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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte CHRISTOPHER RICHARD SWEET and
JAMES CHRISTOPHER SWEET

Appeal 2017-006742
Application 13/849,258[1]
Technology Center 2600

Before NATHAN A. ENGELS, JAMES W. DEJMEK, and
MICHAEL M. BARRY, *Administrative Patent Judges*.

BARRY, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellants appeal under 35 U.S.C. § 134(a) from a Final Rejection of claims 1–13, which constitute all of the pending claims. We have jurisdiction under 35 U.S.C. § 6(b).

We affirm.

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[1] Appellants identify the University of Notre Dame du Lac as the real party in interest. App. Br. 1.

Introduction

Appellants state their Application "relates generally to computer visualization and more particularly to systems and methods for geometrically mapping two-dimensional images to three-dimensional surfaces." Spec. ¶ 2. Claim 1 is representative:

> 1. A computer-implemented method of mapping a two-dimensional image to a three-dimensional surface comprising:
>
> capturing electronic data for a two-dimensional image;
>
> capturing electronic data for a three-dimensional structure having a surface;
>
> determining coincident points between the data associated with the two-dimensional image and the data associated with the three-dimensional structure;
>
> determining a scale factor for points on the two-dimensional image;
>
> using the scale factor to geometrically map points on the two-dimensional image to the three-dimensional structure by projecting relative two-coordinate points from the two-dimensional image to relative three-coordinate points of the three-dimensional structure;
>
> creating a three-dimensional surface and texturing the three-dimensional surface;
>
> removing superfluous data from the created three-dimensional surface; and
>
> storing the three-dimensional surface as electronic data.

App. Br. 18 (Claims App'x).

Rejections and References

1. Claims 1–3, 6, 7, 10, 11, and 13 stand rejected as unpatentable under 35 U.S.C. § 101 as directed to non-statutory subject matter. Final Act. 8–9.

2. Claims 1, 2, 4, 6, 7, 10, and 13 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Vashisth et al. (US 6,759,979 B2; July 6, 2004) ("Vashisth") and Clatworthy et al. (US 2007/0146360 A1; June 28, 2007) ("Clatworthy"). *Id.* at 10–17.

3. Claims 3, 8, and 9 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Vashisth, Clatworthy, and Schlichte et al. (US 2011/0298800 A1; Dec. 8, 2011) ("Schlichte"). *Id.* at 17–20.

4. Claim 5 stands rejected under 35 U.S.C. § 103(a) as unpatentable over Vashisth, Clatworthy, and Chen et al. (US 2013/0124159 A1; May 16, 2013) ("Chen"). *Id.* at 20–21.

5. Claims 11 and 12 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Vashisth, Clatworthy, and Bodor et al. (EP 1160731 A2; Dec. 5, 2001) ("Bodor"). *Id.* at 21–23.

ISSUES

Based on Appellants' arguments, the issues are whether the Examiner errs in:

(a) the 35 U.S.C. § 101 rejection of claim 1[2] (App. Br. 6–10);

(b) the 35 U.S.C. § 103(a) rejection of claim 1[3] (*id.* at 11–15);

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[2] Appellants present no arguments of Examiner error in the 35 U.S.C. § 101 rejections of claims 2, 3, 6, 7, 10, 11, and 13 separate from the arguments presented for independent claim 1. App. Br. 10. Thus, the § 101 rejections of dependent claims 2, 3, 6, 7, 10, 11, and 13 stand or fall with the § 101 rejection of parent independent claim 1. 37 C.F.R. § 41.37(c)(1)(iv).

[3] Appellants present no arguments of Examiner error in the 35 U.S.C. § 103(a) rejections of dependent claims 2, 3, 6–10 and 12 separate from the arguments presented for independent claim 1. App. Br. 10–11. Thus, the § 103(a) rejections of dependent claims 2, 3, 6–10 and 12 stand or fall with

(c) the 35 U.S.C. § 103(a) rejection of claim 4 (*id.* at 16);

(d) the 35 U.S.C. § 103(a) rejection of claim 5 (*id.* at 16–17);

(e) the 35 U.S.C. § 103(a) rejection of claims 11 (*id.* at 17); and

(f) the 35 U.S.C. § 103(a) rejection of claim 13 (*id.* at 16).

ANALYSIS

We have reviewed the Examiner's rejections in light of Appellants' contentions of reversible error. We disagree with Appellants' conclusions. Instead, we adopt the Examiner's findings and reasons: (a) for the 35 U.S.C. § 101 rejection, as set forth in the Answer; and (b) for the 35 U.S.C. § 103(a) rejection, as set forth in the Final Rejection and as set forth in the Answer. We highlight the following for emphasis.

The 35 U.S.C. § 101 Rejection

Analytical Framework

The Supreme Court identifies laws of nature, physical phenomena, and abstract ideas as three exceptions of subject matter ineligible for patent protection. *Bilski v. Kappos*, 561 U.S. 593, 601 (2010). In *Alice Corp. v. CLS Bank International*, the Court provides the following framework for analysis:

> First, we determine whether the claims at issue are directed to one of those patent-ineligible concepts. If so, we then ask, "[w]hat else is there in the claims before us?" To answer that question, we consider the elements of each claim both individually and "as an ordered combination" to determine whether the additional elements "transform the nature of the claim" into a patent-eligible application. We have described step two of this analysis as a search for an "'inventive concept'"— *i.e.*, an element or combination of elements that is "sufficient to

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the § 103(a) rejection of parent independent claim 1. 37 C.F.R. § 41.37(c)(1)(iv).

> ensure that the patent in practice amounts to significantly more than a patent upon the [ineligible concept] itself."

134 S. Ct. 2347, 2355 (2014) (quoting *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66 (2012)).

Step One of the Alice Analysis

Appellants argue claim 1 is not directed to an abstract idea without significantly more, but instead is directed towards a patent-eligible digital image process that improves the functioning of the computer itself. App. Br. 6. More specifically, Appellants analogize claim 1 to methods held patent-eligible in *Research Corp. Technologies Inc. v. Microsoft Corp.*, 627 F.3d 859 (Fed. Cir. 2010), where our reviewing court described the claimed "method[s] for the halftoning of gray scale images" as "functional and palpable applications in the field of computer technology, *id.* at 864, 868. App. Br. 6–9. Appellants assert claim 1 similarly improves upon the functioning of a computerized digital mapping of a two-dimensional ("2D") image to a three-dimensional ("3D") structure. *Id.* Appellants also analogize claim 1 to the patent-eligible claims in *McRO, Inc. v. Bandai Namco Games America Inc.*, 837 F.3d 1299 (Fed. Cir. 2016), which were directed to "a specific asserted improvement in computer animation, i.e., the automatic use of rules of a particular type," *id.* at 1314. App. Br. 10. In addition, Appellants assert that claim 1 is similar to the claims in *Trading Tech. International, Inc. v. CQG, Inc.*, 675 Fed. Appx. 1001 (Fed. Cir. 2017) (nonprecedential), because it sets forth a use of a programmatic structure that provides electronic digital image processing that improves the functioning of technology and is more than the generalized use of a computer as a tool. Reply Br. 4. In sum, Appellants posit "[t]he instant claim . . . is an innovation in computer technology, namely digital image processing, which in this case reflects both an improvement in the functioning of the computer and an improvement in image processing." App. Br. 9.

We disagree with Appellants. Instead, we agree with the Examiner claim 1 is directed to an abstract idea—a mathematical algorithm. Final Act. 8 ("Claim 1 is directed to an abstract idea as [the limitations] describe a set of mathematical operations."). Claims directed to "calculating and comparing regions in space," without more, "recite nothing more than a mathematical algorithm that could be implemented using a pen and paper." *Coffelt v. NVIDIA Corp.*, 680 F. App'x 1010, 1011 (Fed. Cir. 2017), *cert. denied*, 137 S. Ct. 2143 (2017). Indeed, "analyzing information by steps people [can] go through in their minds, or by mathematical algorithms, without more . . . [are] mental processes within the abstract-idea category." *Id.* (brackets and ellipsis in original) (quoting *Synopsys, Inc. v. Mentor Graphics Corp.*, 839 F.3d 1138, 1146 (Fed. Cir. 2016) (citation omitted)). Similarly, the Supreme Court has held claims directed to updating alarm limit values and claims for converting one form of numerical representation to another to be mathematical algorithms, and thus, abstract ideas. *Parker v. Flook*, 437 U.S. 584, 594–95 (1978); *Gottschalk v. Benson*, 409 U.S. 63, 65 (1972). Further, "[i]f a claim is directed essentially to a method of calculating, using a mathematical formula, even if the solution is for a specific purpose, the claimed method is nonstatutory." *Flook*, 437 U.S. at 595 (quoting *In re Richman*, 563 F.2d 1026, 1030 (CCPA 1977)).

Claim 1 is directed to algorithmic steps for capturing data for a 2D image and a 3D structure, determining coincident points between the 2D and 3D data, determining a scale factor for points on the 2D image, using the scale factor to geometrically map the 2D image onto the 3D structure, creating and texturing a 3D surface, removing superfluous data from the 3D surface, and storing the 3D surface. Thus, we agree with the Examiner that claim 1 is directed to the abstract idea of a mathematical algorithm for mapping 2D data to 3D. Final Act. 8; Ans. 16–17. The idea to which claim 1 is directed is analogous to the abstract ideas of calculating and comparing regions in space.

Contrary to Appellants' assertions, claim 1 is distinguishable from the claims in *Research Corp.* in two key respects. First, the claimed methods in *Research Corp.* plainly represented specific improvements to commercially available computer technologies. For example, the mask in *Research Corp.* resulted in producing "higher quality halftone images while using less processor power and memory space." 627 F.3d at 865. No such technological advance is evident in the present invention. Rather, beyond the generic "capturing" and "storing" of the data, Appellants' claim 1 merely employs computer technology to perform a mathematical algorithm that maps 2D data to 3D space—i.e., the computer simply performs more efficiently what otherwise could be accomplished manually. *See Bancorp Services, L.L.C. v. SunLife Assur. Co. of Can.*, 687 F.3d 1266, 1279 (Fed. Cir. 2012). Second, the invention in *Research Corp.* was limited to types of software data structures (the pixels of a digital image, the mask, and the halftoned image) that necessitated computer components to perform the claimed method. *See CyberSource Corp. v. Retail Decisions, Inc.*, 654 F.3d 1366, 1376 (Fed. Cir. 2011) ("[T]he method [in *Research Corp.*] could not, as a practical matter, be performed entirely in a human's mind."). Here, in contrast, there are no meaningful technologic software limitations, and the computer merely permits one to perform the recited 2D–to–3D mapping more efficiently than one could mentally. "Using a computer to accelerate an ineligible mental process does not make that process patent-eligible." *See Bancorp*, 687 F.3d at 1279.

Claim 1 is also distinguishable from the improvement over existing manual 3D animation techniques recited by the claims in *McRO*. *See McRO*, 837 F.3d at 1313–16. In *McRO*, the court focused on the fact that the claim incorporated specific features of rules as claim limitations. *Id.* at 1316. In other words, the claim was limited to a specific process for automatically animating characters using particular information and techniques and did not preempt approaches that used rules of a different structure or different techniques. *Id.* By contrast, such a level of specificity is not present in claim 1. For example, claim 1 does not meaningfully limit the manner in which a scale factor is used to geometrically map 2D data points to 3D data points. Nor does claim 1 specify the manner in which the scale factor or coincident points are determined, or how to remove superfluous data.

For similar reasons, we also find claim 1 to be distinguishable from the improvements in existing graphical user interface devices recited by the claims in *Trading Tech*. Contrary to claim 1's relatively generic recitation of 2D–to–3D mapping functionality, the claims in *Trading Tech.* recited "specific structure and concordant functionality of [a] graphical user interface . . . removed from abstract ideas." 675 Fed. Appx. at 1004. As the Examiner explains, and we agree, "[t]he claim limitations in claims 1 do not provide [a] specific way and detail technology to render images beyond a mathematic process which can be done by human using a pen and paper, and beyond a mathematical model building process." Ans. 17.

Accordingly, because claim 1 is directed to an abstract idea under the first step of the *Alice* analysis, we proceed to the second step.

Step Two of the Alice Analysis

In the second step, we "consider the elements of [the] claim both individually and 'as an ordered combination' to determine whether the additional elements 'transform the nature of the claim' into a patent-eligible application." *Alice*, 134 S. Ct. at 2355 (quoting *Mayo*, 566 U.S. at 78). The Supreme Court has "described step two of this analysis as a search for an 'inventive concept'—*i.e.*, an element or combination of elements that is sufficient to ensure that the patent in practice amounts to significantly more than a patent upon the [ineligible concept] itself." *Id.* (quotation omitted).

Appellants argue claim 1 recites significantly more than the abstract idea because

> [the] additional steps of capturing electronic data, determining coincident points and a scale factor, using the scale factor to geometrically map the two-dimensional image to the three-dimensional structure, the electronic creation of a three-dimensional surface, the removal of superfluous data and the storing of the electronic three-dimensional surface **tie the mathematical operation of mapping points to the computer's ability to process digital images**.

App. Br. 8–9. According to Appellants, based on these additional limitations, the claim as a whole "<u>goes significantly beyond the mere concept of simply retrieving and combining data</u>," but rather "improve[s] the functioning of the computer itself." *Id.* at 9; *see also* Reply Br. 3 (contending the claims are "<u>specifically rooted in digital image processing</u>" and "necessarily rooted in and improve the functionality of computer technology"). More specifically, Appellants assert "the claimed process allows the computer to more accurately depict the relationship between a stored two-dimensional image and a three-dimensional structure, thereby improving the virtual representation of stored three-dimensional surfaces, producing an improved digital image." App. Br. at 9. Appellants further assert that similar to "the claimed rules in *McRO* [that] transformed a traditionally subjective process performed by human artists into a mathematically automated process executed on computers," claim 1's geometric mapping of two dimensional images onto three dimensional structures "transforms a traditionally manual matching process into a mathematically automated process executed on computers." *Id.* at 10.

We disagree with Appellants. Instead, we agree with the Examiner that claim 1 does not recite "significantly more" than the abstract idea. Final Act. 9; Ans. 17–18. First, contrary to Appellants' assertion that claim 1 recites a patent-eligible "transformation" from a manual to an automated process, claim 1 generically recites computing equipment that performs the recited mathematical algorithm, which is insufficient to transform the nature of the claim into a patent-eligible application. *Alice*, 134 S. Ct. at 2358 ("the mere recitation of a generic computer cannot transform a patent-ineligible abstract idea into a patent-eligible invention"); Ans. 18 ("To merely recite that the math is being done by a computer and the data involved are electronic is only generally linking the use of the method to a particular technological environment, that is, implementation via computers" (quotations omitted).). Second, the recited capturing, creating of a 3D surface, removal of superfluous data, and storing steps reflect extra-solution activity and no more than well-understood, routine, and conventional activities previously known to the industry. *See Mayo*, 566 U.S. at 79 (holding that purely conventional or obvious pre-solution or post-solution activity is normally not sufficient to transform an unpatentable law of nature into a patent-eligible application of such a law); *Alice*, 134 S. Ct at 2359; Final Act. 10–11 (citing Vashisth Figs. 1, 9, 1:20–25, 3:36–41, 54–57, 6:15–18, 7:16–28, 8:60–67, 9:34–43, 57–63); *see also* Ans. 18 ("[S]toring the data electronically is only well-understood, routine and conventional in the field and, therefore, not significant."). Third, determining coincident points and a scale factor and using the scale factor to perform geometric mapping from a 2D image to a 3D structure merely limit the abstract idea to a particular technological environment, which is insufficient to transform it into a patent-eligible application of the abstract idea at its core. *See Alice*, 134 S. Ct. at 2358; Final Act. 9.

Alice Analysis Conclusion

For the reasons stated above, Appellants do not persuade us the Examiner errs in rejecting claim 1 under 35 U.S.C. § 101. Accordingly, we sustain the Examiner's § 101 rejection of claim 1 as being directed to a patent ineligible abstract idea.

Remaining Claims

Appellants do not present additional arguments for the patentability of claims 2, 3, 6, 7, 10, 11, and 13 under 35 U.S.C. § 101. Accordingly, in view of the above analysis, we also sustain their rejection.

The 35 U.S.C. § 103(a) Rejections

Claims 1, 2, 3, 6–10, and 12

Appellants argue Clatworthy does not teach or suggest "determining a scale factor for points on the [2D] image" and "using the scale factor to geometrically map points on the [2D] image to the [3D] structure by projecting relative two-coordinate points from the [2D] image to relative three-coordinate points of the [3D] structure," as recited in claim 1. App. Br. 14–15. In particular, Appellants assert that, contrary to the claim language, Clatworthy scales a 3D object merely to ensure the perspective and size of the object is maintained relative to the background. *Id.* at 15. Appellants further assert "Clatworthy merely projects the two-dimensional image to a plane of a three-dimensional space to ensure visual consistency in depiction of various objects in the depicted environment." *Id.* (citing Clatworthy ¶ 112).

Appellants' argument is unpersuasive of Examiner error. Clatworthy extensively discusses scaling of objects when mapping between 2D and 3D images, which teaches the ordinarily skilled artisan the use of scale factors. *See* Clatworthy ¶¶ 101–119. The Examiner finds, and we agree, that Clatworthy teaches determining a scale factor and using it to geometrically map points on a 2D image to a 3D structure with its disclosure that scale factors may be used to calculate and translate objects between 2D and 3D space. Final Act. 11–12 (citing Clatworthy ¶ 119). Also relevant to the disputed claim language, the Examiner finds Clatworthy discloses mapping a 2D background object onto a 3D image plane based on metadata associated with the 2D storyboard frame, wherein the metadata includes a common size factor defining scale. *Id.* (citing Clatworthy ¶ 101); *see also id.* (citing Clatworthy, ¶ 112, which discloses a camera module that calculates camera position in a 3D scene using 2D object metadata (including a sizing element) and translation of a 2D frame rectangle to a 3D camera site pyramid). Contrary to Appellants' assertions, whether the intended use or purpose of Clatworthy's method differs from that of Appellants' invention is immaterial to the determination of obviousness. *See In re Linter*, 458 F.2d 1013, 1016 (CCPA 1972) (it is unnecessary for prior art to serve same purpose as disclosed by applicant in an obviousness analysis); *see also KSR Int'l Co. v. Teleflex Inc.*, 550 U.S 398, 419 (2007) ("[N]either the particular motivation nor the avowed purpose of the [Appellant] controls" in an obviousness analysis).

Appellants further argue Vashisth does not teach or suggest the optimization of point clouds for data reduction (e.g., the removal of superfluous data). App. Br. 12, 14. Instead, Appellants assert "Vashisth is specifically directed towards a known non-automated method of manually manipulating image positions until a good fit is found." *Id.* at 14. According to Appellants, the "manual method of Vashisth is not practical in anything other than the simplistic case where a point cloud has few images." *Id.* at 12.

Appellants' argument does not persuade us of error. Appellants' arguments are not commensurate with the scope of claim 1, which does not recite "point clouds." The Examiner finds, and we agree, that Vashisth teaches or suggests the concept of "removing superfluous data from the created three-dimensional surface," as recited in claim 1. Final Act. 11 (citing Vashisth 8:60–67, Fig. 9). In particular, Vashisth discloses that a merging module makes fine adjustments to transformed range data, thereby eliminating the gaps, incongruities, regions of overlap, and redundancy. Vashisth 8:60–67. We agree with the Examiner that Vashisth's disclosure of eliminating regions of overlap and redundancy teaches or suggests "removing superfluous data" as claimed. Final Act. 11. For example, Vashisth discloses that:

> the VripPack [software] merges range images into a compressed volumetric grid, extracts a surface from the compressed volumetric grid, fills holes in the reconstruction by carving out empty space, removes small triangles from the reconstruction, and performs a simple 4-level decimation for interactive rendering.

Vashisth 9:43–48. These disclosures are consistent with Appellants' Specification, which similarly describes removing certain triangles (or points in the cloud) of merged data scans such that important structural features are retained. *See* Spec. ¶¶ 70–72, 75, 76.

Accordingly, we sustain the Examiner's rejection of claim 1, and also of claims 2, 3, 6–10, and 12, for which Appellants present no arguments separate from those for claim 1.

Claim 4[4]

Claim 4 depends from claim 1 and adds the requirements "wherein the determination of coincident points comprises the input of two known coincident points and the calculation of the relative angular orientation of the

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[4] Should there be further prosecution of this application (including review for allowance), we direct the Examiner's attention to the question of whether claim 4 is indefinite under 35 U.S.C. 112(b). Claim 4 recites, in part, "the device capturing the data for the two-dimensional image and the device capturing the data for the three-dimensional structure." App. Br. 19 (Claims App'x). Here, the term "the device" lacks antecedent basis. Further, because the quoted claim language could be reasonably interpreted as meaning a single device for capturing 2D and 3D image data or separate devices (i.e., a first device that captures 2D image data and a second device that captures 3D image data), the claim language is opaque. We note the Specification discloses that 3D data can be combined with 2D surface images acquired from the same device. Spec. ¶ 34.

device capturing the data for the two-dimensional image and the device capturing the data for the three-dimensional structure." App. Br. 19 (Claims App'x).

Appellants argue the Examiner errs in finding Vashisth teaches or suggests the added requirements of claim 4 because "while Vashisth does explain how to calculate the angle of the device capturing data, it does not explain how to use it in combination with the coincidence points." App. Br. 16. Appellants do not dispute the Examiner's findings that Vashisth teaches or suggests (1) "wherein the determination of coincident points comprises the input of two known coincident points," and (2) "the calculation of the relative angular orientation of the device capturing the data for the two-dimensional image . . . and . . . three-dimensional structure," as recited in claim 4. *See id.*; Final Act. 13–14 (citing Vashisth 4:45–50, 7:16–28, 9:49–56); Ans. 22–23 (additionally citing Vashisth 6:60–65, 7:20–30, Figs. 1, 5). Rather, Appellants dispute the Examiner's finding that Vashisth teaches or suggests that the determination of coincident points (between 2D image data and 3D structure data) *comprises both* the input of two known coincident points *and* the calculated angular orientation of the image capturing device. *See* App. Br. 16.

Appellants' argument is unpersuasive. As the Examiner finds, Vashisth discloses collecting range data, orientation information, and digital images at each scanning position or location to generate a virtual model of a site. Ans. 22 (citing Vashisth 6:60–65, Fig. 1). Vashisth's range data is merged and transformed into a polygon mesh; the digital images are decomposed into textures and applied to the polygon mesh. Vashisth 9:33–38, 49–51. In essence, Vashisth's digital images are draped and mapped onto the polygon mesh. *Id.* at 9:33–43, 49–56, Figs. 8, 9. In addition, the Examiner finds Vashisth discloses a range scanner including one or more orientation indicators for providing the angular orientation of the range scanner with respect to the Earth. Final Act. 13 (citing Vashisth 4:45–50); Ans. 23.

We agree with the Examiner the above disclosures of Vashisth teach or suggest the input of known coincident points between the range data/polygon mesh and the digital image/texture, as well as calculating the angular orientation of the image capturing device. *See also* Vashisth, Fig. 3 (showing range data 302a–c overlaid on digital images 306a–c). One of ordinary skill in the art, given these disclosures of Vashisth, would have understood to use the inputted known coincident points and relative angular orientation of the image capturing device in order to more accurately drape or map the 2D images onto the polygon mesh. *See KSR*, 550 U.S. at 418 (explaining that an obviousness analysis can take account of the inferences and creative steps of a person of ordinary skill in the art); *Perfect Web Techs., Inc. v. InfoUSA, Inc.*, 587 F.3d 1324, 1329 (Fed. Cir. 2009) (holding that an obviousness analysis "may include recourse to logic, judgment, and common sense available to the person of ordinary skill that do not necessarily require explication in any reference or expert opinion"). In other words, we agree with the Examiner that the combination of Vashisth and Clatworthy renders obvious "wherein the determination of coincident points comprises the input of two known coincident points and the calculation of the relative angular orientation of the device capturing the data for the two-dimensional image and the device for capturing the data for the three-dimensional structure," as set forth in claim 4.

Accordingly, we sustain the Examiner's rejection of claim 4.

Claim 5[5]

Claim 5 depends from claim 1 and recites the same limitations as claim 4 and further recites "the focal length of the device capturing the data for the two-dimensional image, and the size of the sensor capturing the data for the two-dimensional image." App. Br. 19 (Claims App'x). Appellants argue the Examiner errs in finding the combination of Vashisth, Clatworthy, and Chen teaches or suggests claim 5 because the rejection "does not explain how to use the focal length and sensor size to assist in creating a three dimensional surface." App. Br. 16. In particular, Appellants assert "Chen simply teaches how to determine distortion caused by certain camera features, but does not show or suggest how this would be used to develop a three dimensional surface out of a two dimensional one." *Id.* at 16–17.

Appellants' argument is unpersuasive. As an initial matter, Appellants' argument attacks Chen individually, but the Examiner relies on the combined teachings of Vashisth, Clatworthy, and Chen in rejecting claim 5. One cannot show nonobviousness by attacking references individually when the rejection is based on a combination of references. *In re Keller*, 642 F.2d 413, 425 (CCPA 1981); *see also In re Merck & Co., Inc.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986) (each reference cited by the Examiner must be

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[5] Should there be further prosecution of this application (including review for allowance), we direct the Examiner's attention to the question of whether claim 5 is indefinite under 35 U.S.C. 112(b). Claim 5 recites, in part, "one known coincident points." App. Br. 19 (Claims App'x). Because it is unclear whether the quoted claim language should be interpreted as a single known coincident point or multiple known coincident points, the claim language is opaque.

read, not in isolation, but for what it fairly teaches in combination with the prior art as a whole).

In any event, for the reasons discussed above, we agree with the Examiner the combination of Vashisth and Clatworthy renders obvious the limitations of claim 5 that are similar to the limitations of claim 4. *See* Final Act. 20–21 (citing Vashisth 4:45–50, 7:16–28, 9:49–56, Figs. 2, 5). Further, the Examiner finds, and we agree, Chen teaches claim 5's additional "focal length" and "size of the sensor" limitations based on its disclosures of accessing image metadata in a target image to determine focal length and using a particular sensor size of the camera body to capture the target image. Final Act. 21 (citing Chen ¶¶ 8, 37); Ans. 25–26 (additionally citing Chen ¶ 61, Figs. 6, 13). One of ordinary skill in the art, given the cited disclosures of Chen, Vashisth, and Clatworthy, would have understood to consider the image capturing device's focal length and sensor size in determining coincident points between 2D image data and 3D structure data. *See KSR*, 550 U.S. at 418; *Perfect Web*, 587 F.3d at 1329. Combining the teachings of Chen with those of Vashisth, as modified by Clatworthy, would have resulted predictably in a more accurate draping or mapping of a 2D image onto a polygon mesh. In other words, we agree with the Examiner that the combination of Vashisth, Clatworthy, and Chen renders obvious claim 5.

Accordingly, we sustain the Examiner's rejection of claim 5.

Claim 11

Claim 11 depends from claim 1 and recites "wherein the created three-dimensional surface is compressed." App. Br. 20 (Claims App'x). The Examiner finds Bodor's disclosure of compressing a composite texture image created from a 3D object teaches this limitation. Final Act. 22 (citing

Bodor ¶¶ 22, 24, Figs. 1, 5); Ans. 26–27. The Examiner concludes it would have been obvious to one of ordinary skill in the art to modify Vashisth in view of Clatworthy to effectively reduce the image size and preserve detail and resolution of 3D images by using Bodor's compression algorithm. Final Act. 22; Ans. 27. Appellants acknowledge that Bodor teaches a texel compression algorithm that reduces the file size of a 3D image but argue the Examiner errs in rejecting claim 11 because the proposed combination of Bodor with Vashisth and Clatworthy does not explain how to use the compression algorithm of Bodor in the process of developing a 3D image from a 2D image. App. Br. 17.

Appellants' argument does not persuade us of error. The Examiner articulates a rationale to combine—to effectively reduce the image size and preserve detail and resolution of 3D images—drawn directly from the Bodor reference, and Appellants do not persuasively rebut that rationale. *See* Final Act. 22; Bodor ¶ 22 ("In such lossy compression embodiments, low complexity results in use of higher compression and high complexity results in use of lower compression to preserve detail and resolution."); *see also id.* ¶ 4 ("Because the data representing large or complex three-dimensional images can be relatively large, it is desirable to take steps to decrease the size of such data to reduce the amount of data that must be stored or transmitted via a network connection."), ¶ 7 ("What is needed is a method of compressing data comprising a three-dimensional polygon mesh in a manner that provides a reduced overall data size and number of files required to represent a three-dimensional image."), ¶ 27 ("The reflected portions or corresponding portions are used only to facilitate efficient and color-accurate compression of the composite texture map and thereby reduce the storage and bandwidth needed to store or transmit the three-dimensional object.”).

Further, to the extent Appellants argue that Bodor’s compression system and method must be bodily incorporated or physically combined with the 2D to 3D mapping process of Vashisth, as modified by Clatworthy, we disagree. “The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference. . . . Rather, the test is what the combined teachings of those references would have suggested to those of ordinary skill in the art.” *Keller*, 642 F.2d at 425.

Accordingly, we sustain the Examiner’s rejection of claim 11.

Claim 13

Claim 13 depends from claim 1 and recites “further comprising a plurality of captured data for the three-dimensional structure, and repeating the geometrically mapping and scaling method for each of the plurality of captured data for the three-dimensional structure.” App. Br. 20 (Claims App’x). With respect to claim 13, Appellants argue “neither Vashisth nor Clatworthy explain how to apply its visualization module using a scale factor—as required in the clarified claim 1—to a plurality of datasets.” App. Br. 16.

Appellants’ argument is unpersuasive. As the Examiner finds, Vashisth discloses a plurality of known software tools for applying textures to polygon meshes. Final Act. 16–17 (citing Vashisth 9:33–60, Figs. 3, 9). Additionally, as discussed above for claim 1, the Examiner finds Clatworthy teaches a plurality of known software tools for using scale factors to calculate and translate objects between 2D and 3D space. Final Act. 11–12 (citing Clatworthy ¶¶ 101, 102, 112, 119); *see also, e.g.,* Clatworthy ¶ 100 ("In one embodiment, the 2D-to-3D frame conversion system 1100 includes hardware, software and/or firmware to enable conversion of a 2D storyboard frame into a 3D scene."). Given the cited disclosures of Vashisth and Clatworthy, one of ordinary skill would have understood the disclosed software tools were not just for use on a single data element, but were for use on "a plurality of captured data," as claimed. *See KSR*, 550 U.S. at 418; *Perfect Web*, 587 F.3d at 1329. In any event, repeating known steps to obtain a desired result is not inventive. *Perfect Web*, 587 F.3d at 1330–31 (affirming the conclusion of obviousness for a claimed invention that required performance of three steps known in the prior art, followed by repetition of those steps until a desired result was obtained).

Accordingly, we sustain the Examiner's rejection of claim 13.

DECISION

For the above reasons, we affirm the § 101 rejection of claims 1–3, 6, 7, 10, 11, and 13, and affirm the § 103(a) rejections of claims 1–13. No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED