



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------|---------------------|------------------|
| 14/316,939 | 06/27/2014 | Devendra Bajpai | MAG04- P2317-423731 | 4170 |
| 153508 | 7590 | 01/22/2020 | EXAMINER | |
| HONIGMAN LLP/MAGNA 650 TRADE CENTRE WAY SUITE 200 KALAMAZOO, MI 49002-0402 | | | ABOUZAHRA, HESHAM K | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 2486 | |
| | | | NOTIFICATION DATE | DELIVERY MODE |
| | | | 01/22/2020 | ELECTRONIC |

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

asytsma@honigman.com
patent@honigman.com
tflory@honigman.com

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte DEVENDRA BAJPAI

Appeal 2019-000994
Application 14/316,939
Technology Center 2400

Before KARL D. EASTHOM, JON M. JURGOVAN, and
AMBER L. HAGY, *Administrative Patent Judges*.

HAGY, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Pursuant to 35 U.S.C. § 134(a), Appellant¹ appeals from the Examiner's decision to reject claims 1–20, which are all of the pending claims. *See* Final Act. 1. We have jurisdiction under 35 U.S.C. § 6(b).

We reverse.

¹ 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 applicant, Magna Electronics Inc. Appeal Br. 2.

CLAIMED SUBJECT MATTER

According to Appellant, the invention “relates generally to rear vision systems for vehicles and, more particularly, to rear vision systems having a rearward facing camera at a rear portion of a vehicle.” Spec. ¶ 2. By way of background, Appellant’s Specification describes challenges drivers face in trying to “back up a trailer on their vehicle due to the dynamic interaction between the relative positions of the vehicle, trailer[,] and front vehicle wheel angles.” *Id.* ¶ 13. Purportedly to address those challenges, Appellant’s Specification describes the present invention, which

provides a determination of the trailer angle (the angle of the longitudinal axis of the towed trailer relative to the longitudinal axis of the towing vehicle) and a prediction or estimation of the trailer angle, such as based on the vehicle dynamics and the vehicle and trailer parameters. The trailer angle detection and prediction system or trailering assist system is useful in assisting a driver in parking a trailer at a parking space.

Id. According to Appellant’s Specification, the system may estimate the trailer angle relative to the towing vehicle for a given driving condition and steering direction or steering angle. *Id.* ¶ 15. As part of the estimation of the trailer angle, the system may also estimate a wheel angle of the towing vehicle, and then compare the estimated wheel angle to a “measured wheel angle (such as determined by or received from a vehicle status system or sensor and vehicle network bus or the like).” *Id.* ¶ 16. “The error or difference between the estimated wheel angle and the determined or actual wheel angle is used to modify the estimated trailer angle in subsequent determinations.” *Id.* Thus, by using a known vehicle wheel angle, the system is able to compute an error value in its estimation of the wheel angle,

and the system then uses that error value to revise its estimation of the trailer angle.

Claims 1, 12, and 18 are independent. Claim 1, reproduced below with disputed limitations italicized, is illustrative of the claimed subject matter:

1. A trailering assist system for a vehicle, said trailering assist system comprising:

a camera disposed at a vehicle equipped with said trailering assist system;

wherein said camera comprises a two dimensional array of photosensing elements;

wherein said camera has a field of view rearward of the equipped vehicle that encompasses a trailer that is being towed by the equipped vehicle, and wherein said camera is operable to capture image data;

a control;

said control comprising an image processor operable to process image data captured by said camera;

wherein said control receives an input of vehicle parameters;

wherein, responsive to receipt of said input of vehicle parameters and to processing of captured image data by said image processor, said trailering assist system is operable to determine an estimated trailer angle and an estimated steering wheel angle of the equipped vehicle;

wherein the estimated trailer angle comprises an estimation of an angle of a longitudinal axis of the trailer relative to a longitudinal axis of the equipped vehicle;

wherein said control compares said estimated vehicle steering wheel angle to an actual steering wheel angle of the equipped vehicle to determine a steering wheel angle error value, and wherein said steering wheel angle error value is

derived from the difference between the estimated steering wheel angle and the actual steering wheel angle;

wherein said steering wheel angle error value is used to modify the estimated trailer angle in subsequent determinations of the estimated trailer angle;

wherein, while said steering wheel angle error value is within a threshold range, said trailering assist system continues to determine steering wheel angle error values in making subsequent determinations of the estimated trailer angle as the driver of the vehicle continues the driving maneuver; and

wherein said control is operable to generate an output responsive to said steering wheel angle error value being at or above a threshold level.

REFERENCES

The prior art relied upon by the Examiner is:

| Name | Reference | Date |
|--------------------------------|--------------------|----------------|
| Dattilo et al. (“Dattilo”) | US 2008/0162000 A1 | July 3, 2008 |
| Greenwood et al. (“Greenwood”) | US 2008/0231701 A1 | Sept. 25, 2008 |
| Kossira et al. (“Kossira”) | US 2014/0136052 A1 | May 15, 2014 |
| Lavoie | US 2014/0303847 A1 | Oct. 9, 2014 |

REJECTIONS²

Claims 1–4, 10–13, and 15–20 stand rejected under 35 U.S.C. § 103 as being unpatentable over the combination of Lavoie, Kossira, and Dattilo. Final Act. 5–11, 14.³

² All rejections are under the provisions of Title 35 of the United States Code in effect after the effective date of the Leahy-Smith America Invents Act of 2011.

³ The Examiner does not specify grounds particularly for claims 12–20, but states they are rejected “under the same art and evidentiary limitations for the system of claims 1–11.” Final Act. 14. The Examiner appears to rely on Greenwood for a “graphic overlay” as recited in claim 5 (*id.* at 11–12); this

Claims 5–9 and 14 stand rejected under 35 U.S.C. § 103 as being unpatentable over the combination of Lavoie, Dattilo, Kossira, and Greenwood. Final Act. 11–14.

OPINION

Appellant presents several arguments challenging the Examiner’s findings and conclusions.⁴ For the reasons stated below, we are persuaded of Examiner error in the rejection, and we do not sustain the Examiner’s rejection of claims 1–20. We need address only claim 1, which is the broadest independent claim and is argued by Appellant collectively with independent claims 12 and 18, and we deem it to be representative on appeal. *See* 37 C.F.R. § 41.37(c)(1)(iv).

The Examiner finds Lavoie teaches a trailering assist system including a camera and control system (Final Act. 5–6), but finds Lavoie does not explicitly suggest, *inter alia*, “compar[ing] said estimated vehicle steering wheel angle to an actual steering wheel angle of the equipped vehicle to determine . . . a steering wheel angle error value,” or “wherein said steering wheel angle error value is used to modify the estimated trailer angle in subsequent determinations of the estimated trailer angle” (*id.* at 6–7). The Examiner finds Dattilo teaches the “control compares said estimated vehicle steering wheel angle to an actual steering wheel angle of the equipped

is also recited in claim 14. Accordingly, we have grouped claim 14 with claims 5–9.

⁴ Appellant raises additional issues beyond those addressed herein. Because the identified issues are dispositive of Appellant’s arguments on appeal, we do not reach the additional issues.

vehicle to determine a steering wheel angle error value.” *Id.* at 7 (citing Dattilo ¶ 4). The Examiner also finds Kossira teaches “wherein said steering wheel angle error value is used to modify the estimated trailer angle in subsequent determinations of the estimated trailer angle.” *Id.* at 8 (citing Kossira ¶¶ 8–9).

Appellant argues that the cited art fails to teach or suggest “a trailering assist system that is operable to determine an *estimated steering wheel angle* of the equipped vehicle (collectively and in combination with the other claim elements).” Appeal Br. 8 (emphasis added). Noting that the Examiner relies on Lavoie for this limitation, Appellant argues “Lavoie merely and solely discloses receiving the *actual steering wheel angle*” (*id.* (emphasis added)) and “makes no disclosure regarding a control that, responsive to receipt of inputs of vehicle parameters and to processing of captured image data by the image processor, *estimates a steering wheel angle of the equipped vehicle*” (*id.* at 16 (emphasis added)). We agree. Lavoie discloses “sensing the hitch angle” between a vehicle and a towed trailer determining a “hitch angle” based on an input of “various parameters associated with” the vehicle and the trailer, including the “steering angle at steered front wheels” of the vehicle. Lavoie ¶¶ 27, 39, 40. The Examiner does not point, however, to disclosure in Lavoie that supports a finding of *estimating a steering wheel angle*, as Appellant correctly contends. *See* Final Act. 6 (citing disclosure in Lavoie about using a camera to “**determine the hitch angle**” and alleging “an estimated trailer angle and an estimated steering wheel angle” reads thereon) (citing Lavoie ¶ 27).

Appellant further argues that Kossira does not remedy the deficiencies in Lavoie, because Kossira discloses a method “for determining the drawbar

length of a trailer of a tractor trailer by *estimating an articulation angle* and comparing it to a known or actual articulation angle to determine an articulation angle error, whereby the determined articulation angle error is used to adjust the estimation of the drawbar length.” Appeal Br. 10 (emphasis added). Kossira’s “articulation angle” appears to be the same as the claimed “trailer angle”—that is, the angle of the longitudinal axis of the towed trailer relative to the longitudinal axis of the towing vehicle. See Spec. ¶ 13 and Fig. 2; Kossira ¶ 2 and Fig. 1. Although Kossira discloses estimating the articulation angle (Kossira ¶¶ 8–9), the Examiner does not point to disclosure in Kossira that supports a finding of *estimating a steering wheel angle*, as Appellant correctly contends. Rather, references in Kossira to a steering angle appear to be only to an actual *measured* steering angle, not an *estimated* steering angle. See Kossira ¶¶ 7, 8, 11.

Appellant also argues Dattilo does not remedy the deficiencies of Lavoie or Kossira, because

Dattilo discloses comparing an actual steering wheel angle and the actual steering direction of the vehicle to provide feedback to an operator of a motion-control system of a mobile machine, whereas the presently claimed invention compares an *estimated* vehicle steering wheel angle to an actual steering wheel angle of the equipped vehicle to determine a steering wheel angle error value.

Appeal Br. 9. We agree. Dattilo discloses a “steer-by-wire steering system” in which a “controller generates a command signal based on the speed of the vehicle, the *actual steering direction of the vehicle*, the *angle of the steering wheel*, and a control error determined by comparing an actual steering direction of the vehicle and the angle of the steering wheel.” Dattilo ¶ 4 (emphasis added). Although Dattilo discloses calculating “a control error,”

this error is calculated based on the difference between “a target value” of an operating parameter and an “actual value” of that same parameter. *Id.* ¶ 7. The Examiner does not point to disclosure in Dattilo that supports calculating an error value between an *estimated* parameter (e.g., a steering wheel angle) and an actual value of that parameter.

The Examiner’s statements in the Answer regarding calculating an estimated steering wheel angle are also not supported by the cited references. In particular, the Examiner states in the Answer that Dattilo teaches comparing “an actual steering angle to a non-actual steering angle.” Ans. 9. Assuming the Examiner intends “non-actual steering angle” to mean “estimated steering wheel angle,” this finding is not supported by Dattilo, as, by the Examiner’s own admission, Dattilo discloses “comparing an actual steering direction of the vehicle and the angle of the steering wheel.” Ans. 9 (citing Dattilo ¶ 4 (emphasis omitted)). In other words, Dattilo relies on actual measured parameters regarding steering direction and steering wheel angle, and not estimated values. The Examiner further states Kossira teaches “an articulation angle made . . . partially from the steering angle.” *Id.* (citing Kossira ¶ 7). Even if correct, this disclosure does not support a determination that Kossira (alone or in combination with Lavoie and Dattilo) teaches or suggests determining “a steering wheel angle error value” that is based on comparing an “*estimated vehicle steering wheel angle* to an actual steering wheel angle,” as recited in claim 1 (emphasis added).

For the foregoing reasons, Appellant shows Examiner error in the rejection of claim 1 as obvious over the combination of Lavoie, Dattilo, and Kossira. In particular, the Examiner has not pointed sufficiently to evidence

that any of these references, alone or in combination, teach or suggest the following limitations recited in claim 1 (emphasis added):

wherein, responsive to receipt of said input of vehicle parameters and to processing of captured image data by said image processor, said triling assist system is operable to determine an estimated trailer angle and an *estimated steering wheel angle of the equipped vehicle*;

wherein said control *compares said estimated vehicle steering wheel angle to an actual steering wheel angle of the equipped vehicle to determine a steering wheel angle error value*, and wherein said steering wheel angle error value is derived from the difference between the estimated steering wheel angle and the actual steering wheel angle; [and]

wherein said *steering wheel angle error value is used to modify the estimated trailer angle in subsequent determinations of the estimated trailer angle*.[.]

Accordingly, we do not sustain the Examiner's 35 U.S.C. § 103(a) rejection of independent claim 1, or of independent claims 12 and 18, which contain commensurate limitations. The dependent claims stand with the independent claims.

CONCLUSION

The Examiner's decision rejecting claims 1–20 under 35 U.S.C. § 103 is reversed.

DECISION SUMMARY

| Claims Rejected | 35 U.S.C. § | Basis/References | Affirmed | Reversed |
|-------------------------|--------------------|-------------------------------------|-----------------|-------------------|
| 1-4, 10-13, 15-20 | 103 | Lavoie, Kossira, Dattilo | | 1-4, 10-13, 15-20 |
| 5-9, 14 | 103 | Lavoie, Kossira, Dattilo, Greenwood | | 5-9, 14 |
| Overall Outcome: | | | | 1-20 |

REVERSED