

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* WOO-JONG LEE

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Appeal 2007-3696  
Application 10/974,740  
Technology Center 2800

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Decided: November 27, 2007

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Before KENNETH W. HAIRSTON, LANCE LEONARD BARRY, and  
ST. JOHN COURTENAY III, *Administrative Patent Judges*.

COURTENAY, *Administrative Patent Judge*.

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134(a) from the Examiner's rejection of claims 1, 3, 4, and 5. We have jurisdiction under 35 U.S.C. § 6(b). An oral hearing on this appeal was conducted on November 14, 2007. We REVERSE.

## THE INVENTION

The disclosed invention relates to a fluxgate sensor for measuring an azimuth angle and a method thereof, and more particularly, to a fluxgate sensor which is capable of obtaining calibrated azimuth even at slope by using a neural network, and an azimuth measurement method thereof (Spec. 1).

Independent claim 1 is illustrative:

1. A fluxgate sensor comprising:

a two-axis fluxgate having an X-axis fluxgate and a Y-axis fluxgate in substantially perpendicular relation with the X-axis fluxgate, the two-axis fluxgate outputting voltage values of the X-axis and Y-axis fluxgates corresponding to a terrestrial magnetism;

a memory storing therein a neural network weight matrix which corresponds to the X-axis and Y-axis fluxgate voltage values, respectively; and

a control unit calibrating the X-axis and Y-axis fluxgate voltage values based on the neural network weight matrix stored in the memory, and computing an azimuth angle by using the calibrated voltage values.

## THE REFERENCES

The Examiner relies upon the following references as evidence in support of the rejection:

|          |                    |               |
|----------|--------------------|---------------|
| Choi     | US 2004/0027121 A1 | Feb. 12, 2004 |
| de Vries | US 5,812,992       | Sep. 22, 1998 |

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Zhou                    US 6,813,584 B2                    Nov. 2, 2004

### THE REJECTIONS

Claims 1, 3, 4, and 5 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the teachings of Choi in view of de Vries, and further in view of Zhou.

Rather than repeat the arguments of Appellant or the Examiner, we make reference to the Briefs and the Answer for the respective details thereof.

### PRINCIPLES OF LAW

“What matters is the objective reach of the claim. If the claim extends to what is obvious, it is invalid under § 103.” *KSR Int’l Co. v. Teleflex, Inc.*, 127 S. Ct. 1727, 1742 (2007). To be nonobvious, an improvement must be “more than the predictable use of prior art elements according to their established functions.” *Id.* at 1740. Appellant has the burden on appeal to the Board to demonstrate error in the Examiner’s position. *See In re Kahn*, 441 F.3d 977, 985-86 (Fed. Cir. 2006) (“On appeal to the Board, an applicant can overcome a rejection [under § 103] by showing insufficient evidence of *prima facie* obviousness or by rebutting the *prima facie* case with evidence of secondary indicia of nonobviousness.”) (quoting *In re Rouffet*, 149 F.3d 1350, 1355 (Fed. Cir. 1998)). Therefore, we look to Appellant’s Briefs to show error in the proffered *prima facie* case.

## ISSUE

We find the following issue to be dispositive with respect to all claims on appeal:

Whether Appellant has shown the Examiner has failed to articulate an adequate reasoning with a rational underpinning to support the proffered combinability of Choi, de Vries, and Zhou.<sup>1</sup> In particular, we decide the question of whether the Examiner has relied upon impermissible hindsight in formulating the rejection under section 103.

## ANALYSIS

We consider the Examiner's rejection of independent claims 1 and 5 as being unpatentable over the teachings of Choi in view of Amro.

Appellant contends that Choi does not recognize any problem with respect to errors in general, and specifically with respect to updating weights using a gradient of the error with respect to the weights. Appellant asserts that a person of ordinary skill in the art, having Choi and de Vries before him or her, would not have been provided with motivation to modify the

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<sup>1</sup> “[T]he examiner bears the initial burden, on review of the prior art or on any other ground, of presenting a *prima facie* case of unpatentability.” *In re Oetiker*, 977 F.2d 1443, 1445 (Fed. Cir. 1992). Moreover, “there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness’ . . . . [H]owever, the analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.” *KSR*, 127 S. Ct. at 1741 (quoting *In re Kahn*, 441 F.3d at 988).

fluxgate sensor of Choi to include the neural network training method and system of de Vries (App. Br. 9). Even if *arguendo* the references were somehow combined, Appellant contends that Choi and de Vries would not have provided any guidance as to how such a combination could have been made. Appellant submits that the Examiner has improperly looked to the present Specification for such guidance (*Id.*). Moreover, Appellant contends the Examiner has provided no rationale why the field of neural networks (as taught by de Vries) would logically have commended itself to one working with fluxgate sensors, as in Choi (App. Br. 11). Appellant concludes that such motivation is taken only from impermissible hindsight afforded by Appellant's disclosure. Regarding the tertiary Zhou reference, Appellant argues that merely because Zhou discloses calibration does not provide sufficient motivation to apply a neural network to a fluxgate sensor in the manner suggested by the Examiner (App. Br. 12).

The Examiner disagrees. The Examiner acknowledges that Choi and de Vries do not provide sufficient motivation for their proffered combination (*See Ans. 5, ¶3*). The Examiner nevertheless looks to the tertiary Zhou reference as purportedly providing the missing motivation (*Id.*). The Examiner asserts that Zhou teaches computing an azimuth angle using a calibrated voltage value (*See Zhou, col. 8, ll. 28-50*) (Ans. 8, ¶1).

We note that the U.S. Supreme Court recently reaffirmed that “[a] factfinder should be aware, of course, of the distortion caused by hindsight bias and must be cautious of argument reliant upon *ex post* reasoning.” *KSR*, 127 S. Ct. at 1742. *See also Graham v. John Deere Co.*, 383 U.S. 1, 36

(1966). Nevertheless, in *KSR* the Supreme Court also qualified the issue of hindsight by stating that “[r]igid preventative rules that deny factfinders recourse to common sense, however, are neither necessary under our case law nor consistent with it.” *KSR*, 127 S. Ct. at 1742-43.

Here, we conclude that a person of ordinary skill in the art having common sense at the time of the invention would not have reasonably combined the Choi, de Vries, and Zhou references in the manner suggested by the Examiner. In particular, we agree with Appellant that Choi does not recognize any problem with respect to errors in general, and specifically with respect to updating weights using a gradient of the error with respect to the weights (*See* App. Br. 9). Thus, we agree with Appellant that there is no problem or deficiency in the teachings of Choi that would have reasonably led an artisan familiar with Choi to look to de Vries’ unrelated teaching of neural networks.

We acknowledge that de Vries discloses that “neural network modeling has been developed to solve [a broad spectrum of] problems ranging from natural language understanding to visual processing” (col. 1, ll. 24-26). Nevertheless, we find the Examiner has admitted in the record that Choi and de Vries do not provide sufficient motivation for their proffered combination (*See* Ans. 5, ¶3). We agree.

The Examiner looks to the tertiary Zhou reference to provide the missing motivation (*Id.*). We find the Examiner’s argument unavailing that the Zhou reference would have motivated an artisan to combine Choi and de Vries, given that Zhou uses a three-axis sensor that calculates an azimuth

angle directly using the output of a Z-axis sensor (*See Zhou, abstract; col. 1, l. 63, col. 2, l. 58; col. 6, ll. 57-59*, i.e., “The three-axis magnetometers measure the three independent components of the earth’s magnetic field and provides signals indicative of the measurement.”). Therefore, we find the weight of the evidence supports Appellant’s position that the Examiner has relied upon impermissible hindsight in formulating the rejection.

Moreover, based upon the record before us, we conclude the instant claimed control unit (that calibrates the X-axis and Y-axis fluxgate voltage values based on a neural network weight matrix stored in a memory, and further computes an azimuth angle by using the calibrated voltage values) is a nonobvious advancement that is more than the predictable use of prior art elements according to their established functions.

For at least the aforementioned reasons, Appellant has satisfied the burden of showing that the Examiner erred by demonstrating insufficient evidence of *prima facie* obviousness in the record. Accordingly, we reverse the Examiner’s rejection of independent claims 1 and 5 as being unpatentable over Choi in view of de Vries, and further in view of Zhou. Because dependent claims 3 and 4 depend directly or indirectly upon claim 1, we also reverse the Examiner’s rejection of these claims. Therefore, we reverse the Examiner’s rejection of all claims on appeal.

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## DECISION

Based on the findings of facts and analysis above, we conclude that the Examiner erred in rejecting claims 1, 3, 4, and 5 under 35 U.S.C. § 103(a) for obviousness. Therefore, the decision of the Examiner rejecting claims 1, 3, 4, and 5 is reversed.

REVERSED

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SUGHRUE MION, PLLC  
2100 PENNSYLVANIA AVENUE, N.W.  
SUITE 800  
WASHINGTON DC 20037