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Paper 7
Date: April 24, 2023

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MEDIVIS, INC.,
Petitioner,

v.

NOVARAD CORP.,
Patent Owner.

IPR2023-00042
Patent 11,004,271 B2

Before MIRIAM L. QUINN, JO-ANNE M. KOKOSKI, and SCOTT RAEVSKY, *Administrative Patent Judges.*

KOKOSKI, *Administrative Patent Judge*.

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

Medivis, Inc. ("Petitioner") filed a Petition to institute an *inter partes* review of claims 1–6 and 11–20 (the "challenged claims") of U.S. Patent No. 11,004,271 B2 ("the '271 patent," Ex. 1001). Paper 3 ("Pet."). Novarad Corp. ("Patent Owner") did not file a Preliminary Response.

Institution of an *inter partes* review is authorized by statute when "the information presented in the petition . . . and any response . . . shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition." 35 U.S.C. § 314; *see also* 37 C.F.R. § 42.4 (2022). For the reasons discussed below, we determine that Petitioner establishes a reasonable likelihood of prevailing with respect to the unpatentability of at least one claim of the '271 patent. Accordingly, for the reasons that follow, we institute an *inter partes* review of claims 1–6 and 11–20 of the '271 patent.

A. Real Parties in Interest

Each party identifies itself as the real party in interest. Paper 5, 2; Paper 6, 1.

B. Related Matters

The parties identify *Novarad Corp. v. Medivis, Inc.*, No. 21-1447-GBW (D. Del. 2021) as a related matter. Paper 5, 2; Paper 6, 1.

C. The '271 Patent

The '271 patent relates to "[a]ugmenting real-time views of a patient with three-dimensional (3D) data." Ex. 1001, code (57). The '271 patent explains that conventional medical imaging systems can create 3D data for a patient that can be viewed on a computer display, detached from the patient, which may cause some problems. *Id*. at 2:49–55. For example, the '271 patent explains that a surgeon may view an image of a patient's brain on a

computer display to determine the location of a tumor, and then shift his view to the actual patient "and attempt to identify the approximate location on the actual patient of the tumor inside the patient's brain." *Id*. at 2:56–63. The surgeon, however, "may accidentally identify the left side of the brain in the image as having the tumor when in reality the tumor is in the right side of the brain," which "may lead to the surgeon erroneously making an unnecessary incision on the left side of the patient's skull." *Id*. at 2:63–3:3. To avoid such errors, the '271 patent describes methods of automatically aligning or registering the 3D data "with a real-time view of the actual patient" so that "images derived from the 3D data may be projected onto the real-time view of the patient." *Id*. at 3:21–27.

Figure 1 of the '271 patent is reproduced below.

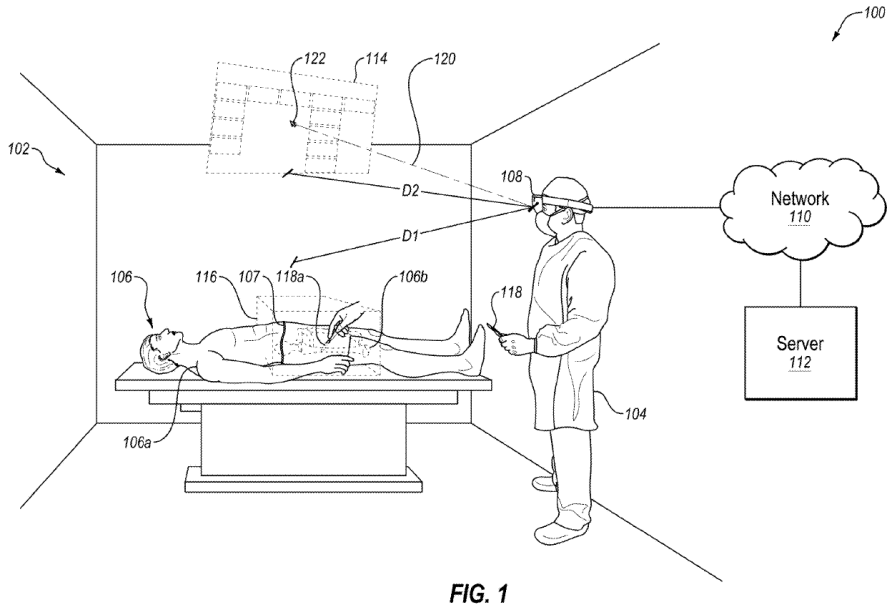

FIG. 1

Figure 1 illustrates an augmented reality (AR) environment in which real-time views of a patient may be augmented with 3D data. Ex. 1001, 2:26–28. Environment 100 includes 3D space 102, user 104, patient 106, and AR headset 108 in communication with server 112 over network 110. *Id*. at 3:63–67. Environment 100 also includes virtual user interface 114, virtual

spatial difference box 116, virtual inserted portion 118*a* of object 118, and virtual cursor 122, "all shown in dashed lines to indicate that these virtual elements are generated by the AR headset 108 and only viewable by the user 104 through the AR headset 108." *Id*. at 4:1–7. The '271 patent teaches that "AR headset 108 may be employed by the user 104 in order to augment a real-time view of the patient 106 with one or more inner layers of the patient 106 including, but not limited to, bones 106*b* (as illustrated in FIG. 1), muscles, organs, or fluids." *Id*. at 4:42–46. The '271 patent further teaches that AR headset 108 may perform this augmenting of a real-time view of patient 106 regardless of the current position of user 104 in 3D space 102. *Id*. at 4:46–49. For example, user 104 may walk around operating table 103 and view patient 106 from any angle within 3D space 102 while AR headset 108 continually augments the real-time view of patient 106 with one or more inner layers of patient 106, "so that both the patient 106 and the 3D data of the patient 106 may be viewed by the user 104 from any angle within the 3D space 102." *Id*. at 4:49–57.

D. Challenged Claims

Petitioner challenges claims 1–6 and 11–20 of the '271 patent. Pet. 29. Claims 1 and 11 are independent; claim 1 is representative of the claimed subject matter, and is reproduced below.

> 1. A method for augmenting real-time, non-image actual views of a patient with three-dimensional (3D) data, the method comprising:
>
> identifying 3D data for the patient, the 3D data including an outer layer of the patient and multiple inner layers of the patient; and
>
> displaying, in an augmented reality (AR) headset, one of the inner layers of the patient from the 3D data projected onto real-time, non-image actual views of the outer layer of the patient, the

> projected inner layer of the patient from the 3D data being confined within the volume of a virtual 3D shape.

Ex. 1001, 18:54–65.

E. Asserted Grounds

Petitioner asserts that claims 1–6 and 11–20 would have been unpatentable on the following grounds:

Claim(s) Challenged	35 U.S.C. §[1]	Reference(s)/Basis
1, 5, 6	102	Doo[2]
1–6, 11–20	103	Doo, Amira[3]
1–6, 11–20	103	Chen,[4] 3D Visualization,[5] 3D Slicer[6]

Pet. 31. Petitioner relies on the Declaration of Peter Kazanzides, Ph.D. (Ex. 1012) in support of its contentions.

[1] The Leahy-Smith America Invents Act ("AIA"), Pub. L. No. 112–29, 125 Stat. 284 (2011), revised 35 U.S.C. §§ 102 and 103 effective March 16, 2013. Because the earliest claimed priority date of the '271 patent is March 30, 2017, the AIA version of §§ 102 and 103 apply.
[2] Doo, WO 2015/164402 A1, published October 29, 2015 (Ex. 1008).
[3] Excerpt of Amira 5 User's Guide, title through Chapter 2 (Visual Imaging 2009) (Ex. 1005).
[4] Chen, *Development of a Surgical Navigation System Based on Augmented Reality Using an Optical See-Through Head-Mounted Display*, 55 JOURNAL OF BIOMEDICAL INFORMATICS 124–131 (2015) (EX. 1009).
[5] Pujol et al., *3D Visualization of DICOM Images for Radiological Applications*, Surgical Planning Laboratory, Brigham and Women's Hospital (©2012–2014) (Ex. 1007).
[6] Main Application GUI for 3D Slicer https://www.slicer.org/wiki/Documentation/4.6/Slicer/Application/MainApplicationGUI (last edited November 7, 2016) (Ex. 1010).

II. ANALYSIS

A. Level of Ordinary Skill in the Art

Petitioner contends that a person having ordinary skill in the art would have had

> a bachelor's degree in computer science, electrical engineering, or a related field with several years of experience in the design, development, and study of augmented reality devices and either (a) familiarity with conventional medical imaging data and visualization of data for medical procedures or (b) working with a team including someone with such familiarity.

Pet. 10 (citing Ex. 1012 ¶ 25).

On this record, we determine that the level of ordinary skill in the art is reflected in the prior art of record. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (specific findings on the ordinary skill level are not required "where the prior art itself reflects an appropriate level and a need for testimony is not shown" (quoting *Litton Indus. Prod., Inc. v. Solid State Sys. Corp.*, 755 F.2d 158, 163 (Fed. Cir. 1985))). A more specific definition is not necessary for purposes of deciding whether to institute review.

B. Claim Construction

We construe each claim "in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent." 37 C.F.R. § 42.100(b). Under this standard, claim terms are generally given their plain and ordinary meaning as would have been understood by a person of ordinary skill in the art at the time of the invention and in the context of the entire patent disclosure. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313 (Fed. Cir. 2005) (en banc). Only those terms in controversy need to be construed,

and only to the extent necessary to resolve the controversy. *Realtime Data LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019).

Relying on Dr. Kanzanzides's supporting testimony, Petitioner proposes the following constructions for the terms "three-dimensional (3D) data" and "3D data" as used in all the challenged claims, "virtual 3D shape" as used in claims 1–6, and "being having" as used in claim 11. Pet. 11–14; Ex. 1012 ¶¶ 28–34.

"three-dimensional (3D) data" or "3D data"	one or more of MRI images, Computerized Tomography (CT) scan images, X-ray images, Positron Emission Tomography (PET) images, ultrasound images, fluorescence images, Infrared Thermography (IRT) images, and Single-Photon Emission Computer Tomography (SPECT) scan images
"virtual 3D shape"	encompasses virtual 3D shapes as simple as a box and as complex as the outer layer of the patient
"being having"	being or having

Pet. 11–14. For purposes of this Decision, and based on the record now before us, we adopt Petitioner's constructions of "three-dimensional (3D) data," "3D data," "virtual 3D shape," and "being having," which are undisputed at this stage of the proceeding.

C. Asserted Anticipation by Doo

Petitioner contends that claims 1, 5, and 6 are anticipated by Doo. Pet. 31–40.

1. Overview of Doo

Doo is directed to "an intra-operative medical image viewing system that can allow the surgeon to maintain a viewing perspective on the patient

while concurrently obtaining relevant information about the patient." Ex. 1008 ¶ 11. Doo's system "can present a selectively or variably transparent image of an anatomical feature of a patient" to a surgeon during surgery as the surgeon views, or maintains a viewing perspective generally toward, the actual anatomical feature of the patient. *Id.* ¶ 30.

Figure 2 of Doo is reproduced below.

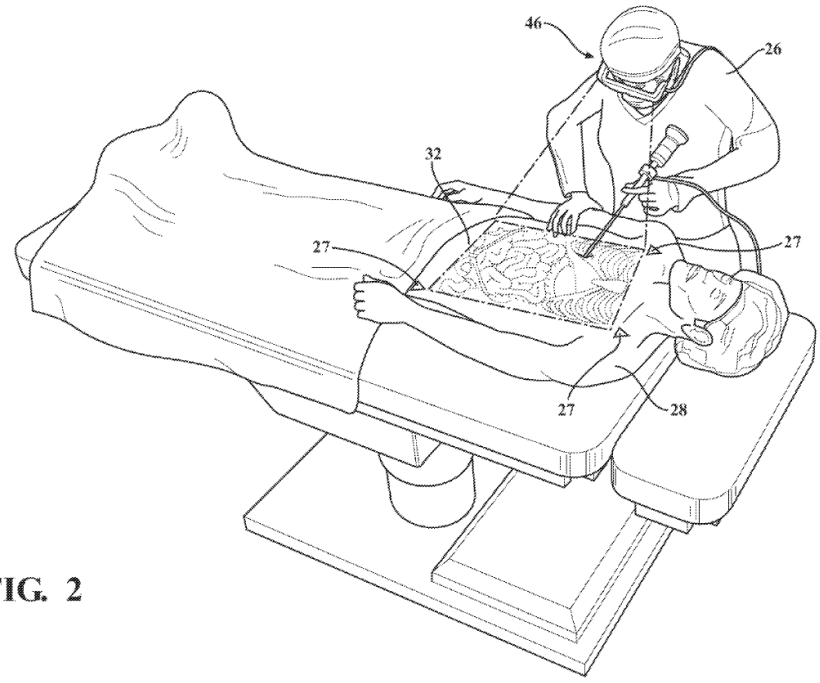

FIG. 2

Figure 2 is a perspective view of an embodiment described in Doo in a first surgical environment. Ex. 1008 ¶ 17. Surgeon 26 wears display 30 suitable for implementing an intra-operative medical viewing system while operating on patient 28. *Id.* ¶ 38. The viewing system allows surgeon 26 to maintain a viewing perspective on patient 28, while concurrently obtaining relevant image-based information about patient 28 on demand. *Id.* Display 30 is positioned between surgeon 26 and patient 28, and is "configured to exhibit at least one medical image 32 to the surgeon 26 that is overlaid on the patient 28 (as shown in Figure 2) or that is positioned in an adjacent hovering location as perceived by the surgeon 26." *Id.* "[D]isplay 30 can be

a component of a head mountable unit 46 . . . worn by the surgeon 26 while the surgeon 26 is operating on the patient 28." *Id.* ¶ 44.

Doo teaches that the system "can allow the surgeon 26 to selectively register, i.e., lock, an image to an actual anatomical feature of the patient 28 or to some other fiducial marker associated with the patient 28." Ex. 1008 ¶ 37. "For example, the image can be overlaid on the patient's actual anatomical feature and, by using commands in a selected user-interface modality, the image can be sized to match the actual anatomical feature, thus creating the visual impression of a 'true registration' and a form of augmented reality." *Id.* Doo also teaches that the system "can be configured to automatically present a true registration, or registration at a predetermined hovering distance, such as by calibrating to one or more strategically arranged markers or fiducials 27 placed directly onto the body of" patient 28. *Id.* Doo further teaches that the system can monitor the movement of surgeon 26 and change the displayed image so to maintain that registration. *Id.*

2. Claim 1

Petitioner contends that Doo discloses all of the limitations of claim 1. Pet. 31–38; Ex. 1012 ¶¶ 63–77.

For the preamble ("A method for augmenting real-time, non-image actual views of a patient with three-dimensional (3D) data"),[7] Petitioner relies on Doo's "intra-operative medical image viewing system [that] can allow a surgeon to maintain a viewing perspective on the patient while calling up visual images on the fly." Pet. 31–32 (quoting Ex. 1008, code (57)). Petitioner also relies on Doo's teaching that "[t]he image can

[7] We do not express an opinion on whether the preamble is limiting.

include portions indicating a three-dimensional nature of the anatomical feature of the patient 28. The image control unit 38 can be configured to modify an image in response to the image control signal in any one of a plurality of different two-dimensional, 2 ½ dimensional, or three-dimensional modalities." *Id*. at 32 (quoting Ex. 1008 ¶ 73).

For the "identifying 3D data for the patient, the 3D data including an outer layer of the patient and multiple inner layers of the patient" limitation of claim 1, Petitioner relies on Doo's teaching that "the system 34 can utilize images generated by radiography, computer-aided tomography, positron emission tomography, single-phase emission tomography, magnetic resonance imaging (MRI), ultrasound, elastography, photo-acoustic imaging, thermography, echocardiography, functional near-infrared, and spectroscopy." Pet. 33 (quoting Ex. 1008 ¶ 40). Petitioner contends that a skilled artisan would have understood that the images disclosed by Doo "would include an outer layer of the patient and multiple inner layers of the patient." *Id*. Petitioner also relies on Doo's teaching that "[a]n image control unit receives the image file from the image source and controls the display so that at least a portion of the image can be exhibited" and "[a] plurality of peripheral devices are each configured to receive an image control input from the surgeon and, in response, generate an image control signal." *Id*. at 34 (quoting Ex. 1008, code (57)).

For the "displaying, in an augmented reality (AR) headset, one of the inner layers of the patient from the 3D data projected onto real-time, non-image actual views of the outer layer of the patient" limitation of claim 1, Petitioner relies on Doo's teaching that the display can be worn by the surgeon, and that the display can be a component of head mountable unit 46. Pet. 34–35 (citing Ex. 1008 ¶¶ 38, 44, Fig. 3). Petitioner also relies on

Doo's teaching that "display 30 can be selectively and/or variably transparent and configured to exhibit at least one medical image 32 to the surgeon 26 that is overlaid on the patient" and "[t]he image 32 can be . . . perceived by the surgeon 26, overlaid on the patient 28." *Id*. at 35 (quoting Ex. 1008 ¶¶ 38–39). Petitioner further points to Doo's Figures 2 and 3, which show "that the projected display may be inner layers of the patient from the 3D data." *Id*. at 36 (citing Ex. 1008, Figs. 2, 3).

For the "the projected inner layer of the patient from the 3D data being confined within a volume of a virtual 3D shape" limitation of claim 1, Petitioner relies on Doo's Figure 11, illustrating "a series of three-dimensional tomographic slices of an anatomical feature of a patient," and Doo's teaching that "a fusion of several tomographic slices can be stitched together to create a 3D image." Pet. 36–37 (quoting Ex. 1008 ¶¶ 26, 78). According to Petitioner, "[t]he virtual 3D shape illustrated in Doo's Figure 11 is a virtual box including a top side, a bottom side, a left side, a right side, a front side, and a back side," and "[e]ach of the inner layers illustrated in *Doo's* Figure 11 is confined within the virtual 3D shape." *Id*. at 38.

Having reviewed Petitioner's arguments and supporting evidence for all of the elements of independent claim 1, and based on the record before us, we determine that Petitioner establishes a reasonable likelihood that it would prevail in showing that claim 1 is anticipated by Doo. Pet. 31–38; Ex. 1012 ¶¶ 63–77.

3. Dependent Claims 5 and 6

Petitioner contends that Doo discloses all of the limitations of claims 5 and 6, which directly depend from claim 1. Pet. 39–40; Ex. 1012 ¶¶ 78–79. We have reviewed Petitioner's arguments and supporting

evidence, including those summarized above with respect to claim 1, and determine that Petitioner also establishes a reasonable likelihood that it would prevail in showing that claims 5 and 6 are anticipated by Doo.

D. Remaining Grounds

Petitioner contends that claims 1–6 and 11–20 would have been obvious over the combined teachings of Doo and Amira, and the combined teachings of Chen, 3D Slicer, and 3D Visualization. Pet. 41–69; Ex. 1012 ¶¶ 80–133. Having determined that Petitioner establishes a reasonable likelihood of showing that at least one of the challenged claims is unpatentable as set forth above, we institute an *inter partes* review based on these grounds as well. *See* 37 C.F.R. § 42.108(a) ("When instituting inter partes review, the Board will authorize the review to proceed on all of the challenged claims and on all the grounds of unpatentability asserted for each claim.").

III. CONCLUSION

Taking into account the arguments in the Petition and the evidence of record, we determine that Petitioner establishes a reasonable likelihood that it will prevail on its challenge to at least one claim of the '271 patent. Thus, we institute an *inter partes* review of the challenged claims on the grounds presented in the Petition.

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that an *inter partes* review is instituted with respect to the grounds asserted in the Petition; and

FURTHER ORDERED that, pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial, which shall commence on the entry date of this Decision.

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