IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION

CYWEE GROUP LTD., *Plaintiff,* v. SAMSUNG ELECTRONICS CO. LTD. and SAMSUNG ELECTRONICS AMERICA, INC., *Defendants.*	§ § § § § § § § § § §	Case No. 2:17-CV-140-WCB

MEMORANDUM OPINION AND ORDER

Before the Court is Defendants Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc.'s Motion for Summary Judgment of Invalidity under 35 U.S.C. § 101. On October 24, 2018, the Court held a hearing on various motions in this case, including the motion for summary judgment of invalidity. After considering the arguments made in the parties' briefs and during the hearing, the Court DENIED the motion in open court and noted the denial in a minute order issued on October 26, 2018. Dkt. No. 238, at 1. This memorandum opinion and order details the reasons for the Court's ruling.

BACKGROUND

Plaintiff CyWee Group Ltd. owns U.S. Patent No. 8,441,438 ("the '438 patent"), which is entitled "3D Pointing Device and Method for Compensating Movement Thereof," and U.S. Patent No. 8,552,978 ("the '978 patent"), which is entitled "3D Pointing Device and Method for Compensating Rotations of the 3D Pointing Device Thereof." CyWee has asserted claims 1, 3-5, 14-17, and 19 of the '438 patent and claims 10 and 12 of the '978 patent against defendants Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc. Dkt. No. 178, at 1, 5.

Claim 1 of the ’438 patent, which is representative of the four asserted apparatus claims, provides as follows:

> A three-dimensional (3D) pointing device subject to movements and rotations in dynamic environments, comprising:
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> a housing associated with said movements and rotations of the 3D pointing device in a spatial pointer reference frame;
>
> a printed circuit board (PCB) enclosed by the housing;
>
> a six-axis motion sensor module attached to the PCB, comprising a rotation sensor for detecting and generating a first signal set comprising angular velocities ωx, ωy, ωz associated with said movements and rotations of the 3D pointing device in the spatial pointer reference frame, an accelerometer for detecting and generating a second signal set comprising axial accelerations Ax, Ay, Az associated with said movements and rotations of the 3D pointing device in the spatial pointer reference frame; and
>
> a processing and transmitting module, comprising a data transmitting unit electrically connected to the six-axis motion sensor module for transmitting said first and second signal sets thereof and a computing processor for receiving and calculating said first and second signal sets from the data transmitting unit, communicating with the six-axis motion sensor module to calculate a resulting deviation comprising resultant angles in said spatial pointer reference frame by utilizing a comparison to compare the first signal set with the second signal set whereby said resultant angles in the spatial pointer reference frame of the resulting deviation of the six-axis motion sensor module of the 3D pointing device are obtained under said dynamic environments, wherein the comparison utilized by the processing and transmitting module further comprises an update program to obtain an updated state based on a previous state associated with said second signal set and a measured state associated with said second signal set; wherein the measured state includes a measurement of said second signal set and a predicted measurement obtained based on the first signal set without using any derivatives of the first signal set.

Claim 14 of the ’438 patent is representative of the five asserted method claims of that patent. It provides as follows:

> A method for obtaining a resulting deviation including resultant angles in a spatial pointer reference frame of a three-dimensional (3D) pointing device utilizing a six-axis motion sensor module therein and subject to movements and rotations in dynamic environments in said spatial pointer reference frame, comprising the steps of:

obtaining a previous state of the six-axis motion sensor module; wherein the previous state includes an initial-value set associated with previous angular velocities gained from the motion sensor signals of the six-axis motion sensor module at a previous time T−1;

obtaining a current state of the six-axis motion sensor module by obtaining measured angular velocities ωx, ωy, ωz gained from the motion sensor signals of the six-axis motion sensor module at a current time T;

obtaining a measured state of the six-axis motion sensor module by obtaining measured axial accelerations Ax, Ay, Az gained from the motion sensor signals of the six-axis motion sensor module at the current time T and calculating predicted axial accelerations Ax′, Ay′, Az′ based on the measured angular velocities ωx, ωy, ωz of the current state of the six-axis motion sensor module without using any derivatives of the measured angular velocities ωx, ωy, ωz; said current state of the six-axis motion sensor module is a second quaternion with respect to said current time T; comparing the second quaternion in relation to the measured angular velocities ωx, ωy, ωz of the current state at current time T with the measured axial accelerations Ax, Ay, Az and the predicted axial accelerations Ax′, Ay′, Az′ also at current time T;

obtaining an updated state of the six-axis motion sensor module by comparing the current state with the measured state of the six-axis motion sensor module; and

calculating and converting the updated state of the six axis motion sensor module to said resulting deviation comprising said resultant angles in said spatial pointer reference frame of the 3D pointing device.

Claim 10 of the ’978 patent is representative of the two asserted method claims of that patent. It provides as follows:

A method for compensating rotations of a 3D pointing device, comprising:

generating an orientation output associated with an orientation of the 3D pointing device associated with three coordinate axes of a global reference frame associated with Earth;

generatinq [sic] a first signal set comprising axial accelerations associated with movements and rotations of the 3D pointing device in the spatial reference frame;

generating a second signal set associated with the Earth’s magnetism; generating the orientation output based on the first signal set, the second signal set and the rotation output or based on the first signal set and the second signal set;

> generating a rotation output associated with a rotation of the 3D pointing device associated with three coordinate axes of a spatial reference frame associated with the 3D pointing device; and
> using the orientation output and the rotation output to generate a transformed output associated with affixed reference frame associated with a display device, wherein the orientation output and the rotation output is generated by a nine-axis motion sensor module; obtaining one or more resultant deviation [sic] including a plurality of deviation angles using a plurality of measured magnetisms Mx, My, Mz and a plurality of predicted magnetism [sic] Mx′, My′, Mz′ for the second signal set.

The defendants have moved for summary judgment invalidating all of the asserted claims of the ’438 patent and the ’978 patent as ineligible for patenting under section 101 of the Patent Act, 35 U.S.C. § 101. In their motion, the defendants particularly focus on the language of claim 14 of the ’438 patent and claim 10 of the ’978 patent. The defendants contend that “CyWee’s patent claims merely recite algorithms that operate on data obtained from conventional sensors,” and that the claims are therefore not directed to subject matter that is eligible for patenting under section 101. Dkt. No. 178, at 1.

DISCUSSION

Section 101 of the Patent Act states that “[w]hoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent.” However, patent protection does not extend to claims that monopolize “the basic tools of scientific and technological work.” *Gottschalk v. Benson*, 409 U.S. 63, 67 (1972). In order to determine whether the claims of the ’139 patent are patent-eligible under section 101, the court “must first determine whether the claims at issue are directed to a patent-ineligible concept,” such as a law of nature, a mathematical formula, or an abstract idea. *Alice Corp. Pty. v. CLS Bank Int'l*, 134 S. Ct. 2347, 2355 (2014). If the court finds that the claims are directed to such a patent-ineligible concept, the court must then examine the

elements of the claims to determine whether they contain "an inventive concept sufficient to transform the claimed [ineligible] idea into a patent-eligible application." *Alice*, 134 S. Ct. at 2357 (internal quotations and citation omitted). If the court determines that the claims are not directed to a patent-ineligible concept, it need not proceed to step two. *See Enfish, LLC v. Microsoft Corp.*, 850 F.3d 1327, 1339 (Fed. Cir. 2016).

Whether a claim that recites a mathematical formula is directed to a patent-ineligible concept depends on the role that the mathematical formula plays in the claim. "[A] process is not unpatentable simply because it contains a . . . mathematical algorithm." *Parker v. Flook*, 437 U.S. 584, 590 (1978). As the Supreme Court noted in *Diamond v. Diehr*, 450 U.S. 175, 187 (1981), "an *application* of a law of nature or mathematical formula to a known structure or process may well be deserving of patent protection." The Federal Circuit has likewise stated that "[c]laims are patent eligible under § 101 'when a claim containing a mathematical formula implements or applies that formula in a structure or process which, when considered as a whole, is performing a function which the patent laws were designed to protect.'" *Thales Visionix, Inc. v. United States*, 850 F.3d 1343, 1347–48 (Fed. Cir. 2017) (quoting *Diehr*, 450 U.S. at 192). On the other hand, the Supreme Court has explained that a mathematical formula is not itself patent-eligible subject matter, "and this principle cannot be circumvented by attempting to limit the use of the formula to a particular technological environment . . . [or by subsequently claiming] insignificant post-solution activity." *Diehr*, 450 U.S. at 191–92 (internal citations omitted).

The claims asserted in this case involve using a particular combination of sensors to gather raw data points relating to an object's position, and then placing those data points into a mathematical formula to determine the orientation of the object in a spatial reference frame. The

defendants argue that "the asserted claims are plainly directed to an unpatentable mathematical algorithm and therefore fail step 1 of the *Alice* test." Dkt. No. 178, at 8. The Court disagrees.

Mathematical formulas, operations, or algorithms are at the heart of countless inventions; the application of mathematical principles has been the key to advancements in any number of fields. Just considering fields akin to the orientation-sensing devices and methods at issue in this case, mathematical algorithms are at the heart of such inventions as driverless vehicles, drone navigation, and the remote orientation of satellites and scientific instrumentation in space. The mathematical processes used in the operation of such devices have consequences in the physical world that make those devices precisely the kinds of inventions that the patent system was designed to protect and encourage. Moreover, improvements in such devices are patentable even when the improvements in the devices are the product of improvements in the sophistication of the algorithms that drive the product's performance. For example, autonomous emergency braking systems in automobiles have evolved through the use of more and more sophisticated algorithms, even when the brakes themselves and the sensors used to detect collisions may not have evolved significantly. An improved system for autonomous emergency braking could hardly be deemed unpatentable if it used an algorithm that was more sophisticated than its predecessors, even though the mechanical components were themselves known in the art. *See, e.g.*, U.S. Patent No. 6,523,391.

In *Thales Visionix Inc. v. United States*, 850 F.3d 1343 (Fed. Cir. 2017), a case involving technology similar to the technology at issue in this case, the Federal Circuit held that the claims at issue were not directed to unpatentable subject matter. The patent in that case "disclose[d] an inertial tracking system for tracking the motion of an object relative to a moving reference frame." *Id.* at 1344. The patent recited two independent claims, claim 1 and claim 22. Claim 1, the

independent system claim, recited: "(1) a first inertial sensor mounted on the tracked object; (2) a second inertial sensor mounted on the moving platform; and (3) an element that uses the data from the two inertial sensors to calculate the orientation of the tracked object relative to the moving platform." *Id.* at 1348. Similarly, claim 22, the independent method claim, recited: "(1) a first inertial sensor on a tracked object; (2) a second inertial sensor on the moving platform; and (3) the determination of orientation of the tracked object 'based on' the signals from the two inertial sensors." *Id.*

In *Thales*, the trial court held that the claims were "merely directed to the abstract idea of using mathematical equations for determining the relative position of a moving object to a moving reference frame." *Id.* at 1348 (internal quotation and citation omitted). The Federal Circuit reversed. As the court explained, the mathematical equations recited in the claims "serve[d] only to tabulate the position and orientation of the object relative to the moving reference frame." *Id.* The court held the claims to be patent eligible because they specified "a particular configuration of inertial sensors and a particular method of using the raw data from the sensors in order to more accurately calculate the position and orientation of an object on a moving platform." *Id.* at 1349.

The *Thales* court found claims 1 and 22 closely analogous to the claims at issue in *Diamond v. Diehr*. *See Thales*, 850 F.3d at 1347. The asserted claims in *Diehr* were directed to a process for curing rubber that used the well-known Arrhenius equation. The process included "installing rubber in a press, closing the mold, constantly determining the temperature of the mold, constantly recalculating the appropriate cure time through the use of the formula and a digital computer, and automatically opening the press at the proper time." *Diehr*, 450 U.S. at 187. The Supreme Court ruled that the patentee did not seek to patent a mathematical formula, but rather sought "patent protection for a process of curing synthetic rubber." *Id.* The Court

held that "an *application* of a law of nature or mathematical formula to a known structure or process may well be deserving of patent protection" and "when a process for curing rubber is devised which incorporates in it a more efficient solution of the [Arrhenius] equation, that process is at the very least not barred at the threshold by § 101." *Id.* at 187–88.

The Federal Circuit in *Thales* emphasized that both the claims in that case and the claims before the Supreme Court in *Diehr* were directed to a new and useful technique, not simply to a mathematical algorithm. The *Thales* court explained that "[j]ust as the claims in *Diehr* reduced the likelihood that the rubber molding process would result in 'overcuring' or 'undercuring,' the claims here result in a system that reduces errors in an inertial system that tracks an object on a moving platform." *Thales*, 850 F.3d at 1348 (internal citation omitted).

The *Diehr* and *Thales* courts distinguished their respective claims from the claims at issue in the Supreme Court's 1978 decision in *Parker v. Flook*, 437 U.S. 584 (1978). In *Flook*, the sole independent claim at issue was directed to a "method for updating the value of at least one alarm limit on at least one process variable in a process comprising the catalytic chemical conversion of hydrocarbons." *Id.* at 596. The claim contemplated that the operator of the process would select an "alarm base" (a temperature), a "margin of safety" (another temperature), a time interval between each updating, and a "weighting factor" between 0 and 1. *Id.* at 596–97. The invention simply consisted of an equation into which each of those operator-selected values would be inserted. *Id.* In light of those facts, the Supreme Court held that the asserted claims were not directed to a patentable invention. *Id.* at 594–95. Importantly, the Court explained that the patent did not "purport to contain any disclosure relating to the chemical processes at work, the monitoring of process variables, or the means of setting off an alarm or

adjusting an alarm system. All that it provide[d] [was] a formula for computing an updated alarm limit." *Id.* at 586.

Besides *Flook*, the defendants rely heavily on the Federal Circuit's decision in *Digitech Image Technologies, LLC v. Electronics for Imaging, Inc.*, 758 F.3d 1344 (Fed. Cir. 2014). The patent at issue in that case was directed to an "improved device profile" that described the spatial and color properties of the devices used in a digital image processing system so as to enable more accurate translation of an image's pixel data in the output devices. The Federal Circuit found that the "device profile," claimed in the patent, was simply "a collection of information." *Id.* at 1349. The court noted that the device profile claims were "not directed to any tangible embodiment of this information" or "any tangible part of the digital processing system," but were "instead directed to information in its non-tangible form," and thus the claims were not patentable. *Id.* The court reached the same conclusion with regard to the related method claims, holding that they simply claimed "a process of organizing information through mathematical correlations," *id.* at 1350, that consisted of "taking two data sets and combining them into a single data set, the device profile," *id.* at 1351. The court concluded that "a process that employs mathematical algorithms to manipulate existing information to generate additional information is not patent eligible." *Id.*

This case differs from *Flook* and *Digitech* in important respects. The asserted claims in the '438 and '978 patents entail more than simply performing a calculation or organizing information through mathematical correlations, as in *Flook* and *Digitech*. The apparatus claims of the '438 patent recite a three-dimensional pointing device with a processing and transmitting module that computes the angular deviations of the pointing device in a dynamic environment based on the signal sets from a six-axis motion sensor module. Unlike the claims in *Flook* and

Digitech, those claims are directed to a particular device that performs a specific, useful function in the physical world. The claims recite tangible, physical results from the receipt and assessment of information. Those claims are clearly directed to more than merely manipulating existing information to generate additional information.

As for the asserted method claims of the ’438 patent and the ’978 patent, on which the defendants focus, those claims discuss utilizing “a six-axis motion sensor module” (the ’438 patent) and a “nine-axis motion sensor module” (the ’978 patent), respectively, to output position and movement-related data points that are then used in mathematical equations. ’438 patent, col. 21, line 10-11; ’978 patent, col. 37, line 17. The result is a system that more accurately translates movement from a 3D pointing device to a display reference frame. *See* ’438 patent, col. 4, ll. 20-24 (“the present invention provides an enhanced comparison method to eliminate the accumulated errors as well as noises over time associated with signals generated by a combination of motion sensors”); ’978 patent, col. 4, ll. 33-37 (same).

Thus, the method claims do not simply describe a mathematical calculation, as in *Flook*. Rather, they are directed to a means of using the inputs from six-axis and nine-axis sensors to track the orientation status of the 3D pointing device and correct errors associated with conventional motion detectors. *See* ’438 patent, col. 4, line 20, through col. 5, line 13; ’978 patent, col. 4, line 15, through col. 6, line 45.

As both *Flook* and *Diehr* make clear, the mathematical equations set forth in the patents must be viewed in conjunction with all other claim components. *See Flook*, 437 U.S. at 590–91 (“[A] process is not unpatentable simply because it contains a law of nature or a mathematical algorithm. . . . The process itself, not merely the mathematical algorithm, must be new and useful.”); *Diehr*, 450 U.S. at 187 (holding that respondents “seek only to foreclose from others the

use of [the Arrhenius] equation in conjunction with all of the other steps in their claimed process"). Here, as in *Thales*, the mathematical equations "serve only to tabulate the position and orientation of the object relative to the . . . reference frame." *Thales*, 850 F.3d at 1348. Based on that characterization, the court in *Thales* described those claims as being "directed to a new and useful technique for using sensors to more efficiently track an object," and thus as being patent eligible. *Id*. at 1349. That characterization applies equally to the asserted claims in this case.

The defendants argue that the claims in this case merely recite known and conventional structures, such that any recitation of structure is incidental and fails to distinguish the subject matter of the claims from claims directed solely to mathematical concepts. *See* Dkt. No. 178, at 10 ("[N]one of the asserted claims requires anything specific or non-conventional with respect to the sensors or their configuration"); *see also* Dkt. No. 178, at 4 (Stating that the structures recited in Claim 14 are "generic, well-known components"); *id.* at 6 ("Claim 10 does not refer to any structure except for a 3D pointing device . . . and a nine-axis motion sensor module"). They contend that *Thales* is distinguishable from this case because the inertial sensors in *Thales* were being used in an unconventional manner, unlike the sensors recited in the patents in this case.

The defendants place undue weight on that asserted distinction between this case and *Thales*. While the court in *Thales* recognized that the sensors in the patents before it were positioned in an unconventional manner, the court did not suggest that the unconventional positioning of the sensors was critical to the patentability of the recited subject matter. Significantly, the court in *Thales* based its decision on its conclusion that the claims at issue satisfied step one of *Alice*, holding that the claims were not directed to an abstract idea; the court did not find it necessary to reach the question whether the claims satisfied step two of *Alice*, by being directed to subject matter that was not well-understood, routine, and conventional. 850 F.3d

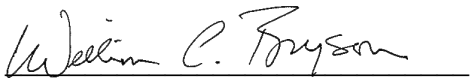
at 1349. Moreover, the court in *Thales* noted that the case before it was analogous to *Diehr*, in that "[j]ust as the claims in *Diehr* reduced the likelihood that the rubber molding process would result in 'overcuring' or 'undercuring,'" the claims in *Thales* resulted "in a system that reduces errors in an inertial system that tracks an object on a moving platform." *Id.* at 1348. In this case, similarly, the claimed inventions resulted in a system that assertedly improved the accuracy of a method for tracking the movements of a pointing device in three-dimensional space. The Supreme Court in *Diehr* made clear that its analysis of the patent eligibility issue did not turn on the novelty of any of the structures used in the rubber curing process. To the contrary, the Court in *Diehr* stated that "[t]he 'novelty' of any element or steps in a process, or even of the process itself, is of no relevance in determining whether the subject matter of a claim falls within the § 101 categories."[1] Accordingly, the Court concludes that the *Thales* court's reference to the unconventional use of inertial sensors was merely additional evidence that the claims were not directed to an abstraction in the form of a pure mathematical formula, but instead to a new and useful technique that simply relied heavily on an algorithm for its effectiveness.

For the foregoing reasons, the Court concluded that the defendants' motion for summary judgment invalidating all of the asserted claims of the '438 patent and the '978 patent as ineligible under 35 U.S.C. § 101 should be DENIED.

[1] CyWee disputes Samsung's contention that the motion sensor modules were well-known and conventional as of 2010. The Court's ruling does not adopt either party's arguments regarding the conventionality of the motion sensor modules. Whether or not the structures were conventional as of that time does not alter the Court's analysis of whether the claims were directed to an abstract idea.

IT IS SO ORDERED.

SIGNED this 7th day of November, 2018.



WILLIAM C. BRYSON
UNITED STATES CIRCUIT JUDGE