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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte WOLFGANG NIEHSEN and STEPHAN SIMON

Appeal 2015-005025
Application 13/000,282[1]
Technology Center 2600

Before ALLEN R. MacDONALD, JASON V. MORGAN, and HUNG H. BUI, *Administrative Patent Judges*.

BUI, *Administrative Patent Judge.*

DECISION ON APPEAL

Appellants seek our review under 35 U.S.C. § 134(a) of the Examiner's Final Office Action rejecting claims 12–17, 19–23, and 25–32, which are all of the claims pending on appeal. Claims 1–11, 18, and 24 are cancelled. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.[2]

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[1] According to Appellants, the real party in interest is Robert Bosch GmbH. App. Br. 1.

[2] Our Decision refers to Appellants' Appeal Brief filed September 24, 2014 ("App. Br."); Reply Brief filed April 2, 2015 ("Reply Br."); Examiner's Answer mailed February 3, 2015 ("Ans."); Final Office Action mailed May 29, 2014 ("Final Act."); and original Specification filed December 20, 2010 ("Spec.").

STATEMENT OF THE CASE

Appellants' invention relates to a method for visualizing image data including a plurality of pixel values for a plurality of pixels, and including, for each of at least a subset of the plurality of pixels, a respective piece of additional information indicating a characteristic of the respective pixel, besides for the pixel value of the respective pixel. Sub. Spec. 1:5–7; Abstract. According to Appellants, the additional information represents a gradual change of the characteristic between neighboring pixels. Sub. Spec. 3:27–32, 4:14–18, Fig. 2. In particular, the additional information is superimposed over image data and can be displayed based on a certain classification (e.g., a difference in coloration, texture, brightness, darkening, sharpening, magnification, increased contrast, reduced contrast, omission, virtual illumination, inversion, distortion, abstraction, with contours, in a chronological variable manner (moving, flashing, vibrating, wobbling)) in a manner that is easier for the user to comprehend. Spec. 3:1–11.

Claims 12, 19, 20, and 23 are independent. Claim 12 is illustrative of Appellants' invention, as reproduced with disputed limitations emphasized:

> 12. A method for visualizing image data including a plurality of pixel values for a plurality of pixels, and including, for each of at least a subset of the plurality of pixels, *a respective piece of additional information indicating a characteristic of the respective pixel, besides for the pixel value of the respective pixel*, the method comprising:
>
> representing the image data as an image data image having pixels whose characteristics are determined based on (a) the pixel values, and (b), for each of the at least the subset of the plurality of pixels, modification of the respective pixel value according to the respective characteristic indicated for the respective pixel by the respective additional piece of

information of the respective pixel;

wherein the additional information represents a gradual change of the characteristic between neighboring pixels.

App. Br. 9 (Claims App'x.).

Examiner's Rejections and References

(1) Claims 12–15, 19–23, and 25–32 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Auty et al., (US 5,809,161; issued Sept. 15, 1998 ("Auty")), Stefan Vacek et al., *Road-Marking Analysis for Autonomous Vehicle Guidance*; Institute for Computer Science and Engineering, University of Karlsruhe ("Vacek")), and Wided Miled et al., *Robust Obstacle Detection Based on Dense Disparity Maps*, Computer Aided Systems Theory-EUROCAST 2007, 1142–50 ("Miled"). Final Act. 3–16.

(2) Claims 16 and 17 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Auty, Vacek, Miled, and Doug DeCarlo and Anthony Santella, *Stylization and abstraction of photographs*, ACM Transactions on Graphics (TOG), vol. 21, no. 3, 769–76 (2002) ("DeCarlo"). Final Act. 16–19.

ISSUE

Based on Appellant's arguments, the dispositive issue presented on appeal is whether the Examiner erred in finding the cited prior art teaches or suggests the disputed limitations: (1) "wherein the additional information represents a gradual change of the characteristic between neighboring pixels"; (2) "a respective piece of additional information indicating a characteristic of the respective pixel"; and (3) "additional information

indicating a characteristic of the respective pixel, besides for the pixel value of the respective pixel," as recited in each of Appellants' independent claims 12, 19, 20, and 23. App. Br. 4–7; Reply Br. 2–4.

ANALYSIS

With respect to independent claim 12, the Examiner finds Auty teaches Appellants' claimed

> method for visualizing image data including a plurality of pixel values for a plurality of pixels, and including, for each of at least a subset of the plurality of pixels, a respective piece of additional information indicating a characteristic of the respective pixel, besides for the pixel value of the respective pixel.

Final Act. 4–5 (citing Auty, 10:63–66, 11:24–45, Fig. 16).

According to the Examiner, Auty's Figure 16 teaches "the image data having pixels as all displayed images have pixels, and the displayed image is enriched over the original image by superimposing boxes around vehicles and a histogram," i.e., "superimposed with cluster markings and other data." Final Act. 4 (citing Auty, 12:11–26, Fig. 16).

Auty's Figure 16 is reproduced below:

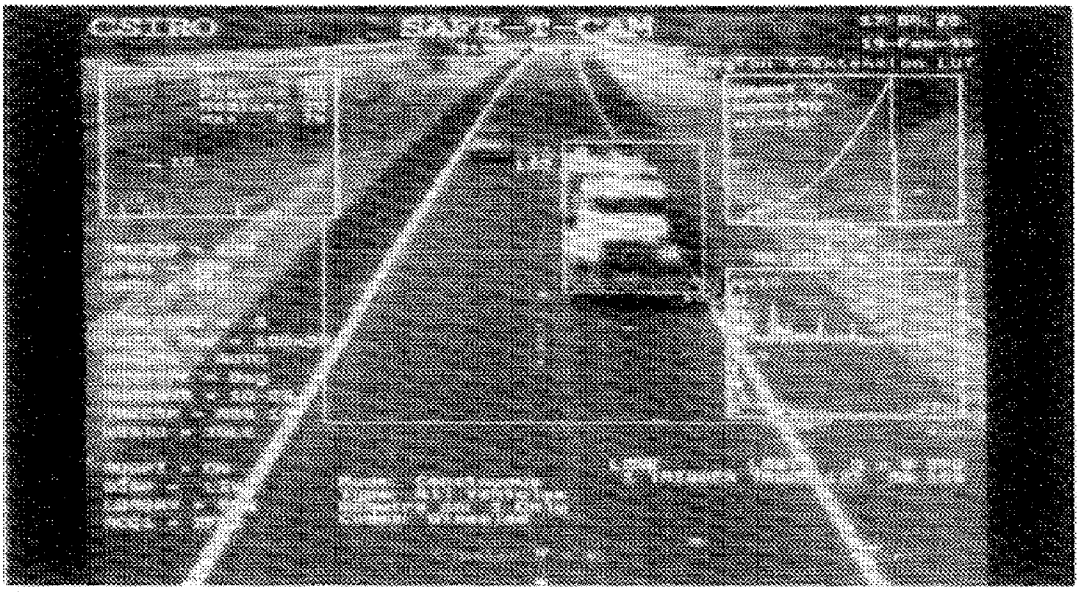


FIG. 16

Auty's Figure 16 depicts a real time status display having a live image superimposed with cluster markings and other data.

The Examiner does not rely on Auty as teaching or suggesting the alternative image enhancement feature of:

> pixels [of image data] whose characteristics are determined based on (a) the pixel values, and (b) for each of the at least subset of the plurality of pixels, modification of the respective pixel value according to the respective characteristic indicated for the respective pixel by the respective additional piece of information of the respective pixel.

Final Act. 5.

Rather, the Examiner relies on Vacek's teaching of overlying images with additional information to highlight the meaningful visual elements with regards to a vehicle to teach or suggest this feature. *Id.* at 5–6 (citing Vacek Fig. 14).

The Examiner further relies on the disparity maps of Miled in combination with Auty and Vacek to teach or suggest **"[w]herein the**

additional information represents a gradual change of the characteristic between neighboring pixels" to provide "a visualization that highlights the distance and location of important road features" and "to aid in the avoidance of possible collisions." Final Act. 5–8 (citing Vacek's Fig. 14; Miled's Fig. 2, Abstract).

Appellants present several arguments against the Examiner's combination. First, Appellants argue the cited art, including Auty, Vacek, and Miled, does not teach that "the additional information represents a gradual change of the characteristic between neighboring pixels," as recited in claims 12, 19, 20, and 23. App. Br. 4–5; Reply Br. 1–4. In particular, Appellants acknowledge Miled teaches "a vision-based obstacle detection method that relies on dense disparity estimation between a pair of stereo images and involves computation of a depth map," but argues (1) "nowhere does Miled disclose or suggest that the disparity maps represent a gradual change in depth between neighboring pixels," as recited in claims 12, 19, 20, and 23, and (2) "the two corresponding points in a pair of stereo images [of Miled] cannot be considered neighboring pixels" and "pixels of different images [as described by Miled] are not neighbors." App. Br. 4–5; Reply Br. 2–3.

Second, Appellants argue the cited art does not teach "a respective piece of additional information indicating a characteristic of the respective pixel," as recited in each of Appellants' independent claims 12, 19, 20, and 23. App. Br. 4–6; Reply Br. 2–3. In particular, Appellants argue: (1) "Auty's classification and labeling of pixel blobs" is not the same as the claimed "***respective piece of additional information*** indicating a characteristic of the respective pixel," as recited in Appellants' claims, and

(2) "one of ordinary skill in the art would not be motivated to combine Auty and Miled in the manner suggested by the Examiner" because Auty's "binary representation (namely a black and white representation of an image) . . . is not suitable for representing gradations of depth," as disclosed by Miled. App. Br. 5–6. According to Appellants, "the cluster marking of Auty is not suitable for annotating the depth map of Miled" because "the cluster markings (e.g., speed of the vehicle) is more accurately computed from a live image rather than the depth map approximation of Miled." Reply Br. 3.

Third, Appellants further argue the cited art does not teach "*additional information indicating a characteristic of the respective pixel, besides for the pixel value of the respective pixel,*" as recited in each of Appellants' independent claims 12, 19, 20, and 23. App. Br. 6–7; Reply Br. 3–4. In particular, Appellants argue Auty's histogram, shown in Figure 16, "refers to a graph whose bars indicate, for each of a plurality of grey level values, the number of pixels having that value" and, as such, "does not provide additional information about an individual pixel other than the pixel's pixel value." App. Br. 6 (citing Auty 11:1–4). Similarly, Appellants argue Auty's "boxes refer to the drawing of an outline of the portion of an image determined to include a vehicle," and, as such, "are not information that indicate a characteristic of an individual pixel, which is then used for modification of the pixel value." *Id.* at 6–7 (citing Auty Fig. 15).

We do not find Appellants' arguments persuasive. Instead, we find the Examiner has provided a comprehensive response to Appellants' arguments supported by a preponderance of evidence. Ans. 2–8. As such, we adopt the Examiner's findings and explanations provided therein. *Id.*

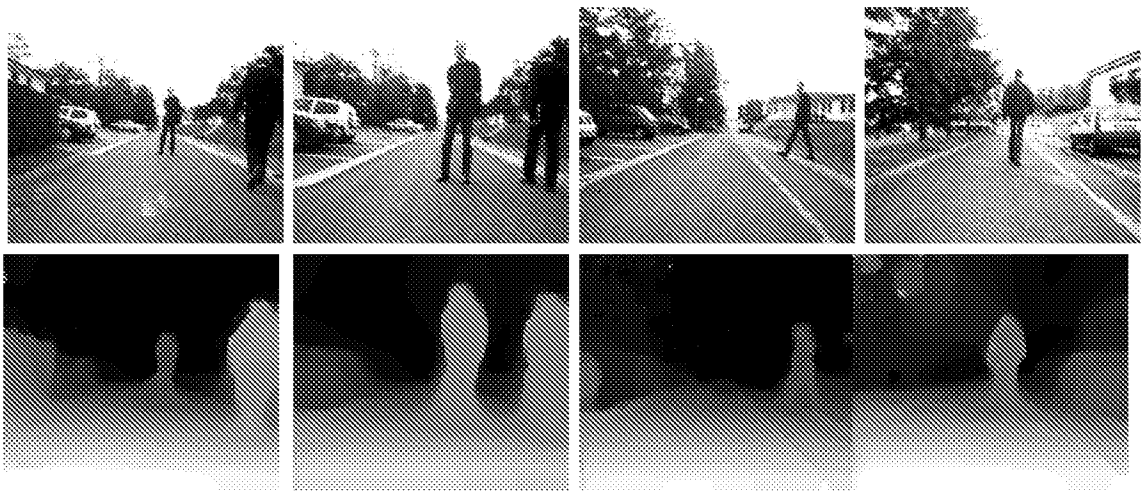
For additional emphasis, we note all the cited references disclose similar techniques of visualizing "image data" having some form of "additional information" superimposed or overlaid on the "image data" in a manner that is easier for the user to comprehend, as is also disclosed by Appellants' disclosure.

For example, Auty teaches visualizing "image data" having "additional information" superimposed thereon in the form of cluster markings and other data (i.e., histogram or boxes). Auty 11:24–45, Fig. 16. Similarly, Vacek also teaches visualizing "image data" having "additional information" superimposed thereon in the form of road markings to avoid accident or collision. Vacek's Fig. 14. Vacek further teaches that "road markings have different brightness at different distances" relative to a vehicle. Vacek p. 2. According to Vacek, "markings are overlaid with short red bars." Vacek's Fig. 14. Likewise, Miled teaches visualizing "image data" having "additional information" superimposed thereon in the form of disparity images, shown in Figure 2 and Figure 4. According to Miled, disparity maps are used to account for "possible illumination change" or "brightness changes between both images [of a scene] in the stereo pair [i.e., pair of left and right views of the same scene]." Miled 1143, 1145.

As recognized by Appellants, "[t]he depth map of . . . (Miled: fig. 2 and fig. 4) represents a gradual change of depth in the identification and marking of objects that are [considered as] obstacles." Ans. 3 (citing Miled's Figs. 2 and 4).

Miled's Figure 2[3] is reproduced below:

[3] Miled's Figure 2 (black/white image) and Figure 4 (color image) are reproduced directly from Wided Miled et al., *Robust Obstacle Detection*



Miled's Figure 2 shows disparity estimation (i.e., computed disparity maps shown below) for corresponding images (shown on top) of a scene acquired in different situations.

As shown in Miled's Figure 2, the depth map (additional information) represents a gradual change of the characteristic (depth) in the marking of objects, i.e., "change of the characteristic between neighboring pixels [of an image scene]." The gradualness of such change is apparent in the lack of definition in the computed disparity maps in areas where there are sharp changes in depth (e.g., in the outlines of the people captured in the images).

Miled's Figure 4 is reproduced below:

Based on Dense Disparity Maps, Computer Aided Systems Theory-EUROCAST 2007, 1142–50, available, via Internet, at *link.springer.com/content/pdf.*

Miled's Figure 4 shows classification of stereo points from disparity images.

As shown in Miled's Figure 4, different colors can be assigned to different types of (1) "pixels belonging to the road surface" and (2) "those [pixels] belonging to obstacles based on the depth map." *See* Miled 1149. Contrary to Appellants' arguments, the two images disclosed by Miled are a pair of left and right views of the same scene (image). As such, pixels as described by Miled are neighboring pixels of the same scene (image).

In our view, the use of "additional information" to superimpose on "image data" is well known, whether for (1) cluster markings and other data (i.e., histogram or boxes) as disclosed by Auty, (2) road markings with "different brightness at different distances" as disclosed by Vacek, or (3) disparity images as disclosed by Miled. As such, any effort to incorporate these features as part of Auty's method of visualizing "image data" with "additional information" would have been obvious to those skilled in the art because these well-known features perform the same known function and yield no more than one would expect otherwise. *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). A skilled artisan would "be able to fit the teachings of multiple patents together like pieces of a puzzle" since the skilled artisan is "a person of ordinary creativity, not an automaton." *Id.* at 420–21.

Lastly, we note Appellants have not demonstrated the Examiner's proffered combination of references would have been "uniquely challenging or difficult for one of ordinary skill in the art." *See Leapfrog Enters., Inc. v. Fisher-Price, Inc.*, 485 F.3d 1157, 1162 (Fed. Cir. 2007) (citing *KSR*, 550 U.S. at 418). Nor have Appellants provided objective evidence of secondary considerations which our reviewing court guides "operates as a beneficial check on hindsight." *Cheese Systems, Inc. v. Tetra Pak Cheese and Powder Systems, Inc.*, 725 F.3d 1341, 1352 (Fed. Cir. 2013).

For these reasons, we sustain the Examiner's obviousness rejection of independent claims 12, 19, 20, and 23, and their respective dependent claims 13–17, 21, 22, and 25–32, which Appellants do not argue separately. App. Br. 7.

CONCLUSION

On the record before us, we conclude Appellants have not demonstrated the Examiner erred in rejecting claims 12–17, 19–23, and 25–32 under 35 U.S.C. § 103(a).

DECISION

As such, we AFFIRM the Examiner's final rejection of claims 12–17, 19–23, and 25–32.

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