

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

FALKBUILT LTD.,
Petitioner

v.

DIRTT ENVIRONMENTAL SOLUTIONS, LTD.,
Patent Owner.

IPR2021-00654
Patent 10,467,814 B2

Before KARA L. SZPONDOWSKI, STACY B. MARGOLIES, and
AARON W. MOORE, *Administrative Patent Judges*.

MOORE, *Administrative Patent Judge*.

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

I. INTRODUCTION

DIRTT Environmental Solutions, Ltd. (“Petitioner”) filed a petition (Paper 2, “Pet.”) requesting *inter partes* review of claims 1–7, 10–16, and 19–20 of U.S. Patent No. 10,467,814 B2 (“the ’814 patent”), owned by Falkbuilt Ltd. (“Patent Owner”). Patent Owner filed a preliminary response. Paper 8 (“Prelim. Resp.”).

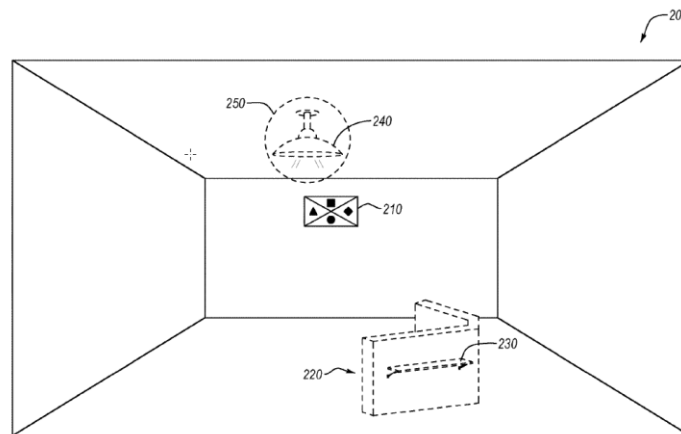
A. *Related Proceedings*

Petitioner asserts that “[t]he ’814 Patent has been asserted against Petitioner in *DIRTT Environmental Solutions, Ltd., et al. v. Falkbuilt Ltd.*, C.A. No. 1:20-cv-04637, pending in the U.S. District Court for the Northern District of Illinois, which could affect, or could be affected by, a decision in this proceeding.” Pet. 62. Petitioner advises that Patent Owner has also asserted U.S. Patent No. 10,783,284 against Petitioner in that litigation, and that Petitioner has filed a petition for post-grant review of that patent with the Board. *Id.* at 63. That proceeding is PGR2021-00067.

B. *The ’814 Patent*

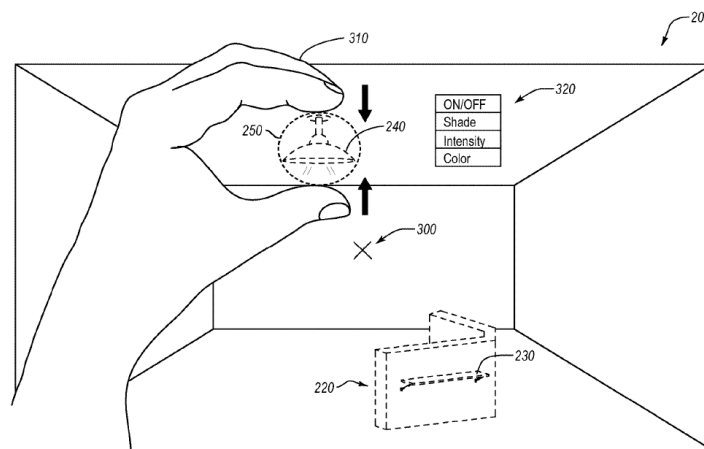
The ’814 Patent describes and claims techniques “to allow one or more users to navigate and interact with a three-dimensional rendering of an architectural design.” Ex. 1001, 1:65–2:1. In one embodiment, the system “generates a coordinate system that associates a virtual coordinate system within [an] architectural design schematic with a physical coordinate system with a real-world environment” so that “when rendering the mixed-reality elements that are associated with the architectural design schematic, the elements appear within the correct position within the real-world environment due to the common coordinate system.” *Id.* at 6:1–14.

Figure 2 of the patent, reproduced below, “illustrates a user’s view of a room within a mixed-reality environment 200,” showing a room that includes a “triangle shaped cubicle 220,” a “desk surface 230,” and a “light fixture 240.” *Id.* at 6:9–38.



“FIG. 2 illustrates a user’s view of a room within an embodiment of a mixed-reality environment.” Ex. 1001, 3:29–30.

The patent explains that “[i]n addition to allowing a user to view virtual elements within the real-world environment . . . disclosed embodiments also provide tools for a user to interact with and change the virtual elements.” Ex. 1001, 7:4–9. This is depicted in Figure 3:



“FIG. 3 illustrates a user interacting with the mixed-reality environment depicted in FIG. 2.” Ex. 1001, 3:31–32.

In the example shown in Figure 3 above, “the user interacts with the mixed-reality light fixture 240 by making a pinching motion with their hand 310 that intersects at the lighting fixture 240 within the user’s view.” Ex. 1001, 7:18–21. The patent explains that “[u]pon making the pinching motion, the user’s mixed-reality device 150(a-c) calculates a ray that extends from a particular portion 300 of the user’s perspective towards the direction in which the user pinched, or in this case, towards area 250.” *Id.* at 7:21–25. The system may determine “what virtual object the user is interacting with by extending the ray until it intersects with the target virtual object.” *Id.* at 7:64–66. Then, the system may identify “one or more functions associated with [an] independently executable software object that is associated with the at least one virtual object” and “generate a command interface within the three-dimensional architectural model that depicts one or more commands related to . . . one or more functions.” *Id.* at 8:2–5, 8:12–14.

The “independently executable software objects . . . provide context and functionality specific to the individual architecture design elements with which each independently executable software object is associated.” Ex. 1001, 5:30–35. The patent explains that “an independently executable software object comprises a set of computer-executable instructions used in object-oriented program code, and which relate to a particular physical component or feature.” *Id.* at 5:36–39.

C. Representative Claim

Challenged claims 1, 10, and 19 are independent. Claim 1 is directed to a computer system for managing multiple distinct perspectives within a mixed-reality design environment, claim 10 is directed to a corresponding computer-implemented method, and claim 19 is directed to a corresponding

system including a “mixed reality server.” Claim 1, which is representative of the subject matter at issue, is reproduced below:

1. A computer system for managing multiple distinct perspectives within a mixed-reality design environment, comprising:

one or more processors; and

one or more computer-readable media having stored thereon executable instructions that when executed by the one or more processors configure the computer system to perform at least the following:

load a three-dimensional architectural model into memory, wherein:

the three-dimensional architectural model is associated with a virtual coordinate system, and

the three-dimensional architectural model comprises at least one virtual object that is associated with an independently executable software object that comprises independent variables and functions that are specific to a particular architectural element that is represented by the at least one virtual object;

associate the virtual coordinate system with a physical coordinate system within a real-world environment;

transmit to each device of multiple different devices rendering information, wherein the rendering information comprises:

three-dimensional image data comprising rendering instructions for the at least one virtual object within at least a portion of the three-dimensional architectural model, and

coordinate information that maps the virtual coordinate system to the physical coordinate system

receive from a particular device of the multiple different devices a ray that is determined based on a motion of a user's hand directed toward a rendered representation of the at least one virtual object and that extends from a particular

portion of a user's field-of-view toward the rendered representation of the at least one virtual object;
determine that the ray intersects with the rendered representation of the at least one virtual object; and
identify one or more functions associated with the independently executable software object that is associated with the at least one virtual object.

Ex. 1001, 12:20–61.

D. Prior Art and Asserted Grounds

Petitioner asserts that claims 1–7, 10–16, and 19–20 are unpatentable as obvious under 35 U.S.C. § 103 over Scranton,¹ Maciocci,² and “the knowledge and skill of a person of ordinary skill in the art.” Pet. 2. Petitioner also relies on a Declaration of Dr. Gregory F. Welch (Ex. 1002).

II. ANALYSIS

A. Level of Skill in the Art

The level of skill in the art is a factual determination that provides a primary guarantee of objectivity in an obviousness analysis. *See Al-Site Corp. v. VSI Int'l Inc.*, 174 F.3d 1308, 1323 (Fed. Cir. 1999) (citing *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966)). The level of skill in the art also informs the claim construction analysis. *See Teva Pharms. USA, Inc. v. Sandoz, Inc.*, 574 U.S. 318, 332 (2015) (explaining that claim construction seeks the meaning “a skilled artisan would ascribe” to the claim term “in the context of the specific patent claim”).

Petitioner asserts that person of ordinary skill in the art “as of June 10, 2016 would have been a person with a working knowledge of virtual reality

¹ U.S. Patent No. 9,367,950 (Ex. 1003).

² U.S. Patent No. 9,047,698 (Ex. 1004).

technologies, including augmented reality technologies, and also three-dimensional design software such as architectural design software,” and that such a person “would have had a Bachelor of Science degree in an academic discipline emphasizing the design and application of electrical, computer, or software technologies, in combination with training or at least one to two years of related work experience with three-dimensional computer models and virtual or augmented reality devices.” Pet. 3–4 (citing Ex. 1002 ¶¶ 41–48). “Alternatively,” argues Petitioner, “the person could have also had a Master of Science degree in a relevant academic discipline with approximately one year of related work experience in the same discipline.” *Id.* at 4. Patent Owner does not address this issue.

On this record, we adopt Petitioner’s proposal in part, finding the skilled artisan to be a person with (a) “a Bachelor of Science degree in an academic discipline emphasizing the design and application of electrical, computer, or software technologies,” and (b) “training or at least one to two years of related work experience with three-dimensional computer models and virtual or augmented reality devices.” That description is generally consistent with the disclosures of the ’814 patent and the prior art.

B. Claim Construction

We construe claims using the same claim construction standard that would be used in a civil action under 35 U.S.C. § 282(b), as enunciated in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc), and subsequent cases. See 37 C.F.R. § 42.100(b).

Petitioner asserts that because “the prior art’s description of the claimed elements [are] similar to the description thereof in the specification of the ’814 Patent, no formal claim constructions are necessary in this proceeding.” Pet. 3. Patent Owner does not address claim construction.

We conclude that we need not engage in any formal claim construction to resolve the issues addressed in this Decision. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (noting that “we need only construe terms ‘that are in controversy, and only to the extent necessary to resolve the controversy’” (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

C. Reasonable Likelihood Analysis

As noted above, Petitioner asserts that claims 1–7, 10–16, and 19–20 are unpatentable over Scranton, Maciocci, and “the knowledge and skill of a person of ordinary skill in the art.” See Pet. 26–73. Patent Owner responds that Petitioner fails to establish a motivation to combine Scranton and Maciocci (see Prelim. Resp. 3–25), and that the Petition should be denied due to assignor estoppel (see *id.* at 25–29).

1. Scranton

Scranton “relates to dynamically presenting visualization of three-dimensional (3D) designs produced by 3D design software.” Ex. 1003, 1:65–67. In one embodiment, a user may “visualize . . . a 3D design through a virtual reality application while the design is in progress using 3D design software,” in which “changes to the 3D design may be obtained dynamically” and “virtual reality information may be determined based on the dynamically obtained changes.” *Id.* at 2:1–5. “[U]sers may traverse the

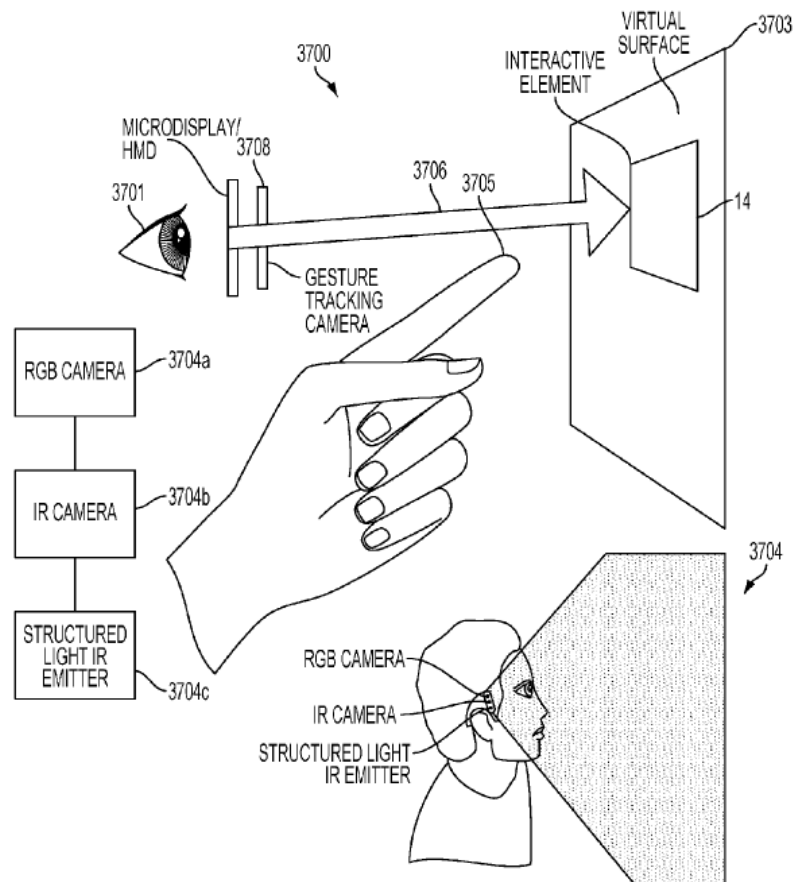
virtual space, manipulate the virtual objects in the virtual space, perform operation, exercise control, and/or engage any other types of interactions with the virtual space.” *Id.* at 6:55–58.

Scranton describes “3D information component 116” that “may be configured to obtain 3D information from the files and/or changes to the files imported by the file import component 114.” Ex. 1003, 10:27–30. “The 3D information obtained by the 3D information component 116 may include position, size, texture, materiality, sound, shading, lighting, color, description, type, content, animation, scale, project, and/or any other information about one or more objects in the 3D design produced by the 3D design software.” *Id.* at 10:30–35. Scranton also describes “virtual reality information component 118” that “may be configured to determine virtual reality information based on the 3D information obtained by the 3D information component 116.” *Id.* at 11:21–24. And there is also a “virtual reality information provision component 120” that “may be configured to provide the virtual reality information determined by the virtual reality information determination component 118 to the users.” *Id.* at 11:44–46.

2. *Maciocchi*

Maciocchi “relates to an augmented or virtual reality system using a head mounted display, or other mobile devices such as smartphones or tablets, that can place a virtual object or interface on a selected physical surface so that a single user or multiple users can collaborate to[] view and interact with the virtual object on the physical surface.” Ex. 1004, 1:28–33.

Figure 37, shown below, “illustrates a high level illustration of a system 3700 that includes a virtual object reality input device or a virtual pointer 3706 that is visible on a head mounted display 3704 and a high level diagram of . . . virtual object 14.” Ex. 1004, 66:41–45.



“FIG. 37 is a high level block diagram of an embodiment [with a] virtual pointer device that is controlled by a user’s finger to select icons on the virtual object.” Ex. 1004, 5:51–55.

Maciocci describes how “[t]he processor measures a vector that may be captured from the head mounted or body mounted camera 3701 to the user’s finger 3705 and from the finger 3705 to the virtual object 14” and that, “[u]sing the vector[,], an input device virtual object 3706 may be generated and may be placed on the vector.” Ex. 1004, 67:14–18.

3. *Discussion*

Independent claim 1 requires, among other things, loading a three-dimensional architectural model associated with a virtual coordinate system into memory, where the model “comprises at least one virtual object that is associated with an independently executable software object that comprises independent variables and functions that are specific to a particular architectural element that is represented by the at least one virtual object.” The claim thus requires that the “independently executable software object,” not the “virtual object,” includes “independent variables and functions that are specific to a particular architectural element that is represented by the at least one virtual object.”

Petitioner observes that the ’814 patent describes how “an independently executable software object comprises a set of computer-executable instructions used in object-oriented program code, and which relate to a particular physical component or feature.” Pet. 27–28 (quoting Ex. 1001, 5:36–39). Petitioner asserts that the patent “provides no further description of what it means to be ‘independently executable’ beyond the elementary aspects of objects in object-oriented programming (e.g., objects have properties and functions, and can have dependency relationships).” *Id.* at 28.

Petitioner then argues that “Scranton discloses ‘at least one virtual object that is associated with an independently executable software object,’” because “Scranton discloses ‘virtual objects.’” Pet. 28–29 (citing Ex. 1003, 1:19, 1:24, 6:56, 16:24–25, 16:27–28, 18:15, 18:18). We agree that Scranton discloses “virtual objects,” but Petitioner does not adequately explain how Scranton’s virtual objects are “associated with an independently

executable software object” or even identify an independently executable software object.

Petitioner next points to Scranton’s description of how “users may . . . manipulate the virtual objects in the virtual space” and “modify the design through the 3D design software,” arguing that “[t]he ability to manipulate a virtual object within a virtual space necessarily suggests that the virtual object has associated manipulable properties and associated functions to manipulate such properties.” Pet. 29 (citing Ex. 1:24–25, 6:55–56, 2:11–12; Ex. 1002 ¶ 72). This is not persuasive because Petitioner fails to explain why the fact that Scranton’s virtual objects can be manipulated means that the virtual objects would necessarily be associated with a separate “independently executable software object that comprises independent variables and functions that are specific to a particular architectural element that is represented by the at least one virtual object.”³

Petitioner also argues that Scranton’s “3D information component 116” and “virtual reality information component 118” can be implemented in software, that “the ‘virtual objects’ in Scranton are associated with a ‘software’ object, *e.g.*, the 3D or virtual reality information component,” and that “[t]hese software objects are ‘independently executable,’” because “[t]he server may be configured to execute . . . a 3D information component [and] a virtual reality information determination component.” Pet. 29 (emphasis omitted). This is not persuasive.

³ In fact, Dr. Welch’s testimony suggests that, in general, such objects need not include functions. *See, e.g.*, Ex. 1002 ¶ 71 (“a POSITA would consider “objects” in object-oriented programming to optionally include inherent independent executable functions”).

Petitioner fails to establish that Scranton’s “information components” could correspond to the claimed “independently executable software object” for several reasons. First, Petitioner does not show how the information components are “objects,” where, as Petitioner acknowledges, the ’814 patent is using “object” in the object-oriented programming sense. *See, e.g.*, Pet. 27–28; Ex. 1001, 5:28–67. Second, Petitioner fails to explain how or why the components are “associated” with the virtual objects, where the patent contemplates an association akin to that of objects in object-oriented programming. *See id.* Third, although Petitioner asserts that the components are “executable,” it fails to explain why they would be considered to be “independently” executable. Finally, Petitioner fails to explain how or why the components would “comprise[] independent variables and functions that are specific to a particular architectural element,” where Scranton’s components are software that obtains and processes the 3D information, but do not appear to include the information themselves. *See* Ex. 1001, 10:27–12:3.

Petitioner also argues that “Scranton explains in its ‘background’ section that 3D design software produces computer models that ‘generate and manage digital representations of physical and functional characteristics of the space,’ where the physical characteristics are represented by software variables and the functional characteristics would be realized by software functions.” Pet. 30. This, too, is unpersuasive. First, Scranton does not say that “the physical characteristics are represented by software variables and the functional characteristics would be realized by software functions”—that

is Petitioner's language.⁴ Second, Petitioner does not explain how or why the "functional characteristics" would need to be "realized by software functions." For example, Petitioner does not show that those characteristics could not be represented by simple parameters. Third, Petitioner does not explain how or why any such "software functions" would be found in an "independently executable software object," as claimed.

Petitioner next argues that "Scranton discloses that the virtual objects within such models have numerous modifiable properties and include any type of information that 3D design software might produce in connection with a 3D model, such as physical or functional characteristics." Pet. 30. That contention concerns the "virtual object," not an "independently executable software object," and, in any event, Petitioner does not identify anything in the 3D information⁵ that would be a "function."

Finally, Petitioner cites Exhibit 1014, which is a manual for a product called Autodesk Revit. See Pet. 30–31. Exhibit 1014 is not part of the combination (*see id.* at 2) and, in any event, the quoted material shows only that the Revit models included parameters, not functions (*see id.* at 30–31).

⁴ See Ex. 1003, 1:34–38 ("Such software typically enables a user to compose . . . models, specify layout of those models in a space, generate and manage digital representations of physical and functional characteristics of the space, and/to perform any other tasks for 3D designs.").

⁵ See Ex. 1003, 10:30–35 ("The 3D information . . . may include position, size, texture, materiality, sound, shading, lighting, color, description, type, content, animation, scale, project, and/or any other information about one or more objects in the 3D design produced by the 3D design software.").

Because Petitioner has not sufficiently shown that Scranton’s virtual objects are “associated with an independently executable software object that comprises independent variables and functions that are specific to a particular architectural element that is represented by the at least one virtual object,” Petitioner has not shown a likelihood that it will prove independent claim 1 obvious. And, because all of the other challenged claims include corresponding language, Petitioner has not shown a reasonable likelihood that it will prove the other challenged claims obvious either.⁶

III. CONCLUSION

Petitioner has not shown a reasonable likelihood that it would prevail in showing that claims 1–7, 10–16, and 19–20 of the ’814 patent are unpatentable.

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that the Petition is *denied*, and no trial is instituted.

⁶ Because this issue is dispositive, we need not, and therefore do not, reach Patent Owner’s arguments regarding the motivation to combine and assignor estoppel.

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