Trials@uspto.gov
571-272-7822

Paper: 86
Date: January 14, 2021

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS AMERICA, INC.,
Petitioner,

v.

PRISUA ENGINEERING CORP.,
Patent Owner.

IPR2017-01188
Patent 8,650,591 B2

Before BARBARA A. PARVIS, STACEY G. WHITE, and TERRENCE W. MCMILLIN, *Administrative Patent Judges*.

PARVIS, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision on Remand
Determining that All Challenged Claims are Unpatentable
35 U.S.C. §§ 144, 318(a)

I. INTRODUCTION

This Decision addresses the opinion of the United States Court of Appeals for the Federal Circuit in *Samsung Elecs. Am., Inc. v. Prisua Eng'r Corp.*, 948 F.3d 1342 (Fed. Cir. 2020) (hereinafter *Samsung*), vacating our Final Written Decision and remanding for further proceedings. Having analyzed the entirety of the record anew in light of the court's directives in *Samsung*, we conclude that Samsung Electronics America, Inc. ("Petitioner") has shown by a preponderance of the evidence that claims 1–4 and 8 of U.S. Patent No. 8,650,591 B2 (Ex. 1001, "the '591 patent") owned by Prisua Engineering Corp. ("Patent Owner") are unpatentable.

A. Procedural History

Petitioner filed a Petition requesting an *inter partes* review of claims 1–4, 8, and 11 of the '591 patent. Paper 3 ("Pet."). Patent Owner filed a Corrected Preliminary Response. Paper 21. On October 11, 2017, we instituted *inter partes* review of only claim 11 of the '591 patent. Paper 22 ("Inst. Dec."), 38. Thereafter, Patent Owner filed a Corrected Patent Owner Response (Paper 26, "PO Resp."), to which Petitioner filed a Reply (Paper 35, "Pet. Reply").

On May 3, 2018, following the Supreme Court's decision in *SAS Inst., Inc. v. Iancu*, 138 S. Ct. 1348 (2018) ("*SAS*"), we issued an Order (Paper 36) modifying our Institution Decision to include review of all challenged claims and all grounds presented in the Petition, including those grounds on which we had previously not instituted. Patent Owner filed, with authorization, a Supplemental Patent Owner Response (Paper 50, "Supp. POR"), to which Petitioner filed a Supplemental Reply (Paper 51, "Supp.

Reply"). Patent Owner also filed, with authorization, a List Identifying Petitioner's Improper Supplemental Reply Arguments (Paper 60), to which Petitioner filed a Response (Paper 62). Patent Owner further filed a Motion to Exclude (Paper 57), Petitioner filed an Opposition (Paper 61), and Patent Owner filed a Reply (Paper 63).

On August 22, 2018, we held a hearing and a transcript of the hearing is included in the record. Paper 69 ("Tr.").

On September 27, 2018, Patent Owner filed a Sur-Reply (Paper 71, "Sur-reply").

On October 18, 2018, we issued a Final Written Decision and held that Petitioner had failed to demonstrate by a preponderance of the evidence that claims 1–4 and 8 of the '591 patent are unpatentable. Paper 73 ("Dec."), 48. We stated "at least the 'digital processing unit' limitation [recited in claim 1] would invoke § 112, sixth paragraph" and "the Petition lacks the analysis required by 37 C.F.R. § 42.104(b)(3)." Dec. 20. We determined that Petitioner had demonstrated by a preponderance of the evidence that claim 11 of the '591 patent is unpatentable, under 35 U.S.C. § 103, as obvious over Sitrick.

The Federal Circuit issued an opinion in *Samsung*, affirming our determination with respect to claim 11, vacating our determination with respect to claims 1–4 and 8, and remanding for further proceedings. *Samsung*, 948 F.3d at 1355, 1359; *see also* Papers 78, 79. The Federal Circuit stated the following: "We [ ] reject the Board's conclusion that the term 'digital processing unit,' as used in claim 1, invoked means-plus-function claiming, and that for that reason claims [1–4 and 8] cannot be analyzed for anticipation or obviousness." *Id.* at 1354. Moreover, the court

directed us, on remand, to "address Samsung's argument that the Board may analyze the patentability of a claim even if that claim is indefinite under the reasoning of *IPXL*," *i.e.*, whether the claim is unpatentable regardless of whether "it is treated as being directed to an apparatus or a method." *Id.* at 1355 (citing *IPXL Holdings, LLC v. Amazon.com, Inc.*, 430 F.3d 1377, 1384 (Fed. Cir. 2005) ("*IPXL*")). The court further directed us as follows: "In the remand proceedings, the Board should determine whether claim 1 and its dependent claims are unpatentable as anticipated or obvious based on the instituted grounds." *Id.*

The Board has jurisdiction under 35 U.S.C. §§ 6 and 144. This Decision on Remand is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons discussed below, we determine that Petitioner has shown by a preponderance of the evidence that claims 1–4 and 8 of the '591 patent are unpatentable.

B. Related Matters

As required by 37 C.F.R. § 42.8(b)(2), each party identifies judicial and administrative matters that would affect, or be affected by, a decision in this proceeding. In particular, the parties inform us that the '591 patent is involved in *Prisua Engineering Corp. v. Samsung Electronics Co.*, No. 1:16-cv-21761 (S.D. Fla.). Pet. 1; Paper 27, 2.

C. The '591 Patent (Ex. 1001)

The '591 patent, titled "Video Enabled Digital Devices for Embedding User Data in Interactive Applications," issued February 11, 2014, from U.S. Patent Application No. 13/042,955. Ex. 1001, codes [54], [45], [21]. The '591 patent generally relates to "a method for generating an

edited video data stream from an original video stream wherein generation of said edited video stream comprises a step of: substituting at least one object in a plurality of objects in said original video stream by at least a different object." *Id.* at 1:40–47. Figure 3 is reproduced below.

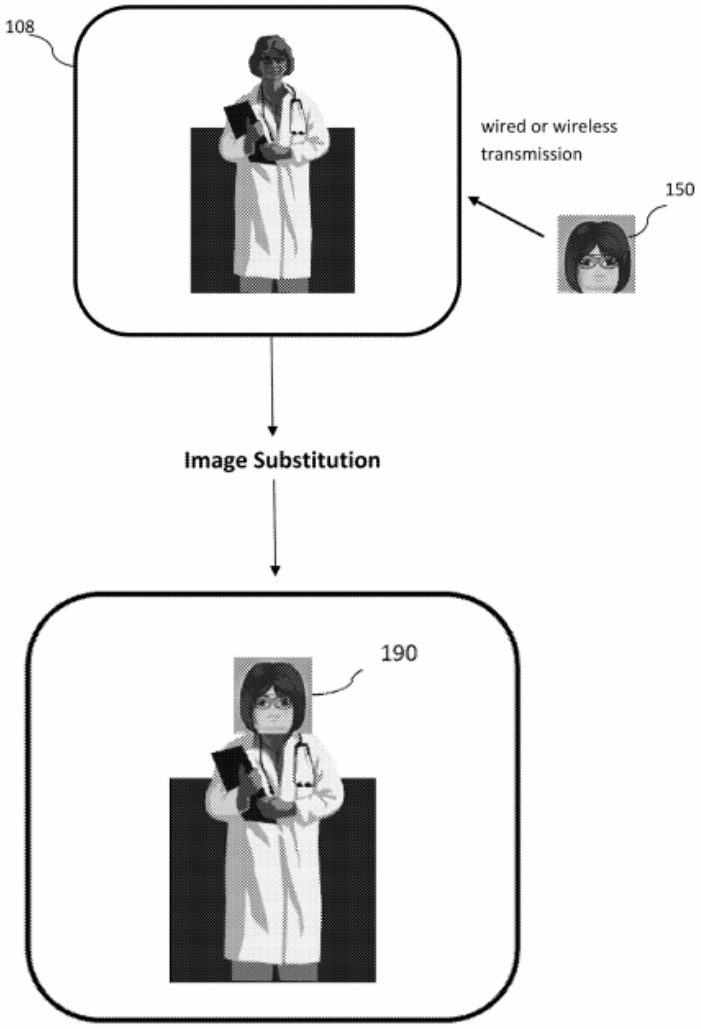

FIG. 3

Figure 3 shows a simplified illustration of a video image substitution according to one embodiment. *Id.* at 1:63–65. Figure 3 shows "a user input 150 of a photo image of the user used to replace the face of the image shown on the device 108." *Id.* at 2:66–3:1. "The user transmits the photo image 150

by wired or wireless means to the device 108." *Id.* at 3:1–3. "The image substitution is performed and the device 108 shows the substituted image 190." *Id.* at 3:3–4.

Figure 1 is reproduced below.

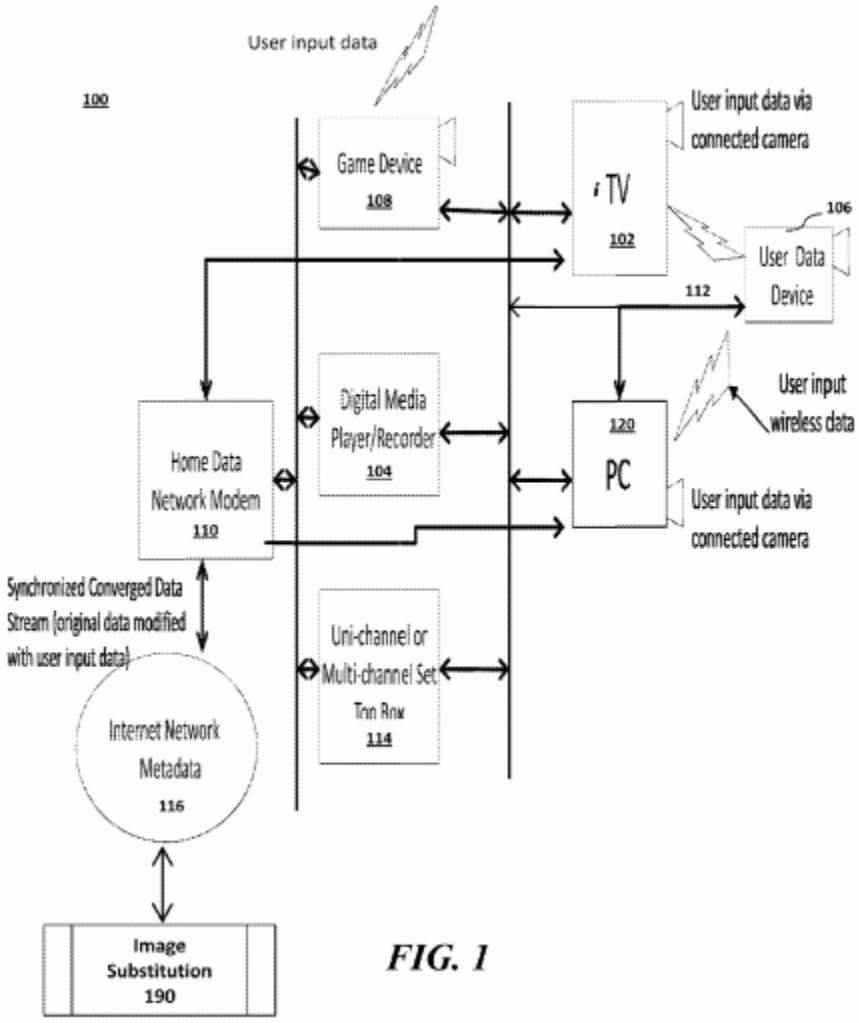

FIG. 1

Figure 1 shows a block diagram of a digital system according to one embodiment. *Id.* at 1:59–60. System 100 includes interactive television 102, camcorder 104, camera-enabled personal device 106, gaming device 108, and "is operable for taking a captured video to be uploaded, or inputted by a

user, for the purpose of inserting the video content into another video, graphics, image sequence selected by the user." *Id.* at 2:10–16. "This produces a new video sequence 190 which is subsequently broadcasted or played by the digital device." *Id.* at 2:16–18.

"User Data Device (UDD) 106 is an image capable digital device" whose "input can be image or video data." *Id.* at 3:41–49. The image or video data captured by UDD 106 can be transmitted to television 102 along with "instructions regarding which actor, actress, or structure item he desires to replace or substitute in the original program." *Id.* at 4:4–10. The embedding instructions and user input video data are then transmitted to internet network devices that "have the capability of processing the user image or video data and the set of instructions that indicate how said user input data is to be embedded into the metadata 116 to produce a modified broadcast bit stream." *Id.* at 4:18–27.

> To accomplish the embedding process, the internet network devices are capable of performing at least the following functions: receiving user input data and instructions, performing image and video analysis such as face recognition and detection, image and video data portioning, image and video enhancement, filtering, texture analysis, data compression and decompression, motion detection and estimation, motion correction to adapt the motion of the user input sequence with that of the original metadata to be broadcasted, error analysis, etc. Once the user input data has been correctly embedded into the data to be broadcasted, the internet network devices send the resulting modified data to the TV 102 to be broadcast.

Id. at 4:28–40.

D. Illustrative Claims

Claim 1 is independent and claims 2–4 and 8 depend, directly or indirectly, from claim 1. Claim 1 is illustrative of the challenged claims and is reproduced below.

> 1. An interactive media apparatus for generating a displayable edited video data stream from an original video data stream, wherein at least one pixel in a frame of said original video data stream is digitally extracted to form a first image, said first image then replaced by a second image resulting from a digital extraction of at least one pixel in a frame of a user input video data stream, said apparatus comprising:
>
> an image capture device capturing the user input video data stream;
>
> an image display device displaying the original video stream;
>
> a data entry device, operably coupled with the image capture device and the image display device, operated by a user to select the at least one pixel in the frame of the user input video data stream to use as the second image, and further operated by the user to select the at least one pixel to use as the first image;
>
> wherein said data entry device is selected from a group of devices consisting of: a keyboard, a display, a wireless communication capability device, and an external memory device;
>
> a digital processing unit operably coupled with the data entry device, said digital processing unit performing:
>
> identifying the selected at least one pixel in the frame of the user input video data stream;
>
> extracting the identified at least one pixel as the second image;
>
> storing the second image in a memory device operably coupled with the interactive media apparatus;

receiving a selection of the first image from the original video data stream;

extracting the first image;

spatially matching an area of the second image to an area of the first image in the original video data stream, wherein spatially matching the areas results in equal spatial lengths and widths between said two spatially matched areas; and

performing a substitution of the spatially matched first image with the spatially matched second image to generate the displayable edited video data stream from the original video data stream.

Ex. 1001, 7:14–54.

E. Evidence Relied Upon

Petitioner relies upon the following prior art references (Pet. 4–5):

Senftner	US 7,460,731 B2	Dec. 2, 2008	Ex. 1006
Sitrick	US 2005/0151743 A1	July 14, 2005	Ex. 1007
Levoy	US 2009/0309990 A1	Dec. 17, 2009	Ex. 1008

As support for its challenge, Petitioner submits a Declaration of Edward Delp III, Ph.D., who has been retained by Petitioner for the instant proceeding. Ex. 1003 ¶ 1. Petitioner also submits a Reply Declaration of Dr. Delp (Ex. 1017) and a Supplemental Reply Declaration of Dr. Delp (Ex. 1025).

Patent Owner submits a Declaration of Yolanda Prieto, Ph.D., who has been retained by Patent Owner for the instant proceeding. Ex. 2012 ¶ 1.[1] Patent Owner also submits a second Declaration of Dr. Prieto. Ex. 2014.

F. Grounds of Unpatentability

Petitioner asserts that the challenged claims are unpatentable based on the following grounds (Pet. 4):

Claim(s) Challenged	35 U.S.C. §[2]	Reference(s)/Basis
1, 2, 8, 11	102	Senftner
1, 2, 8, 11	103	Senftner
3, 4	103	Senftner, Levoy
1, 2, 8, 11	103	Sitrick
3, 4	103	Sitrick, Levoy

Table Summarizing the Grounds Asserted by Petitioner.

II. ANALYSIS

A. Patent Owner's Motion to Terminate the Proceeding

Patent Owner filed a Motion to terminate this *inter partes* review. Paper 83. Patent Owner argues that the proceeding should be terminated for two reasons: (1) parallel district court litigation has proceeded so far as to frustrate the purpose of providing an efficient substitute for resolution of the

[1] Dr. Prieto's declaration is labeled "Ex. 2011" in the footer, but was uploaded as Exhibit 2012. We cite to it as Exhibit 2012.
[2] The Leahy-Smith America Invents Act, Pub. L. No. 112–29, 125 Stat. 284 (2011) ("AIA"), amended 35 U.S.C. §§ 102 and 103. Because the '591 patent has an effective filing date before the effective date of the applicable AIA amendments, we refer to the pre-AIA versions of 35 U.S.C. §§ 102 and 103.

validity issues; and (2) we should decline to proceed because we are unable to construe the claims. *Id.* at 1. Petitioner opposes. Paper 84.

Regarding the first issue, Patent Owner, more specifically, asserts that proceeding would frustrate the purpose of an *inter partes* review providing an efficient substitute for the resolution of validity issues because a parallel district court litigation proceeded to a jury verdict upholding the '591 Patent's validity over two years ago. Paper 83, 1, 5–7 (citing, *e.g.*, *NHK Spring Co., LTD., v. Intri-Plex Techs, Inc.*, IPR2018-00752, Paper 8 (PTAB Sept. 12, 2018) (precedential) ("*NHK*"); *Apple Inc., v. Fintiv, Inc.*, IPR2020-00019, Paper 11 (PTAB Mar 20, 2020) (precedential) ("*Fintiv*")). Regarding the second issue, Patent Owner argues that after *SAS*, "the Board fully denies institution where issues of indefiniteness would otherwise dominate the proceedings." *Id.* at 1–2 (citing *SAS*, 138 S. Ct. at 1348).

Petitioner asserts the following:

> The Federal Circuit affirmed a portion of the FWD—invalidity of claim 11—and remanded for the Board to apply the prior art to the remaining claims at issue. Invalidity of claim 11 is part of the mandate and cannot be reconsidered by the Board. And given the Board's obligations under *SAS* and 35 U.S.C. § 318 to issue a decision on every claim and ground in the petition, the Board has no discretion or authority to partially terminate this IPR at this point.

Paper 84, 1 (citing *SAS*, 138 S. Ct. at 1354; 35 U.S.C. § 318). Petitioner further argues "[h]ere, because the invalidity of claim 11 was affirmed on appeal, the Office must issue a cancellation certificate with respect to at least claim 11 once these proceedings conclude." *Id.* at 5 (citing *SAS*, 138 S. Ct. at 1354–55; 35 U.S.C. § 318).

Petitioner also responds to Patent Owner's first reason asserting that even considering the *Fintiv* factors termination is inappropriate. *Id.* at 14 (citing *Fintiv* at 6). Petitioner, more specifically, asserts that "[t]he district court case has [ ] been stayed since the Board modified its institution decision to consider all claims following the *SAS* decision" and "the district court has denied Petitioner's motion to lift the stay following the Federal Circuit's decision and has explained that it will maintain the stay and await the final resolution of this IPR before it rules on pending post-trial issues." *Id.* at 10–11 (citing Ex. 2029, 5–7). Petitioner also responds to the second issue raised by Patent Owner, Petitioner asserting that "[t]he Federal Circuit also remanded the case with explicit instructions to apply the prior art to claims 1–4 and 8 despite the IPXL-type indefiniteness." *Id.* at 3–4 (citing *Samsung* at 1353–55).

We agree with Petitioner. Importantly, once instituted, "[petitioner] is entitled to a final written decision addressing all of the claims it has challenged." *SAS*, 138 S. Ct. at 1359; *see also* Patent Trial and Appeal Board Consolidated Trial Practice Guide (Nov. 2019) ("TPG"), at 5 ("In instituting a trial, the Board will either (1) institute as to all claims challenged in the petition and on all grounds in the petition, or (2) institute on no claims and deny institution. The Board will not institute on fewer than all claims or all challenges in a petition.") (available at https://www.uspto.gov/TrialPracticeGuideConsolidated).

Patent Owner's arguments that we should terminate this proceeding do not take into consideration the procedural history of the instant proceeding. In particular, on May 3, 2018, we modified our institution decision to institute on all of the challenged claims presented in the Petition.

Paper 36. On October 2, 2019, we entered a Final Written Decision addressing all challenged claims. *See generally* Dec. The Federal Circuit issued an opinion in *Samsung*, affirming our determination with respect to claim 11, vacating our determination with respect to only claims 1–4 and 8, and remanding for further proceedings. *Samsung*, 948 F.3d at 1355, 1359; *see also* Papers 78, 79. That procedural history is not in dispute as Patent Owner acknowledges that Petitioner prevailed on claim 11. *See, e.g.*, Paper 83, 10. We, therefore, deny Patent Owner's request.

We further note that Patent Owner's arguments regarding *NHK* and *Fintiv* are inapposite as contrary to the circumstances in those cases, here Patent Owner is requesting termination of a proceeding on remand after appeal to the Federal Circuit. Also, consistent with Petitioner's arguments, the parallel district court proceeding is stayed. *See generally* Ex. 2029. Indeed, recently on July 9, 2020, the court issued an order stating that "the Court finds that a continued stay pending the outcome of the remand to the PTAB is appropriate." Ex. 2029, 7.

Also, Patent Owner's arguments regarding termination relating to indefiniteness are not consistent with the mandate. Instead, consistent with Petitioner's arguments, the Federal Circuit directed us, on remand, to "address Samsung's argument that the Board may analyze the patentability of a claim even if that claim is indefinite under the reasoning of *IPXL*." *Samsung*, 948 F.3d at 1355 (citing *IPXL*, 430 F.3d at 1384). The court further directed us as follows: "In the remand proceedings, the Board should determine whether claim 1 and its dependent claims are unpatentable as anticipated or obvious based on the instituted grounds." *Id.*

Accordingly, we deny Patent Owner's Motion to Terminate the proceeding.

B. Petitioner's Argument to Apply of Law-of-the-Case or Estoppel

In the Final Written Decision, we determined that Petitioner had demonstrated, by a preponderance of the evidence, that claim 11 of the '591 patent is unpatentable under 35 U.S.C. § 103(a) as obvious over Sitrick. Dec. 48. The Federal Circuit's opinion in *Samsung* affirmed our determination with respect to claim 11. *Samsung*, 948 F.3d at 1355, 1359; *see also* Papers 78, 79.[3]

Petitioner argues that law-of-the-case doctrine and estoppel apply to the instant proceeding because claims 1–4 and 8 remaining in this proceeding are not materially different from claim 11. Paper 81. Petitioner asserts that law-of-the-case doctrine compels a finding that claims 1 and 2 are obvious over Sitrick. *Id.* at 5–6 (citing, *e.g.*, *Ormco Corp. v. Align Tech., Inc.*, 498 F.3d 1307, 1319 (Fed. Cir. 2007)). Petitioner also argues that this proceeding should result in a favorable determination for Petitioner as to the remaining challenged claims "because the few remaining elements of the claims at issue are plainly in the asserted prior art, rendering those claims unpatentable under section 103, and/or those claims are not materially different from invalid claim 11, rendering them unpatentable." *Id.* at 1 (citing *Ohio Willow Wood Co. v. Alps S., LLC*, 735 F.3d 1333, 1342 (Fed. Cir. 2013)).

---

[3] We also determined that Petitioner had not established, by a preponderance of the evidence, that claim 11 is unpatentable as anticipated by Senftner. Dec. 26.

Patent Owner asserts that claims 1–4 and 8 contain a limitation — "an image display device displaying the original video stream"— that is entirely absent from claim 11. Paper 85, 1. Patent Owner argues that this limitation is not insignificant and is not taught by Sitrick. *Id.* at 5–7.

Although we agree with Petitioner that claims 1 and 11 are similar, as Petitioner acknowledges, claim 1 recites "an image display device displaying the original video stream," which is not recited in claim 11. *Id.* at 1. Also, claim 11 is written as a method claim instead of an apparatus claim.

In light of our determinations below (*see infra* § III.F), however, we need not make further determinations regarding law-of-the-case or estoppel.

C. Principles of Law

To establish anticipation, each and every element in a claim, arranged as recited in the claim, must be found in a single prior art reference. *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1369 (Fed. Cir. 2008). "To anticipate a claim, a prior art reference must disclose every limitation of the claimed invention, either explicitly or inherently." *In re Schreiber*, 128 F.3d 1473, 1477 (Fed. Cir. 1997).

A claim is unpatentable as obvious under 35 U.S.C. § 103(a) if the differences between the claimed subject matter 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 (4) where in evidence, so-called "secondary considerations," including commercial success, long-felt but unsolved needs, failure of others, and unexpected results. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

D. Level of Ordinary Skill

Petitioner contends that a hypothetical person of ordinary skill in the art, with respect to and at the time of the'591 patent, would have been "at least an engineer with a Bachelor of Science degree and at least three years of imaging and signal processing experience or would have earned a Master's Degree in Electrical Engineering and at least two years of professional experience in signal, image, and video processing." Pet. 8; Ex. 1003 ¶ 25.

Patent Owner's declarant contends that such a person "would need to be knowledgeable in image processing, in image coding and programming, and possess some experience in system and hardware applications as applied to image and video applications" and that such knowledge "may be achieved by an engineer with a Bachelor of Science degree and at least three years of imaging and signal processing experience." Ex. 2012 ¶¶ 27–285. Patent Owner does not otherwise address the level of ordinary skill in the art. *See generally* PO Resp.

As in our Decision on Institution (Dec. 14), we again determine that no express finding on a specific corresponding level of technical education and experience is necessary. Here, the level of ordinary skill in the art is reflected by the prior art of record. *See Okajima v. Bourdeau*, 261 F.3d

1350, 1355 (Fed. Cir. 2001); *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995).

E. Claim Construction

In this *inter partes* review, we construe the claim terms according to their broadest reasonable construction in light of the specification of the patent in which they appear. 37 C.F.R. § 42.100(b) (2017).[4] Under the broadest reasonable construction standard, claim terms are given their ordinary and customary meaning, as would be understood by one of ordinary skill in the art in the context of the entire disclosure. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). Any special definition for a claim term must be set forth in the specification with reasonable clarity, deliberateness, and precision. *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994). We must be careful not to read a particular embodiment appearing in the written description into the claim if the claim language is broader than the embodiment. *See In re Van Geuns*, 988 F.2d 1181, 1184 (Fed. Cir. 1993). Only terms that are in controversy need to be construed, and then only to the extent necessary to resolve the controversy. *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999).

---

[4] The claim construction standard to be employed in an *inter partes* review changed. *See* Changes to the Claim Construction Standard for Interpreting Claims in Trial Proceedings 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). At the time of the filing of the Petition in this proceeding, however, the applicable claim construction standard was set forth in 37 C.F.R. § 42.100(b) (2017).

In our Decision on Institution, we construe "digitally extracted" to mean "digitally selected and separated out, such as by copying," and we construe "digital extraction" to mean "digital selection and separation out, such as by copying." Dec. 9–10. Neither party disputes our construction. PO Resp. 6; Pet. Reply 4. Having considered the arguments and evidence, we maintain our construction of "digitally extracted" to mean "digital selection and separation out, such as by copying."

Patent Owner proposes constructions for "user input video data stream," "original video data stream," and "spatially matching" recited in claim 1. PO Resp. 7–9. Petitioner contends that "there are no issues as to these constructions that the Board needs to resolve." Pet. Reply. 5. For the reasons given below, we use Patent Owner's proposed constructions for the recitations in claim 1 and need not make further determinations regarding claim construction to resolve issues before us in this proceeding.

Patent Owner also proposes that "pixel from the user entering data in the data entry display device" recited in claim 3 means "selecting and separating out the at least one pixel chosen by a user on a display, when said display is acting as a data entry device and receives a selection of at least one pixel by said user." PO Resp. 8. Patent Owner proposes that "at the digital processing unit is further capable of extracting the at least one pixel from the user pointing to a spatial location in a displayed video frame" recited in claim 4 means performing spatial analysis on a video frame based on a user input, then selecting and separating out the at least one pixel chosen by said user." *Id.* As support, Patent Owner points to the description in the '591 Patent Specification of a touchscreen input device. *Id.* at 9 (citing Ex. 1001, 4:45–56).

Patent Owner's proposed constructions modify the language of claims 3 and 4. The description in the '591 Patent Specification does not support all modifications proposed by Patent Owner. Ex. 1001, 4:45–56. We are persuaded that claims 3 and 4 are broad enough to encompass the Patent Owner's proposed constructions. For the purposes of this Decision, we need not construe the terms more than that. As such, for the reasons discussed below, we determine Petitioner has shown that claims 3 and 4 are obvious by adopting part of Patent Owner's proposal that a "data entry display device" means a touchscreen device.

Patent Owner provides additional constructions for recitations in claim 4, which modify the actual language of claim 4 without explanation. PO Resp. 9. Nonetheless, we determine that Petitioner has shown that claim 4 is unpatentable using Patent Owner's constructions.

F. Sitrick Grounds—Claims 1–4 and 8

In light of the Federal Circuit's opinion in *Samsung* affirming our determination that claim 11 is unpatentable as obvious over Sitrick (*Samsung*, 948 F.3d at 1355, 1359; *see also* Papers 78, 79), we begin our discussion of claims 1–4 and 8 with Petitioner's grounds of obviousness based on Sitrick. In particular, Petitioner contends that claims 1, 2, and 8 are unpatentable as obvious over Sitrick. Pet. 4. Petitioner also contends that claims 3 and 4 are unpatentable as obvious over Sitrick and Levoy. *Id.*

We start with summaries of Sitrick and Levoy and then turn to the parties' contentions.

1. Overview of Sitrick

Sitrick is directed generally to "a system and method for processing a video input signal providing for tracking a selected portion in a predefined audiovisual presentation and integrating selected user images into the selected portion of the predefined audiovisual presentation." Ex. 1007, Abstract. Figure 1 of Sitrick is reproduced below.

Fig. 1

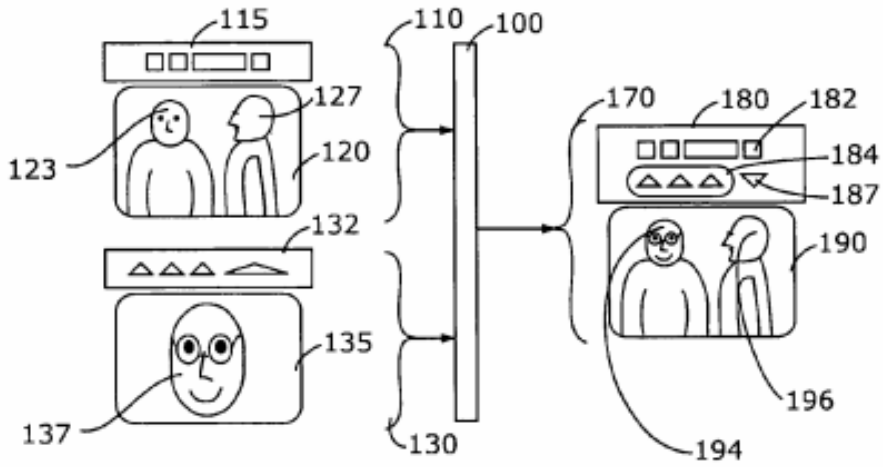

Figure 1 shows a system block diagram of an embodiment of Sitrick, including user image video processing and integration subsystem 100. *Id.* ¶ 31. External source of program content 110 includes program video 120, in which first person 123 and second person 127 are visible. *Id.* External source of user image content 130 includes user image data 135, in which user specified image 137 is visible. *Id.* Subsystem 100 processes sources 110 and 130 to produce output content 170, which includes output video 190. *Id.* Output video 190 consists of a processed version of program video 120 such that first person 123 has been replaced by user specified image 137. *Id.*

Figure 13, reproduced below, is a detailed block diagram of a preferred embodiment of Sitrick in which subsystem 100 is implemented on a general purpose computer. *Id.* ¶ 121.

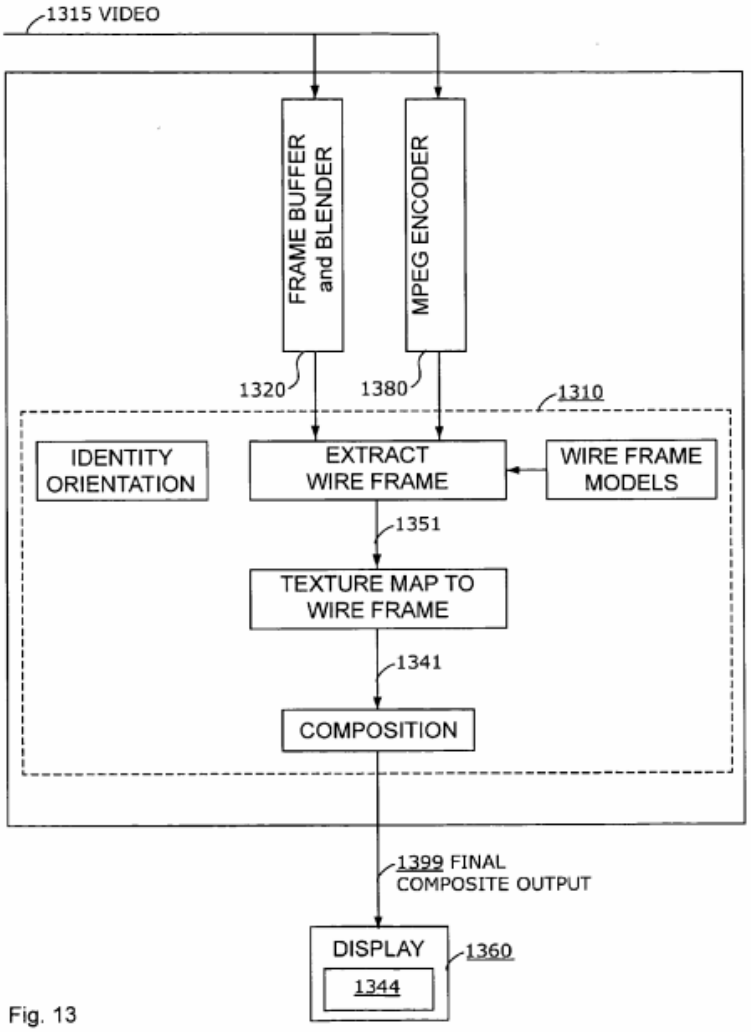

Fig. 13

As shown in Figure 13, the system comprises frame buffer 1320, MPEG encoder 1380, and general purpose computer 1310. *Id.* at 121. In operation,

> The general purpose computer 1310 comprises an extract wire-frame means, a wire-frame model database, an orientation identification means, a mapping means, and a compositing means. The wire-frame model database comprises user geometric object information. An output of wire-frame model

> data is supplied to the extract wire-frame means. An output of the orientation identification means is supplied to the extract wire-frame means. The extract wire-frame means transforms the wire-frame model data, responsive to information from at least one of the frame buffer 1320 and the MPEG encoder 1380, and supplied transformed wire-frame model data 1351 to the mapping means. In a preferred embodiment, the functions of the extract wire-frame means, the orientation identification means, the mapping means, and the compositing means may be performed by software executing on the general purpose computer 1310.
>
> The mapping means maps user replacement object images onto the transformed wire-frame model data 1351 producing a texture mapped output replacement object image 1341. The replacement object image 1341 is provided from the mapping means to the compositing means. The compositing means combines the replacement object image 1341 with data from the frame buffer 1320 producing final composited output 1399. The final composited output 1399 is representative of the first audiovisual presentation with selected portions being replaced by user object image content. In a preferred embodiment, the final composited output 1399 is provided as an input signal to display unit 1360, where it may be displayed as a display presentation 1344.

Id. ¶¶ 122, 123.

2. Overview of Levoy

Levoy is directed to an apparatus for presenting burst images. Ex. 1008, code (57). Apparatus 100 for presenting burst images includes processor 105, user interface 115, communication interface 120, and memory device 110. *Id.* ¶ 21. Figure 3 illustrates a presentation of burst images fragments. *Id.* ¶ 18.

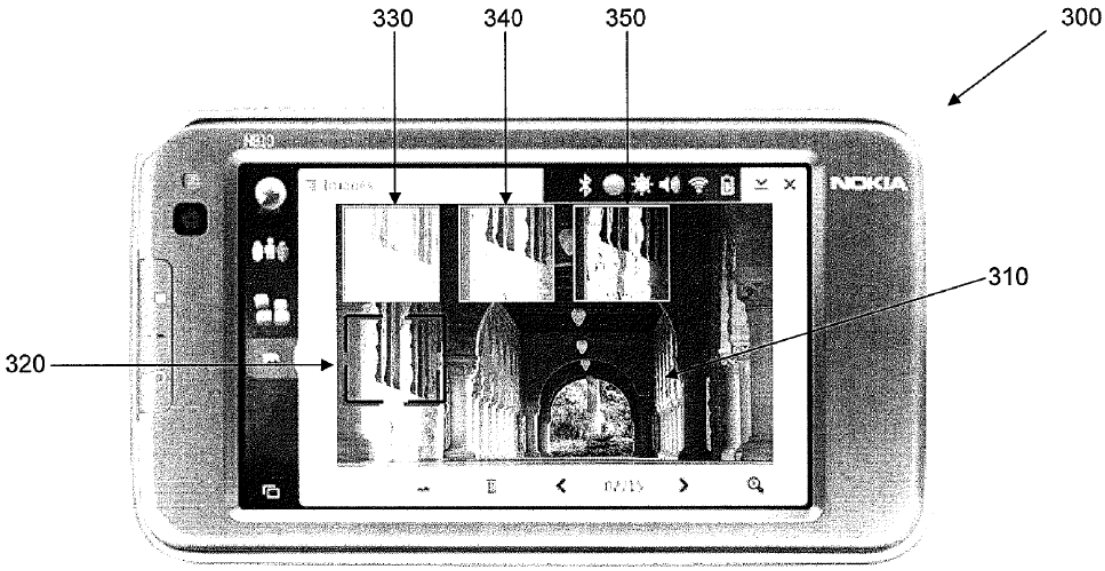

FIG. 3

Figure 3 of Levoy, above, illustrates a presentation of burst image 310 on mobile terminal device 300. *Id.* ¶ 46. As shown, burst image fragments 330, 340, and 350 cover the upper portion of burst image 310. *Id.*

Processor 105 is configured to receive selection of particular burst images. *Id.* ¶ 47. Processor 105 also is configured to generate a composite image based on one or more selected burst images and the corresponding one or more selected locations. *Id.* ¶ 50.

3. Analysis of Claim 1—Sitrick

Petitioner argues that claim 11 includes the same limitations as claim 1, but is written as a method claim instead of an apparatus claim. Pet. 66. We agree that claim 1 is substantially similar to claim 11, except claim 1 recites "an image display device displaying the original video stream," which is not recited in claim 11. Our determination is consistent with our Final Written Decision. Indeed, as we explained in our Final Written Decision, in light of the similarity in certain recitations in both claims 1 and 11, we cited only to the pages of the Petition in which Petitioner's analysis for the corresponding claim 1 limitations appear. Dec. 30 n.8.

a. Preamble

The preamble of claim 1 recites "[a]n interactive media apparatus for generating a displayable edited video data stream from an original video data stream." Petitioner relies upon Sitrick's teaching of subsystem 100 performing a "system and method for processing a video input signal providing for tracking a selected portion in a predefined audiovisual presentation and integrating selected user images into the selected portion of the predefined audiovisual presentation." Pet. 48–49; Ex. 1007, code (57), ¶ 31.

Patent Owner asserts that "original video data stream" means "a digitally recorded sequence of images that is to be modified." PO Resp. 7. Sitrick teaches "original video data stream" using Patent Owner's construction. In particular, Sitrick teaches "representations of two people, a first person 123 and a second person 127, are visible in the program video 120." Ex. 1007 ¶ 31. Sitrick further teaches "[t]he output video 190 consists

of a processed version of the program video 120 selectively processed by the subsystem 100 such that the representation 123 has been replaced by the user specified image 137 producing the output 194." *Id.* Sitrick's program video 120 teaches the "original video data stream" using Patent Owner's construction.

Patent Owner argues that Sitrick's subsystem is not an apparatus comprised of various hardware elements. Supp. POR. 18–19. We disagree. Patent Owner's arguments are not consistent with the language of claim 1 i.e., "[a]n interactive media apparatus," which is not limited to a single unitary device. *In re Walter*, 618 F.2d 758, 768 (CCPA 1980), abrogated on other grounds by *In re Bilski*, 545 F.3d 943 (Fed. Cir. 2008). Patent Owner's argument also is not consistent with the language of claim 1, which recites multiple devices including "an image capture device," "an image display device," "a data entry device," and "a digital processing unit."

We are persuaded by Petitioner's showing and find that Sitrick teaches that subsystem 100 processes program content 110 and user image content 130 to produce output content 170, which is displayed on a display device as output video 190. Also, for the additional reasons discussed below (*see infra* §§ II.F.3.b–o), we are persuaded by Petitioner's showing and find that Sitrick teaches the apparatus comprising all hardware elements recited in claim 1.

The preamble of claim 1 further recites "wherein at least one pixel in a frame of said original video data stream is digitally extracted to form a first image, said first image then replaced by a second image resulting from a digital extraction of at least one pixel in a frame of a user input video data stream." Petitioner relies upon Sitrick's teaching of a "mask" as the recited

first image (Pet. 49–51) and, alternatively, relies upon Sitrick's teaching to use image recognition to identify an image of a reference object (*id.* at 51–55). Specifically, Petitioner contends that "a POSITA would understand that Sitrick discloses forming the first image at least (1) when the mask is produced, or (2) when the image of the reference object is created to be used by the tracking subsystem." *Id.* at 53.

Patent Owner asserts that "user input video data stream" means "a sequence of images digitally recorded by a user separate from the original video data stream." PO Resp. 7. Sitrick teaches "user input video data stream" using Patent Owner's construction. In particular, Sitrick teaches "external source of user image content 130," which is comprised of "other user data 132 and user image data 135, the user image data 135 is further comprised of a user specified image 137." Ex. 1007 ¶ 31. Sitrick teaches that program video 120 is recorded separately from external source of user image content 130. *Id.* (describing that "[c]oupled to the subsystem 100 is an external source of program content 110 and an external source of user image content 130" and the external source of program content "is further comprised of other program data 115 and program video 120"). Patent Owner does not argue this part of the preamble. *See generally* PO Resp.; Supp. POR.

Using Patent Owner's construction, therefore, we are persuaded by Petitioner's showing and find that Sitrick teaches this part of the preamble.

b. "an image capture device capturing the user input video data stream"

Claim 1 recites "an image capture device capturing the user input video data stream." Petitioner relies upon Sitrick's teaching of a "video camera" and "digital camera." Pet. 55 (citing Ex. 1007 ¶¶ 12, 139).

Patent Owner argues that Sitrick does not teach providing the captured images to the system claimed. Supp. POR 19–20. However, that requirement is not part of the aforementioned recitation and is discussed where appropriate below. *See infra* §§ III.F.3.d–n.

Furthermore, Sitrick's teachings relied upon in the Petition are that its "user image *creation* system" links "user *defined* images." Ex. 1007 ¶ 12 (emphasis added). Although not required, we note that Sitrick teaches that this linking is "for integration" "such as where the user defined or created visual images are utilized." *Id.* Sitrick also teaches "capturing all this user data and putting it on the smart card." *Id.* ¶ 139. For these reasons, as well as those further discussed below, we are persuaded that Sitrick teaches providing the captured images to the system claimed.

Patent Owner also refers to its construction that "user input video data stream" means "a sequence of images digitally recorded by a user separate from the original video data stream." Supp. POR 20 (citing Ex. 2014 ¶ 141). Dr. Prieto testifies that Sitrick does not disclose capturing a sequence. Ex. 2014 ¶ 141.

Sitrick teaches that "[t]he user image can be provided by any one of a number of means" including "by video camera." Ex. 1007 ¶ 12. Sitrick also describes capturing "user defined *images*" and provides as an example a "*video* presentation." *Id.* (emphases added). Even using Patent Owner's construction, therefore, Sitrick teaches "user input video data stream."

We, therefore, are persuaded by Petitioner's showing and find that Sitrick's video camera or digital camera is a digital video capture device that captures a user input video data stream.

c. "an image display device displaying the original video stream"

Claim 1 recites "an image display device displaying the original video stream." Petitioner relies upon Sitrick's teaching of the device used to show program video 120 in Figure 1. Pet. 55 (citing Ex. 1007, Fig. 1). Petitioner also asserts that Sitrick's Figures 2–6 show similar program videos being displayed. *Id.* (citing Ex. 1007, Figs. 2–6).

Patent Owner argues that Petitioner misrepresents Sitrick's "cartoon" and Sitrick does not teach or suggest that program video 120 is displayed. Supp. POR 20–21 (citing Ex. 2014 ¶¶ 128, 142–144, 152, 202, 207). Dr. Prieto testifies "[a]bsolutely nothing in Sitrick discloses, teaches or suggests that the program video 120 is displayed on a display device, particularly one that is incorporated as part of an apparatus as claimed." Ex. 2014 ¶ 143.

Petitioner responds that Sitrick discloses a display device that plays the original video. Supp. Reply 12 (citing Ex. 1007, FIGS. 1–6; Pet. 55; Ex. 1017 ¶¶12–14; Ex. 1028, 96:4-11, 98:7-101:14; Ex. 1027, 44:11-46:12). Dr. Delp testifies "Figure 1 of Sitrick teaches to a POSITA that the original video data stream (*e.g.*, the program video 120), the user input (*e.g.*, a user specified image 137), and the edited audio-visual presentation (*e.g.*, the output video 190) are all displayed." Ex. 1017 ¶ 12.

Upon consideration of the testimony of Dr. Prieto (Ex. 2014 ¶¶ 128, 142–144, 152, 202, 207) and Dr. Delp (Ex. 1017 ¶¶ 12–14, we find the testimony of Dr. Delp more credible on this issue. Figure 1 of Sitrick

illustrates multiple displays, including display of program video 120. Ex. 1007, Fig. 1. Sitrick describes that first person 123 and second person 127 "are visible" in program video 120. *Id.* ¶ 31. We are not persuaded by Patent Owner's arguments because they are based on an overly narrow reading of the prior art without sufficient consideration of the knowledge of a person having ordinary skill in the art. *Cf. In re Paulsen*, 30 F.3d at 1480 (rejecting an argument that "fails to recognize that a prior art reference must be 'considered together with the knowledge of one of ordinary skill in the pertinent art.'") (citing *In re Samour*, 571 F.2d 559, 562, (CCPA 1978)). Furthermore, Dr. Prieto testifies that program video 120 shown in Figure 1 of Sitrick represents the original video data stream and it is displayed. *See, e.g.*, Ex. 1028, 96:4–11; Ex. 1027, 44:11–46:12.

We, therefore, are persuaded by Petitioner's showing and find that Sitrick's devices, such as the device that displays program video 120, are image display devices displaying the original video stream.

d. "a data entry device, operably coupled with the image capture device and the image display device. . ."

Claim 1 recites "a data entry device, operably coupled with the image capture device and the image display device." Petitioner relies upon Sitrick's teaching of an embodiment implemented using a general purpose computer which, Petitioner argues, "would necessarily have a 'data entry device,' such as a keyboard." Pet 56 (citing Ex. 1003 ¶¶ 98, 105). Petitioner argues that a person of ordinary skill in the art would have recognized that Sitrick's general purpose computer, with its data entry device, would be operably coupled to a digital video capture device and to a digital display device. Pet. 57–59.

Patent Owner argues that Sitrick does not necessarily have a "data entry device," as Petitioner contends, because its general purpose computer "may or may not have" a data entry device. Supp. POR 22–24. Petitioner counters that Patent Owner's argument ignores what a person of ordinary skill in the art would have understood "general purpose computer" to mean and argues that "Dr. Prieto admitted that Sitrick discloses using a PC with a data entry device." Pet. Reply 18; Supp. Reply 12.

Patent Owner's argument is not persuasive because this is an obviousness ground, not an anticipation ground, and Petitioner therefore need not establish that Sitrick "necessarily" has a keyboard. Moreover, we are persuaded that a person of ordinary skill in the art would have understood Sitrick's disclosure of a "general purpose computer" to include a keyboard. As Petitioner points out, Dr. Prieto conceded as much in deposition:

> Q. Sure. That the general purpose computer of Paragraph 42 including the disclosure of the standard commodity personal computer, that person of ordinary skill in the art would understand that has an input device such as a keyboard and a display; right?
>
> A. Yes, the personal computer that is available, yes, definitely.

Ex. 1020, 101:4–23. Furthermore, the parties' arguments are similar to those discussed with respect to the similar recitation in claim 11 and that reasoning applies here. Dec. 31–32. As a result, we are persuaded that Sitrick teaches a "data entry device."

Patent Owner also argues that Sitrick's display unit 1360 cannot be considered part of the general purpose computer because it is drawn as

separate device. Supp. POR 23–24. We agree with Petitioner that claim 1 is not limited to a single unitary device for the reasons given above including that and Patent Owner's argument is not consistent with the language of claim 1. *See supra* § II.F.3.a

e. "operated by a user to select the at least one pixel in the frame . . ."

Claim 1 recites "operated by a user to select the at least one pixel in the frame of the user input video data stream to use as the second image, and further operated by the user to select the at least one pixel to use as the first image." Petitioner relies upon Sitrick's teaching of "a user selected image" and argues that "a user operating the Sitrick system would necessarily have to 'select' at least one pixel in . . . the user input video data stream in order for the system to analyze . . . 'the user selected image' (the second image)." Pet. 57–58 (citing Ex. 1007 ¶¶ 11; Ex. 1003 ¶ 157).

Patent Owner argues that Sitrick does not disclose that a user operates Sitrick's computer. Supp. POR 24–25; Ex. 2017 ¶ 157. Rather, according to Patent Owner, in Sitrick the selection of the best images is performed by a general purpose computer running an algorithm. Ex. 1003 ¶ 157 (citing Ex. 1007 ¶ 46).

After consideration of Patent Owner's argument, we are persuaded by Petitioner's showing for the same reasons discussed with respect to claim 11. Dec. 32–34. Sitrick states repeatedly that face 137 is a "user specified image" and that a "user selected" image is substituted into a predefined audiovisual presentation. Ex. 1007 ¶¶ 3, 6, 11, 13, 31. Figure 1 illustrates the process unambiguously:

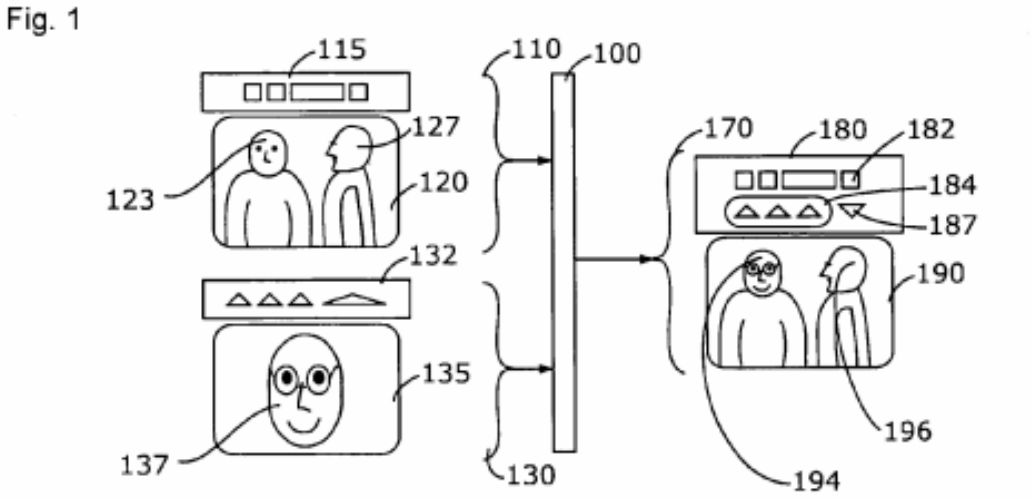

Figure 1 of Sitrick, above, shows that representation 123 has been replaced by face 137. Ex. 1007, Fig. 1, ¶ 31. Even if Figure 6 shows a number of variations of face 137 that have been extracted from a video, each of those is nevertheless the result of a selection of at least one pixel—i.e., face 137—by the user. *See, e.g.*, *id.* ¶¶ 20, 31, Figs. 1, 6.

f. "wherein said data entry device is selected from a group . . ."

Claim 1 recites "wherein said data entry device is selected from a group of devices consisting of: a keyboard, a display, a wireless communication capability device, and an external memory device." Petitioner relies upon Sitrick's teaching of a general purpose computer and argues that "[a] general purpose computer necessarily includes a data entry device, such as a keyboard." Pet 59. Patent Owner argues that a general purpose computer does not necessarily include a data entry device, such as a keyboard. Supp. POR 24–25. For the reasons discussed above (*see supra* § II.F.3.d), we are persuaded that a person of ordinary skill in the art would have understood Sitrick to teach, or at least suggest, a keyboard.

g. "digital processing unit operably coupled with the data entry device . . ."

Claim 1 recites "digital processing unit operably coupled with the data entry device, said digital processing unit performing." Petitioner relies upon Sitrick's disclosure of an implementation on a general purpose computer 1310, which would include a central processing unit (CPU). Pet 59 (citing Ex. 1007 ¶ 115). Although paragraph 115 describes general purpose computer 1110 in Figure 11, rather than general purpose computer 1310 in Figure 13, we are persuaded that general purpose computer 1310 would similarly comprise a CPU.

Patent Owner argues that Sitrick does not teach this limitation because, according to Patent Owner, a person of ordinary skill in the art would have understood that the CPU comprises "only the ALU (arithmetic logic unit), responsible for the number crunching (arithmetic operations) and the CU (control unit), responsible for instruction sequencing and branching, with the added capability to communicate with the system bus in the form of a memory interface unit." Supp. POR 25. Patent Owner asserts the CPU of Sitrick is not equivalent to the recited digital processing unit (DPU). *Id.* (citing Ex. 2014 ¶¶ 158–161).

Petitioner counters that "digital processing unit" recited in the claims is met by any processor capable of performing the recited functions and, indeed, "Dr. Prieto admits that the DPU may be a CPU." Supp. Reply 12 (citing, *e.g.*, Ex. 1026, 148:10–20; Ex. 2014 ¶ 159).

We agree with Petitioner for the same reasons given for the corresponding recitation in claim 11. Dec. 34–36. For instance, the '591 patent does not define "digital processing unit," or even use that term apart

from the claims. *See generally* Ex. 1001. The '591 patent does not describe a "processor" or "processing unit" at all. *Id.* Also, consistent with Petitioner's contentions, Dr. Prieto testified that the "digital processing unit contain[s] various forms" including that "it takes the form of an application's processor" or "just a central processing unit." Ex. 1026, 148:10–20.

Sitrick discloses a general purpose computer with a CPU that performs all the functions recited in claim 1. As a result, we are persuaded that Sitrick's CPU teaches the recited "digital processing unit."

h. "identifying the selected at least one pixel in the frame of the user input video stream"

Claim 1 recites "identifying the selected at least one pixel in the frame of the user input video stream." According to Petitioner, "Sitrick discloses selecting a user's face (second image) from the user's image data for overlaying on the mask/reference object (first image) of the program video." Pet. 59–60 (citing Ex. 1007, Figs. 1, 5, ¶¶ 11, 31, 40, 87). Petitioner argues that "[t]o complete the overlaying, pixel(s) of the user image data must necessarily be identified and selected." *Id.* at 60 (citing Ex. 1003 ¶ 108).

Patent Owner argues that Sitrick does not teach this limitation because what is substituted, in processing subsystems 500 and 600, is not the selected "second image" but rather a texture map (Figure 5, 570) or a series of images (Figure 6, 670). Supp. Resp. 25–27. According to Patent Owner, "what is actually inputted to the composite and mask subsystem block 640 Fig. 6 is a transformed image of the selected view 632," which "is not the same in structure to the second image and cannot therefore be considered a second image." *Id.* at 27.

After consideration of Patent Owner's arguments, we are persuaded by Petitioner's showing for the same reasons discussed with respect to claim 11. Dec. 36–37. As an initial matter, Patent Owner appears to be arguing limitations other than what is recited in the "identifying" step. Nevertheless, with respect to the "identifying" step, as shown in Figure 1 of Sitrick, "at least one pixel"—i.e., face 137—is identified and substituted for face 123 in output video 190.

Fig. 1

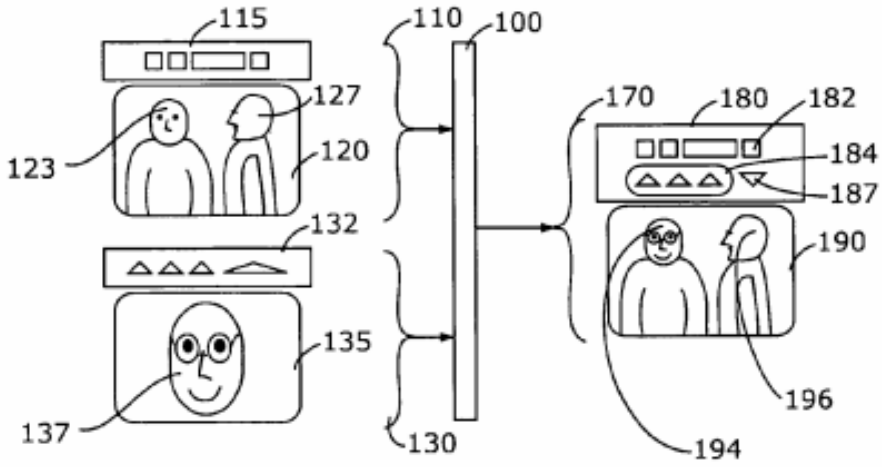

Figure 1 of Sitrick, above, shows that representation 123 in program video 120 has been replaced in output video 190 by face 137. Ex. 1007, Fig. 1, ¶ 31.

We, therefore, are persuaded that Sitrick teaches "identifying" the selected at least one pixel in the user image data 135.

i. "extracting the identified at least one pixel as the second image"

Claim 1 recites "extracting the identified at least one pixel as the second image." Petitioner relies upon Sitrick's teaching to extract user specified image 137 from user image data 135. Pet. 60–61 (citing Ex. 1007,

Fig. 1, ¶¶ 31, 101). Sitrick teaches that "In the external source of user image content 130 is further comprised of other user data 132 and user image data 135, the user image data 135 is further comprised of a user specified image 137." Ex. 1007 ¶ 31.

Patent Owner argues Sitrick does not teach this limitation because Sitrick's processing subsystems 500 and 600, shown in Figures 5 and 6, respectively, receive as inputs either a texture map (Figure 5, 570) or a series of images (Figure 6, 670), neither of which are "at least one pixel" extracted from a frame of the user input video data stream. PO Resp. 27–28.

Petitioner counters that Sitrick explicitly describes facial image 137 as a "user-specified" image (Ex. 1007 ¶ 31) and elsewhere describes a "user selected image" that "can be provided by any one of a number of means, such as by . . . digitization scan of an external object such as of a person by video camera or a photograph or a document" (*id.* ¶¶ 11–13). Pet. Reply 14–15; Supp. Reply 12. Petitioner rebuts Patent Owner's characterization of Sitrick's description of subsystems 500 and 600, arguing that images are extracted from an "external source of user image content 570" and, likewise, that individual images 671, 672, 673, 674, 675, 676, and 677 shown in Figure 6 are extracted from user input content 130. Pet. Reply 15–16.

We agree with Petitioner. Sitrick states repeatedly that face 137 is a "user specified image" and that a "user selected" image is substituted into a predefined audiovisual presentation. Ex. 1007 ¶¶ 3, 6, 11, 13, 31. Figure 1 illustrates the process.

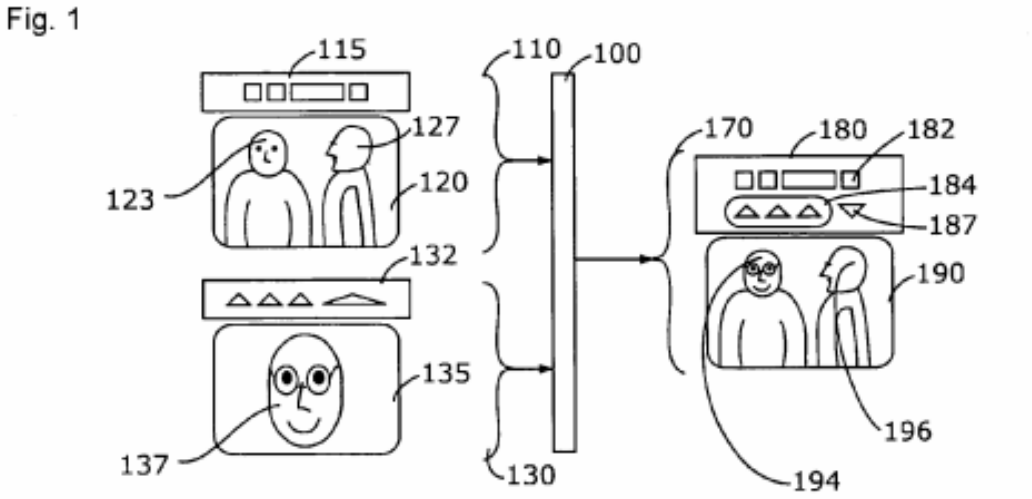

Figure 1 of Sitrick, above, shows that representation 123 in program video 120 has been replaced in output video 190 by face 137. Ex. 1007, Fig. 1, ¶ 31. Moreover, we agree with Petitioner that, even if Figure 6 shows a number of variations of face 137 that have been extracted from a video, each of those is nevertheless the result of a selection of at least one pixel i.e., face 137 by the user. Finally, even assuming that the user-specified image is a texture map by the time it is an input 570 into subsystem 500, that does not undermine Sitrick's teaching that the image was extracted as "at least one pixel in the frame of the user input video data stream," as the claim requires. *Id.*

Additionally, Sitrick illustrates clearly in Figure 1, where image 137 of user input content 130 is "extracted"—which we have construed to mean "selected and separated out"—from user image data 135 so that it can be substituted for face 123. Ex. 1007 ¶¶ 13, 31. We, therefore, are persuaded that Sitrick teaches "extracting the identified at least one pixel as the second image."

j. "storing the second image . . ."

Claim 1 recites "storing the second image in a memory device operably coupled with the interactive media apparatus." Petitioner relies upon Sitrick's teaching that, "[t]he data for the user replacement object image may reside in either or both of the storage subsystem 1140 or the memory subsystem 1150." Pet. 61–62 (citing Ex. 1007, Fig. 11, ¶¶ 111, 115, 116). Although this disclosure relates to Figure 11, we are persuaded that a person of ordinary skill in the art would have understood the system of Figure 13 to similarly store image data in similar storage or memory subsystems.

Patent Owner refers to its argument for the previous recitation and argues that "Sitrick fails to disclose storing the user's images in memory because what is stored in memory are not images, but rather representative pixel textures of the surface of a user object." Supp. POR 28. Petitioner counters by making the same arguments made for claim 11. Supp. Reply 13 (citing Reply 14–16).

We agree with Petitioner. As discussed above (*see supra* § II.F.3.i), even assuming that the user-specified image is a texture map by the time it is an input 570 into subsystem 500, that does not undermine Sitrick's teachings. Furthermore, Sitrick teaches storage subsystem 1140 and memory subsystem 1150 storing software and data referenced by the software. *Id.* ¶ 115. Indeed, Sitrick expressly teaches "[t]he data for the user replacement object may reside in either or both of the storage subsystem 1140 or the memory subsystem 1150." *Id.* ¶ 116.

We, therefore, are persuaded that Sitrick's storing data for the user replacement object image in storage subsystem 1140 or memory subsystem

1150 teaches "storing the second image in a memory device operably coupled with the interactive media apparatus."

k. "receiving a selection of the first image . . ."

Claim 1 recites "receiving a selection of the first image from the original video stream." Petitioner relies upon Sitrick's teaching to replace an identified reference object in an audiovisual presentation, and argues that "the Sitrick system, which may be implemented on a general purpose computer, necessarily receives the selection of the first image in order to carry out the disclosed replacement process." Pet. 62–63 (citing Ex. 1003 ¶ 111; Ex. 1007 ¶¶ 13 ("the selected portion of the predefined audiovisual presentation"), 84, 115). Patent Owner does not argue this limitation. *See generally* PO Resp.; Supp. Reply 28. We are persuaded by Petitioner's showing and find that Sitrick teaches receiving a selection of the first image from the user operating the data entry device.

l. "extracting the first image"

Claim 1 recites "extracting the first image." Petitioner states

> Sitrick extracts a first image, such as a mask or reference object image. (*Id.* at, *inter alia*, Fig. 7 and ¶¶ 48–49, 54 (shows extraction of the mask image); Figs. 7–8, ¶¶ 49, 57, 71–72, 82 (shows extraction of a reference object image).) (Ex. 1003 at ¶¶ 112–114 (explaining Sitrick's extraction of the mask and reference object images).).

Pet 63. Sitrick describes an embodiment of a tracking subsystem, which "accepts a first audiovisual presentation comprised of visual picture image 710 and performs processing on that presentation." Ex. 1007 ¶ 48. "The tracking subsystem 700 may compute a[] mask 750[,] which represents the

region of the reference object within the visual picture image 710, in this example the face 711." *Id.* ¶ 54. Sitrick also describes a tracking subsystem that works with a first audiovisual presentation "comprised of a time-ordered sequence 810 of visual picture images." *Id.* ¶¶ 55–61 (describing embodiment of Figure 8). Sitrick teaches that, "[i]n an embodiment where the reference object is embedded within the visual picture, the present invention includes means to analyze the visual picture to detect the embedded reference object" and that "[t]his may be accomplished by image recognition means." *Id.* ¶ 71. Notwithstanding Patent Owner's argument, which we address below, we are persuaded that this step is taught by Sitrick's teaching of using image recognition to identify a reference object from the original video data stream.

Patent Owner argues "Sitrick also fails to disclose the limitation 'extracting the first image.'" Supp. POR 28–29 (citing Ex. 2014 ¶¶ 131–132). Patent Owner's argument is conclusory. Dr. Prieto testifies that Sitrick does not teach this limitation because its tracking subsystem "does not output an image (first image)." Ex. 2014 ¶ 132. This argument is not persuasive because it is not commensurate with the claims, which do not require outputting an image. Pet. Reply 12–13. The claims recite instead "extracting" the first image. Sitrick's tracking subsystem "extracts" the first image by creating a mask (e.g., mask 750 or mask 860) "which represents the region of the reference object within the visual picture image 710, in this example face 711." Ex. 1007 ¶ 54. "In a preferred embodiment, the mask is opaque in the region of the reference object and clear elsewhere." *Id.* "In another embodiment, the mask is clear in the region of the reference object and opaque elsewhere." *Id.* Thus, Sitrick teaches that its tracking subsystem

create masks that are used to "extract"—which we have construed to mean "select and separate out"—face 711, for example, from the first audiovisual presentation.

m. "spatially matching . . ."

Claim 1 recites "spatially matching an area of the second image to an area of the first image in the original video data stream, wherein spatially matching the areas results in equal spatial lengths and widths between said two spatially matched areas." Petitioner relies upon Sitrick's teaching of "several methods of matching an area of the second image to an area of the first image—*e.g.*, mapping, stretching, rotating, scaling, zooming, curling, shearing, distorting, and morphing of the size of a replacement image (second image) to obtain the best results." Pet. 63–64 (citing Ex. 1007 ¶¶ 94–96, 100).

Patent Owner argues that "spatially matching" means "aligning a set of pixels in the spatial domain" and that Sitrick does not teach this limitation because "[i]t is not obvious to a [person of ordinary skill in the art] that a shrinking transform, a zooming transform, stretching transform, etc., as cited by Petitioner, that the selected two areas would have equal lengths and widths." Supp. POR. 29–30. Patent Owner cites Sitrick's disclosure that these transforms are used to obtain "the best result." *Id.* (citing Ex. 1007 ¶ 95).

Petitioner counters that Patent Owner's assertions about how a person of ordinary skill in the art would understand Sitrick are conclusory and unsupported by evidence. Supp. Reply 13. Dr. Delp testifies as follows:

> 47. As an illustration, Sitrick teaches a morphing technique which "is a graphical image transformation algorithm that operates on two arrays of coordinates, also known as locations, or points. The first array of coordinates represents points on a first visual image. The second array of coordinates represents points on a second visual image." (Ex. 1007-Sitrick at ¶97; *see also id.* at ¶¶94-98.) A POSITA would understand that these arrays of coordinates are a way of representing the locations or points of the pixels in the first visual image (i.e., a replacement image) and the second visual image (i.e., an original image).
>
> 48. Sitrick further describes that "[t]here is a required ***exact one to one relationship between the first array of coordinates and the second array of coordinates***" and that "[t]he algorithm of morphing computes a local distortion of the first visual image so that each one of the coordinates in the first array is distorted and moved to align with the corresponding one coordinate in the second array, thereby producing the second visual image." (Ex. 1007-Sitrick at ¶97.) As explained here, a POSITA would understand that morphing aligns the points of the first image (i.e., a replacement image) into the points of the second image (i.e., an original image), causing the replacement image to be distorted (i.e., spatially matched) into the original image. In other words, a distorted (spatially matched) replacement image will have the same spatial length and width as the original image. Thus, a POSITA would understand that the operation of morphing of the first visual image into the second visual image results in equal length and width between the two spatially matched images.

Ex. 1017 ¶¶ 47–48.

We agree with Petitioner using Patent Owner's construction that "spatially matching" means "aligning a set of pixels in the spatial domain." Although Dr. Prieto testifies in support of Patent Owner's position, we find the testimony of Dr. Delp more credible on this issue. Ex. 1017 ¶¶ 46–53. Dr. Prieto's declaration merely parrots the Patent Owner Response without

providing a persuasive explanation for the assertion that a person of ordinary skill in the art would not find it obvious to use the transforms to achieve "equal spatial lengths and widths between two spatially matched areas." Ex. 2012 ¶¶ 69–72. Dr. Prieto does not, for example, identify particular obstacles that a person of ordinary skill in the art would have understood to exist and why the transforms disclosed in Sitrick would not have been adequate to overcome those obstacles.

In contrast, Dr. Delp explains that spatial matching does not require any particular technique, and that a person of ordinary skill in the art would understand Sitrick's morphing technique—involving an "exact one to one relationship between the first array of coordinates and the second array of coordinates"—to align the points of the first image into the points of the second image, which would result in equal length and width. *Id.* ¶¶ 46–48 (quoting Ex. 1007 ¶ 97). Dr. Delp further explains that Dr. Prieto's reliance on the phrase "to obtain the best results" in Sitrick is misplaced because that phrase "does not indicate the limitations of Sitrick, but rather, simply indicates that different techniques may be selectively used to obtain a better output that the user would have desired." *Id.* ¶ 49.

As a result, we are persuaded that Sitrick teaches the use of its transforms to perform "spatially matching" using Patent Owner's construction of the term.[5]

[5] Regarding similar analysis for claim 11, the Federal Circuit stated that "the Board weighed both experts' testimony" and the Federal Circuit saw "no reason to disturb the Board's conclusion." *Samsung*, 948 F.3d at 1357–58.

n. "performing a substitution . . ."

Claim 1 recites "performing a substitution of the spatially matched first image with the spatially matched second image to generate the displayable edited video data stream from the original video data stream." Petitioner relies upon Sitrick's teaching of overlaying user image data over a portion of a first audiovisual presentation to create output video 190. Pet. 64 (citing Ex. 1007, Fig. 1, ¶¶ 31, 87, 95, 96, 100).

Patent Owner argues that Sitrick does not substitute, but rather overlays. Supp. POR 31–32 (citing Ex. 2014 ¶¶ 169–174). Patent Owner acknowledges "[a] user would only see the replacement image." *Id.* at 32.

Petitioner responds that Patent Owner "attempts to distinguish an 'overlay' process from the claimed substitution, but this argument fails because one image is substituted for the other in the video that is displayed." Supp. Reply 13 (citing Ex. 1017 ¶¶ 46–53). Dr. Delp testifies as follows:

> It is my opinion that Sitrick's ability to utilize multiple images to obtain a more seamless substitution is consistent with the '591 Patent's rudimentary substitution using a single image. Sitrick may simply use only one image for the substitution as opposed to multiple, satisfying the '591 Patent's image substitution technique. (*See, e.g.*, Ex. 1001 at Fig. 3.)

Ex. 1017 ¶ 50.

Consistent with Petitioner's contentions and Dr. Delp's testimony, Sitrick's tracking subsystem "extracts" the first image by creating a mask (e.g., mask 750 or mask 860) "which represents the region of the reference object within the visual picture image 710, in this example face 711." Ex. 1007 ¶ 54. "In a preferred embodiment, the mask is opaque in the region of

the reference object and clear elsewhere." *Id.* "In another embodiment, the mask is clear in the region of the reference object and opaque elsewhere." *Id.*

Sitrick further teaches "[t]he output video 190 consists of a processed version of the program video 120 selectively processed by the subsystem 100 such that the representation 123 *has been replaced by the user specified image 137* producing the output 194." Ex. 1007 ¶ 31 (emphasis added); *see also id.* ¶ 87 ("The invention then replaces a portion of the first audiovisual presentation with a portion of the associated replacement object image" and that overlaying "will obscure or replace a portion of the first audiovisual presentation"). As shown in Figure 1 of Sitrick (*see supra* § II.F.3.i), representation 123 in program video 120 has been replaced in output video 190 by face 137. Ex. 1007, Fig. 1.

We, therefore, are persuaded by Petitioner's showing and find that Sitrick's overlaying teaches this limitation.

o. Summary

For the foregoing reasons, we are persuaded that Petitioner has established, by a preponderance of the evidence, claim 1 of the '591 patent is unpatentable under 35 U.S.C. § 103(a) as obvious over Sitrick.

4. Analysis of Claims 2 and 8—Sitrick

Claim 2 recites

> 2. The interactive media apparatus of claim 1 wherein the digital processing unit is further capable of performing:
>
> computing motion vectors associated with the first image; and
>
> applying the motion vectors to the second image extracted from the user input video data stream, wherein the generated displayable edited video data stream resulting from the

> substitution maintains an overall motion of the original video data stream.

Ex. 1001, 7:55–63.

Petitioner relies upon Sitrick's disclosure of tracking a location of a face, and of a correlation means, that uses motion vector information from encoded video. Pet. 65 (citing Ex. 1007 ¶¶ 57, 65, 67); *see also* Ex. 1007 ¶¶ 66, 76). Petitioner argues that "a [person of ordinary skill in the art] understands Sitrick as disclosing that its computer computes the motion vectors in a video encoded in the MPEG standard to estimate the actual position of the reference object in each frame of the video." *Id.* (citing Ex. 1003 ¶ 119). Petitioner also relies upon Sitrick's teaching of applying the motion vectors to the user specified image by geometrical transformations. Pet. 65–66 (citing Ex. 1003 ¶ 120; Ex. 1007 ¶¶ 100, 104).

Patent Owner argues that Sitrick does not teach that the motion vectors are applied to the second image. Supp. POR 32. According to Patent Owner, Sitrick's motion vectors computer for the purpose of correlation is only associated with the first audiovisual presentation (video input signal) and are then only associated with the first image (reference). *Id.* (citing Ex. 2014 ¶¶ 175–183).

Petitioner counters that Patent Owner's argument is not commensurate with the scope of the claim, which does not recite "suppl[ying]" or "obtain[ing]," but instead recites "applying." Pet. Reply 26. According to Petitioner, to the extent Patent Owner is arguing that motion vectors associated with the first image are applied to something other than the "second image," that argument is erroneous. *Id.* (citing Ex. 1017 ¶¶ 57–58).

Upon consideration of the contentions and evidence in the record before us, we are persuaded by Petitioner's arguments and evidence for the

same reasons given for claim 11. Dec. 44–47. In particular, we again find the testimony of Dr. Delp more credible than the testimony of Dr. Prieto. Dr. Prieto's testimony parrots the Supplemental Patent Owner Response that the use of the motion vectors as it is related to the correlation function is solely associated with what may be considered the first image, and thus not applied to the representation of the second image. Ex. 2012 ¶¶ 77–78; Ex. 2014 ¶¶ 175–181. Also, Dr. Prieto's testimony is that "[n]o motion vectors are supplied or obtained from the first audiovisual presentation from which the representation of the first image is obtained" (Ex. 2014 ¶¶ 182–183), but we agree with Petitioner that claim 2 recites "applying."

Dr. Delp testifies as follows:

> Sitrick describes that "[a]s the correlation means continues to recognize the reference object, the scaling, rotation, and positioning parameters are continually or periodically updated, resulting in updated transformed user object geometric information." (Ex. 1007-Sitrick at ¶100.) This updated information, in combination with other information, "permits the reconstruction of the appearance of the user object in the same placement and orientation as the detected reference object." (*Id.* at ¶104.) Based on these disclosures, a POSITA thus would understand the motion vectors associated with the first image are used by the correlation means in Sitrick to reconstruct the user object that contains the second image. In other words, this application of motion vectors associated with the first image results in maintaining the same placement and orientation of the second image to the detected first image.

Ex. 1017 ¶ 58.

Dr. Delp's testimony is consistent with Sitrick's disclosure that the correlation means uses motion vector information (Ex. 1007 ¶ 76 ("[T]he correlation means of the present invention uses the motion vector

information in the first audiovisual presentation to describe the displacement of identified reference points from a first detected location to another location.") and that the association means, which "associates a detected reference object with one or more replacement object images," "uses the information provided by the correlation means" (*id.* ¶ 84).

Having considered all the arguments and evidence, we are persuaded that Sitrick teaches the further recitations in claim 2.

Claim 8 depends directly from claim 1 and further recites "wherein the substitution performed by the digital processing device replaces at least a face of a first person from the original video data stream by at least a face of a second person from the user input video data stream." Ex. 1001, 8:15–19.

Petitioner argues Sitrick discloses this limitation as the first person's facial image 123 is replaced with a second person's facial image 137. Pet. 66 (citing Ex. 1007 ¶ 31, Fig. 1). Patent Owner provides only a conclusory argument that Sitrick does not disclose the further recitation of claim 8. Supp. POR 33. For the same reasons given for claim 1 (*see supra* §§ II.F.a–o), upon consideration of the arguments and evidence before us, we are persuaded by Petitioner's showing that Sitrick teaches replacing a face of a first person (facial image 123) by a face of a second person (facial image 137). Ex. 1007, Fig. 1, ¶ 31.

Accordingly, for the reasons given, we determine that Petitioner has demonstrated by a preponderance of the evidence that claims 2 and 8 are unpatentable, under 35 U.S.C. § 103(a), as obvious over Sitrick.

5. Analysis of Claims 3 and 4—Sitrick and Levoy

Claim 3 depends directly from claim 1 and further recites "wherein the digital processing unit is further capable of extracting the at least one pixel from the user entering data in the data entry display device." Ex. 1001, 7:64–67. Claim 4 depends from claim 3 and further recites "wherein the digital processing unit is further capable of extracting the at least one pixel from the user pointing to a spatial location in a displayed video frame." *Id.* at 8:1–4. As we explain above (*see supra* § II.E), we perform our analysis using part of Patent Owner's proposed construction, i.e., that "data entry display device" is limited to a touchscreen device. We also use Patent Owner's constructions (PO Resp. 9) that "the user pointing to" means "chosen by said user" and "a spatial location in a displayed video frame" means "performing spatial analysis on a video frame based on a user input."

For claim 3, Petitioner argues that "Sitrick discloses that a replacement image (e.g., a user's face) may be identified and discloses an extracted user selected image as a facial image 137." Pet. 68–69 (citing Ex. 1007 ¶ 31, Fig. 1; Ex. 1003 ¶ 101). Petitioner also argues that a person having ordinary skill in the art would have used Levoy's conventional touch screen technology with the general purpose computing device of Sitrick because of the known benefits of touch screen technology. *Id*. at 38–42, 67–69 (citing, *e.g.*, Ex. 1007 ¶¶ 11, 13, Fig. 1; Ex. 1008 ¶¶ 10, 21, 23, 46, 47, 50, Fig. 3; Ex. 1003 ¶¶ 81, 82, 105, 142, 145; Ex. 1010 ¶ 4; Ex. 1011, 1:25-36; Ex. 1012, 1:24-40). For claim 4, Petitioner further argues that "[w]hen using touch screen technology to edit pictures, a user would naturally point 'to a spatial location in a displayed video frame,'" as taught in Levoy. *Id.* at 70 (Ex. 1008 ¶ 47).

Patent Owner counters "a person of ordinary skill in the art would know that Sitrick includes a huge data burden—not easily satisfied in the type of small touchscreen device disclosed by Levoy." Supp. POR 33 (citing Ex. 2014 ¶¶ 197–202). Patent Owner simply states that Sitrick in view of Levoy does not render claim 4 obvious. *Id.* at 34 (citing Ex. 2014 ¶¶ 204–209). Dr. Prieto's testimony relied upon by Patent Owner pertains to asserted deficiencies with respect to claim 1 and whether Levoy remedies those deficiencies. Ex. 2014 ¶¶ 197–209. For the reasons given (*see supra* § II.F.3), we are not persuaded that Sitrick has the asserted deficiencies. Patent Owner's other assertions are conclusory.

Upon consideration of the contentions and evidence in the record before us, Petitioner's contentions are consistent with the evidence of record. For instance, Levoy teaches a "touch screen display" and that "a user may tap on a touch screen in the location of a particular burst image fragment to select the underlying burst image." Ex. 1008 ¶ 47, Fig. 3; *see also id.* ¶ 10 ("The selected location may be received from a user interface device, such as, but not limited to, a mouse, a stylus, a *touch-screen*, or the like" (emphasis added)), ¶ 23 (describing that "user interface 115 may also include a display, which may be embodied as a *touch screen display*" (emphasis added)). Levoy teaches that the user's selection is received by processor 105. *Id.* ¶ 47.

Dr. Delp testifies that a person having ordinary skill in the art would have been motivated to use conventional touch screen technology as opposed to non-touch technologies because "touch screen devices were known to be easier to use and more versatile than keyboards" and "[t]ouch screens were also known to provide a natural and user-friendly experience

for operators." Ex. 1003 ¶¶ 81–82, 142, 145. Dr. Delp's testimony is consistent with the evidence of record. *See, e.g.*, Ex. 1010 ¶ 4 (describing that "[t]ouch screens, in particular, are becoming increasingly popular because of their ease and versatility of operation"); Ex. 1011, 1:25–36 (describing that using a touch-panel "the user can readily make a device execute various processing simply by touching the display screen"); Ex. 1012, 1:24–40 (describing that "[h]uman factors studies have shown that by providing a means for inputting data on the visual display screen itself, the user can achieve the most closely coupled interactive operations with the data processing system" and that "[w]hen the user responds to visual signals output at the face of the visual display device, by inputting signals at that same visual display surface, an accuracy and immediacy in the interaction between man and machine can be achieved").

Accordingly, for the reasons given, we determine that Petitioner has demonstrated by a preponderance of the evidence that claims 3 and 4 are unpatentable, under 35 U.S.C. § 103(a), as obvious over Sitrick and Levoy.

G. Senftner Grounds

In the Final Written Decision, we concluded Petitioner had not established, by a preponderance of the evidence, that claim 11 is unpatentable as anticipated by Senftner. Dec. 26. The Federal Circuit's opinion in *Samsung* affirmed our determination with respect to claim 11 and Sitrick. *Samsung*, 948 F.3d at 1355, 1359; *see also* Papers 78, 79.

Petitioner contends that claims 1, 2, and 8 are anticipated by Senftner. Pet. 4. Petitioner contends in the alternative that claims 1, 2, and 8 are

unpatentable as obvious over Senftner. *Id.* Petitioner also contends that claims 3 and 4 are unpatentable as obvious over Senftner and Levoy. *Id.*

We determine that Petitioner has not shown that Senftner discloses "wherein spatially matching the areas results in equal spatial lengths and widths between said two spatially matched areas," but in our view the recitation is obvious in the context of the challenged claims over Senftner. *See infra* § II.G.2.m. For claim 1, therefore, we discuss obviousness, but not anticipation in our analysis of Petitioner's element-by-element contentions. Below, we start with a summary of Senftner and then turn to the parties' contentions regarding obviousness.

1. Overview of Senftner

Senftner is directed to "[p]rocesses and apparatus for personalizing video through partial image replacement." Ex. 1006, Abstract. "Personalization may include partial or full replacement of the image of an actor, an object, or both." *Id.* "Personalization may also include insertion or replacement of an object, and full or partial replacement of the background and/or sound track." *Id.*

Figure 8 of Senftner is reproduced below.

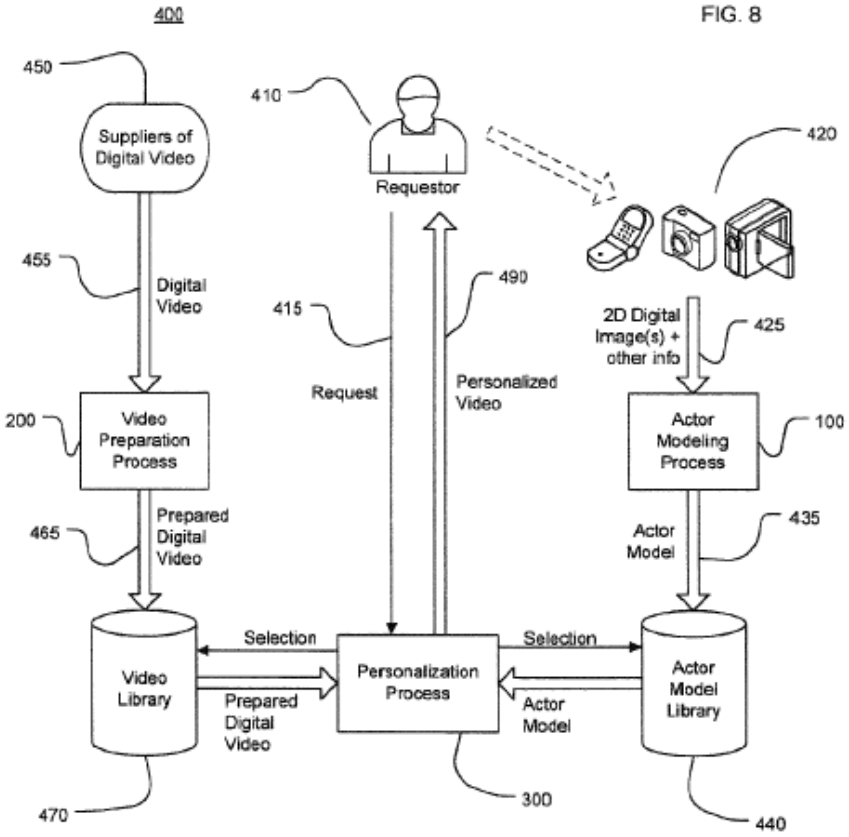

Figure 8 of Senftner is a flowchart of process 400 for creating and delivering personalized video comprising video preparation process 200, actor modeling process 100, and personalization process 300. *Id.* at 9:32–34, 17:23–26, Fig. 8.

As shown in Figure 8, requester of the personalized video 410 transmits request 415 to the personalization process. *Id.* at 18:1–2. Request 415 may identify an actor model to be retrieved from actor model library 440. *Id.* at 18:11–12. Request may include 2D digital image 425, in which case actor modeling process 100 will be performed on the image prior to personalization process 300. *Id.* at 18:11–16. 2D digital image 425 may be

created by means of digital image recording device 420, such as a digital camera, a digital video recorder, or a camera-equipped cell phone. *Id.* at 17:46–49.

In video preparation process 200, the position, orientation, and expression of an original actor is identified and tracked. *Id.* at 10:29–31. The facial image of the original actor is removed. *Id.* at 11:7–12.

Personalization process begins at step 320, where the image of the new actor is inserted into the video. *Id.* at 12:27–28. At step 322, the 3D model of the new actor is transformed to match the orientation and expression of the original actor. *Id.* at 12:30–32. After the 3D model is rotated and morphed, a 2D image of the 3D model is developed and scaled to the appropriate size at step 324. *Id.* at 12:35–37. The transformed scaled 2D image of the new actor is then inserted into the video at step 326 such that the position, orientation, and expression of the new actor substantially matches the position, orientation, and expression of the previously removed original actor. *Id.* at 12:37–42.

2. Analysis of Claim 1— Senftner

a. Preamble

The preamble of claim 1 recites "[a]n interactive media apparatus for generating a displayable edited video data stream from an original video data stream." Petitioner relies upon Senftner's teaching of processes and apparatus for personalizing video through partial image replacement. Pet. 13 (citing Ex. 1006, code (57), 2:41–54, 5:20–25). Senftner describes its "apparatus" as "computer-implemented." Ex. 1006, code (57) (describing "[p]rocesses and apparatus for personalizing video through partial

replacement are disclosed"), 2:41–44 (describing that "a computer-implemented process for providing personalized digital video can include selecting a target in original digital video to be replaced by a target replacement").

Patent Owner asserts that "original video data stream" means "a digitally recorded sequence of images that is to be modified." PO Resp. 7. Senftner teaches "original video data stream" using Patent Owner's construction. Senftner describes "a computer-implemented process for providing personalized digital video can include selecting a target in *original digital video* to be replaced by a target replacement." *Id.* at 2:41–44 (emphasis added). Figure 8 of Senftner illustrates digital video 455 received by video preparation process 200. *Id.* at Fig. 8. Senftner describes "*original digital video 455* may be obtained from a supplier of video 450" and then may be delivered to the video preparation process 200. *Id.* at 17:30–33.

Patent Owner argues that Senftner's subsystem is not an apparatus comprised of all the features of the claimed apparatus. Supp. POR. 6–7. We disagree. As discussed above (*see supra* § II.F.3.a), claim 1 is not limited to a single unitary device. Patent Owner's argument also is not consistent with the language of claim 1, which recites multiple devices. *See supra* § II.F.3.a.

Also, we agree with Petitioner that anticipation is not an *ipsissimis verbis* test. Supp. Reply 6 (citing *In re Bond*, 910 F.2d 831, 832 (Fed. Cir. 1990)). Nevertheless, Senftner uses the term "apparatus" with respect to its system (*see, e.g.*, Ex. 1006, code (57)) and, indeed, uses the subtitle "Description of Apparatus" for describing hardware for its system including, for example, (1) computing device 600 including processor 610 in communication with memory 620 and storage medium 630; and

(2) computing device 700 comprising processor 710 in communications with memory 720 and storage medium 730. Ex. 1006, 20:22–21:53. Additionally, for the reasons discussed below (*see infra* §§ II.F.3.b–o), we are persuaded by Petitioner's showing and find that Senftner teaches the apparatus comprising all features recited in claim 1.

The preamble of claim 1 further recites "wherein at least one pixel in a frame of said original video data stream is digitally extracted to form a first image, said first image then replaced by a second image resulting from a digital extraction of at least one pixel in a frame of a user input video data stream." Petitioner relies upon Senftner's teaching of "target replacement," which Petitioner describes as follows: "images of the target or original actor (the first images) are 'replaced' with images of a 'target replacement' or 'new actor' (the second images)." Pet. 14–19 (citing, *e.g.*, Ex. 1006, 2:41–54, 9:6–9, 10:3–28, 12:27–45). Senftner teaches that "a computer-implemented process for providing personalized digital video can include selecting a target in original digital video to be replaced by a *target replacement*." Ex. 1006, 2:41–54 (emphasis added). Senftner teaches an example case "where the video is personalized by substituting the image of the face of a new actor for the facial portion of the image of one of the video's original actors." Ex. 1006, 9:6–9; *see also id.* at 12:27–45 (describing details for "substituting the image of the new actor").

Patent Owner asserts that "user input video data stream" means "a sequence of images digitally recorded by a user separate from the original video data stream." PO Resp. 7. Senftner teaches "user input video data stream" using Patent Owner's construction. Senftner teaches request 415 may include 2D digital image 425, in which case actor modeling process 100

will be performed on the image prior to personalization process 300. Ex. 1006, 18:11–16. 2D digital image 425 may be created by means of digital image recording device 420, such as a digital camera, a digital video recorder, or a camera-equipped cell phone. *Id.* at 17:46–49. Patent Owner does not argue the second part of the preamble. *See generally* PO Resp.; Supp. POR.

Using Patent Owner's construction, we are persuaded by Petitioner's showing and find that Senftner teaches this part of the preamble.

b. "an image capture device capturing the user input video data stream"

Claim 1 recites "an image capture device capturing the user input video data stream." Petitioner relies upon Senftner's teaching that "[t]he 2D [2-dimensional] digital image 425 may be created by means of a digital image recording device 420, such as a digital camera, a digital video recorder, or a camera-equipped cell phone." Pet. 19 (citing Ex. 1006, 17:45–48, Figs. 8–11).

Patent Owner argues that the device relied on by Petitioner, i.e., digital image recording device 420 is not part of computing device 600 or computing device 700 and, therefore, is not part of Senftner's apparatus. Supp. POR 7–8 (citing Ex. 1006, 20:39–42, 21:8–11; Ex. 2014 ¶ 54). Patent Owner's argument is similar to its argument regarding the preamble and is not persuasive for the same reasons. *See supra* § II.G.2.a.

Also, Patent Owner appears to be arguing other limitations. Even with respect to those other limitations, however, Patent Owner's argument is not consistent with the language of claim 1, which recites "a data entry device, *operably coupled* with the image capture device and the image display

device" and "a digital processing unit *operably coupled* with the data entry device." Ex. 1001, 7:25–36 (emphasis added).

As will be discussed below, Senftner teaches those recitations. For instance, Senftner teaches that a data entry device, such as the keyboard of computer 670, is *operably coupled* with a digital image device, such as a digital camera, a digital video recorder, or a camera-equipped cell phone. *See, e.g.*, Ex. 1006, Figs. 10, 11, 20:35–38, 20:64–67. Senftner describes digital image recording device 425 with respect to Figure 8 and digital image device 660 with respect to Figures 10 and 11. *Id.* at Figs. 8, 10, 11, 17:45–48, 20:35–38, 20:64–67. Each of Senftner's digital image recording device 425 and digital image device 660 similarly may be a digital camera, a digital video recorder, or a camera-equipped cell phone that provides digital images and each teaches an image capture device recited in claim 1.

Senftner teaches that the image capture device captures 2D digital image 425 and then that image is received and processed by actor modeling process 100. Ex. 1006, 17:45–48, 20:33 (describing that computing device 600 receives the 2D digital image), 17:51–52 (describing delivering the 2D digital image by means of a network). Actor modeling process 100 is performed by Senftner's apparatus (computing device 600 or computing device 700) relied upon by Petitioner. *Id.* 10:3–6 (describing actor modeling process 100 creating a digital model of the new actor for personalizing videos), 20:23–33 (describing that creating personalized videos is performed by computing device 600 or computing device 700). Senftner teaches that computing device 600 may interface with a requester 650 via network 640 and remote personal computer 670 having the keyboard. *Id.* at 20:35–38.

Computing device 700 has an interface to requester 650, "such as a keyboard, mouse, or other human interface means." *Id.* at 20:62–64.

We, therefore, are persuaded by Petitioner's showing and find that Senftner's digital image device, such as a digital camera, a digital video recorder, or a camera-equipped cell phone is a digital video capture device that captures a user input video data stream.

c. "an image display device displaying the original video stream"

Claim 1 recites "an image display device displaying the original video stream." Petitioner relies upon Senftner's teaching of computer 670 having a monitor that Petitioner asserts may be used to display the original video data stream. Pet. 20 (citing Ex. 1006, Fig. 10). Senftner teaches that computer 670 used by requestor 650 interfaces with computing device 600. Ex. 1006, 20:35–38. Petitioner also relies on Senftner's teaching in connection with computing device 700 of presenting to a user "by means of *display device*." Pet. 20 (citing Ex. 1006, 21:6–8).

Patent Owner argues that Senftner does not disclose that the display devices relied upon by Petitioner display the original video stream. Supp. POR 8–10. Patent Owner argues that the devices are used to present only the personalized video. *Id.* Patent Owner also argues the only interface 640 between personalization computer device 600 and computer 670 does not exchange data between the original video library 680 and computer 670. *Id.* at 10.

Petitioner counters that Senftner's teaching of selecting targets in the original video involves viewing the original video to select the appropriate

target. Supp. Reply 7 (citing Ex. 1006, 2:33–54, 5:14–40, 6:1–20; Ex. 1025 ¶¶ 9-10).

We agree with Petitioner. Senftner teaches providing "personalized" digital video by replacing target images "based on user preferences." Ex. 1006, 2:33–37. Senftner teaches that those user preferences are provided by the user "selecting a target in original digital video to be replaced." *Id.* at 2:41–44. Senftner states that "[t]he process steps applied to the video involve altering or manipulating the actual data stored in the digital video on a pixel-by-pixel and frame-by-frame basis." *Id.* at 8:52–54; *see also id.* at 20:35 (describing that computing device 600 may interface with a requestor 650).

Also, contrary to Patent Owner's argument that interface 640 does not exchange data between the original video library 680 and computer 670 (Supp. POR 10), Senftner states that "[t]he requester of the personalized video 410 transmits a request 415 to the personalization process" (Ex. 1006, 18:1–2) and "[t]he request may identify a specific video to be retrieved from the video library 470" (*id.* at 18:10–12). Senftner teaches that video library 470 stores, for example, original digital video 455. *Id.* at 17:35–39. Additionally, Figure 10 relied upon by Patent Owner illustrates that Senftner's interface 640 is between processor 610 and computer 670, which is used by requestor 650. *Id.*, Fig. 10. Video library 680 is shown to have a two-way data exchange with processor 640. *Id.* Importantly, Senftner also states that "computing device 600 may interface with a video library 680 by means of *network 640* or a second interface" and that "computing device 600 may interface with a requester 650 and a digital image source 660 via the *network 640* and a remote personal computer 670. *Id.* at 20:35–39.

We, therefore, are persuaded by Petitioner's showing and find that each of Senftner's computer 670 having a monitor and display device operating in connection with computing device 700 teaches an image display device displaying the original video stream.

d. "a data entry device, operably coupled with the image capture device and the image display device. . ."

Claim 1 recites "a data entry device, operably coupled with the image capture device and the image display device." Petitioner relies upon Senftner's teaching of computer 670 having a keyboard (not numbered) and computing device 700 including an interface to requestor 650 "such as a keyboard, mouse, or other human interface means." Pet. 20 (citing Ex. 1006, 20:24, 20:35–36, Figs. 10, 11). Petitioner also relies on Senftner's teaching of displaying the personalized video to requestor 650. *Id.* (citing Ex. 1006, 20:62–64, 21:5–7).

Patent Owner argues that Senftner's data entry devices are not capable of serving the function and application of claim 1. Supp. POR 10 (citing Ex. 2014 ¶¶ 64–74). Patent Owner's argument is conclusory. Dr. Prieto testifies that keyboard and mouse of computer 670 and data entry device of computing device 700 are not used by requestor 650 to enter at least a pixel in an image frame of video to select, identify, and extract an image because in Senftner the selection of the target is performed by using the embedded metadata. Ex. 2014 ¶¶ 64–74.

Patent Owner's argument and Dr. Prieto's testimony pertain to a different limitation and are not persuasive as discussed below with respect to that limitation. *See infra* § II.G.2.h. Also, contrary to Patent Owner's argument and Dr. Prieto's testimony, Senftner teaches providing

"personalized" digital video by replacing target images "based on user preferences." Ex. 1006, 2:33–37. Senftner teaches that those user preferences are provided by the user "selecting a target in original digital video to be replaced." *Id.* at 2:41–44. Senftner states that "[t]he process steps applied to the video involve altering or manipulating the actual data stored in the digital video on a pixel-by-pixel and frame-by-frame basis." *Id.* at 8:52–54; *see also id.* at 20:35 (describing that computing device 600 may interface with a requestor 650), 20:56–21:11(describing that computing device 700 may interface with a requestor 650).

We agree with Petitioner that Senftner teaches a data entry device, such as the keyboard of computer 670 that is *operably coupled* with a digital image device, such as a digital camera, a digital video recorder, or a camera-equipped cell phone. *See, e.g.*, Ex. 1006, Figs. 8, 10, 11, 17:45–48, 20:35–38, 20:64–67; *see also supra* § II.G.2.b. Senftner's image capture device captures 2D digital image 425 and then that image is received and processed by Senftner's apparatus, i.e., computing device 600 or computing device 700. *Id.* 10:3–6 (describing actor modeling process 100 creating a digital model of the new actor for personalizing videos), 20:23–33 (describing that creating personalized videos is performed by computing device 600 or computing device 700). Senftner teaches that computing device 600 may interface with a requester 650 via network 640 and remote personal computer 670 having a keyboard. *Id.* at 20:35–38, Fig. 10. Computing device 700 has an interface to requester 650, "such as a keyboard, mouse, or other human interface means." *Id.* at 20:62–64.

Senftner teaches that a data entry device, such as the keyboard of computer 670 or keyboard, mouse, or other human interface means of

computing device 700 (20:62–64) is operably coupled with the image display device. Indeed, Senftner's computer (670) has both a keyboard and display (both not numbered). Ex. 1006, Fig. 10. Computing device (700) including an interface to requestor (650) "such as a keyboard, mouse, or other human interface means" presents to user 650 "by means of a display device." Ex. 1006, 20:35–36, 21:7.

We, therefore, are persuaded by Petitioner's showing and find that Senftner teaches "a data entry device, operably coupled with the image capture device and the image display device."

e. "operated by a user to select the at least one pixel in the frame . . ."

Claim 1 recites "operated by a user to select the at least one pixel in the frame of the user input video data stream to use as the second image, and further operated by the user to select the at least one pixel to use as the first image." Petitioner asserts the "'requestor' is shown in FIGS. 8–11, and meets the requirements of 'a user' who selects the first and second images." Pet. 21 (citing Ex. 1006, Figs. 8–11, 18:1–18, 20:35–38). Petitioner also relies upon Senftner's teaching of creating and delivering personalized video. *Id.* at 21–23 (citing, *e.g.*, Ex. 1006, 2:8–10, 2:33–45, 5:5–6, 8:52–67, 10:3–16, 12:37–45, 17:23–24, 18:45–46, 20:24–39, 20:56–57).

Figure 10 of Senftner showing requestor 650 operating Senftner's apparatus is reproduced below.

FIG. 10

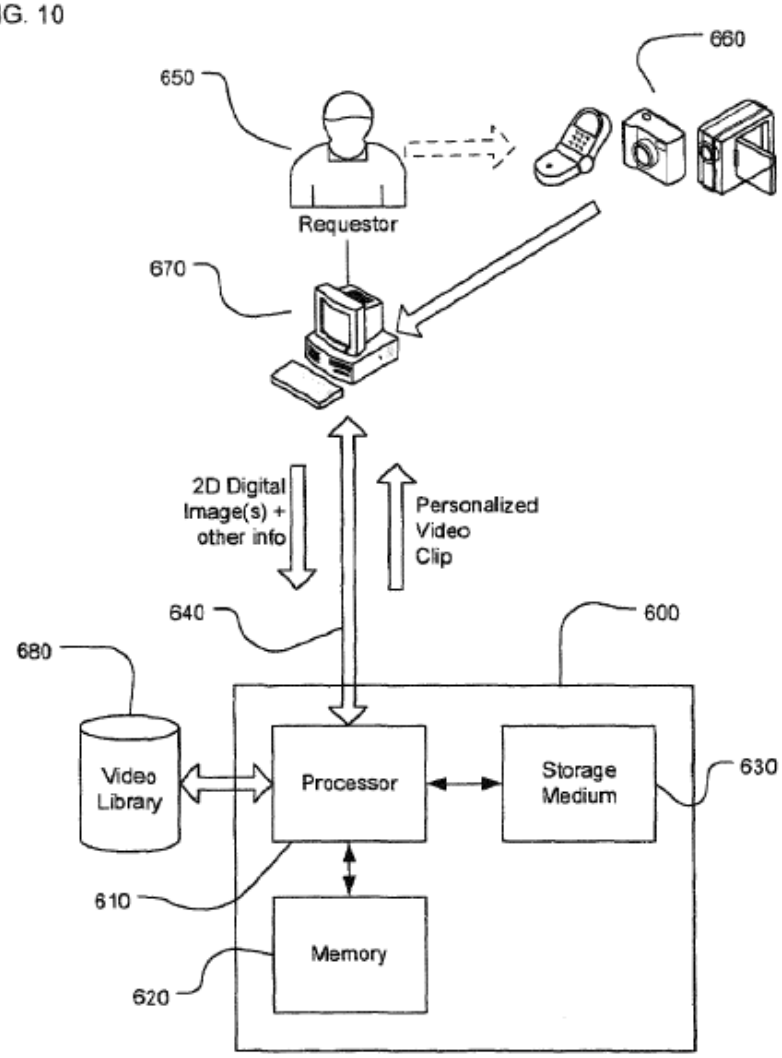

Figure 10 of Senftner is a block diagram of a computer apparatus (Ex. 1006, 5:5) that illustrates *requestor* 650 operating remote personal computer 670 to interface with computing device 600 via network 640 (*id.* at 20:35–38). Figure 11 of Senftner is similar to Figure 10, except requester 650 uses "a keyboard, mouse, or other human interface means" to interface with computing device 700. *Id.* at 20:62–64. Senftner teaches that its apparatus is used for providing personalized digital video by selecting a target in original digital video to be replaced by a target replacement. *Id.* at 2:42–44.

Patent Owner argues that Senftner does not teach the requester using a data entry device or selecting the target replacement. Supp. POR 11. We disagree. As illustrated in Figures 10 and 11, Senftner teaches requestor 650 using the keyboard of computer 670 and the keyboard and/or mouse that interfaces with computing device 700 for providing personalized digital "based on user preferences." *Id.* at 2:34–44, 20:35–38, 20:62–64, Figs. 10, 11.

Senftner teaches a user selecting both (1) the at least one pixel in the frame of the user input video data stream to use as the second image and (2) the at least one pixel to use as the first image. Regarding the first of those selections, Senftner states "[t]he requester of the personalized video 410 transmits a request 415 to the personalization process." *Id.* at 18:1–2. Senftner further states "[t]he request may identify an actor model to be retrieved from the actor model library 440" or "may include a 2D digital image 425, in which case the actor modeling process 100 will be performed on the image prior to the personalization process 300." *Id.* at 18:11–16. Senftner further teaches that its process begins by "accept[ing] one or more two-dimensional (2D) digital images of the new actor, plus related supporting information." *Id.* at 10:3–16. According to Senftner, "[t]he new actor may be the individual desiring the personalized video, a friend or family member thereof, or any other individual, real or imagined, so long as at least one 2D image can be provided." *Id.* at 9:28–31. Senftner also teaches requestor using a digital camera, a digital video recorder, or a camera to provide digital image 425 to actor modeling process 100. *Id.* at 17:46–49, Figs. 10, 11. Regarding the second of the selections, Senftner, for example, teaches "a computer-implemented process for providing personalized digital

video can include *selecting a target in original digital video* to be replaced by a target replacement." Ex. 1006, 2:41–45 (emphasis added).

Patent Owner also asserts that Senftner's selection process differs because all pixels must be selected, whereas claim 1 recites image extraction via the selection of at least one pixel. Supp. POR 12 (citing Ex. 2014 ¶ 78). Patent Owner further asserts the manipulation of Senftner is not a pixel manipulation, but is instead data manipulation. *Id.* (citing Ex. 2014 ¶ 79).

Petitioner counters that claim 1 requires selection of "at least one pixel" and Senftner discloses selecting more than one pixel. Supp. Reply 9. Petitioner also points to Senftner's disclosure that "[t]he process steps applied to the video involve altering or manipulating the actual data stored in the digital video on a pixel-by-pixel and frame-by-frame basis." Ex.1006 8:52–54.

We agree with Petitioner. Senftner teaches a user selecting "at least one pixel." *See, e.g.*, *id.* at 2:8–10 ("Each frame of a digital video is therefore comprised of some total number of pixels"), 8:52–67 (describing "altering or manipulating the actual data stored in the digital video on a pixel-by-pixel and frame-by-frame basis").

We, therefore, are persuaded by Petitioner's showing and find that Senftner teaches "operated by a user to select the at least one pixel in the frame of the user input video data stream to use as the second image, and further operated by the user to select the at least one pixel to use as the first image."

f. "wherein said data entry device is selected from a group . . ."

Claim 1 recites "wherein said data entry device is selected from a group of devices consisting of: a keyboard, a display, a wireless communication capability device, and an external memory device." Petitioner relies upon Senftner's teaching of a keyboard. Pet. 23. Patent Owner argues that Senftner does not teach a display as a data entry device. Supp. POR 13. Petitioner counters that Patent Owner's argument is not consistent with the claim language, which more broadly covers multiple types of data entry devices. Supp. Reply 9.

We agree with Petitioner. Claim 1 recites "wherein said data entry device is selected from a group of devices consisting of: a *keyboard*" (emphasis added). Senftner teaches requestor 650 using the keyboard of computer 670 and the keyboard and/or mouse that interfaces with computing device 700 for providing personalized digital video by selecting a target in original digital video to be replaced by a target replacement. *Id.* at 20:62–64 ("computing device 700 may include an interface to requester 650, such as a keyboard, mouse, or other human interface means"), Fig. 10 (illustrating personal computer 670).

We, therefore, are persuaded by Petitioner's showing and find that Senftner teaches "wherein said data entry device is selected from a group of devices consisting of: a keyboard, a display, a wireless communication capability device, and an external memory device."

g. "digital processing unit operably coupled with the data entry device . . ."

Claim 1 recites "digital processing unit operably coupled with the data entry device, said digital processing unit performing." Petitioner relies upon

"[t]he computers of Senftner," which Petitioner asserts "include normal hardware (*e.g.*, a processor 610/710) and software." Pet. 23–24 (citing Ex. 1006, 20:56–21:11, Figs. 10, 11).

Patent Owner argues that Senftner does not teach this limitation, because Senftner fails to disclose a DPU performing the functions required by claim 1. Supp. POR 13 (citing Ex. 2014 ¶¶ 91–92). Dr. Prieto testifies that a person of ordinary skill in the art would not equate a DPU with computer 670 taught by Senftner. Ex. 2014 ¶ 91.

Petitioner counters that "Dr. Prieto admits that DPU is a general term, that DPUs are well-known to a POSITA, and that a DPU 'can take the form of maybe just a central processing unit[.]'" Supp. Reply 10 (citing Ex. 1028, 6:6–13:3, 15:7–9, 17:8–24, 18:17–21, 21:20–24; Ex. 1026, 148:10–20.)

We agree with Petitioner. First, we agree with Petitioner that "digital processing unit" is a general term. *See supra* § II.F.2.g. Consistent with Petitioner's contentions, Dr. Prieto testified that the "digital processing unit contain[s] various forms" including that "it takes the form of an application's processor" or "just a central processing unit." Ex. 1026, 148:10–20.

As has been shown, computing device 600 and computing device 700 are operably coupled with other hardware elements and teach the limitations recited in claim 1. *See supra* §§ II.G.2.a–f. For instance, Senftner's computing device 600 includes processor 610, memory 620, and storage medium 630 and interfaces with other hardware elements via network 640. *Id.* at 20:25–31, Fig. 10. Those other hardware elements include personal computer 670 having a keyboard and a digital image device, such as a digital camera, a digital video recorder, or a camera-equipped cell phone. *Id.* at 17:46–49, 20:25–38, Fig. 10. Senftner's computing device 700 includes

processor 710, memory 720, storage medium 730, "an interface to requestor 650, such as a keyboard, mouse, or other human interface means," and presents personalized video "to a user by means of display device." *Id.* at 20:56–21:7, Fig. 11. Computing device 700 also has an interface to a digital image device, such as a digital camera, a digital video recorder, or a camera-equipped cell phone. *Id.* at 17:46–49, 20:56–21:7, Fig. 11. As will be discussed below, Senftner teaches the remaining features of claim 1. *See infra* §§ II.G.2.h–n.

We, therefore, are persuaded by Petitioner's showing and find that Senftner teaches "digital processing unit operably coupled with the data entry device."

h. "identifying the selected at least one pixel in the frame of the user input video stream"

Claim 1 recites "identifying the selected at least one pixel in the frame of the user input video stream." According to Petitioner, Senftner discloses "matching pixel(s) from the original image to pixel(s) in the new image, on 'a pixel-by-pixel and frame-by-frame basis' to achieve the replacement." Pet. 24 (citing Ex. 1006, 8:52–9:5.) Petitioner asserts, "Senftner further discloses that portions of the original image in the frame of a video must be identified to achieve the replacement." *Id.* (citing Ex. 1006, 8:60–62.)

Patent Owner argues that Senftner does not teach this limitation because the user does not make the selection. Supp. POR 14 (citing Ex. 2014 ¶¶ 94–101). Dr. Prieto testifies "identification of the original target image and replacement target image is not a result of a user selecting at least one pixel in the frame of a digital video," but, instead, "the identifying of the

targets (original and replacement targets) is made based on demographic profile/or embedded data in the image and video files." Ex. 2014 ¶ 98.

Contrary to Patent Owner's arguments, as discussed above (*see supra* § II.G.2.e), Senftner teaches a user selecting the at least one pixel in the frame of the user input video data stream to use as the second image. As illustrated in Figures 10 and 11, Senftner teaches requestor 650 using the keyboard of computer 670 and the keyboard and/or mouse that interfaces with computing device 700 for providing personalized digital "based on user preferences." *Id.* at 2:34–44, 20:35–38, 20:62–64, Figs. 10, 11. Senftner also states expressly that "[t]he requester of the personalized video 410 transmits a request 415 to the personalization process." *Id.* at 18:1–2. Senftner further states "[t]he request may identify an actor model to be retrieved from the actor model library 440" or "may include a 2D digital image 425, in which case the actor modeling process 100 will be performed on the image prior to the personalization process 300." *Id.* at 18:11–16. Senftner also teaches requestor using a digital camera, a digital video recorder, or a camera to provide digital image 425 to actor modeling process 100. *Id.* at 17:46–49, Figs. 10, 11.

Senftner further teaches that its modeling process "accepts one or more two-dimensional (2D) digital images of the new actor, plus related supporting information." *Id.* at 10:3–5. According to Senftner, "[t]he preferred 2D image primarily captures the new actor's face, the top and bottom of their head, both ears, portions of their neck, with both eyes visible and no more than a 30 degree rotation away from the camera." *Id.* at 10:8–12.

We, therefore, are persuaded by Petitioner's showing and find that Senftner teaches "identifying the selected at least one pixel in the frame of the user input video stream."

i. "extracting the identified at least one pixel as the second image"

Claim 1 recites "extracting the identified at least one pixel as the second image." Petitioner asserts "Senftner's system performs the replacement process on a pixel-by-pixel and frame-by-frame basis, and a POSITA would understand that selecting/extracting an image necessarily requires selecting/extracting the pixel information relating to the selected image." Pet. 24–25 (citing Ex. 1003 ¶ 49). Petitioner further asserts "[s]ince images of the new actors are captured in an actor modeling process, and stored in an actor digital library, Senftner discloses 'extracting the identified at least one pixel as the second image.'" *Id.* at 25 (citing Ex. 1006, 10:3–12, 4:15–24). Petitioner asserts alternatively "a POSITA would find it obvious to also remove the new actor's image (second image) from its applicable data stream." *Id.* at 26 (citing Ex. 1006, 2:51–54, 2:58–62; Ex. 1003 ¶ 51).

Patent Owner does not argue this limitation. Supp. POR 14–15.

We agree with both Petitioner's assertions. As discussed above, Senftner teaches accepting one or more 2D digital images of the new actor and that the preferred 2D image captures the entirety of the new actor's face. Ex. 1006, 3–12 (describing that the 2D image "primarily captures the new actor's face, the top and bottom of their head, both ears, portions of their neck, with both eyes visible and no more than a 30 degree rotation away from the camera"). Senftner also teaches using "a video library" of prepared videos resulting from a video preparation process and "an actor model

library" where each of the models results from an actor modeling process. *Id.* at 4:15–24. We are persuaded by Petitioner's contentions that Senftner's capturing teaches extracting.

We also are persuaded by Petitioner's alternative contentions that removing the new image would have been obvious. Pet. 26. Senftner discloses removal of an image and we are persuaded that applying that technique to the new actor would have been obvious. Ex. 1006, 2:51–54 (describing "replacing the selected target with an image that resembles a continuation of a scene adjacent to the target in the original digital video to produce altered digital video in which the selected target is *removed*" (emphasis added)), 2:58–62 (describing "[a]t least one target in an original video file *is removed* in a corresponding altered digital video file" (emphasis added)).

We, therefore, are persuaded by Petitioner's showing and find that Senftner teaches "extracting the identified at least one pixel as the second image."

j. "storing the second image . . ."

Claim 1 recites "storing the second image in a memory device operably coupled with the interactive media apparatus." Petitioner asserts

> FIG. 8 shows that the "new actor" images from step 100 are stored in the "Actor Model Library" (440). (Ex. 1006 at 17:65-67.) This library is coupled to the computer in order to achieve the replacement. (*Id.* at 18:11-12.) Moreover, Senftner discloses a memory device operably coupled with the disclosed system. (*Id.* at 21:23-29.)

Pet. 27.

Patent Owner does not argue this limitation. Supp. POR 15.

Senftner teaches that the actor model "may be saved in an actor model library 440." Ex. 1006 at 17:65-67. Senftner also teaches that "[t]he requester of the personalized video 410 transmits a request 415 to the personalization process" (*id.* at 18:1–2) and that request "may identify an actor model to be retrieved from the actor model library 440" (*id.* at 18:11–12). As discussed above, discloses memory operably coupled with its system. *See supra* §§ II.G.2.a, II.G.2.g.

We, therefore, are persuaded by Petitioner's showing and find that Senftner teaches "storing the second image in a memory device operably coupled with the interactive media apparatus."

k. "receiving a selection of the first image . . ."

Claim 1 recites "receiving a selection of the first image from the original video stream." Petitioner states "[a]s described above, Senftner discloses that the computer receives a selection of the original actor's face (the first image) from the original video (original video data stream) in order to replace the original actor's face (first image) with the new actor's face (second image)." Pet. 27 (citing Ex. 1006, 2:41–44, 9:6–9, 10:29–12:17).

Patent Owner argues that Senftner does not disclose a digital processing unit or a data entry device performing this function. Supp. Reply. 15. Patent Owner's argument is conclusory. For the reasons given above with respect to the recitations of "a data entry device" and "a digital processing unit," we agree with Petitioner regarding those terms. *See supra* §§ II.G.2.d, II.G.2.g.

Senftner states "a computer-implemented process for providing personalized digital video can include selecting a target in original digital video to be replaced by a target replacement." Ex. 1006, 2:41–44. Senftner also states "[t]he video preparation process 200 begins at step 210 where the position, orientation, and expression of an original actor is identified and tracked." *Id.* at 10:29–31. Senftner further states "[t]he initial description of the processes will be made using an example case where the video is personalized by substituting the image of the face of a new actor for the facial portion of the image of one of the video's original actors." *Id.* at 9:6–9. Senftner teaches receiving the selection to perform the subsequent steps for personalization of the video.

We, therefore, are persuaded by Petitioner's showing and find that Senftner teaches "receiving a selection of the first image from the original video stream."

l. "extracting the first image"

Claim 1 recites "extracting the first image." Petitioner asserts "the first image (e.g., the original actor's face) is selected and separated out (extracted) for replacement by the second image (e.g., the 'new actor's' face)." Pet. 28 (citing Ex. 1006, 2:33–54, 5:42–59, 6:8–14, 8:58–9:5, 11:7–12).

Patent Owner argues "the extracting of the first image follows the same methodology as extracting the second image." Supp. POR 15. As discussed above, we agree with Petitioner regarding "extracting the identified at least one pixel as the second image." *See supra* § II.G.2.i.

Senftner teaches the following:

> The act of "replacing" may involve identifying all pixels within each video frame that represent an image of the original object to be replaced, and then changing the digital data for those pixels in a two step process: 1) overwrite the original object with pixels that represent the background behind the object, and 2) overwrite the new background replaced image with the image of the new object. The data may be changed in a single step by overwriting the original data with the new data. The two step process is employed when the shape of the replacing object has the potential to be different than the original object. The steps of identifying and changing are then repeated for every frame of the video.

Ex. 1006, 8:60–9:5.

Senftner also teaches in certain situations "a complete removal of the original actor is executed." *Id.* at 6:10–11. Senftner provides further details regarding complete removal of an original actor.

> To ensure complete removal of the facial image of the original actor without the possibility of residual pixels, the video preparation process 200 may continue at step 220 where at least the key portions of the image of the original actor are removed and replaced by an image that continues the background behind the actor.

Id. at 11:7–12.

We, therefore, are persuaded by Petitioner's showing and find that Senftner teaches "extracting the first image."

m. "spatially matching . . ."

Claim 1 recites "spatially matching an area of the second image to an area of the first image in the original video data stream, wherein spatially matching the areas results in equal spatial lengths and widths between said two spatially matched areas." Petitioner asserts "[i]n order to replace the

original actor's image (first image) with the new actor's image (second image), the images must necessarily be spatially matched in the X-Y dimensions (length-width)." Pet. 28 (citing Ex. 1006, 10:29–46, 12:27–45; Ex. 1003 ¶ 55).

Patent Owner argues that "spatially matching" means "aligning a set of pixels in the spatial domain." PO Resp. 7. Patent Owner argues that Senftner uses the terms "digital video clip," "video clip," "clip," and "digital video," which connote digital encoding of the data. Supp. POR 16 (citing Ex. 1006 5:14–17). Patent Owner argues that this means the data is not in the spatial domain and, thus, cannot be spatially matched. *Id.* (citing Ex. 2014 ¶¶ 85–86, 107–112).

Petitioner counters that "a POSITA would understand that pixels of images (whether encoded or not) are aligned in the spatial domain, as disclosed in Senftner." Supp. Reply 10 (citing Ex. 1006, 10:29–46, 12:27–45; Ex. 1025 ¶¶ 11–12.)

We agree with Petitioner using Patent Owner's construction that "spatially matching" means "aligning a set of pixels in the spatial domain." Although Dr. Prieto testifies in support of Patent Owner's position, we find the testimony of Dr. Delp more credible on this issue. Ex. 1025 ¶¶ 11–12. Dr. Prieto's declaration merely parrots the Patent Owner Response without providing a persuasive explanation for the assertion that a person of ordinary skill in the art would not find it obvious to use Senftner's image processing and transformations to achieve "equal spatial lengths and widths between two spatially matched areas." Ex. 2014 ¶¶ 85–86, 107–112. Dr. Prieto does not, for example, identify particular obstacles that a person of ordinary skill

in the art would have understood to exist and why the transforms disclosed in Senftner would not have been adequate to overcome those obstacles.

In contrast, Dr. Delp testifies that spatial matching does not require any particular technique, and a person having ordinary skill in the art would have known how to perform spatial matching by any number of methods. Ex. 1025 ¶¶ 11–12. Dr. Delp further testifies that a person of ordinary skill in the art would have understood Senftner's technique to be aligning the pixels of one image in the spatial domain in place of the replaced pixels of a prior image, as required the claim. Ex. 1025 ¶ 12. Dr. Delp explains that Senftner's "personalized 'illusion' would not be convincing if the new image was visibly not aligned in place of the old image in space." *Id.*

Senftner teaches that "[t]he video preparation process 200 begins at step 210 where the position, orientation, and expression of an original actor is identified and tracked." Ex. 1006, 10:29–31. Senftner further teaches the following:

> At step 322, the 3D model of the new actor may be transformed to match the orientation and expression of the original actor as defined by data from step 210 of the video preparation process. This transformation may involve both rotation on several axis and geometric morphing of the facial expression, in either order. After the 3D model is rotated and morphed, a 2D image of the 3D model is developed and scaled to the appropriate size at step 324. The transformed scaled 2D image of the new actor is then inserted into the video at step 326 *such that the position, orientation, and expression of the new actor substantially matches the position, orientation, and expression of the previously removed original actor*. In this context, a "*substantial match*" occurs when the personalized video presents a convincing illusion that the new actor was actually present when the video was created.

Id. at 12:30–45 (emphases added).

We agree with Petitioner that a person having ordinary skill in the art would have understood that Senftner teaches matching the new image resulting in equal spatial lengths and widths to replace the original image. Based on Senftner's teachings and our weighing of the testimony of Dr. Prieto and Dr. Delp, we are persuaded by Petitioner's showing and find that Senftner teaches "spatially matching an area of the second image to an area of the first image in the original video data stream, wherein spatially matching the areas results in equal spatial lengths and widths between said two spatially matched areas."

n. "performing a substitution . . ."

Claim 1 recites "performing a substitution of the spatially matched first image with the spatially matched second image to generate the displayable edited video data stream from the original video data stream." Petitioner asserts in Senftner "the new actor image replaces the original actor video." Pet. 28 (citing Ex. 1006, 2:33–54, 5:42–59, 8:58–9:5, 12:27–45).

Patent Owner relies on its prior arguments. Supp. POR 17.

We agree with Petitioner. Senftner teaches that the new actor's image replaces or is substituted for the image of the original actor. Ex. 1006, 2:33–54 (describing "*replacing* the selected target with an image that resembles a continuation of a scene adjacent to the target in the original digital video" (emphasis added)), 5:42–59 (describing "*replacement* of participants in an original video") (emphasis added), 8:58–9:5 (describing that "[t]he act of '*replacing*'" may involve "changing the digital data for th[e] pixels in a two step process" or "[t]he data may be changed in a single step") (emphasis

added), 12:27–45 (describing "[t]he process for *substituting* the image of the new actor" to create "the personalized video") (emphasis added).

We, therefore, are persuaded by Petitioner's showing and find that Senftner teaches "performing a substitution of the spatially matched first image with the spatially matched second image to generate the displayable edited video data stream from the original video data stream."

o. Summary

For the foregoing reasons, we are persuaded that Petitioner has established, by a preponderance of the evidence, claim 1 of the '591 patent is unpatentable under 35 U.S.C. § 103(a) as obvious over Senftner.

3. Analysis of Claim 2— Senftner

Claim 2 recites

> 2. The interactive media apparatus of claim 1 wherein the digital processing unit is further capable of performing:
>
> computing motion vectors associated with the first image; and
>
> applying the motion vectors to the second image extracted from the user input video data stream, wherein the generated displayable edited video data stream resulting from the substitution maintains an overall motion of the original video data stream.

Ex. 1001, 7:55–63.

Petitioner relies upon Senftner's disclosure of capturing the "key motions" of a new actor and then "referenc[ing]" them when substituting the new actor for the original actor. Pet. 29–31 (quoting Ex. 1006, 2:41–54, 6:8–14, 17:10–23). Based on our review of the cited portions of Senftner, we do not find any explicit disclosure of computation or application of motion vectors. Even assuming that "key motions are preserved," as Senftner

discloses (*see, e.g.*, Ex. 1006, 6:11–12), Petitioner identifies nothing in Senftner that discloses or implies that they are computed as vectors. For these reasons, we are not persuaded that Senftner discloses the further recitations of claim 2. We also are not persuaded that the Petition show that those recitations would have been obvious to a person having skill in the art.

Accordingly, for the reasons given, we determine that Petitioner has not demonstrated by a preponderance of the evidence that claim 2 is unpatentable, under 35 U.S.C. § 103(a), as obvious over Senftner.

4. Analysis of Claim 8— Senftner

Claim 8 depends directly from claim 1 and further recites "wherein the substitution performed by the digital processing device replaces at least a face of a first person from the original video data stream by at least a face of a second person from the user input video data stream." Ex. 1001, 8:15–19. Petitioner argues "[a]s discussed above relative to claim 1, Senftner discloses replacing an original actor's face with a new actor's face." Pet. 31 (citing Ex. 1006, 9:6–9). Patent Owner makes a conclusory argument that the "new actor's face" of Senftner is not extracted from the user input video data stream. Supp. POR 17 (citing Ex. 2014 ¶¶ 120–121). As explained with respect to claim 1, we are persuaded by Petitioner's contentions regarding extraction. *See supra* § III.G.2

Accordingly, for the reasons given with respect to claim 1, we determine that Petitioner has demonstrated by a preponderance of the evidence that claim 8 is unpatentable, under 35 U.S.C. § 103(a), as obvious over Senftner.

5. Analysis of Claims 3 and 4— Senftner and Levoy

Claim 3 depends directly from claim 1 and further recites "wherein the digital processing unit is further capable of extracting the at least one pixel from the user entering data in the data entry display device." Ex. 1001, 7:64–67. Claim 4 depends from claim 3 and further recites "wherein the digital processing unit is further capable of extracting the at least one pixel from the user pointing to a spatial location in a displayed video frame." Ex. 1001, 8:1–4. As we explain above (*see supra* § II.E), we perform our analysis using part of Patent Owner's proposed construction, i.e., that "data entry display device" is limited to a touchscreen device. We also use Patent Owner's constructions (PO Resp. 9) that "the user pointing to" means "chosen by said user" and "a spatial location in a displayed video frame" means "performing spatial analysis on a video frame based on a user input."

For claim 3, Petitioner argues that "Senftner discloses various computer devices that can be used to select the original images and new images for replacement." Pet. 41 (citing Ex. 1006, 21:25–29). Petitioner also argues that a person having ordinary skill in the art would have used Levoy's conventional touch screen technology with any one of the computing devices enumerated by Senftner. *Id*. at 38–42 (citing, *e.g.*, Ex. 1008 ¶¶ 10, 21, 23, 46, 47, 50, Fig. 3; Ex. 1003 ¶¶ 81, 82; Ex. 1010 ¶ 4; Ex. 1011, 1:25-36; Ex. 1012, 1:24-40). For claim 4, Petitioner further argues that "[w]hen using touch screen technology to edit pictures, a user would naturally point 'to a spatial location in a displayed video frame,'" as taught in Levoy. *Id.* at 46 (citing Ex. 1008 ¶ 47).

Patent Owner counters that "Levoy fails to cure the deficiencies of Senftner." Supp. POR 33 (citing Ex. 2014 ¶¶ 189–196). Dr. Prieto's

testimony relied upon by Patent Owner pertains to asserted deficiencies with respect to claim 1 and whether Levoy remedies those deficiencies. Ex. 2014 ¶¶ 189–196. For the reasons given (*see supra* § II.G.2), we are not persuaded that Senftner has the asserted deficiencies.

Upon consideration of the contentions and evidence in the record before us, Petitioner's contentions are consistent with the evidence of record. As discussed with respect to obviousness over Sitrick and Levoy (*see supra* § III.F), Levoy teaches a "touch screen display" and that "a user may tap on a touch screen in the location of a particular burst image fragment to select the underlying burst image." Ex. 1008 ¶ 47, Fig. 3; *see also id.* ¶ 10 ("The selected location may be received from a user interface device, such as, but not limited to, a mouse, a stylus, a *touch-screen*, or the like" (emphasis added)), ¶ 23 (describing that "user interface 115 may also include a display, which may be embodied as a *touch screen display*" (emphasis added)). Levoy teaches that the user's selection is received by processor 105. *Id.* ¶ 47.

Dr. Delp testifies that a person having ordinary skill in the art would have been motivated to use conventional touch screen technology with Senftner as opposed to non-touch technologies because "touch screen devices were known to be easier to use and more versatile than keyboards" and "[t]ouch screens were also known to provide a natural and user-friendly experience for operators." Ex. 1003 ¶¶ 81–82. Dr. Delp's testimony is consistent with the evidence of record. *See, e.g.*, Ex. 1010 ¶ 4 (describing that "[t]ouch screens, in particular, are becoming increasingly popular because of their ease and versatility of operation"); Ex. 1011, 1:25–36 (describing that using a touch-panel "the user can readily make a device execute various processing simply by touching the display screen"); Ex.

1012, 1:24–40 (describing that "[h]uman factors studies have shown that by providing a means for inputting data on the visual display screen itself, the user can achieve the most closely coupled interactive operations with the data processing system" and that "[w]hen the user responds to visual signals output at the face of the visual display device, by inputting signals at that same visual display surface, an accuracy and immediacy in the interaction between man and machine can be achieved").

Accordingly, for the reasons given, we determine that Petitioner has demonstrated by a preponderance of the evidence that claims 3 and 4 are unpatentable, under 35 U.S.C. § 103(a), as obvious over Senftner and Levoy.

H. Patent Owner's Motion to Exclude

Patent Owner filed a Motion to Exclude Evidence (Paper 57); Petitioner filed an Opposition (Paper 61); and Patent Owner filed a Reply in support of its Motion to Exclude (Paper 63). As movant, Patent Owner has the burden of proof to establish that it is entitled to the requested relief. *See* 37 C.F.R. § 42.20(c).

Patent Owner moves to exclude (1) paragraphs 8–12 of Exhibit 1025, the Supplemental Reply Declaration of Edward J. Delp III, Ph.D. on the grounds that it exceeds the proper scope of reply; and (2) Exhibits 1026, 1027, 1029, 1030, and 1031 under Federal Rules of Evidence 401, 402, and 403 as being misleading, confusing, unfairly prejudicial, and irrelevant. Paper 57, 2–5.

Patent Owner asserts that paragraphs 8–12 of Exhibit 1025 include testimonial evidence to support arguments that were not made in the Petition. Paper 57, 2. Patent Owner also asserts that Petitioner relies on a

"new interpretation" of the prior art and an "evolving theory of unpatentability." Paper 63, 1–2. We disagree.

We, instead, agree with Petitioner (Paper 61, 3) that Dr. Delp's testimony in Exhibit 1025 fairly and directly responds to assertions made by Patent Owner. *See* 37 C.F.R. § 42.23(b*); see also Belden Inc., v. Berk-Tek LLC*, 805 F.3d 1064, 1078−80 (Fed. Cir. 2015) (holding that the Board may rely on new evidence submitted with a reply because the evidence was legitimately responsive to patent owner's arguments and not needed for a prima facie case of obviousness). Consistent with Petitioner's arguments (*see generally* Paper 61), we also find Dr. Delp's testimony in his Reply Declaration (Ex. 1025) simply provides further details to support that his testimony in his initial Declaration (Ex. 1003) is correct and, therefore, Dr. Delp's testimony in his Reply Declaration (Ex. 1025) is proper responsive testimony. We further find that Dr. Delp's testimony does not take Dr. Prieto's testimony out of context regarding the knowledge of a person having ordinary skill in the art.

Patent Owner asserts that it moves to exclude Exhibits 1026 and 1027, which are trial transcripts, as inadmissible and objects to Exhibits 1026 and 1027 on the basis that the transcripts are mischaracterized, taken out of context, misleading, confusing, and unfairly prejudicial. Paper 57, 5. Patent Owner also asserts that Exhibits 1026 and 1027 should be excluded because they are not relevant. Paper 63, 5.

Petitioner asserts it cited to Patent Owner's own testimony elicited under direct examination. Paper 61, 6–7. We agree with Petitioner (*see generally* Paper 61) that Petitioner's use of Patent Owner's testimony given in the parallel district court proceeding is appropriate. We also agree we can

assess to the extent, if at all, such testimony is mischaracterized. Additionally, we determine that Exhibits 1026 and 1027 including testimony regarding the knowledge of a person having ordinary skill in the art regarding digital signal processing units (Ex. 1026, 148:10–20) and the teachings of Sitrick (Ex. 1027, 44:11–46:12) are relevant evidence in the instant proceeding.

Patent Owner asserts that it objects to Exhibits 1029–1031, which are e-mails regarding briefing relating to indefiniteness arguments. We did not rely on Exhibits 1029–1031 in our decision.

Accordingly, we deny Patent Owner's Motion to Exclude Evidence.

III. CONCLUSION

Claim 11 is not before us in this remand. We, therefore, do not make any further determinations regarding claim 11 in this decision. Claims 1–4 and 8 are before us and our conclusions are summarized below.[6]

[6] Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding. *See* 84 Fed. Reg. 16654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. *See* 37 C.F.R. § 42.8(a)(3), (b)(2).

Claims	35 U.S.C. §	Reference(s)/Basis	Claims Shown Unpatent-able	Claims Not Shown Unpatent-able
1, 2, 8	102	Senftner		1, 2, 8
1, 2, 8	103	Senftner	1, 8	2
3, 4	103	Senftner, Levoy	3, 4	
1, 2, 8	103	Sitrick	1, 2, 8	
3, 4	103	Sitrick, Levoy	3, 4	
Overall Outcome			1–4, 8	

Table 2 of this Decision, above, summarizes the outcome for each challenged claim and ground in the instant proceeding.

IV. ORDER

Accordingly, it is:

ORDERED that claims 1–4 and 8 of the '591 Patent have been proven to be unpatentable;

FURTHER ORDERED that Patent Owner's Motion to Exclude is *denied*;

FURTHER ORDERED that Patent Owner's Motion to Terminate the Proceeding is *denied*; and

FURTHER ORDERED that because this is a Final Written Decision, parties to the proceeding seeking judicial review of the Decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

PETITIONER: (via electronic transmission)

Heath J. Briggs
Patrick J. McCarthy
Barry Schindler
GREENBERG TRAURIG, LLP
BriggsH@gtlaw.com
McCarthyP@gtlaw.com

PATENT OWNER: (via electronic transmission)

Bryan Wilson
Adam Underwood
Thomas K. Landry
CAREY RODRIGUEZ MILIAN GONYA, LLP
bwilson@careyrodriguez.com
aunderwood@careyrodriguez.com
tlandry@careyrodriguez.com