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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte JOERN IHLENBURG, GOERG PFLUG, and ACHIM GIESEKE

Appeal 2018-003893
Application 14/233,508
Technology Center 2400

Before BRADLEY W. BAUMEISTER, IRVIN E. BRANCH, and MICHAEL M. BARRY, *Administrative Patent Judges.*

BRANCH, *Administrative Patent Judge.*

DECISION ON APPEAL

STATEMENT OF THE CASE[1]

Pursuant to 35 U.S.C. § 134(a), Appellant[2] appeals from the Examiner's decision to reject claims 1–12 and 15–20, which are all of the

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[1] We refer to the Specification, filed January 17, 2014 ("Spec."); Final Office Action, mailed April 4, 2017 ("Final Act."); Appeal Brief, filed October 4, 2017 ("Appeal Br."); Examiner's Answer, mailed December 28, 2017 ("Ans."); and Reply Brief, filed February 27, 2018 ("Reply Br.").

[2] We use the word Appellant to refer to "applicant" as defined in 37 C.F.R. § 1.42. Appellant identifies the real party in interest as Magna Electronics Inc. Appeal Br. 2.

pending claims. *See* Final Act. 1. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM-IN-PART.

CLAIMED SUBJECT MATTER

The claims are directed to an imaging system for a vehicle. Claims 1 and 15, reproduced below with disputed limitations emphasized in *italics*, are illustrative of the claimed subject matter:

> 1. A vision system for a vehicle, said vision system comprising:
>
> a plurality of imaging sensors disposed at the vehicle, each having a respective exterior field of view and each capturing respective image data;
>
> a display screen disposed in the vehicle and operable to display images for viewing by a driver of the vehicle, wherein said display screen is operable to display images derived from image data captured by said imaging sensors;
>
> a processing system operable to process image data captured by said imaging sensors and to at least one of combine and manipulate image data captured by said imaging sensors to provide a three-dimensional representation of the exterior scene for display at said display screen;
>
> wherein said processing system is operable to process said captured image data in accordance with a curved surface model;
>
> wherein said processing system is operable to process said captured image data *to provide a first three-dimensional representation in accordance with a first curved surface model as if seen by a virtual observer from a first virtual viewing point* exterior of the vehicle having a first viewing direction;
>
> wherein said processing system is operable to *adjust processing of said captured image data for displaying a second three-dimensional representation in accordance with a second curved surface model as if seen by a virtual observer from a second virtual viewing point exterior of the vehicle having a*

second viewing direction to provide enhanced display of the images as if viewed from the second virtual viewing point; and

wherein said first and second curved surface models each comprise a virtual surface around the vehicle, and wherein each virtual surface has respective surface curvature, and wherein the surface curvature of the virtual surface of said second curved surface model is different from the surface curvature of the virtual surface of said first curved surface model; and

wherein, responsive to the first virtual viewing point exterior of the vehicle having said first viewing direction, said display screen displays the first three-dimensional representation in accordance with said first curved surface model, and wherein, responsive to the second virtual viewing point exterior of the vehicle having said second viewing direction, said display screen displays the second three-dimensional representation in accordance with said second curved surface model.

15. A vision system for a vehicle, said vision system comprising:

a plurality of imaging sensors disposed at the vehicle and having exterior fields of view, said imaging sensors capturing image data for transmitting image data to a processing system;

a display screen for displaying images derived from said captured image data;

wherein said processing system is operable to transform transmitted image data to produce a view of the exterior area surrounding the vehicle, and *wherein said processing system is operable to select a first portion of captured image data for transmitting by said imaging sensors to said processing system*, and wherein said processing system transforms the transmitted first portion of image data and communicates the transformed first portion of image data to said display screen for displaying images at said display screen;

wherein, responsive to an indication that information outside of the first portion of said transformed image data is to be displayed on said display screen, *said processing system selects a second portion of captured image data for transmitting by said imaging sensor to said processing system*, and wherein said processing system transforms the transmitted second portion

of image data and communicates the transformed second portion of image data to said display screen for displaying images at said display screen; and

wherein said transformed first portion of image data comprises a defined region of a captured image that is less than the entire captured image, and wherein said transformed second portion of image data comprises another defined region of the captured image that is different from the defined region of the first portion.

REFERENCES

The Examiner relies upon the following prior art:

Name	Reference	Date
Okamoto	US 7,307,655 B1	Mar. 6, 2008
Riconda	US 2002/0130953 A1	Sept. 19, 2002
Hager	US 2004/0105580 A1	June 3, 2004
Jones	US 2006/0268360 A1	Nov. 30, 2006
Ovsiannikov	US 2008/0056607 A1	Dec. 11, 2007
Baur	US 2008/0212189 A1	Sept. 4, 2008
Long-Tai	US 2009/0167564 A1	July 2, 2009
Sanders-Reed	US 2010/0017047 A1	Jan. 21, 2010
Hongo	US 2011/0001826 A1	Jan. 6, 2011
Peterson	US 2011/0193961 A1	Aug. 11, 2011

REJECTIONS

Claims 1–4 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Okamoto and Hongo. Final Act. 17–25.

Claim 5 stands rejected under 35 U.S.C. § 103(a) as unpatentable over Okamoto, Hongo, and Riconda. Final Act. 25.

Claims 6, 7, and 9 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Okamoto, Hongo, and Maki. Final Act. 25–27.

Claim 8 stands rejected under 35 U.S.C. § 103(a) as unpatentable over Okamoto, Hongo, Maki, and Hager. Final Act. 27–28.

Claims 10–12 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Okamoto, Hongo, and Baur. Final Act. 28–30.

Claim 15 stands rejected under 35 U.S.C. § 103(a) as unpatentable over Okamoto, Hongo, and Jones. Final Act. 30–34.

Claims 19 and 20 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Okamoto, Hongo, Jones, and Ovsiannikov. Final Act. 34–36.

Claim 16 stands rejected under 35 U.S.C. § 103(a) as unpatentable over Okamoto, Hongo, Jones, and Sanders-Reed. Final Act. 36–37.

Claim 17 stands rejected under 35 U.S.C. § 103(a) as unpatentable over Okamoto, Hongo, Jones, and Long-Tai. Final Act. 37.

Claim 18 stands rejected under 35 U.S.C. § 103(a) as unpatentable over Okamoto, Hongo, Jones, Long-Tai, and Peterson. Final Act. 37–38.

ANALYSIS

We have reviewed the Examiner's rejections in light of Appellant's arguments. We have considered in this Decision only those arguments Appellant actually raised in the Briefs. Any other arguments Appellant could have made but chose not to make in the Briefs are deemed to be waived. *See* 37 C.F.R. § 41.37(c)(1)(iv).

To the extent consistent with our analysis herein, we adopt as our own the findings and reasons set forth by the Examiner in (1) the action from which this appeal is taken (Final Act. 16–38) and (2) the Examiner's Answer in response to Appellant's Appeal Brief (Ans. 24–135).

35 U.S.C. § 103

Claim 1

With respect to the obviousness rejection of independent claim 1, Appellant contends that the combination of Okamoto and Hongo "does not disclose or suggest the curved surface model as claimed, including adjustment of image processing to provide first and second three-dimensional representations in accordance with first and second curved surface models." Appeal Br. 16. Appellant contends that "Okamoto discloses using a joystick to change the virtual point of view within the *same curved surface model.*" *Id.* at 17.

Regarding Hongo, Appellant argues as follows:

> Hongo discloses taking the view of a camera mounted on the rear of the vehicle, changing the viewpoint to a bird's-eye view, and then presenting an image to the user of a portion of the bird's-eye view, and a portion of the camera's actual view. There is no curved surface model, and there is only a single virtual viewpoint (the bird's eye view; the other viewpoint is not virtual, it is merely a view directly from the camera, see Figures 6 and 7 of Hongo). Moreover, there is no disclosure or suggestion in Hongo of first and second curved surface models having different surface curvatures, as claimed.

Id. at 23.

Appellant further argues that

> neither Okamoto nor Hongo (alone or in combination with one another or with any other prior art of record) discloses or suggests a processing adjustment that results in surface curvature of the virtual surfaces of the respective curved surface models being different from one another, with the display screen displaying the first three-dimensional representation in accordance with the first curved surface model responsive to the first virtual viewing point exterior of the vehicle having the first

> viewing direction, and with the display screen displaying the second three-dimensional representation in accordance with the second curved surface model responsive to the second virtual viewing point exterior of the vehicle having the second viewing direction, such as claimed (collectively and in combination with the other claim elements). To the contrary, Okamoto and Hongo merely disclose providing different virtual viewpoints, but without any corresponding change in surface curvature of a curved surface model.

Id. at 24–25.

Appellant also argues that "one of ordinary skill in the art would have no reason to combine these two references." *Id.* at 24.

Figures 3 and 4 of Appellant's Specification are reproduced below.

FIG. 3

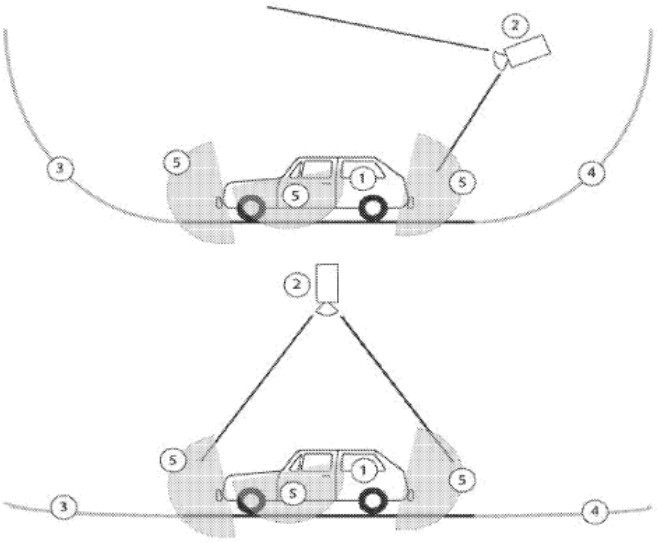

FIG. 4

Figures 3 and 4 depict "schematics . . . [with] FIG. 4 show[ing] how a virtual projection surface is adapted for different virtual viewpoints in accordance with the present invention." Spec. ¶ 10, Figs. 3, 4. Appellant contends "[a]s

is clearly shown in FIGS. 3 and 4, the surface curvature of the virtual surface of the second curved surface model (FIG. 3) is different from the surface curvature of the virtual surface of the first curved surface model (FIG. 4)." *Id.* at 20.

The Examiner finds as follows regarding Okamoto:

> Through [] user interaction, the three-dimensional position of the virtual point of view is changed and the direction of the line of sight from the virtual point of view is changed [See Okamoto, Col. 51]. Okamoto discloses that the correction of the point of view (changing of the point of view) includes the replacement/correction of the X, Y, and Z coordinates of the camera position (point of view) in the three-dimensional system.
>
> Though the space model is not explicitly changed into a new space model, the space model's coordinates and view (i.e., change of perspective) are changed which creates a space model that is different from the original space model (before the change of view/perspective) [See Okamoto]. Therefore, the first image of the space model that is displayed on the screen contains different coordinates than the second space model that is displayed on the screen when the three-dimensional position of the virtual point of view of the space model is changed [See Okamoto, Col. 51]. Thus, the space model would be changed into the same model with different coordinates based on the changing of the virtual point of view, which would change the three dimensional model used.

Ans. 46 (emphasis added).

With respect to Hongo, the Examiner finds as follows:

> Hongo discloses an original bird's-eye-view image as viewed from the viewpoint of a virtual camera on a bird's-eye-view coordinate plane [See Hongo, 0063–0065]. An augmented bird's-eye-view image is viewed from the viewpoint of the virtual camera with a narrower viewing field than the original bird's-eye-view image [See Hongo, 0068 and 0071]. The original bird's-eye-view image is located on a flat plane for a

> narrow view and the augmented bird's-eye-view image is located with the different plane for a less narrow view [See Hongo, 0068]. As can be seen in Fig. 9, the augmented bird's eye-view image has a curved surface in the 2nd image region. Thus, the original bird's eye-view image (first image) has zero surface curvature on a flat plane and the augmented bird's-eye-view image (second image) has surface curvature on a different plane. Therefore, the two images have different surface curvatures.

Id. at 46–47.

The Examiner reasons as follows:

> It would have been obvious to modify the changing of the viewing direction/point of view on the same curved surface model with different coordinates and the use of more than one curved surface model to map the three dimensional positions of the images surrounding the vehicle as taught by Okamoto with the use of creating an augmented bird's eye view image and the original bird's-eye-view image with different coordinate planes, which have different surfaces as taught by Hongo.

Id. at 47.

We are persuaded by Appellant's arguments that the Examiner has erred. Specifically, we find no reasonable basis for the Examiner's apparently contradictory findings that "[t]hough the space model is not explicitly changed into a new space model, the space model's coordinates and view (i.e., change of perspective) are changed[,] which creates a space model that is different from the original space model (before the change of view/perspective)." Ans. 46 (referring to Okamoto col. 51). Thus, we are not persuaded that Okamoto discloses "adjust processing of said captured image data for displaying a second three-dimensional representation in accordance with a second curved surface model as if seen by a virtual observer from a second virtual viewing point exterior of the vehicle having a

second viewing direction," as recited in claim 1. Further, the Examiner does not cite Hongo for adjusting processing to display a second three-dimensional representation in accordance with a second curved surface model, but rather cites Hongo for first and second bird's-eye-views. *See* Final Act. 20–22; Ans. 46–47.

For at least the foregoing reasons, we do not sustain the Examiner's decision to reject claim 1 or claims 2–12, which depend either directly or indirectly therefrom.

Claim 15

Independent claim 15 recites, in relevant part,

> wherein said processing system is operable to select a first portion of captured image data *for transmitting by said imaging sensors to said processing system*, and . . . *wherein*, responsive to an indication that information outside of the first portion of said transformed image data is to be displayed on said display screen, *said processing system selects a second portion of captured image data for transmitting by said imaging sensor to said processing system*.

Claim 15 (emphasis added).

The Examiner finds that "Jones discloses that in response to user input or randomly, different sections of an image can be selected to transmit from the imaging device to a remote location." Ans. 103 (citing Jones ¶ 73).

Jones discloses

> Either as part of a temporal sequence, in response to user input, or randomly, the system may begin selecting different sections of the image 250 to transmit in high resolution format. This is depicted in FIG. 12D by the high resolution section 252 of the image 250 that appears on the right-hand side of the scene. The next figure, **FIG. 12E,** shows an image **260,** which illustrates the high resolution section **258** being centered on the car and the

> adjacent tree. The transmitted image **260** has a relatively low resolution for that portion of the image which is not of interest to the user. However, the sensor array that is capturing the image of the car and the adjacent tree can be identified and the image data generated by that sensor can also be identified and transmitted in a high resolution format to the remote location. This provides the composite image **260** depicted in the figure.

Jones ¶ 73.

Appellant argues claim 15 on the basis that "Jones discloses transmitting an entire image, a portion of which may be transmitted *in higher resolution.* There is no disclosure in Jones of transmitting only a *portion* of the image, as claimed." Reply Br. 12.

This argument does not persuade us of error because the argument is not commensurate with the scope of the claim. The claim does not recite transmitting *only* a portion of the image, as Appellant argues. Thus, we sustain the Examiner's rejection of claim 15.

Claim 16

Claim 16 depends from claim 15 and recites "wherein said vision system provides for reduced bandwidth requirements by transmitting only data appropriate for providing the selected image display."

The Examiner finds that "Sanders-Reed discloses that when the bandwidth is not sufficient to support the fully enhanced image, the image processor modifies one or more of the transmission characteristics to enable the transmission of an adequate enhanced image to be displayed on the HMD." Ans. 114 (citing Sanders-Reed Fig. 4; ¶ 44).

Appellant does not dispute the disclosure of Sanders-Reed, but rather argues the rejection of claim 16 on the basis that "the claimed invention

reduces bandwidth by only transmitting a *subset* of the image." Reply Br. 13.

Appellant's argument is unpersuasive of error because the argument is not commensurate with the scope of the claim. The claim does not recite transmitting a *subset* of the image, as Appellant argues. The claim recites "transmitting only data appropriate for providing the selected image display," which reads on the disclosure of Sanders-Reed because Sanders-Reed discloses "enabl[ing] the transmission of an adequate enhanced image to be displayed." Sanders-Reed ¶ 44. Thus, we sustain the rejection of claim 16.

Claim 17

Claim 17 depends from claim 15 and recites "wherein a subset of captured image data is transmitted by each of said imaging sensors and processed by said processing system." Appellant argues claim 17 on the basis that "Long-Tai makes no reference to the image sensor only transmitting a *subset* of the image data captured. Instead, the image sensors send *all* of their respective data to the controller." App. Br. 36; see Reply Br. 14 ("Long-Tai discloses the image sensors outputting the *entirety* of the data they capture and not a *subset* as claimed.").

Again, Appellant misstates the claim, which does not recite each image sensor *only* transmitting a *subset* of the image data captured. By "outputting the *entirety* of the data they capture" (Reply Br. 14), the image sensors of Long-Tai also are transmitting a subset within the entirety.

Accordingly, we sustain the rejection of claim 17.

Claim 18

Claim 18 depends from claim 17 and recites "wherein said processing system is operable to set a resolution of subsets of captured image data and wherein at least one subset of captured image data is transmitted at a lower resolution as compared to others of said subsets of captured image data."

The Examiner rejects claim 18 over the combination of Okamoto, Hongo, Jones, Long-Tai, and Peters. Final Act. 38. The Examiner finds "Long-Tai discloses wherein said processing system is operable to set a resolution of subsets of captured image data" and "Peterson discloses wherein at least one subset of captured image data is transmitted at a lower resolution as compared to others of said subsets of captured image data." *Id.* (citing Long-Tai ¶ 43 (disclosing adjusting the detection range resolution of detection sensors) and Peterson ¶ 26 ("the image resolution may be reduced (such as by reducing the resolution by half or by any other suitable or desired amount) temporarily either in X or Y or both")).

Appellant argues that "Long-Tai has no disclosure or suggestion of transmitting a subset of data at a lower resolution than other subsets of data." App. Br. 37. This argument is unpersuasive because Peterson, not Long-Tai, is cited for "at least one subset of captured image data is transmitted at a lower resolution as compared to others of said subsets of captured image data." Final Act. 38.

Appellant also argues that "[t]here is no disclosure or suggestion in Peterson that only a subset of the image data may be transmitted with reduced resolution, as claimed." App. Br. 37. We disagree because the claim recites "wherein at least one subset of captured image data is transmitted at a lower resolution as compared to others of said subsets of

captured image data," and Peterson discloses temporarily reducing resolution, which discloses varying the resolution of transmitted subsets (i.e., temporal subsets) of captured image data, as claimed.

Accordingly, Appellant's arguments do not persuade us of error in the Examiner's rejection of claim 18.

The Remaining Claims

We also sustain the rejections of claims 19 and 20, which Appellant does not argue with particularity.

CONCLUSION

We reverse the Examiner rejection of claims 1–12, and we affirm the Examiner's decision to reject claims 15–20 as obvious.

DECISION SUMMARY

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
1–4	103	Okamoto, Hongo		1–4
5	103	Okamoto, Hongo, Riconda		5
6, 7, 9	103	Okamoto, Hongo, Maki		6, 7, 9
8	103	Okamoto, Hongo, Maki, Hager		8
10–12	103	Okamoto, Hongo, Baur		10–12
15	103	Okamoto, Hongo, Jones	15	
19, 20	103	Okamoto, Hongo, Jones, Ovsiannikov	19, 20	
16	103	Okamoto, Hongo Jones, Sanders-Reed	16	
17	103	Okamoto, Hongo, Jones, Long-Tai	17	

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
18	103	Okamoto, Hongo, Jones, Long-Tai, Peterson	18	
Overall Outcome:			15–20	1–12

TIME PERIOD FOR RESPONSE

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a). *See* 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED-IN-PART