10. Petersen elaborates that “remote hand-held instruments with processing means have been developed where a programmable logic to capture and store images has been developed.” *Id.* at 1:22–24.

According to Petersen, one embodiment of the disclosed hand-held instrument “combines imaging capture and processing system, imaging visualisation, user interface and plurality of exchangeable instrument heads

for multiple examination.” Ex. 1035, 2:19–22. Petersen discloses that the digital hand-held imaging instrument comprises: “a housing, a digital imaging system for capturing digital images and imaging processing, a conical shaped instrument head . . . , and means for adjusting the radial size of the instrument head.” *Id.* at 3:4–14. Petersen describes various functions of the processing means, including comparing images to known images in a database. *Id.* at 5:12–22.

Petersen discloses a hand-held digital imaging instrument for medical treatment of patients, including a plurality of interchangeable instrument heads. Ex. 1035, 7:21–22, 9:1–2, Fig. 1. One such instrument head is a “dental intraoral head.” *Id.* at 9:11–12.

Petersen illustrates a hand-held instrument. Ex. 1035, Fig. 4. According to Petersen, the instrument has a two-part housing and “[t]he interior of the instrument section is large enough to contain the electronics and the required sensors and imaging devices.” *Id.* at 11:9–13. Petersen Figure 4 shows two-part housing 49a, 49b, with CPU module 41 on the main PCB (printed circuit board) 50 within the housing. *Id.* at 11:9–12, 11:25–27, Fig. 4.

### 3. *Fisker* (Ex. 1037)

Fisker discloses “a handheld scanner for obtaining and/or measuring the 3D geometry of at least a part of the surface of an object using confocal pattern projection techniques.” Ex. 1037, Abstract. One disclosed embodiment is for intraoral scanning, i.e., direct scanning of teeth and surrounding soft tissue in the oral cavity. Ex. 1037, Abstract, 1:3–7.

According to Fisker, one objective is “to provide a scanner which may be integrated in a manageable housing, such as a handheld housing.” *Id.* at

2:31–32. Fisker discloses that the 3D scanner includes: “data processing means for: a) determining by analysis of the correlation measure the in-focus position(s) of: each of a plurality of image pixels for a range of focus plane positions, or each of a plurality of groups of image pixels for a range of focus plane positions, and b) transforming in-focus data into 3D real world coordinates.” *Id.* at 3:1–2, 3:19–26.

Fisker states that one objective is “to provide short scan time and real time processing, e.g. to provide live feedback to a scanner operator to make a fast scan of an entire tooth arch.” Ex. 1037, 13:19–21. To accomplish this objective and in view of the “enormous amount of data” created by real time high resolution 3D scanning, Fisker teaches that “data processing should be provided in the scanner housing, i.e. close to the optical components, to reduce data transfer rate to e.g. a cart, workstation or display.” *Id.* at 13:21–24.

#### 4. *Engelhardt (Ex. 1005)*

Engelhardt discloses a confocal surface-measuring device for measuring the surface profile of teeth. Ex. 1005, (54), (57), 1:5–7, 2:20–24. Engelhardt’s device includes a probe that is small enough to be introduced into the oral cavity of a patient and a processor that digitizes the detected signal and processes it. *Id.* at 1:7–11, 2:24–25.

Engelhardt discloses a system for confocal surface measurement of the surface profile of teeth in an oral cavity. Ex. 1005, 6:41–44, Fig. 1. The system includes, among other things, a probe, a light source, a detector, a processor, a housing, and an illumination and detection window. *Id.* at 6:45–48, 7:1–6, Fig. 1. According to Engelhardt, the processor digitizes

the detected signal and processes it into a three-dimensional representation. *Id.* at 6:47–49.

Engelhardt discloses that the light source, detector, and processor may be placed within the housing that spatially defines the probe. Ex. 1005, 5:56–57, 5:62–6:3. Specifically, Engelhardt discloses:

It would also be conceivable to integrate other functional units which are outside the housing . . . into the housing or to place them within the housing. For instance, the light source and/or the beam splitter and/or--if necessary--the focusing control and/or the detector and/or the processor could be arranged within the housing by miniaturizing all the functional units. That, correspondingly, would be a compact system needing only connection to the proper power supply.

Ex. 1005, 5:62–6:3; *see also id.* at 10:34–39, 10:66–11:4 (claims 30 and 39–41). In addition, Engelhardt discloses that the processor can “take over several functions, such as control, transformation or geometric correction, and digitizing of the signal, serving to compute the three-dimensional surface profile or for storing the data.” *Id.* at 6:8–12.

#### *F. Petitioner’s Obviousness Challenges*

Petitioner contends that claims 1–21 of the ’207 patent are unpatentable as obvious over (1) Babayoff in view of Petersen; (2) Babayoff in view of Fisker; and (3) Babayoff in view of Engelhardt. Pet. 32–62. Each of these grounds is asserted against all challenged claims. *Id.*

Petitioner contends that Babayoff discloses all features of claims 1–21, except that Babayoff does not disclose, either implicitly or explicitly, that a processor configured to associate depth data with color image data is contained in the handheld device. Pet. 36, 46, 53; *see also id.* at 32–54 (Petitioner’s contentions regarding where the elements of claims 1–21 are

found in the prior art). Petitioner contends that this missing limitation is disclosed by each of Petersen, Fisker, and Engelhardt. *Id.* at 36–37, 54, 58, 60.

Petitioner contends that a POSITA “would have been motivated to modify Babayoff by placing the processor disclosed in Babayoff in the hand-held device of Babayoff because,” as suggested by each of Petersen, Fisker, and Engelhardt, “there was a need for a unitary, handheld dental imaging device with imaging and processing capabilities.” Pet. 56, 60, 62 (citing Ex. 1026 ¶¶ 167, 175, 179). Petitioner contends that, in making each of these combinations, a POSITA would have had a reasonable expectation of success of achieving the claimed invention. *Id.* at 57–58, 60, 62.

Aside from its argument that Babayoff is not prior art to the ’207 patent, Patent Owner does not contest Petitioner’s obviousness contentions. Patent Owner’s arguments and the Bajaj Declaration (Prelim. Resp. 32–34, 36–38; Ex. 2001 ¶¶ 58, 59, 60, 73, 76, 78) are consistent with Petitioner’s argument that it would have been obvious to place the processor disclosed in Babayoff in the hand-held device of Babayoff.

After considering the Petition and the Preliminary Response, we determine that Petitioner’s arguments and evidence are sufficient to show a reasonable likelihood of prevailing on its contention that claims 1–21 of the ’207 patent are unpatentable as obvious over (1) Babayoff in view of Petersen; (2) Babayoff in view of Fisker; and (3) Babayoff in view of Engelhardt.

### III. CONCLUSION

For the reasons stated above, we institute an *inter partes* review as set forth in the Order. At this stage of the proceeding, the Board has not made a

final determination with respect to the patentability of any challenged claim or any underlying factual or legal issues.

#### IV. ORDER

It is

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review of claims 1–21 of the '207 patent is instituted with respect to the grounds of unpatentability asserted in the Petition; and

FURTHER ORDERED that pursuant to 35 U.S.C. § 314(a), *inter partes* review of the '207 patent is hereby instituted commencing on the entry date of this Order, and pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of trial.

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