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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/824,538	03/18/2013	Hua Sheng	HCL60074US02	2624
14868	7590	07/03/2018	EXAMINER	
Patent Docketing 200 Bellevue Parkway, Suite 300 Attention: Docketing Wilmington, DE 19809			PEREZ BERMUDEZ, YARITZA H	
			ART UNIT	PAPER NUMBER
			2864	
			NOTIFICATION DATE	DELIVERY MODE
			07/03/2018	ELECTRONIC

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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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*Ex parte* HUA SHENG

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Appeal 2017-007252  
Application 13/824,538<sup>1</sup>  
Technology Center 2800

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Before KAREN M. HASTINGS, BEVERLY A. FRANKLIN, and  
MERRELL C. CASHION, JR., *Administrative Patent Judges*.

HASTINGS, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellant requests our review under 35 U.S.C. § 134 of the Final Rejection of claims 1–13 and 17–37 under 35 U.S.C. § 101 as directed to non-statutory subject matter.<sup>2</sup> We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

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<sup>1</sup> Hillcrest Laboratories, Inc. is identified as the real party in interest. Appeal Br. 3.

<sup>2</sup> The Examiner withdrew the § 103 rejections made in the Final Action (Ans. 2).

## THE INVENTION

Claim 1, reproduced below, is illustrative of the subject matter on appeal.

A method for estimating a yaw angle of a body reference system of a device relative to a gravitational reference system, using motion sensors and a magnetometer attached to the device, the method comprising:

receiving measurements from the motion sensors and from the magnetometer;

determining a measured 3-D magnetic field, a roll angle, a pitch angle and a raw estimate of yaw angle of the device in the body reference system based on the received measurements;

extracting a local 3-D magnetic field from the measured 3-D magnetic field; and

calculating a tilt-compensated yaw angle of the body reference system of the device in the gravitational reference system based on the extracted local 3-D magnetic, the roll angle, the pitch angle and the raw estimate of yaw angle using at least two different methods, wherein an error of the roll angle estimate, an error of the pitch angle estimate, and an error of the extracted local 3-D magnetic field affect the error of the tilt-compensated yaw angle differently for the at least two different methods.

Appeal Br. 20 (Claims Appendix).

Independent claims 1, 31 and 34 are similarly directed to calculating “a tilt-compensated yaw angle . . . based on . . . the raw estimate of yaw angle using at least two different methods” (Appeal Br. 20 & 25–26, Claims Appendix). Although Appellant separately addresses each of the independent claims, Appellant does not present any new arguments for independent claims 31 and 34 (Appeal Br. 7–12). With respect to dependent claims 2–14, 17–30, 32, 33, and 35–37, Appellant present arguments under a

separate header that do not more than point to the features in the claims. A statement which merely points out what a claim recites will not be considered an argument for separate patentability of the claim. *See* 37 C.F.R. § 41.31(c)(1)(iv). Accordingly, we have selected independent claim 1 as representative. Claims 2–13 and 17–37 stand or fall with claim 1.

#### ANALYSIS

*The rejection under 35 U.S.C. § 101 as directed to non-statutory subject matter.*

*Alice Corp. Pty. Ltd. v. CLS Bank International*, 134 S. Ct. 2347 (2014), identifies a two-step framework for determining whether claimed subject matter is judicially-excepted from patent eligibility under § 101.

According to *Alice* step one, “[w]e must first determine whether the claims at issue are directed to a patent-ineligible concept,” such as an abstract idea. *Alice*, 134 S. Ct. at 2355. In that regard, the Examiner finds the claim elements of “determining a measured 3-D magnetic field, a roll angle, a pitch angle and a raw estimate of yaw angle in the body reference system based on the received measurements; extracting a local 3-D magnetic field from the measured 3-D magnetic field; and calculating a tilt-compensated yaw angle” to be abstract ideas directed to mathematical relationships/formulas and concluded that the subject matter of the claims is directed to the judicial exception of abstract ideas. Final Act. 18–19.

The Appellant challenges the Examiner’s articulation of what the claims are directed to, but the challenge is unfounded. *See* Appeal Br. 7–8. For example, the fact that the claims are drafted to correcting an estimated yaw angle using “real-world measurements” (*id.*) is not dispositive. The question is what the claims are “directed to.”

[T]he “directed to” inquiry applies a stage-one filter to claims, considered in light of the specification, based on whether “their character as a whole is directed to excluded subject matter.” *Internet Patents Corp. v. Active Network, Inc.*, 790 F.3d 1343, 1346 (Fed. Cir. 2015); *see Genetic Techs. Ltd. v. Meril L.L.C.*, 818 F.3d 1369, 1375, 2016 WL 1393573, at \*5 (Fed. Cir. 2016) (inquiring into “the focus of the claimed advance over the prior art”).

*Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327, 1335 (Fed. Cir. 2016). “The ‘abstract idea’ step of the inquiry calls upon us to look at the ‘focus of the claimed advance over the prior art’ to determine if the claim’s ‘character as a whole’ is directed to excluded subject matter.” *Affinity Labs of Texas v. DIRECTTV, LLC*, 838 F.3d 1253, 1257 (Fed. Cir. 2016) (quoting *Elec. Power Grp., LLC v. Alstom S.A.*, 830 F.3d 1350, 1353 (Fed. Cir. 2016)). “In determining the eligibility of [Appellant’s] claimed process for patent protection under § 101, the[] claims must be considered as a whole.” *Diamond v. Diehr*, 450 U.S. 175, 188 (1981).

The claims are directed to calculating a tilt-compensated yaw angle based on a raw estimate of the yaw angle, magnetic field and sensor measurements. As set out in the Background section of Appellant’s Specification, it is conventional to correct “the hard- and soft-iron effects . . . using plural magnetic field measurements” (§ 11). Accordingly, the claims as a whole, in light of the Specification, are directed to calculating a mathematical value or angle, which is consistent with the Examiner’s position of Appellant’s claims being directed to the abstract idea of mathematical relationships/formulas (Final Act. 2–4; Ans. 3–4).

Appellant argues that the Examiner has failed to establish that the claims are directed to a patent-ineligible subject matter because the

Examiner “throughout the prosecution history” does not mention any prior court decision directed to abstract ideas that include a mathematical relationship/formula similar to the abstract idea identified by the Examiner from the claimed subject matter (Reply Br. 2–3).

The prosecution history does not support Appellant’s argument. The Appellant acknowledges that the Examiner recites prior case law stating that “[t]he final Office Action cites the analysis on pages 294–295 of *In re Schrader*”<sup>3</sup> (App. Br. 10 citing to Final Act. 5), wherein Appellant argues that *In re Schrader* is not relevant case law for the current application because “there is nothing in common between Appellant’s claim 1 and the claims in *In re Schrader*, which relate to a method of competitively bidding on a plurality of items” (App. Br. 11). The Examiner explains that the Federal Circuit in *In re Schrader* found the claims to be directed to the non-statutory subject matter of mathematical algorithms or mathematical calculation steps (Ans. 12). The Examiner then explains that Appellant’s claims are also directed to non-statutory subject matter in view of the similarity between those claims and the claims in *In re Schrader* (Ans. 12).

In addition, the Examiner identifies each of the claim elements, except the step of obtaining the measurements, as being directed to an abstract idea involving mathematical relationships/formulas which the Examiner notes is “analogous to e.g. an algorithm for calculating parameters indicating an abnormal condition (*In re Grams*)”<sup>4</sup> (Final Act. 18; *see also* Answer 6).

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<sup>3</sup> *In re Schrader*, 22 F.3d 290 (Fed. Cir. 1994).

<sup>4</sup> *In re Grams*, 888 F.2d 835 (Fed Cir. 1989).

Consequently, the Examiner provided Appellant with adequate notification of prior court decisions with similar abstract ideas.

Appellant further argues that the claims are distinguished from those of in *Grams* because “Appellant’s claimed combinations are not similar to Grams,” “are not directed to solving a math problem,” and “the method of Grams could also be performed using pen and paper” (Reply Br. 3, emphasis omitted).

Appellant’s arguments are unpersuasive. Regardless of whether Appellant’s claimed invention can be performed with pen and paper, the dispositive issue remains whether the claims are directed to the identified abstract idea of mathematical relationships/formulas. A procedure for solving a given type of mathematical problem is known as an “algorithm”. *Gottschalk v. Benson*, 409 U.S. 63, 65, 93 S. Ct. 253, 254, 34 L. Ed. 2d 273 (1972). The Examiner asserts that the claims of the current application are similar to those from *Grams*, wherein the claims were upheld as being directed to the abstract idea of a mathematical algorithm (Ans. 6: *see also* Final Act. 18–19). The claims in *Grams* comprise steps of obtaining parameters/measurements and then performing a series of mathematical calculations in order to determine a mathematical result (deviation from normal condition). *Id.* at 837. In *Grams*, “the only physical step involves merely gathering data for the algorithm” *In re Grams*, 888 F. 2d. at 839. The subject matter of claim 1, like *Grams*, also comprises steps of obtaining parameters/measurements and then performing a series of mathematical calculations in order to determine a mathematical result (corrected yaw angle). The remaining steps of claim 1, the Examiner explains (Ans. 4), are

disclosed in the Specification as comprising merely the performance of mathematical calculations:

“According to the original disclosure of the invention the determination of measured 3-D magnetic field is being determined by calculations, and it is a vector value based on measurements received, (paragraph 0037, 0235, 0239), similarly the roll pitch and raw estimate yaw are determined by calculations using parameters that are constants or determined during calibration procedures (paragraph 0235) and the calculating a tilt-compensated step is being achieved by mathematical calculations paragraphs (0014–0016, 0237).”

In addition, Appellant’s argument that the claims solve the problem of correcting the yaw angle using magnetic field measurements without being “time and memory consuming” (Reply Br. 6 citing Spec. ¶ 11) indicates that the claims are directed to solving the mathematical problem of improving mathematical calculations used to determine a corrected yaw angle.

Consequently, we conclude that the Examiner correctly found the claims to be directed to the abstract idea of mathematical relationships/formulas.

Step two is “a search for an ‘inventive concept’—*i.e.*, an element or combination of elements that is ‘sufficient to ensure that the patent in practice amounts to significantly more than a patent upon the [ineligible concept] itself.’” *Alice*, 134 S. Ct. at 2355 (alteration in original) (quoting *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66, 72–73 (2012)).

In this regard, the Examiner determined that, generically linking the use of a judicial exception to a particular technological environment or field of use is insufficient because (1) the claims do “not include additional

elements that are sufficient to amount to significantly more than the judicial exception and (2) the step of receiving measurements using the additional elements of motion sensors and the magnetometer is a mere data gathering recited at a high level of generality, which is an insignificant extra-solution activity using conventional equipment (Final Act. 18–19). “The presence of a physical step in the claim to derive data for the algorithm will not render the claim statutory.” *In re Grams*, 888 F.2d at 840. “[N]otwithstanding that the antecedent steps are novel and unobvious, they merely determine values for the variables used in the mathematical formulae used in making the calculations. [They] do not suffice to render the claimed methods, considered as a whole, statutory subject matter.” *Id.* at 840, quoting *In re Richman*, 563 F.2d 1026, 1030 (CCPA 1977).

The claims of the current application employ conventional devices (motion sensors and magnetometer) for performing their common functions without reciting any additional steps beyond data gathering and determining values for use in calculating the yaw angle. The Specification supports the view that the use of motion sensors and a magnetometer to obtain measurements and correct a yaw angle is conventional. Appellant acknowledges that “correcting for ‘the hard- and soft-iron effects’ was previously done by ‘using plural magnetic field measurements’, which can be ‘time and memory consuming.’ (See specification, [0011])” (Reply Br., para. bridging 6–7). The Specification also discloses that the “term ‘motion sensors’ means any sensing element(s) that can provide a measurement of roll and pitch, and at least a relative yaw (i.e., a raw estimate of yaw)” (*see, e.g., Spec. ¶ 210*). *Cf. Alice*, 134 S. Ct. 2358 (citation omitted). “[T]he mere

recitation of a generic computer cannot transform a patent-ineligible abstract idea into a patent-eligible invention. Stating an abstract idea ‘while adding the words “apply it” is not enough for patent eligibility.’ *Id.* In addition, the Specification recites that “so-called nine-axis sensors” comprising “3-axis gyroscopes, 3-D accelerometer and 3-D magnetometer” are “increasingly popular and widespread” (*see, e.g.*, Spec. ¶ 3).

Appellant argues that the claims comprise significantly more than the abstract idea because “the ordered combination of receiving measurements and then correcting some of the measurements by first correcting the measured magnetic field and then correcting the raw estimate of the yaw angle in the body reference system by calculating a tilt-compensation yaw angle in a gravitational reference system recites an inventive concept” (Appeal Br. 9).

Appellant’s Specification does not support this assertion. “[A]n inventive concept can be found in the non-conventional and non-generic arrangement of known, conventional pieces.” *Bascom Glob. Internet Servs., Inc. v. AT&T Mobility LLC*, 827 F.3d 1341, 1350 (Fed. Cir. 2016). That inventive concept must recite an invention that is not merely routine or conventional in order to comprise significantly more than the abstract idea. *Id.* at 1348. As discussed *supra*, the process of obtaining measurements of a magnetic field (Spec. ¶ 7), correcting those magnetic measurements for hard-iron and soft-iron effects and using those corrected measurements to obtain a corrected yaw angle is conventional (Spec. ¶ 8–11).

In addition, while in *Bascom* the claims recite “a specific, discrete implementation of the abstract idea of filtering content” (*Bascom*, 827 F.3d

at 1350), the claims of the current application broadly recite calculating the yaw angle “using at least two different methods” wherein the details of what those methods entail are left unspecified. Notably the claims end with calculating the yaw angle using the unspecified “at least two different methods” and do not recite any use or transmission/output of the yaw angle after the calculation is performed. Therefore, a preponderance of the evidence supports the Examiner’s position that the inventive concept urged by Appellant is routine and conventional and insufficient to constitute significantly more than the abstract idea of mathematical relationships/formulas (Ans. 8–9).

Finally, Appellant argues that the claims comprise significantly more than the abstract idea because “Appellant’s claims have been found to be novel and non-obvious over any prior art” (Reply Br. 4). However, a finding of novelty or nonobviousness does not necessarily lead to the conclusion that subject matter is patentable eligible. “Groundbreaking, innovative, or even brilliant discovery does not by itself satisfy the § 101 inquiry.” *Ass’n for Molecular Pathology v. Myriad Genetics, Inc.*, 569 U.S. 576, 591 (2013). The question in step two of the *Alice* framework is not whether an additional feature (i.e., the calculation) is novel but whether the implementation of the abstract idea involves “more than [the] performance of ‘well-understood, routine, [and] conventional activities previously known to the industry.’” *Content Extraction and Transmission LLC v. Wells Fargo Bank, Nat. Ass’n*, 776 F.3d 1343, 1347–48 (Fed. Cir. 2014) (quoting *Alice*, 134 S. Ct. at 2359) based upon whether “[t]aking the claim elements separately, the function performed by the computer at each step of the

process is “[p]urely conventional.” *Alice*, 134 S. Ct. at 2359 (citing *Mayo*, 566 U.S. at 66). *Cf. Alice*, 134 S. Ct. at 2359 (“Considered ‘as an ordered combination,’ the computer components of petitioner’s method ‘ad[d] nothing . . . that is not already present when the steps are considered separately.”).

In Appellant’s claims, the motion sensors and magnetometer perform the generic functionality of obtaining measurements. Regardless of whether the mathematical function itself is novel, the functionality performed by the sensors and magnetometer is conventional. As such, the novelty of the claims does not comprise significantly more than the abstract idea because Appellant’s Specification and claims support a view that the sensors and magnetometer act merely as a platform or conduit for the data-manipulating abstract idea. *Cf. In re TLI Communications LLC Patent Litigation*, 823 F.3d 607, 612 (Fed. Cir. 2016).

For the foregoing reasons, the Appellant has not shown error in the Examiner’s *Alice* step two determination that the claims do not include an element or combination of elements sufficient to ensure that in practice they amount to significantly more than the ineligible concept itself.

The remaining arguments have been carefully considered but are unpersuasive as to error in the rejection.<sup>5</sup>

The rejection of claims 1–13 and 17–37 under 35 U.S.C. § 101 as being directed to non-statutory subject matter is sustained.

#### DECISION

The decision of the Examiner to reject claims 1–13 and 17–37 is affirmed.

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

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<sup>5</sup> To the extent Appellant presents new arguments in the Reply Brief, we will not consider them. Any argument not presented in the Appeal Brief will not be considered when filed in a Reply Brief, absent a showing of good cause explaining why the argument could not have been presented in the Appeal Brief. *See Ex parte Borden*, 93 USPQ2d 1473, 1474 (BPAI 2010) (informative) (“the reply brief [is not] an opportunity to make arguments that could have been made in the principal brief on appeal to rebut the Examiner’s rejections, but were not.”); *compare also Optivus Tech., Inc. v. Ion Beam Applications S.A.*, 469 F.3d 978, 989 (Fed. Cir. 2006) (argument raised for the first time in the Reply Brief is considered waived); *see also* 37 C.F.R. § 41.41(b)(2) (2013). Appellant has not shown good cause why any new arguments could not have been presented in the Appeal Brief.