UNITED STATES PATENT AND TRADEMARK OFFICE

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte WEIBIN PAN and LIANG HU

Appeal 2018-002981
Application 14/250,193
Technology Center 2400

Before DAVID M. KOHUT, BARBARA A. BENOIT, and
LYNNE E. PETTIGREW, *Administrative Patent Judges.*

PETTIGREW, *Administrative Patent Judge.*

DECISION ON APPEAL

STATEMENT OF THE CASE

Pursuant to 35 U.S.C. § 134(a), Appellant[1] appeals from the Examiner's decision to reject claims 1, 2, 4–9, and 11–24. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

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[1] We use the word Appellant to refer to "applicant" as defined in 37 C.F.R. § 1.42(a). Appellant identifies the real party in interest as Google Inc. Appeal Br. 3.

CLAIMED SUBJECT MATTER

The claims are directed to sensor corrections for portable devices with image input where sensor corrections are generated based on the image input. Spec. ¶ 16. Claim 1, reproduced below, is illustrative of the claimed subject matter:

1. A portable device comprising:

> a sensor;
>
> a video capture module;
>
> a processor; and
>
> a computer-readable memory that stores instructions thereon, wherein the instructions, when executed by the processor, operate to:
>
>> cause the sensor to generate raw sensor data indicative of a physical quantity,
>>
>> cause the video capture module to capture video imagery of a reference object concurrently with the sensor generating raw sensor data when the portable device is moving relative to the reference object, wherein the captured video imagery comprises a plurality of consecutive images of the reference object;
>>
>> cause the processor to infer a three-dimensional (3D) structure of the reference object from the captured video imagery;
>>
>> cause the processor to calculate one or more position or orientation fixes associated with the portable device based at least in part on the 3D structure of the reference object; and
>>
>> cause the processor to calculate correction parameters for the sensor based at least in part on the one or more position or orientation fixes and the raw sensor data.

REFERENCES

The prior art relied upon by the Examiner is:

Name	Reference	Date
Ladetto et al.	US 2003/0018430 A1	Jan. 23, 20003
Camp et al.	US 2005/0181810 A1	Aug. 18, 2005
Ohta	US 2009/0326850 A1	Dec. 31, 2009
Watanabe et al.	US 2010/0030471 A1	Feb. 04, 2010
Katsman et al.	US 2010/0157061 A1	June 24, 2010
Chen et al.	US 2011/0149094 A1	June 23, 2011
Zhang et al.	US 2011/0178708 A1	July 21, 2011
Solem et al.	US 2013/0300830 A1	Nov. 14, 2013

REJECTIONS

The Examiner rejected claims 1, 4–9, 13–15, 17–19, and 24 under 35 U.S.C. § 103(a) as unpatentable over Chen, Solem, and Zhang. Final Act. 4–19.

The Examiner rejected claims 2 and 16 under 35 U.S.C. § 103(a) as unpatentable over Chen, Solem, Zhang, and Ohta. Final Act. 19–20.

The Examiner rejected claim 11 under 35 U.S.C. § 103(a) as unpatentable over Chen, Solem, Zhang, and Ladetto. Final Act. 20–21.

The Examiner rejected claim 12 under 35 U.S.C. § 103(a) as unpatentable over Chen, Solem, Zhang, and Katsman. Final Act. 21–22.

The Examiner rejected claims 20, 22, and 23 under 35 U.S.C. § 103(a) as unpatentable over Chen, Solem, Zhang, Ohta, and Watanabe. Final Act. 22–26.

The Examiner rejected claim 21 under 35 U.S.C. § 103(a) as unpatentable over Chen, Solem, Zhang, Ohta, Watanabe, and Camp. Final Act. 26–27.

ANALYSIS

The Examiner relies on the combination of Chen, Solem, and Zhang in concluding that claim 1 would have been obvious. Final Act. 6–8; Ans. 2–5. The Examiner finds that Chen teaches a device with a sensor (accelerometer) that captures photographs/video of a reference object as the device moves relative to the object where the sensor generates raw sensor data (velocity or acceleration) that can be used to calculate correction parameters to correct tilt or distortion in the captured image/video. Final Act. 5–6; Ans. 2–3; Chen ¶¶ 24–26, 28, 32, 35.

The Examiner finds that Chen does not explicitly teach inferring a 3D structure of the reference object from the captured photographs/video or calculating position or orientation fixes based at least in part on that 3D structure. Final Act. 6; Ans. 3–4. However, the Examiner finds that Solem teaches imaging a reference object, determining the 3D representation of the object, and using geodata for the image and the 3D representation to calculate the accurate position and orientation (position and orientation fixes) for the imaging device. Final Act. 6–7; Ans. 4, 25–27; Solem ¶¶ 39, 43. According to the Examiner, it would have been obvious to modify the teachings of Chen with the teachings of Solem to determine the 3D position and orientation of the imaging device. Final Act. 7; Ans. 5.

The Examiner further finds that Chen does not explicitly teach calculating correction parameters for the sensor based on the position or orientation fixes and the raw sensor data. Final Act. 6; Ans. 4. The Examiner finds that Zhang teaches using position and orientation of a camera to calculate the orientation of sensors in a navigation system in order to initialize (calibrate/correct) the navigation system—and the sensors in the system—before using the system. Final Act. 7; Ans. 4–5, 27–31, 40–43; Zhang ¶¶ 34–37, 40, 41; fig.4; *see also* Zhang fig.10.

According to the Examiner, it would have been obvious to modify the teachings of Chen and Solem with Zhang's teaching to initialize the sensor to improve the system. Final Act. 8; Ans. 5.

Portable device is moving relative to the reference object

Claim 1 recites "cause the video capture module to capture video imagery of a reference object concurrently with the sensor generating raw sensor data when the portable device is moving relative to the reference object, wherein the captured video imagery comprises a plurality of consecutive images of the reference object." Appeal Br. 19. Appellant contends that Chen does not teach this limitation. *Id.* at 9–10. In support of its assertion, Appellant cites to and quotes sections of paragraphs 24 and 25 of Chen. *Id.* Appellant's argument is conclusory and does not persuade us that the Examiner erred.

As Appellant notes, Chen states that "the object being photographed and the image capture device may each include global positioning system (GPS) devices such that the relative GPS orientation of the object and the image capture device may be recorded along with the image data." Chen ¶ 25; *see* Appeal Br. 9. Chen further states that "although this disclosure may focus on still images, the concepts disclosed herein equally apply to recording moving images and/or video." Chen ¶ 25; *see* Final Act. 5. Thus, the Examiner finds, and we agree, that Chen teaches the orientation data and position of the portable device is determined relative to the object imaged, whether the imaging device is still or moving. Ans. 32; Chen ¶ 32; *see* Final Act. 5; Chen ¶ 25. The Examiner also finds that video comprises consecutive images and further relies on Solem's teaching of video frames to teach "video imagery comprises a plurality of consecutive images," as recited in claim 1. Final Act. 5–6; Ans. 31–33; Solem ¶ 43. Therefore, the Examiner finds that Chen, supported by Solem, teaches "cause the video capture module to capture video

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imagery of a reference object concurrently with the sensor generating raw sensor data when the portable device is moving relative to the reference object, wherein the captured video imagery comprises a plurality of consecutive images of the reference object." Final Act. 5–6; Ans. 31–33. We do not find that the Examiner erred.

Position or orientation fixes and 3D structure

Claim 1 recites "cause the processor to calculate one or more position or orientation fixes associated with the portable device based at least in part on the 3D structure of the reference object." Appeal Br. 19.

Appellant agrees that Solem teaches using existing image geodata and 3D representation data of noteworthy locations based on the geodata to determine the position and orientation of the image device used to capture the image. Appeal Br. 11. However, Appellant contends that the position and orientation of the image device are not the claimed "position and orientation fixes associated with the portable device." Appeal Br. 11.

Appellant's argument is unpersuasive. As the Examiner notes, Appellant's Specification states "a position fix identifies the geographic location of the portable device and an orientation fix identifies the orientation of the portable device." Ans. 33 (quoting Spec. ¶ 16). The Examiner finds, and Appellant agrees, that Solem teaches determining a 3D spatial (i.e., geographic) location and an orientation of an imaging device by recognizing objects in a captured image and matching the image to a 3D representation in a database. Ans. 34; Appeal Br. 11; Solem ¶ 30; *see* Solem ¶¶ 33, 35, 43. Thus, the Examiner finds that Solem teaches determining a position fix (geographic location of the portable device) and an orientation fix (orientation of the portable device) based at least in part on the 3D structure of a reference object. We do not find that the Examiner erred.

Calculate correction parameters for the sensor

Claim 1 recites "cause the processor to calculate correction parameters for the sensor based at least in part on the one or more position or orientation fixes and the raw sensor data." Appeal Br. 19.

Appellant contends that neither Chen nor Zhang teaches this limitation. Appeal Br. 8–9, 11–12. Appellant asserts that Chen teaches using orientation data (correction parameters) to correct the photographs/video, not to correct the sensor as required in claim 1. *Id.* at 9. Appellant further asserts that Zhang teaches using positional and orientation information encoded in an imaged object to initialize the position and orientation of an inertial navigation system, but does not teach calculating correction parameters based on the position or orientation fixes as required in claim 1. *Id.* at 12.

Appellant's argument is unpersuasive because it addresses Chen and Zhang individually, whereas the Examiner relies on a combination of Chen, Solem, and Zhang to teach the disputed limitation. Appellant cannot establish nonobviousness by attacking references individually when the rejection is based on a combination of references. *See In re Merck & Co.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986); *In re Keller*, 642 F.2d 413, 425 (CCPA 1981). The Examiner finds that Chen teaches an imaging device with a sensor where the sensor generates raw sensor data, which can be used to calculate correction parameters to correct tilt or distortion in the captured image/video. Final Act. 5–6; Ans. 2–3; Chen ¶¶ 24–26, 28, 32, 35. The Examiner modifies Chen with the 3D spatial location determination of Solem to determine the 3D position and orientation of the image device. Final Act. 7. The Examiner further modifies the combination of Chen and Solem with Zhang's teaching to use position and orientation data to initialize and update a system (including a sensor) and not just correct the captured image. Final Act. 8. Thus,

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the Examiner finds the combination of Chen, Solem, and Zhang teaches "cause the processor to calculate correction parameters for the sensor based at least in part on the one or more position or orientation fixes and the raw sensor data," as recited in claim 1. Final Act. 5–7; Ans. 27–31, 40–43; Chen ¶¶ 24–26, 28, 32, 35; Zhang ¶¶ 34–37, 40, 41; fig.4. Appellant's assertions that Chen and Zhang individually do not disclose the disputed limitation fail to address the Examiner's proposed combination of Chen, Solem, and Zhang. Therefore, Appellant has not persuaded us that the Examiner erred.

For these reasons, we are not persuaded of error and sustain the Examiner's rejection of independent claim 1. Independent claims 13 and 19 recite similar limitations as claim 1, and Appellant presents essentially the same arguments for them. Appeal Br. 13–14. Appellant also repeats essentially the same arguments for dependent claims 4–9, which depend from independent claim 1; dependent claims 14, 15, 17, 18, which depend from independent claim 13; and dependent claim 24, which depends from independent claim 19. *Id.* at 14–15. Therefore, we sustain the Examiner's obviousness rejection of claims 4–9, 13–15, 17–19, and 24 over Chen, Solem, and Zhang. We also sustain the Examiner's obviousness rejections, based on various combinations of references, of dependent claims 2, 11, 12, 16, and 20–23, as Appellant repeats essentially the same arguments for those dependent claims as well. *Id.* at 15–17.

CONCLUSION

The Examiner's rejections are affirmed.

DECISION SUMMARY

In summary:

Claims Rejected	35 U.S.C. §	References	Affirmed	Reversed
1, 4–9, 13–15, 17–19, 24	103	Chen, Solem, Zhang	1, 4–9, 13–15, 17–19, 24	
2, 16	103	Chen, Solem, Zhang, Ohta	2, 16	
11	103	Chen, Solem, Zhang, Ladetto	11	
12	103	Chen, Solem, Zhang, Katsman	12	
20, 22, 23	103	Chen, Solem, Zhang, Ohta, Watanabe	20, 22, 23	
21	103	Chen, Solem, Zhang, Ohta, Watanabe, Camp	21	
Overall Outcome			1, 2, 4–9, 11–24	

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