



U.S. Patent No. 6,474,159 (“the ‘159 patent”). The technology involved in the ‘159 patent relates to motion-tracking relative to a moving platform.

TVI alleges that its patented technology is critical to the success of the F-35 Joint Strike Fighter (“F-35”), the first tactical fighter jet in 50 years without a heads-up display system. A heads-up display system shows tactical information on a transparent surface inside the cockpit and within the pilot’s forward line of sight. One disadvantage of traditional heads-up display systems is that the pilot must look straight ahead at the display in order to read tactical information, target enemy aircraft, and fire weapons. The F-35 is “revolutionary” in that it employs a helmet-mounted display system (“HMDS”). Compl. 2. The HMDS projects tactical information onto the interior of the visor of the pilot’s helmet. Thus, the pilot does not need to look straight ahead at a fixed point to receive the displayed information. The HMDS further allows the pilot to target enemies and fire weapons in all directions. This capability enhances the pilot’s situational awareness and his ability to combat enemy aircraft. Id. at 2-3.

A major technical challenge in designing an HMDS is that the displayed information must be updated constantly to correlate with the direction the pilot is looking. Id. at 3. The orientation of the helmet relative to the moving aircraft must be continuously tracked to provide current and accurate information to the HMDS. Id. Even a small interval of time between helmet rotation and the presentation of visual data, called latency, can cause a mismatch of information expected and information presented. Id. This slight delay can cause pilot disorientation and nausea. Id. A latency as small as five milliseconds can induce such adverse effects. Id. The challenges of delivering this information and reducing latency are “especially acute” when the frame of reference (the aircraft) is moving independently of the helmet. Id.

The U.S. Patent and Trademark Office (“PTO”) issued the ‘159 patent, titled “Motion-Tracking,” on November 5, 2002. Id. at 4. TVI owns the ‘159 patent by assignment from the inventors. The ‘159 patent describes and claims systems for using inertial trackers to track motion relative to a moving platform instead of relative to the earth. Id. Prior to the patent application, inertial trackers had gained widespread acceptance as “high-performance, robust, and cost-effective alternatives to magnetic, optical, and acoustic tracking systems.” Id. Specifically, the ‘159 patent claims a “system” consisting of two inertial tracking sensors, one mounted on the tracked object and the other on a moving reference frame, and a receiver configured to process the information. Id. The system is used for determining the orientation of the tracked object relative to the moving reference frame. Id. Though Plaintiffs repeatedly point to using the system with an HMDS and an F-35 fighter jet, the patent claims are not specific to this use.

TVI filed its complaint in this Court on June 16, 2014. TVI alleges that Lockheed Martin Corporation, a prime contractor to the U.S. Government on the F-35 project, obtains the HMDS or its components from Rockwell Collins ESA Vision Systems, LLC (“Vision Systems”). Id. at 5. Vision Systems is a joint venture between Rockwell Collins and Elbit Systems of America. TVI alleges that Lockheed Martin’s HMDS employs the same system of inertial trackers mounted on the helmet and the F-35 jet as claimed in the ‘159 patent. Id. Accordingly, TVI asserts that Lockheed Martin infringes on the ‘159 patent by installing this technology in the F-35 jets. Id.

TVI brings two counts of patent infringement of the ‘159 patent. Count One is brought against the United States Government, and Count Two is brought against Lockheed Martin, with the authorization and consent of the United States.

The Government filed its answer and moved to notify interested parties on October 14, 2014. The Court sent notices to Lockheed Martin, Rockwell Collins, and Elbit Systems of America, LLC (“ESA”) advising them of their opportunity to participate in this case as a third-party defendant. Only ESA responded, and it filed an answer to the complaint on December 9, 2014. On March 27, 2015, the United States and ESA filed a motion for judgment on the pleadings, alleging that the ‘159 patent is invalid under 35 U.S.C. § 101 because it claims a “patent-ineligible law of nature.” Defs.’ Mot. 1. TVI responded to the motion on May 4, 2015, arguing that the ‘159 patent claims are directed to patent-eligible subject matter and do not preempt the field of inertial tracking or the use of Newton’s equations. The Government and ESA replied on May 14, 2015, and TVI filed a surreply on May 18, 2015. The Court heard oral argument on the motion on June 16, 2015. The motion is ready for decision.

### Factual Background

The parties agree that the ‘159 patent at issue in this case is extraordinarily complicated, yet the parties disagree in describing the complexity. TVI asserts that in 2000, when the inventors filed their patent application, “inertial trackers [had] not been used in applications that require tracking motion relative to a moving platform instead of relative to the earth.” Pl.’s Resp. 3; ‘159 Patent at 1:23-25. Indeed, “standard inertial tracking systems . . . [would] not function correctly if operated on a moving platform such as a motion-based simulator or vehicle.” ‘159 Patent at 1:32-35. The inventors allegedly solved this problem with the system described in their patent. Pl.’s Resp. 3. In contrast, Defendants argue that the complicated nature of the patent derives solely from the mathematical equations for determining relative orientation between two moving objects, and that the “system” is merely a generic, physical application of the mathematical formulae. Defs.’ Mot. 11-19.

The patent contains 42 claims, two of which are independent. Claims 2-21 depend on Claim 1, the independent system claim, and Claims 23-42 depend on Claim 22, the independent method claim. Claim 1 states:

1. A system for tracking the motion of an object relative to a moving reference frame, comprising:

[1] a first inertial sensor mounted on the tracked object;

[2] a second inertial sensor mounted on the moving reference frame; and

[3] an element adapted to receive signals from said first and second inertial sensors and configured to determine an orientation of the object relative to the moving reference frame based on the signals received from the first and second inertial sensors.

'159 Patent at 11:50-59. Claims 2-21 all depend directly or indirectly on Claim 1, and thus incorporate the same three limitations. Claim 22, the independent method claim, states, "a method comprising determining an orientation of an object relative to a moving reference frame based on signals from two inertial sensors mounted respectively on the object and on the moving reference frame." '159 Patent at 13:24-27. TVI argues that the placement of a second inertial sensor on the moving reference frame is unique, and allowed the inventors to overcome any novelty or obviousness rejections at the PTO. Pl.'s Resp. 5.

In the "Background of the Invention" section of the patent, the inventors acknowledge that inertial trackers had already been "successfully applied to a wide range of HMD [head mounted displays] applications." '159 Patent at 1:10-17. Inertial trackers had achieved "widespread acceptance as a high-performance, robust, and cost-effective alternatives [*sic*] to magnetic, optical, and acoustic tracking systems." Id. The inventors go on to describe kinematic equations involved in inertial tracking relative to a fixed platform. Id. at 3:27-4:9. They then review "basic equations of terrestrial navigation" for inertial tracking relative to the rotating earth. Id. at 4:52-54. These equations were "primarily a source of inspiration" for the section dealing with tracking a moving body relative to another moving body. Id. at 4:10-15. Then, "borrowing" these mathematics, the inventors made "modifications" to account for the motion of a moving platform instead of the earth. This modification requires an inertial measurement unit ("IMU") to measure a variable angular rate vector for the moving object (for example, a fighter jet) instead of using the more constant angular rate vector of the rotating earth. Id. at 6:1-4.

The inventors show the work for their mathematical formulae in the "Detailed Description" section of the patent. They describe equation (10) as the "complete navigation equation," and note that it "can be integrated using just data available from the two IMUs." Id. at 8:14-17. The inventors' simulation results also focus on the success of the "kinematic algorithms." Id. at 11:21-27. Ultimately, the invention requires the inertial trackers to gather orientation data from the moving object and moving reference frame and then apply that data to the navigation equation. The legal question before the Court is whether this system of generic inertial trackers and a novel navigation equation together form a patentable subject matter.

### Jurisdiction

The Court has jurisdiction to hear claims against the United States Government for patent infringement. 28 U.S.C. § 1498(a) ("Whenever an invention described in and covered by a patent of the United States is used or manufactured by or for the United States without license of the owner thereof or lawful right to use or manufacture the same, the owner's remedy shall be by action against the United States in the United States Court of Federal Claims for the recovery of his reasonable and entire compensation for such use and manufacture.").

## Standard of Review

Judgment on the pleadings under Rule 12(c) of the Court (“RCFC”) is appropriate only where there are no material facts in dispute. See Forest Labs, Inc. v. United States, 476 F.3d 877, 881 (Fed. Cir. 2007). The Court must assume each well-pled factual allegation to be true, and give all inferences in favor of the non-movant. Owen v. United States, 851 F.2d 1404, 1407 (Fed. Cir. 1988). Because patents are presumed to be valid, even under a § 101 analysis, Defendants bear the burden of establishing invalidity by “clear and convincing evidence.” Microsoft Corp. v. i4i Ltd. P’ship, 131 S. Ct. 2238, 2242 (2011); see also CLS Bank Int’l v. Alice Corp. Pty. Ltd., 717 F.3d 1269, 1284 (Fed. Cir. 2013) (holding that the presumption of validity applies to challenges under § 101). Thus, “[a] Rule 12(c) motion for judgment on the pleadings challenging patent eligibility must be shown by clear and convincing evidence appearing in the patent itself.” Vehicle Intelligence & Safety LLC v. Mercedes-Benz USA LLC, No. 13 C 4417, 2014 WL 983123, at \*2 (N.D. Ill. Mar. 13, 2014).

Section 101 of the Patent Act defines subject matter eligibility. In Section 101 jurisprudence, the Supreme Court has identified three categories of subject matter that cannot be patented: “laws of nature, physical phenomena, and abstract ideas.” Bilski v. Kappos, 561 U.S. 593, 601 (2010). These categories are excluded from patentable subject matter because they are the “basic tools of scientific and technical work.” Alice Corp. Pty. Ltd. v. CLS Bank Int’l, 134 S. Ct. 2347, 2354 (2014) (citation omitted). “[M]onopolization of those tools through the grant of a patent might tend to impede innovation more than it would tend to promote it.” Id. (citation and quotation marks omitted). However, “an *application* of a law of nature or mathematical formula to a known structure or process may well be deserving of patent protection.” Mayo Collaborative Servs. v. Prometheus Labs., Inc., 132 S. Ct. 1289, 1293-94 (2012).

The modern test for patent eligibility, derived from Alice, consists of two parts: (1) a court must determine whether the patent claims at issue are directed to an abstract idea, law of nature, or natural phenomenon; and (2) if so, the court must consider whether the elements of each claim, both individually and as an ordered combination, transform the nature of the claim into a patent-eligible application. Alice, 134 S. Ct. at 2355. The second prong often is referred to as the search for an “inventive concept” and requires the patent to amount to “‘significantly more than a patent upon the [ineligible concept] itself.’” Id. (quoting Mayo, 132 S. Ct. at 1294).

Whether asserted patent claims are invalid for failure to claim statutory subject matter under Section 101 is a question of law. In re Comiskey, 554 F.3d 967, 975 (Fed. Cir. 2009). Invalidity under Section 101 is a “threshold test,” Bilski, 561 U.S. at 602, and may provide grounds for granting judgment on the pleadings. See, e.g. Ulramercial, Inc. v. Hulu, LLC, 772 F.3d 709 (Fed. Cir. 2014) (affirming district court’s grant of 12(b)(6) motion to dismiss based on Section 101 invalidity); buySAFE, Inc. v. Google, Inc., 765 F.3d 1350, 1352 (Fed. Cir. 2014) (affirming district court’s grant of motion for judgment on the pleadings based on Section 101). The Court declines to perform any claim construction before ruling on the validity of the claimed subject matter, as Plaintiff has failed to identify a claim term that requires construction. See Bancorp Servs., L.L.C. v. Sun Life Assur. Co. of Canada, 687 F.3d 1266, 1273 (Fed. Cir. 2012).

## Discussion

### A. Alice Step One

The Court must first determine whether the patent claims at issue are, on their face, directed to an abstract idea, law of nature, or natural phenomenon. The accompanying diagrams and background sections of the patent are irrelevant to this analysis. Similarly, Plaintiff's attempts to characterize the patent as a complicated system involving a fighter jet and pilot helmet are immaterial to the Court's Section 101 analysis. Accenture Global Servs., GmbH v. Guidewire Software, Inc., 728 F.3d 1336, 1345 (Fed. Cir. 2013) ("Regarding [Appellant's] argument concerning the complexity of the specification . . . the important inquiry for a § 101 analysis is to look to the claim."). Further, when a "system claim and method claim contain only 'minor differences in terminology [but] require performance of the same basic process' . . . they should rise or fall together." Id. at 1344 (quoting CLS Bank, 717 F.3d at 1291). Here, the Court looks to the two independent claims in the patent: Claim 1 and Claim 22.

Claim 1 is the system claim, describing a system comprised of two inertial sensors and an element adapted to receive signals from the sensors. This element is "configured to determine an orientation of the object relative to the moving reference frame." '159 Patent at 11:50-59. The element is configured to employ the claimed navigation equations in order to determine the relative orientation of the moving object. Thus, although this claim primarily describes a system of sensors, it is clear that the claim is "directed to" the determining step accomplished by the element's configuration to perform the navigation equations. Put simply, the system in Claim 1 appears to be an arrangement of generic data-gathering elements designed to feed orientation data into the navigation equations, which are described in Claim 22.

Claim 22, the method claim, even more directly describes the navigation equations by reciting, "a method comprising determining an orientation of an object relative to a moving reference frame. . . ." '159 Patent at 13:24-27. The orientation of the object is represented mathematically by an orientation matrix. Id. at 8:6-8. The orientation matrix is calculated using the angular velocities determined by the inertial sensors, and solved in equation (11). Id. at 8:5-8; Defs' Mot. at 11. This orientation matrix is then plugged into the complete navigation equation, equation (10). Distilled to its core, Claim 22 is nothing more than an instruction to solve a navigation equation.

The Court must decide whether a system of generic inertial sensors and a receiving element (Claim 1), combined with an instruction to solve a navigation equation (Claim 22), satisfies the first part of the Alice test. Other recent cases from the Supreme Court and the Federal Circuit are instructive.

The petitioner in Alice was the assignee of patents that disclosed a scheme for mitigating "settlement risk," or the risk that only one party to a financial agreement will satisfy its obligation. Alice, 134 S. Ct. at 2349. The patent claims were designed to facilitate the exchange of financial

obligations between two parties by using a computer system as a third-party intermediary. Id. The patents claimed (1) a method for exchanging financial obligations, (2) a computer system configured to carry out the method, and (3) a computer-readable medium containing program code for performing the method of exchanging obligations. Id. In its analysis, the Court “distinguish[ed] patents that claim the ‘buildin[g] block[s]’ of human ingenuity, which are ineligible for patent protection, from those that integrate the building blocks into something more. . . .” Id. at 2350 (quotation marks and citation omitted).

The Supreme Court held that, although the claims involved a computer application and a multi-step process of accomplishing risk mediation, they were *directed to* the “abstract idea of intermediated settlement.” Id. The Court referred in its reasoning to the holdings in Gottschalk v. Benson, 409 U.S. 63 (1972), Parker v. Flook, 437 U.S. 584 (1978), and Bilski v. Kappos, 561 U.S. 593 (2010). The Court explained that the concept of intermediated settlement is a “fundamental economic practice long prevalent in our system of commerce.” Alice, 134 S. Ct. at 2350 (internal quotation marks omitted). Thus, the claims in Alice failed the first prong.

Here, the Court similarly finds that TVI fails the first prong of the Alice analysis because the independent claims of the ‘159 Patent are directed to mathematical equations for determining the relative position of a moving object to a moving reference frame. Derived from Newtonian principles of motion and “borrowing the mathematics that an inertial navigation system uses to track an airplane relative to a rotating earth,” the navigation equation is undoubtedly a complex mathematical concept, and a solution to the problem of tracking two moving objects in relation to each other. ‘159 Patent at 5:63-65. However, the Court finds that this concept is a “building block of human ingenuity,” and the solution lies in the mathematical formulae, not the generic devices listed in the system claim. See Alice, 134 S. Ct. at 2350. Accordingly, TVI’s claims fail the first prong of the Alice analysis because the claims are directed to the abstract idea of tracking two moving objects, and incorporate laws of nature governing motion, both of which are ineligible for patent protection.

## B. Alice Step Two

The Supreme Court in Alice then examined the claims under the second prong to search for an inventive concept that would “transform that abstract idea into a patent-eligible invention.” Id. However, the Court did not find one. “Simply appending conventional steps, specified at a high level of generality, to a method already well known in the art is not *enough* to supply the inventive concept needed to make this transformation.” Id. (quoting Mayo, 132 S. Ct. at 1300) (internal quotation marks omitted). Nor is limiting the use of an abstract idea to a particular technological environment enough for patent eligibility. Id.; Bilski, 561 U.S. at 611. Indeed, “wholly generic computer implementation is not generally the sort of ‘additional featur[e]’ that provides any ‘practical assurance that the process is more than a drafting effort designed to monopolize the [abstract idea] itself.’” Alice, 134 S. Ct. at 2350-51; Mayo, 132 S. Ct. at 1297. Importantly, the Supreme Court found that when the system claims were considered as an ordered combination, the computer components added nothing that was not already present when the steps were considered separately. Alice, 134 S. Ct. at 2351; Mayo, 132 S. Ct. at 1298.

Here, the system claim fails to transform the method claim into a patent-eligible invention. The plain language of Claim 1 describes generic, fungible inertial sensors that admittedly have already gained “widespread acceptance” in the field of motion tracking. Like the computer elements in Alice, these inertial trackers, when considered as an ordered combination in the claimed system, add nothing transformative to the patent. Although the concept of tracking the motion of a moving object relative to a moving reference frame may have been novel and nonobvious, the claimed system does nothing to ground this abstract idea in a specific way. The claims allow for the application of the navigation equation in almost endless environments, and are not limited to a fighter jet and a pilot’s helmet.

The Court rejects Plaintiff’s attempts to construe its claims more narrowly and less abstractly. See, e.g., In re TLI Commc’ns LLP Patent Litig., No. 1:14md2534, 2015 WL 627858, at \*10 (E.D. Va. Feb. 6, 2015) (rejecting patentee’s argument to narrowly characterize the abstract idea underlying the claims “because it focuses incorrectly on a concrete application of the idea . . . instead of properly focusing at a higher level of generality on the abstract idea or concept underlying the [] patent.”). In fact, the patent allows for a wide variety of sensors to be employed to provide data for the navigation equation, including angular accelerometers, angular rate sensors, and angular position gyroscopes. ‘159 Patent at 1:63-67. The Court finds that this allowance for variance among generic, widely-used devices to provide data for the equation indicates that the patent is directed primarily to the equation itself, and the arrangement of fungible devices to receive and generate the necessary data does not transform the abstract nature of the patent’s core claim: the navigation equation.

Plaintiff argues that Alice has a limited effect, and applies primarily to business method patents. Yet the Court is aware of at least three post-Alice cases invalidating a patent under § 101 that involved a “technological” claim instead of an “entrepreneurial” claim. See, e.g., Synopsys, Inc. v. Mentor Graphics Corp., No. C 12-6467 MMC, 2015 WL 269116, at \*2 (N.D. Cal. Jan. 20, 2015) (a system for converting a hardware independent user description of a logic circuit); In re TLI, 2015 WL 627858, at \*3 (a system to simplify transmission of digital images); Celsis In Vitro, Inc. v. CellzDirect, Inc., No. 10 C 4053, 2015 WL 1523818, at \*2 (N.D. Ill. Mar. 16, 2015) (a method for producing hepatocytes capable of being frozen and thawed). The Court is not persuaded that Alice was limited to business method patents when it laid out the test for patent eligibility under § 101.

In a report and recommendation to the U.S. District Judge for the Western District of Texas, U.S. Magistrate Judge Jeffrey C. Manske performed an analysis similar to the one required for the case at bar. Affinity Labs of Texas, LLC v. Amazon, Inc., 2015 WL 3757497 (June 12, 2015 W.D. Texas). In that case, the independent claims comprised a network-based media managing system for maintaining a library of content that a given user has a right to access, and which delivered content over a network to a user’s wireless device. In considering whether the purpose of the patent was abstract, the Magistrate’s report concluded that “the inclusion of ‘some concrete claim elements – even elements associated with computer- or Internet-based technology – is insufficient to indicate that the claims as a whole are not directed to an abstract idea, if those elements are well

overtaken in the claim by the articulation of the abstract idea itself.” Affinity Labs, 2015 WL 3757497, at \*8 (quoting TriPlay, Inc. v. WhatsApp Inc., 2015 WL 1927696, at \*11 (citations omitted)). The Court here has come to the same conclusion, that the ‘159 Patent is directed to the abstract navigation equation allowing for the tracking of a moving object’s orientation relative to a moving reference frame. This overriding purpose of the patent “well overtake[s]” the concrete elements and data gathering steps, rendering the patent’s subject matter ineligible under § 101.

### C. Mayo, Diehr, and Flook

In another recent Supreme Court case, Mayo, where the court first applied the two-step analysis later used in Alice, Justice Breyer emphasized that the mere presence of an algorithm or law of nature does not render a patent ineligible. The Supreme Court in Mayo reiterated that, “[w]hile a scientific truth, or the mathematical expression of it, is not a patentable invention, a novel and useful structure created with the aid of knowledge of scientific truth may be.” Mayo, 132 S. Ct. at 1294 (quoting Diamond v. Diehr, 450 U.S. 175, 188 (1981)). In that vein, the Supreme Court in Diehr upheld as valid a patent claiming a process for curing synthetic rubber, reasoning that a mathematical formula alone is not patentable, but may be so when it is applied in a structure or process that is designed to be protected by the patent laws. Diehr, 450 U.S. at 175-76. However, the Court in Diehr also relied on the fact that the inventors did not “seek to preempt the use of that equation.” Id. at 176. Instead, the claims were limited to a specific set of steps involving the installation of rubber in a press, closing the mold, constantly determining internal temperature, recalculating the cure time with a computer, and automatically opening the press at the proper time. Id. at 187.

Unlike the limitations in Diehr, the claims here would virtually preempt the use of the navigation equation by others because the claims are overly broad in defining the system. By claiming various generic inertial trackers and receivers for gathering orientation data, the inventors would preempt anyone who sought to use the equations because the only feasible way to gather orientation data from moving objects and reference frames would be from devices like the ones broadly described in the patent. Thus, the claims here are potentially endless in their scope, and would not allow for others to use the mathematical equation at their core. Indeed, the Supreme Court reasoned in Diehr that “[a] mathematical formula does not suddenly become patentable subject matter simply by having the applicant acquiesce to limiting the reach of the patent for the formula to a particular technological use. A mathematical formula in the abstract is nonstatutory subject matter regardless of whether the patent is intended to cover all uses of the formula or only limited uses.” Id. at 192 n.14.

Further, the claims in Diehr involved a process that physically transformed synthetic rubber in a novel way. While the Court notes that physical transformation is not required for § 101 eligibility, it does not find Plaintiff’s system claim to be transformative of anything. See Card Verification Solutions, LLC v. Citigroup Inc., No. 13 C 6339, 2014 WL 4922524, at \*5 (N.D. Ill. Sept. 29, 2014) (“Therefore, even though the method does not result in the physical transformation of matter . . . it plausibly recites a patent-eligible application of the abstract idea of verifying a transaction.”). While the Plaintiff here claims that attaching an inertial tracker both to a moving

object and a moving reference frame is novel, its novelty does not approach the necessary inventiveness achieved by the claims in Diehr. “The questions of whether a particular invention meets the ‘novelty’ requirements of 35 U.S.C. § 102 or the ‘nonobviousness’ requirements of § 103 do not affect the determination of whether the invention falls into a category of subject matter that is eligible for patent protection under § 101.” Diehr, 450 U.S. at 176. Thus, the novelty of attaching a generic inertial tracker to a moving reference frame is unpersuasive in the context of a § 101 analysis. Ultimately, the use of generic inertial trackers to measure an object’s orientation is not inventive, and thus cannot serve to “transform” the abstract navigation equation into a patentable claim.

Furthermore, in Diehr, the claimed process was specifically limited and allowed for the curing of synthetic rubber in a new way. “Industrial processes such as this are the types which have historically been eligible to receive the protection of our patent laws.” Id. at 184. Here, instead, the inventors have combined common measurement devices into a system to feed information into their navigation equation. While the Court is impressed by the equation’s complexity, it is unconvinced that adding the requisite data-gathering elements to the patent claims moves the equation out of the abstract and into the specific. The Court is also concerned by the lack of limitations in the patent’s claims, further contrasting this case from the claims in Diehr.

Instead, the claims at issue here are more akin to those rejected in Parker v. Flook, 437 U.S. 584 (1978). The claims in Flook involved a method for updating alarm limits during a catalytic conversion process. As the court noted again in Diehr, an alarm limit is “simply a number,” and the claims in Flook merely sought to protect a formula for computing this number. Diehr, 450 U.S. at 186. Yet the claimed process in Flook did not disclose anything related to the chemical processes at work, the monitoring of the process variables, or the means of setting off an alarm or adjusting the alarm system. Flook, 437 U.S. at 586. Instead, the claims were directed to the mathematical formula itself. Similarly, here, the patent does not disclose the technical processes of inertial sensors gathering orientation data, nor does it claim to modify or improve the inertial sensors at work.

The Supreme Court also rejected in Flook the patentee’s argument that adjustment of the alarm limit after employing the formula rendered the process distinct from the bare algorithm. In so holding, the Court explained, “[t]he notion that post-solution activity, no matter how conventional or obvious in itself, can transform an unpatentable principle into a patentable process exalts form over substance.” Id. at 590. The Court identified the danger associated with allowing a “competent draftsman” to attach post-solution activity to a claimed formula and render it patentable. Id. The Federal Circuit has also rejected ad-hoc activities added to a formula with the intent of grounding an abstract patent claim. Specifically, “adding a data-gathering step to an algorithm is insufficient to convert that algorithm into a patent-eligible process.” In re Bilski, 545 F.3d 943, 963 (Fed. Cir. 2008) (citing In re Grams, 888 F.2d 835, 840 (Fed. Cir. 1989)). The patentees here have done just that.

TVI’s argument that “non-computer components, like inertial sensors,” should not be considered generic is also unavailing. Pl.’s Opp. at 22. In addition to the inventors’ own

description of inertial sensors as having “widespread acceptance” in the field of motion tracking and the fact that a range of sensors may fit the definition in the patent’s claims, the Federal Circuit has found certain non-computer components to be generic and therefore ineligible. For example, in Cyberfone Sys., LLC v. CNN Interactive Grp., Inc., the patent at issue involved capturing and storing data with a telephone. 558 F. App’x 988, 990 (Fed. Cir. 2014). The patent claims required “obtaining data” from a telephone, “exploding” the data into its component parts, and sending the data to different destinations. Id. at 990-92. The patentee argued that the telephone was a “specific machine that plays an integral role in the method.” Id. at 992. However, the Court rejected this logic, and noted that the claimed “telephone” could be a “range of different machines.” Id. Indeed, the Court found that “[t]he ‘telephone’ recited in claim 1 is not a specific machine, and adds nothing of significance to the claimed abstract idea.” Id. at 993. The Court finds that TVI’s claimed system of inertial sensors is not materially more specific or unique than the generic telephone rejected in Cyberfone Sys., LLC.

#### D. Machine-or-Transformation Test

TVI also relies on SiRF Tech., Inc. v. Int’l Trade Comm’n, 601 F.3d 1319 (Fed. Cir. 2010) as an example of a “position-related claim[]” upheld under § 101 by the Federal Circuit. SiRF based its patent on the “machine-or-transformation test” outlined in Bilski, 561 U.S. at 605-06. Under that test, a claim satisfies § 101 if it (1) “is tied to a particular machine or apparatus,” or (2) “transforms a particular article into a different state or thing.” Id. at 602-04. To be “a meaningful limit on the scope of a claim,” the machine “must play a significant part in permitting the claimed method to be performed, rather than function solely as an obvious mechanism for permitting a solution to be achieved more quickly.” SiRF, 601 F.3d at 1333. Though previously considered the “sole test for deciding whether an invention is a patent-eligible ‘process,’” the machine-or-transformation test has been relegated to a lesser role as an “investigative tool” that may provide “a useful and important clue” in determining patent eligibility. Bilski, 561 U.S. at 602-04. The Court will briefly examine this test here.

The Federal Circuit defines a machine as “a concrete thing, consisting of parts, or of certain devices and combination of devices. This includes every mechanical device or combination of mechanical powers and devices to perform some function and produce a certain effect or result.” SiRF, 601 F.3d at 1332 (citation omitted). In SiRF, the claims were directed to a method of calculating an absolute position of a GPS receiver and a method of “estimating a plurality of states associated with a satellite signal receiver” to assist in global positioning in low signal situations. Id. at 1331. The “GPS receiver” was held to be a “particular machine” that was “integral to each of the claims at issue.” Id. at 1332. The Court focused on the fact that the “methods at issue could not be performed without the use of a GPS receiver,” and there was no evidence that “the calculations [] can be performed entirely in the human mind.” Id. at 1332-33. Yet Plaintiff’s claims here are not tied to any particular machine that is integral to the claimed method of determining the relative orientation of two tracked objects.

Neither the “tracked object” nor the “moving reference frame” identified in the claims are particular machines, as neither has a limiting definition. Although Plaintiff points the Court

towards the patent's use in a fighter jet and pilot helmet, the claim language is not so limiting. Further, Plaintiff's inertial sensors are not a "particular machine," unlike the GPS receiver in SiRF. There, the claims were focused on improving GPS technology, and thus focused on the GPS receivers and the chips inside them. The claims were worded to reflect the integral nature of the GPS receiver, claiming a method comprising "estimating a plurality of states associated with a satellite signal receiver" and "forming a dynamic model relating the plurality of states, the dynamic model operative to compute position of the satellite signal receiver." Id. at 1331-32. The patent claims in that case were directed to improving the GPS device itself, and modifying the way GPS signal receivers could calculate location in poor signal reception conditions. Id. at 1322-23. Here, however, the inertial sensors can be a range of devices, including angular accelerometers, angular rate sensors, and angular position gyroscopes. '159 Patent at 1:63-67. The claims do not seek to improve upon inertial sensor technology and do not modify their capabilities; rather, the inertial sensors fill the role of gathering data to feed into the navigation equation and improve upon the field of motion tracking. Thus, the Court finds that Plaintiff's patent fails the first prong of the machine-or-transformation test because it is not tied to a particular machine, but merely incorporates a range of fungible machines in its data-gathering process.

The second prong of the machine-or-transformation test requires a process that "transforms a particular article into a different state or thing." Bilski, 561 U.S. at 600. Plaintiff argues that its claims are patent eligible because the "inputted data (forces measured by inertial sensors on the helmet and aircraft) are transformed into helmet-tracking information." Pl.'s Opp. at 24. Plaintiff claims this feature "fundamentally alter[s] the original . . . information." Card Verification Solutions, 2014 WL 4922524, at \*5. However, as the Court noted in Card Verification Solutions, "[t]ypically, transforming data from one form to another does not qualify as the kind of transformation regarded as an important indicator of patent eligibility." Id. Further, Plaintiff's attempt to characterize the patent process as a "transformation of sensor data into helmet-orientation information" belies the scope of the patent's claims, which are not limited to a helmet's interface. Instead, the data is entered into a navigation equation and solved to provide the moving object's position and orientation relative to a moving reference frame. Although Plaintiff cites to Research Corp. Tech., Inc. v. Microsoft Corp., 627 F.3d 859, 869 (Fed. Cir. 2010) because it "[b]orrow[s] from the reasoning of the Supreme Court in Diehr" to explain that Diehr's transformation test applies to non-physical computer applications, the Court also notes that the patentees in Research Corp. did "not seek to patent a mathematical formula. Instead, they [sought] patent protection for a process of halftoning in computer applications." Research Corp., 627 F.3d at 869.

The Court finds that solving a mathematical equation incorporating Newtonian principles of motion does not "transform" sensor data into motion tracking information any more than Einstein's discovery of the natural law  $E=mc^2$  transforms a mass measurement into energy information. Contrary to Plaintiff's characterizations, the data is not fed into one side of a machine and pushed out the other as something new. Instead, the tracking information is derived from mathematical calculations *based on* a combination of the sensor data and natural laws of motion. Plaintiff therefore fails the transformation prong of the machine-or-transformation test.

### Conclusion

Ultimately, the concern that drives the exclusionary exceptions for abstract ideas and laws of nature from § 101 eligibility “[i]s one of pre-emption.” Alice, 134 S. Ct. at 2354 (citation omitted). The Court finds that the scope of the subject patent’s claims is insufficiently limited under the holdings of Mayo and Diehr, and if the patent were considered to protect eligible subject matter, it would pre-empt the use of the underlying abstract idea of relative motion tracking by others in the field. The patent’s ineligibility is confirmed by the machine-or-transformation test, under which the claims are not tied to any specific machine and do not transform the nature of the patent into something more than the abstract mathematics behind it. At its core, the patent is seeking protection for the mathematical formulae used in determining the relative orientation of two moving objects. The Court is unwilling to afford patent protection to Plaintiff’s claim on this building block of motion tracking technology.

Accordingly, Defendants’ motion for judgment on the pleadings is GRANTED. The Clerk is directed to dismiss Plaintiff’s complaint with prejudice.

IT IS SO ORDERED.

s/Thomas C. Wheeler  
THOMAS C. WHEELER  
Judge