

**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.

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NO. 2:17-CV-00140-RWS-RSP

DEFENDANTS' RESPONSIVE CLAIM CONSTRUCTION BRIEF

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I. INTRODUCTION

At their core, the parties' claim construction disputes present two key issues. First, a claim is invalid as indefinite if it fails to inform persons skilled in the art, with reasonable certainty, of the scope of the invention. This is so when a claim limitation is subject to multiple interpretations, but the patent provides no way to identify which interpretation is appropriate, and also when a claim limitation is mathematically impossible. Here, the claims of the patents-in-suit require comparing angular velocities with "axial accelerations," which could be any one of three types of acceleration. The patents-in-suit provide no guidance as to the type of axial acceleration to be used, and each possibility results in a mathematically impossible comparison. These claim limitations are therefore indefinite, rendering each asserted claim invalid.

Second, the remaining claim terms have plain meanings consistent with the guidance of the specification and prosecution history. For example, a "3D pointing device" is described throughout the patents-in-suit and extrinsic evidence, and even by CyWee's own expert as something that moves a cursor or pointer on a display, not merely a device that calculates its own orientation. As another example, when prosecuting the patents-in-suit, the patentee distinguished a nine-axis motion sensor from a six-axis motion sensor by stating that the six-axis motion sensor would not include a magnetometer. Yet, CyWee seeks now to interpret "six-axis motion sensor" to cover structures with magnetometers. These claim limitations should be construed consistent with the intrinsic evidence.

II. LAW OF CLAIM CONSTRUCTION AND INDEFINITENESS

The Court is well-versed in the relevant law. Terms are construed from the perspective of a person of ordinary skill in the art ("POSA") at the time of the invention. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313 (Fed. Cir. 2005) (*en banc*). Terms "are generally given their ordinary and customary meaning." *Phillips*, 415 F.3d at 1312 (quoting *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)). The claims themselves provide significant guidance. *Phillips*, 415 F.3d at 1314.

“[A]ll claim terms are presumed to have meaning in a claim.” *Innova/Pure Water, Inc. v. Safari Water Filtration Sys., Inc.*, 381 F.3d 1111, 1119 (Fed. Cir. 2004). Nevertheless, “the person of ordinary skill in the art is deemed to read the claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification.” *Phillips*, 415 F.3d at 1313. “The specification is the ‘single best guide to the meaning of a disputed claim term’” *Eon-Net LP v. Flagstar Bancorp.*, 653 F.3d 1314, 1320 (Fed Cir. 2011) (quoting *Phillips*, 415 F.3d at 1315). The prosecution history provides additional evidence of how the Patent Office and the patentee understood the claims. *Phillips*, 415 F.3d at 1317. Extrinsic evidence may also be considered, but not to vary the meaning of terms based on the intrinsic record. *Id.* at 1317–19.

Where a claim term’s plain and ordinary meaning does not resolve the parties’ dispute, it is inappropriate to rely on such meaning or decline to construe the term. *O2 Micro Int’l Ltd. v. Beyond Innovation Tech. Co.*, 521 F.3d 1351, 1361 (Fed. Cir. 2008). When the parties “present a fundamental dispute regarding the scope of a claim term, it is the court’s duty to resolve it.” *Id.* at 1362–63.

The claims must particularly point out and distinctly claim the subject matter which the applicant regards as the invention. 35 U.S.C. § 112 ¶ 2. A patent is indefinite “if its claims, read in light of the specification delineating the patent, and the prosecution history, fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention.” *Nautilus, Inc. v. Biosig Instruments, Inc.*, 134 S. Ct. 2120, 2124 (2014). Section 112 requires patent claims to have the precision necessary “to afford clear notice of what is claimed, thereby ‘apprising the public of what is still open to them.’” *Id.* at 2128–29 (citation omitted). A claim term is indefinite when it has multiple divergent, but equally plausible interpretations. *See, e.g., Innovative Display Techs. LLC v. Hyundai Motor Co.*, No. 2:14-CV-201-JRG, 2015 U.S. Dist. LEXIS 57810, at *72–73 (E.D. Tex. May 4, 2015);

Harcol Research, LLC v. Europea Sports Prods., No. 2:13-CV-228-JRG-RSP, 2014 U.S. Dist. LEXIS 155307, at *21–22 (E.D. Tex. Nov. 3, 2014).

III. BACKGROUND OF THE TECHNOLOGY

A. U.S. Patent No. 8,441,438

The '438 Patent (Ex. 1)¹ is directed to a 3D pointing device that utilizes orientation sensors to output the movement of the device in relation to a reference frame of a display device. '438 Patent, Abstract. As shown in Figure 1, when the user moves a 3D pointing device (110), a cursor on the screen (122) moves relative to the orientation, direction, and distance traveled by the device. *Id.*, 1:29–2:40.

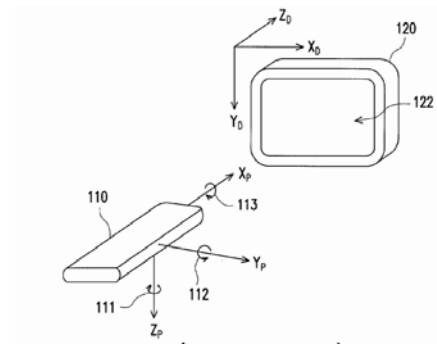


FIG. 1 (RELATED ART)

As shown in Figure 4, the 3D pointing device includes a six-axis motion sensor module containing a rotation sensor (342) and accelerometer (344). *Id.*, 7:59–61. The six-axis sensor module is connected to a processing and transmitting module containing a data transmitting unit (346) and a

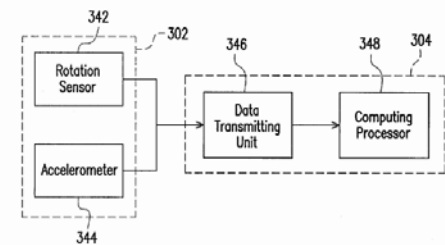


FIG. 4

computing processor (348). *Id.* To calculate the deviation of the 3D pointing device in relation to a reference frame, the gyroscope generates a set of angular velocity readings and the accelerometer generates a set of acceleration readings. *Id.*, 7:64–8:17. These readings are transmitted from the sensors via the data transmitting unit to the computing processor. *Id.*, 8:18–30. A “predicted” acceleration is obtained from the set of angular velocities and the amount the device has moved (*i.e.*, deviated) is calculated using these values in a manner that purportedly minimizes the inherent errors of each sensor. *Id.*, 8:18–58.

¹ Unless otherwise stated, all exhibits referenced herein are attached to the Declaration of Elizabeth L. Brann, filed concurrently herewith.

B. U.S. Patent No. 8,552,978

The '978 Patent (Ex. 2) is related to the '438 Patent and is generally directed to the same subject matter. Like the '438 Patent, the '978 Patent is directed to a 3D pointing device that utilizes orientation sensors to output the movement of the device in relation to the reference frame of a display device. '978 Patent, Abstract.

Unlike the '438 Patent, the '978 Patent uses a set of measured and predicted magnetism readings to calculate the deviation of the device. To do so, the '978 Patent discloses the use of a nine-axis sensor module containing a rotation sensor (342), accelerometer (344), and magnetometer (345). *Id.*, 9:65–10:1. Similar to the method disclosed in the '438 Patent, the angular velocities from the gyroscope, acceleration readings from the accelerometer, magnetic readings from the magnetometer, and a set of “predicted” magnetisms are used to obtain the updated “state” of the 3D pointing device in a way that purportedly minimizes the inherent errors of each sensor. *Id.*, 10:50–11:30.

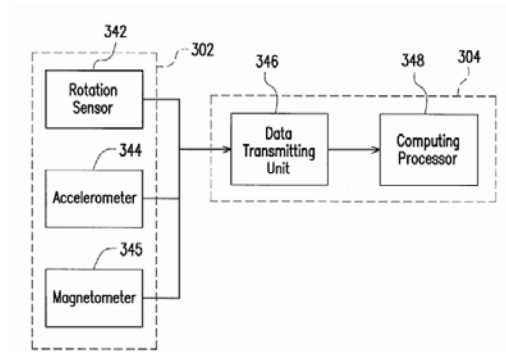


FIG. 4

IV. DISPUTED CLAIM TERMS

A. “utilizing a comparison to compare the first signal set with the second signal set” ('438 Patent, Claim 1)

Plaintiff's Proposal	Defendants' Proposal
“determining or assessing differences based on a previous state associated with the first signal set and a measured state associated with the second signal set while calculating deviation angles”	Indefinite

Although the mathematics underlying the claimed “utilizing a comparison to compare the first signal set with the second signal set” are complex, the reasons the term is indefinite are simple. The term is indefinite because all parties agree it is subject to multiple interpretations, and each of those interpretations is mathematically impossible. A patent “must be precise enough to afford clear

notice of what is claimed” to avoid public uncertainty about infringement. *Nautilus*, 134 S. Ct. at 2128–29. To balance these concerns when considering definiteness under 35 U.S.C. § 112 ¶ 2, a claim, when viewed in light of the specification and prosecution history, must inform POSAs about the scope of the invention with reasonable certainty. *Id.* at 2129. Because the ’438 Patent does not indicate which interpretation of “utilizing a comparison . . .” is correct, and because each interpretation is mathematically impossible, this term does not inform POSAs about the scope of the invention with reasonable certainty.

“[U]tilizing a comparison . . .” appears in Claim 1 of the ’438 Patent. The claimed 3D pointing device has a six-axis motion sensor module comprising a rotation sensor that “detect[s] and generat[es] a first signal set comprising angular velocities ω_x , ω_y , ω_z ” and an accelerometer that “detect[s] and generat[es] a second signal set comprising axial accelerations A_x , A_y , A_z .” ’438 Patent, Claim 1. A “computing processor” then “communicates with the six-axis motion sensor module to calculate a resulting deviation comprising resultant angles . . . by utilizing a comparison” to compare the first signal set—the angular velocities measured by the rotation sensor—with the second signal set—the axial accelerations measured by the accelerometer. *Id.*

A POSA would not have understood the meaning of this limitation with reasonable certainty for at least three reasons. First, the specification and claims of the ’438 Patent ubiquitously reference “axial accelerations.” *See* ’438 Patent, 4:8–19; 4:59–65; 6:16–20; 8:4–8; 11:8–15; 13:6–13; March 9, 2018 Responsive Declaration of M. Ray Mercer, Ph.D (filed concurrently) (“Mercer Decl.”) ¶¶ 70–74. The ’438 Patent states that “axial accelerations” are detected and generated by an accelerometer. In general, an accelerometer reports a combined measurement that reflects the contributions of three different types of accelerations—(i) linear accelerations; (ii) centrifugal accelerations; and (iii) gravitational accelerations. Mercer Decl. ¶ 72; Declaration of Joseph J. LaViola, Jr., Ph.D (filed February 23, 2018, Dkt. No. 66-6) (“LaViola Decl.”) ¶¶ 29–30. Linear accelerations measure the rate

in change of velocity of an object traveling along a straight path. Mercer Decl. ¶ 52. Centrifugal accelerations measure the rate in change of velocity of an object rotating about a point. Mercer Decl. ¶ 55. Gravitational accelerations measure an object's acceleration due to gravitational force. Mercer Decl. ¶ 48. A POSA would recognize that an "axial acceleration" could be any of these three accelerations or some combination from among the three. *Id.* ¶¶ 66, 70–74. In fact, CyWee's expert, Joseph LaViola, admits that "axial accelerations can have multiple interpretations depending on the 3 types of forces (gravity, linear, centrifugal) that can act on an accelerometer," noting expressly that this is an "ambiguity" in the claim term. LaViola Decl. ¶ 29.

Second, given the multiple types of axial accelerations, it would not be clear to a POSA how to compare the first signal set of angular velocities with the second signal set of axial accelerations. A POSA would not know which acceleration (linear, centrifugal, or gravitational) is being compared with angular velocities, and the specification does not indicate which meaning is correct, leaving no way for a POSA to resolve the admitted ambiguity in the claim term.

Such claim terms are indefinite. In *Innovative Display*, the court held the term "more in the width direction" to be indefinite, finding "divergent interpretations [of that term were] plausible" and that the plaintiff "failed to adequately demonstrate that its preferred interpretation [was] necessarily the correct one." 2015 U.S. Dist. LEXIS 57810, at *73. Similarly, in *Harvol Research*, the court held that the term "[a] method of large and rapid energy supply to a healthy individual . . ." was indefinite because the meaning of that phrase could change situationally. 2014 U.S. Dist. LEXIS 155307, at *22. Similarly, here it is undisputed that there are multiple types of axial accelerations, and the specification does not indicate which of these types of axial accelerations is being compared with the angular velocities.

Third, from a practical perspective, regardless of how "axial accelerations" is interpreted, a POSA would also have understood that it is impossible to decompose the acceleration reading

measured by an accelerometer into separate linear, rotational, and gravitational acceleration components. Accelerometer measurements do not contain information regarding the source(s) or type(s) of force(s) underlying the measured accelerations. Mercer Decl. ¶¶ 67, 75–81; *see* LaViola Decl. ¶¶ 30–31, 34. The specification of the ’438 Patent recognizes these technical limitations:

Furthermore, the reading of the accelerometer may be accurate only when the pointing device is static since due to the limitation on known accelerometers that **these sensors may not distinguish the gravitational acceleration from the acceleration of the forces including centrifugal forces or other types of additional accelerations imposed or exerted by the user.**

’438 Patent at 3:10–13 (emphasis added); *see* LaViola Decl. ¶¶ 30–31. CyWee also acknowledged these limitations in its discovery responses:

Prior to 2010, motion sensors had limited applicability to portable electronic devices due to a variety of technological hurdles. For example, **different types of acceleration (e.g., linear, centrifugal, gravitational) could not be readily distinguished from one another**, and rapid, dynamic, and unexpected movements caused significant errors and inaccuracies. . . .

For example, it is impossible for MEMS accelerometers to distinguish different types of acceleration (e.g., linear, centrifugal, gravitational).

Ex. 3 at 9–10 (emphasis added). CyWee alleges that an accurate result can be calculated if “non-gravitational accelerations and forces” are “estimated and subtracted from the MEMS accelerometer measurement,” *id.*, but the ’438 Patent does not disclose how to accomplish these corrections. *See* Mercer Decl. ¶ 77.

Finally, even assuming acceleration could be decomposed into components, a mathematically meaningful comparison between an object’s angular velocities and axial accelerations is impossible, rendering the limitation indefinite for that additional reason. *See Invensys Sys., Inc. v. Emerson Elec. Co.*, No. 6:12-cv-799, 2014 U.S. Dist. LEXIS 108401, at *17–18 (E.D. Tex. Aug. 6, 2014) (claim limitation is indefinite when it requires a mathematically impossible calculation). The

angular velocity of an object is the rate of the object's rotational movement around an axis. Mercer Decl. ¶ 85. If an "axial acceleration" is interpreted to include either linear or gravitational acceleration components, it is mathematically impossible to compare an axial acceleration with an angular velocity. This is because linear and gravitational accelerations relate to types of motion that differ fundamentally from the type of motion measured as an object's angular velocity. *See id.* ¶¶ 68, 82–93, 101. As such, the angular velocity, linear acceleration, and gravitational acceleration experienced by an object are mutually independent. *See id.*

If an "axial acceleration" is interpreted instead as the centrifugal acceleration, a POSA would have recognized that additional data is necessary to compare a centrifugal acceleration to an angular velocity. *See id.* ¶¶ 94–101. The centrifugal acceleration of an object depends on the magnitude of acceleration and the object's instantaneous radius of rotation—*i.e.*, the distance of the object from the center of the circle created by the object's motion. As such, this radius must be known in order to compare an object's instantaneous centrifugal acceleration to its instantaneous angular velocity. *See id.* The '438 Patent does not consider or discuss this radius, and a POSA would understand that neither a rotation sensor nor an accelerometer is capable of ascertaining this radius. *Id.* ¶¶ 86, 95–99.

These issues are further complicated when the rotational movements are complex. Except for rotation induced by a single rigid body, the radius of rotation is generally variable and the rotational motions can also be compound—each with a different radius of rotation. *See Mercer Decl.* ¶¶ 55–59; 80–81; 98–99. Again, the '438 Patent does not disclose how to deal with such compound rotational movements. *Id.* Therefore, the comparison still requires a mathematically impossible calculation, rendering the limitation indefinite. *See Invensys Sys.*, 2014 U.S. Dist. LEXIS 108401 at *17–18.

CyWee fails to address these problems. Instead, Dr. LaViola claims they are “immaterial” because the ’438 Patent discloses an Extended Kalman filter in Equations 5–11. LaViola Decl. ¶¶ 29–35, 39, 41–42; Opening Br. at 7–10.

As an initial matter, neither claim 1 nor the ’438 Patent recite the term “Kalman filter” or “Extended Kalman filter.” *See* ’438 Patent; 39:22–40:16. Contrary to CyWee’s arguments, a POSA would not read the ’438 Patent (including Equations 5–11) and conclude that it teaches an Extended Kalman filter. Mercer Decl. ¶¶ 143–146. In fact, Equations 5–11 are rife with undisclosed functions and variables. *Id.*, ¶¶ 119–129. As just one example, the ’438 Patent defines Equation 11 as “an exemplary method of data association of an exemplary equation” (’438 Patent, 14:19–20) which provides no information on what the equation actually does. Even more confusingly, CyWee’s expert, Dr. LaViola, testified both that Equation 11 is the “actual equation that will do the comparison” (Ex. 4, 61:20–22) and that “it’s slightly unclear what Equation 11 is doing.” *Id.*, 129:15–17.

Dr. LaViola’s statements are not relevant because there is no dispute that a POSA would not understand which “axial acceleration” is being utilized in the comparison between the “axial accelerations” and the “angular velocity.” CyWee’s argument that these multiple, equally plausible interpretations are “immaterial” because the comparison is still “possible” misses the point. Regardless of whether the comparison is possible (which it is not), the differences are material (indeed, critical) because the comparison differs depending on the interpretation chosen, and nowhere does the ’438 Patent indicate which interpretation is correct.

CyWee’s argument is also technically inaccurate. A Kalman filter is a tool used to estimate the value of a variable when noise has been introduced. Mercer Decl. ¶ 148. An Extended Kalman filter is a non-linear version of a Kalman filter and deals with system and measurement noise. *Id.*, ¶¶ 148–150. CyWee’s expert in the *CyWee Grp. Ltd. v. Apple Inc.* litigation, Sheikh Iqbal Ahamed,

described “noise” as resulting from the effects of temperature and frequency on the electronic signal generated by the accelerometer. Ex. 5 at 10–12. An Extended Kalman filter is not designed to partition accelerometer readings into linear, centrifugal, and gravitational acceleration components in order to compare axial accelerations with angular velocities. Mercer Decl. ¶ 150. The ’438 Patent and Dr. LaViola further do not disclose how an Extended Kalman filter would do so. *Id.*, ¶¶ 150–152.

CyWee’s argument that its patents use Kalman filters to solve these issues also directly contradicts its prior position that its patents do not cover Kalman filters. Ex. 5 at 20–22. Indeed, if CyWee were correct that the patents cover Kalman filters, the patents would be invalid because Kalman filters and Extended Kalman filters have been known in the art since the 1960s—as CyWee’s expert concedes. Ex. 4, 42:18–25; 80:11–15 (“Q. Do you know when extended Kalman filters came around? A. To the best of my knowledge, they came around sometime in the ’60s.”); Mercer Decl. ¶¶ 153–154.

Indeed, Dr. LaViola was unable to articulate any distinctions between an Extended Kalman filter in its traditional form and the Extended Kalman filter purportedly disclosed in the ’438 Patent beyond how the ’438 Patent’s filter was “set up”, which he testified was set forth in Equations 1–4 of the ’438 Patent:

You have to have Equations 1 through 4 in order to be able to populate Equations 5 through 11. If you don’t have that, then you don’t know what your process model would be. In some sense, the patent’s description of the process model and the measurement that you’re getting is more important than Equations 5 through 11 themselves, because if Equations 5 through 11 are in the standard ordinary skill in the art, people understand. Right? But what the patent is doing is, is describing, you know, how you’re actually setting it up with the current framework and the current set of measurements and stuff. That’s where the real difference lies in a standard extended Kalman filter in its traditional form.

Ex. 4, 139:18–140:10 (emphasis added). Yet Dr. LaViola also testified that each of Equations 1–4 were known in the art prior to the invention of the ’438 Patent. *Id.*, 45:4–20; 58:23–59:16.

CyWee devotes the remainder of its brief to a variety of straw man arguments that are either misleading or entirely miss the point. First, CyWee argues that the '438 Patent is confined to “rigid-body” motion because the 3D pointing device has a rigid body. Opening Br. at 14. But nowhere does the '438 Patent limit the 3D pointing device to a rigid body, and, even if it did, the body of the 3D pointing device is immaterial to this issue. Mercer Decl. ¶¶ 131–37. Instead, the motion of the 3D pointing device is induced by multiple, non-rigid bodies—the user’s hand, arm, and shoulder. *Id.* ¶¶ 80, 98–99, 131–137. Indeed, CyWee’s expert, Dr. LaViola, conceded that accurately calculating the motion of an object depends in part on: (i) whether what is affecting the movement has a rigid or non-rigid body; and (ii) whether the movement is being induced by multiple bodies. Ex. 4 at 29:9–19, 32:2–25. Dr. LaViola also conceded that the value read by the sensors discloses nothing about the characteristics of what is affecting the object’s motion. *Id.* at 35:18–36:17. Yet the comparison recited in the claims must be able to account for compound motion induced by these non-rigid bodies, and the '438 Patent does not state how this comparison could be accomplished. Mercer Decl., ¶¶ 133–137.

Second, CyWee argues that Samsung conceded its understanding of “axial accelerations” in other claim limitations. It is not disputed that a POSA would understand that the term “axial accelerations” could have multiple, equally plausible interpretations. *Innovative Display*, 2015 U.S. Dist. LEXIS 57810, at *70–71 (“[I]f a person of ordinary skill would determine that there are multiple equally plausible but materially dissimilar constructions of a claim term, the claim would fail the ‘reasonable certainty’ standard, even if none of the competing constructions are ‘insolubly ambiguous.’”). Both CyWee and its expert have conceded this fact. LaViola Decl. ¶ 29. These multiple interpretations change the scope of the “comparison” limitation depending on which interpretation is selected, and comparing the three types of axial accelerations, alone or in combination, with angular velocities is both practically and mathematically impossible.

Finally, CyWee argues that a comparison of angular velocities and axial accelerations is not necessary (despite the plain claim language) based on the Northern District of California's decision in *CyWee v. Apple*. CyWee's characterization of that court's decision is at best misleading. In that case, CyWee proposed that the term "utilizing a comparison to compare the first signal set with the second signal set" be construed as "calculating using the first signal set and the second signal set." The court held that this construction was inadequate, since it did not "incorporate or even reference the specific definition of 'comparison' contained in the specification and does not clarify the scope of the overall claim when combined with the rest of claim 1's language." *CyWee Grp. Ltd. v. Apple Inc.*, No. 14-cv-01853-HSG, 2015 U.S. Dist. LEXIS 120133, at *15 (N.D. Cal. Sep. 9, 2015). Accordingly, the court construed the term as "using the calculation of actual deviation angles to compare the first signal set with the second signal set." *Id.* at *15. The court did not (as CyWee claims) state that a comparison between angular velocities and axial accelerations was unnecessary. Nor did it address the same indefiniteness arguments that are at issue here.

B. "comparing the second quaternion in relation to the measured angular velocities ω_x , ω_y , ω_z of the current state at current time T with the measured axial accelerations A_x , A_y , A_z and the predicted axial accelerations A_x' , A_y' , A_z' also at current time T" ('438 Patent, Claims 14 and 19)

Plaintiff's Proposal	Defendants' Proposal
This term need not be construed. In the alternative, this term may be construed as follows: "comparing the second quaternion in relation to the measured angular velocities ω_x , ω_y , ω_z of the current state at current time T with the measured axial accelerations A_x , A_y , A_z and the predicted axial accelerations A_x' , A_y' , A_z' also at current time T"	Indefinite

The "comparing the second quaternion" limitation in Claims 14 and 19 of the '438 Patent is indefinite for the same reasons discussed above with respect to the "utilizing a comparison" limitation in Claim 1. Indeed, Claims 14 and 19 of the '438 Patent recite nearly identical comparison steps as Claim 1, in which "angular velocities" are compared with "axial accelerations":

Claims 14 and 19	Claim 1
“comparing the second quaternion in relation to the measured angular velocities ω_x , ω_y , ω_z of the current state at current time T with the measured axial accelerations A_x , A_y , A_z and the predicted axial accelerations A_x' , A_y' , A_z' also at current time T”	“utilizing a comparison to compare the first signal set with the second signal set”

As discussed above, it is undisputed that a POSA would understand that the term “axial accelerations” could have multiple different interpretations. LaViola Decl. ¶ 29; Mercer Decl. ¶¶ 70–74. This ambiguity is compounded in Claims 14 and 19, which in addition recite “**predicted** axial accelerations.” As with measured axial accelerations, a POSA would not have known whether the predicted axial accelerations are: (i) linear accelerations; (ii) centrifugal accelerations; (iii) gravitational accelerations; or (iv) a combination from among the three. Mercer Decl. ¶¶ 164–65.

Accordingly, a POSA would not have known which “axial accelerations” and “predicted axial accelerations” were being compared with the “second quaternion in relation to the measured angular velocities.” *See* Mercer Decl. ¶¶ 162, 164–65. Each of these different interpretations changes the scope of the “comparison” term, and the specification provides no guidance regarding which interpretation is correct, rendering the above-described claim limitation indefinite. *See, e.g., Innovative Display*, 2015 U.S. Dist. LEXIS 57810, at *72–73; *Harcol Research*, 2014 U.S. Dist. LEXIS 155307, at *21–22.

Regardless of how axial accelerations and predicted axial accelerations are interpreted, a POSA would also have understood that it is impossible to decompose the acceleration reading measured by an accelerometer into separate linear, rotational, and gravitational acceleration components. Again, this point is undisputed. Mercer Decl. ¶¶ 75–81, 163; LaViola Decl. ¶¶ 30, 34; ’438 Patent at 3:10–13; Ex. 3 at 9–10.

Further, even if an acceleration measurement could be decomposed, a POSA would have understood that it is mathematically impossible to compare angular velocities with axial accelerations

and predicted axial accelerations. Mercer Decl. ¶¶ 171–75. Indeed, a POSA would have understood that this would require the mathematically impossible comparison of: (i) units that measure fundamentally different attributes of an object’s motion (*i.e.*, comparing linear or gravitational accelerations with angular velocities); or (ii) units with undefined variables (*i.e.*, comparing a centrifugal acceleration with an undefined radius with angular velocities.). *Id.* The fact that Claims 14 and 19 recite a “second quaternion in relation to the measured angular velocities” does not render the comparison between an angular velocity, an axial acceleration, and a predicted axial acceleration possible. Mercer Decl. ¶¶ 173–75. A quaternion is merely a mathematical notation for representing the orientation of an object and does not resolve any of the problems identified above. *Id.*; *see also* Ex. 4 at 45:21–46:11, 49:22–50:5.

CyWee’s other arguments are substantively identical to those it raises with respect to the “utilizing a comparison” term discussed in the preceding section. *See* Section IV.A *supra*.

C. “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” (’978 Patent, Claim 10)

Plaintiff’s Proposal	Defendants’ Proposal
This term need not be construed. In the alternative, this term may be construed as follows: “generating the orientation/deviation angle output based on (1) the first signal set (from an accelerometer), the second signal set (from a magnetometer) and the rotation output (from a rotation sensor or gyroscope) or (2) the first signal set (from an accelerometer) and the second signal set (from a magnetometer)”	Indefinite

Claim 10 discloses generating “a first signal set comprising axial accelerations,” “a second signal set associated with Earth’s magnetism,” and “a rotation output associated with a rotation of the 3D pointing device.” ’978 Patent, Claim 10. An “orientation output” is then generated based on either “the first signal set, the second signal set and the rotation output” or “the first signal set and the second signal set.” *Id.* The “orientation output” is a value “associated with the orientation of the

3D pointing device associated with the three coordinate axes of the global reference frame associated with the Earth.” ’978 Patent, 33:29–50; 33:53–64. Claim 10 therefore recites generating the orientation of a 3D pointing device based on: (i) the axial accelerations and a set of magnetism readings; or (ii) the axial accelerations, a set of magnetism readings, and the rotation output. As discussed below, a POSA would not be able to determine the scope of this limitation with reasonable certainty.

It is undisputed that a POSA would understand that the term “axial accelerations” could have multiple different interpretations. LaViola Decl. ¶ 29; Mercer Decl. ¶¶ 70–74, 162, 193. Accordingly, a POSA would not know which of the practical interpretations of “axial accelerations” was being used to generate the orientation output. Mercer Decl. ¶¶ 70–74, 193. Similar to the “comparison” limitations in the ’438 Patent, each of these different interpretations fundamentally changes the scope of the “generating” term in the ’978 Patent, and the specification provides no guidance regarding which interpretation is correct, rendering the claim limitation indefinite. *See Innovative Display*, 2015 U.S. Dist. LEXIS 57810, at *72–73; *Harcot Research*, 2014 U.S. Dist. LEXIS 155307, at *21–22. And, regardless of how axial accelerations are interpreted, it is further undisputed that a POSA would have known it is impossible to decompose the acceleration reading measured by an accelerometer into separate linear, rotational, and gravitational acceleration components. Mercer Decl. ¶¶ 75–81, 194; LaViola Decl. ¶¶ 30, 34; ’438 Patent at 3:10–13; Ex. 3 at 9–10.

Even if the acceleration measurement could be decomposed into linear, centrifugal, and gravitational components, a POSA would understand that generating an orientation output based on a set of axial accelerations and the output of a magnetometer is mathematically impossible when the 3D pointing device is moving. *See* Mercer Decl. ¶¶ 195–201. A magnetometer does not provide information regarding the upward or downward direction of an object. Accordingly, to generate an orientation output using just a magnetometer and an accelerometer, information regarding the

upward and downward direction of the device is necessarily provided by the gravitational acceleration read by the accelerometer which provides a direction to the center of the Earth. *Id.*

¶¶ 199–200. As already discussed, however, it is impossible to separately determine the contribution of the gravitational acceleration component if the 3D pointing device is experiencing linear or centrifugal accelerations. As such, it is impossible to accurately determine the 3D pointing device’s orientation in the upward or downward direction while the device is moving. *Id.* ¶¶ 75–81, 194.

CyWee again argues without support that these issues are immaterial because “a person of ordinary skill in the art would understand that the enhanced comparison method of the ’978 patent is designed to eliminate noise and reduce errors when a device is moving.” Opening Br. at 22; LaViola Decl. ¶ 96. CyWee’s only support for its argument is a short passage in the ’978 Patent. But the ’978 Patent never states that it is designed to eliminate noise when the 3D pointing device is moving. Instead, the ’978 Patent states in conclusory fashion that the computing processor “may utilize a comparison or algorithm to eliminate accumulated errors of the first, second and/or third signal sets of the nine-axis motion sensor module 302” ’978 Patent, 10:64–11:1.

Noise is the result of conditions like temperature and the frequency of an electronic signal. Ex. 5 at 10–12. Sensor errors are the result of things like sensor drift, which broadly distort the values returned by the sensor, in effect causing the readings to be off the mark. Mercer Decl. ¶ 220. Algorithms that account for sensor “error” or sensor “noise” (including Extended Kalman filters) are not designed to partition accelerometer readings into linear, centrifugal and gravitational acceleration components. *Id.* ¶ 219. The ’978 Patent and Dr. LaViola further do not disclose how an Extended Kalman filter would do so. *Id.*

Indeed, the reduction of sensor noise or error bears no relationship to the inability to generate an orientation output based on axial accelerations and magnetisms readings when the device is moving. *Id.* ¶ 221. This problem relates to the physical limitations of a magnetometer and

the inability of an accelerometer to separately quantify linear, centrifugal, and gravitational accelerations. *Id.* ¶¶ 195–201, 222. CyWee does not explain how any algorithms disclosed in the ’978 Patent would account for these limitations.

Indeed, CyWee’s expert, Dr. LaViola argues that: “[t]he ’978 patent discloses how to calculate orientation using the axial accelerations (roll and pitch) and the magnetometer measurements (yaw) in Equations 26–28” (LaViola Decl. ¶ 95), but then concedes that Equations 26–28 will only work when the device is stationary. *Id.*; Ex. 4 at 161:22–162:6. Instead, Dr. LaViola argues that Equations 5–11 are used to calculate an orientation using axial accelerations and magnetometer measurements if the device is moving. Ex. 4 at 162:8–12. Yet it is unclear how this could be true as Equations 5–11 do not recite or use the variables M_x , M_y and M_z —which are specifically described in the ’438 Patent as the measurements from the magnetometer. ’978 Patent, 35:5–10.

CyWee’s other arguments are essentially substantively identical to its arguments for the previous limitations, and are deficient for the same reasons. *See* Sections IV.A and IV.B, *supra*.

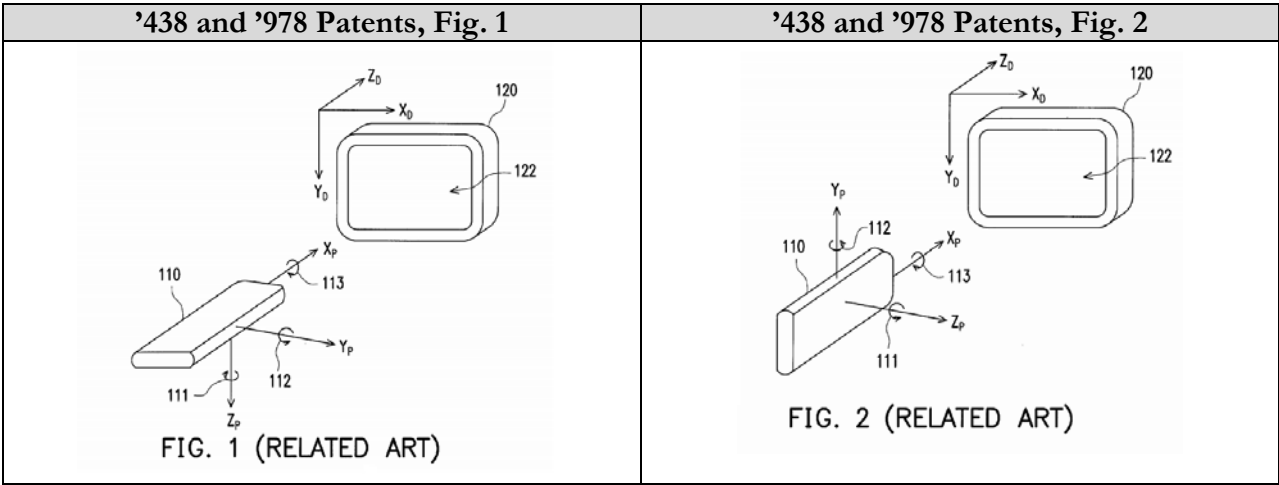
D. “three-dimensional (3D) pointing device”/ “3D pointing device” (’438 Patent, Claims 1, 3, 4, 5, 14, 15, 16, 17, 19) (’978 Patent, Claim 1)

Plaintiff’s Proposal	Defendants’ Proposal
This term need not be construed. In the alternative, this term may be construed as follows: “a handheld device that uses at least a rotation sensor comprising one or more gyroscopes, and one or more accelerometers to determine deviation angles or the orientation of a device.”	“a device that detects the motion of the device in three-dimensions and translates the detected motions to control the movement of a cursor or pointer on a display”

The parties’ constructions of “three dimensional (3D) pointing device” and “3D pointing device” differ in one key respect: CyWee’s proposal would cover any device that determines deviation angles or the device’s orientation, but Samsung’s construction requires that the device

“control the movement of a cursor or pointer on a display.” Samsung’s construction is supported by the intrinsic and extrinsic evidence and should be adopted for three reasons.

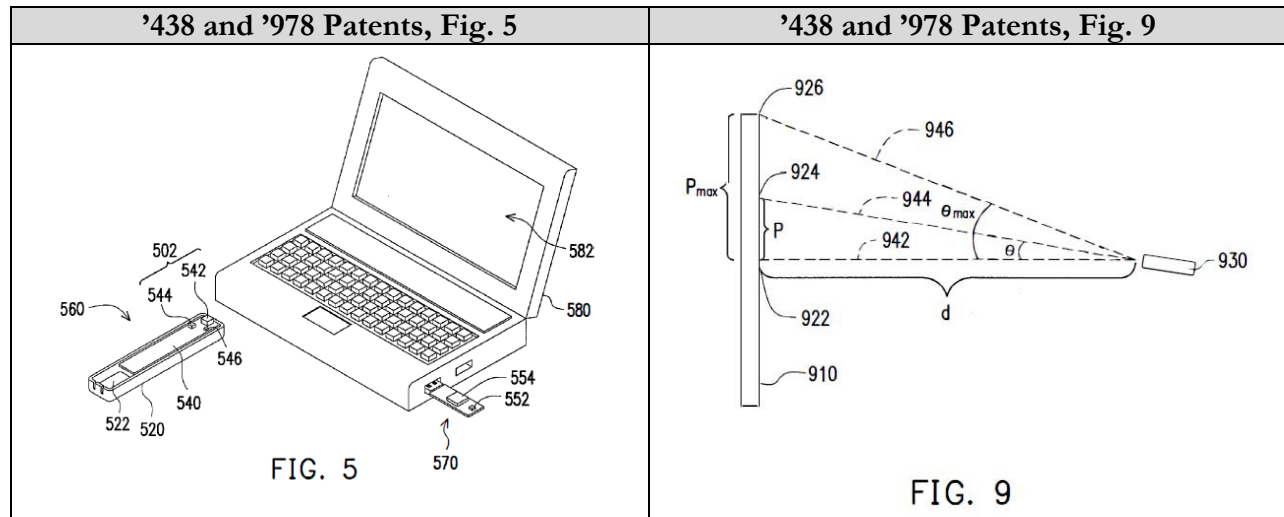
First, Samsung’s construction properly conforms to the usage of the term “3D pointing device” in the patent specifications. *See Phillips*, 415 F.3d at 1315 (noting that the specification is “the single best guide to the meaning of a disputed term”); *UltimatePointer, LLC v. Nintendo Co.*, 816 F.3d 816, 823–24 (Fed. Cir. 2016) (holding that there is no error in holding that term “handheld device” should be construed as a “handheld direct pointing system” where specification repeatedly emphasized that invention was directed to a “direct-pointing system”). As shown in Figures 1 and 2 of the patents, a 3D pointing device (110) is used for “detecting motions of the device and translating the detected motions to a cursor display such as a cursor pointing on the screen 122 of a 2D display device 120.” ’978 Patent, 1:30–35; *see also* ’438 Patent, 1:29–30 (“FIG. 1 is a schematic diagram showing a user using a handheld 3D pointing device 110 to point at a point on the screen 122 of a 2D display device.”).



By using the 3D pointing device, the user “may perform control actions and movements utilizing the pointing device for certain purposes” such as “playing a video game.” ’438 Patent, 1:48–50; ’978 Patent, 1:52–55. For proper interaction, “when the user moves the pointing device 110, the pointer on the screen 122 is expected to move along with the orientation, direction and distance

traveled by the pointing device[.]” ’438 Patent, 1:53–55; ’978 Patent, 1:55–60.

Second, Samsung’s construction is consistent with every embodiment disclosed in the patents. *Edwards Lifescis. LLC v. Cook Inc.*, 582 F.3d 1322, 1331 (Fed. Cir. 2009) (holding that construction was correct when it was consistent with every embodiment and drawing shown in the patent specification).



As examples, Figure 5 discloses a schematic diagram of one embodiment of a 3D pointing device (560) interacting with the screen of a laptop computer (582). ’438 Patent, 9:6–25; ’978 Patent, 12:20–40. The movement of the 3D pointing device is mapped and then translated “to a movement pattern in a display frame associated with the notebook computer 580. The movement pattern may be displayed on the screen 582 of the notebook computer.” ’438 Patent, 9:46–10:8; ’978 Patent, 12:41–13:4 (emphasis added). Similarly, Figure 9 discloses a “bird’s eye view” of a “3D pointing device 930 and the display screen 910 of a display device.” ’438 Patent, 16:18–20; ’978 Patent, 20:49–52. The movement of the 3D pointing device is mapped to the display screen. The display screen may “display a cursor or some video effect on the display screen 910 to highlight the position of the target point 924.” ’438 Patent, 17:22–40; ’978 Patent, 21:48–64 (emphasis added).

Third, Samsung’s construction is fully supported by the relevant extrinsic evidence. *See*

Fundamental Innovation Sys. Int'l LLC v. Samsung Elecs. Co., No. 2:17-cv-145-JRG-RSP, 2018 U.S. Dist. LEXIS 15541, at *64–65 (E.D. Tex. Jan. 31, 2018) (adopting construction where extrinsic evidence is consistent with patent disclosures). The New Oxford American Dictionary defines a “pointing device” as a device “used to control the movement of a cursor on a computer screen.” Ex. 6 (emphasis added). Similarly, the American Heritage Dictionary defines a “pointing device” as a device “with which one can move or manipulate a cursor or pointer on a GUI.” Ex. 7 (emphasis added). Thus, the extrinsic evidence all defines a “pointing device” as moving a cursor or pointer on the display as opposed to merely affecting what is shown on the display.

CyWee inconsistently argues that the meaning of a “3D pointing device” is unambiguous and requires no construction, while simultaneously disputing its proper scope and proposing an alternate construction. *See O2 Micro*, 521 F.3d at 1361 (construing a term to have its plain and ordinary meaning is inadequate when reliance on a term’s “ordinary” meaning does not resolve the parties’ dispute). CyWee’s alternate construction removes the claimed “pointing” requirement entirely.

In this way, CyWee’s construction directly contradicts the patent specifications, which expressly distinguish 3D pointing devices from other types of devices. Specifically, the ’978 Patent states:

In addition, as the trend of 3D technology advances and is applicable to various fields including displays, interactive systems and navigation, there is a significant need for an electronic device, including for example a motion detector, a **3D pointing device**, a navigation equipment, or a communication device integrated with motion sensors therein, capable of accurately outputting a deviation of such device readily useful in a 3D or spatial reference frame.

’978 Patent, 3:63–4:4 (emphasis added). It is clear from the above that the patentee intended a “3D pointing device” to have a different meaning than just a “device integrated with motion sensors” that is “capable of accurately outputting a deviation” as CyWee suggests.

CyWee's expert, Dr. LaViola, recognized these differences, stating:

Well, the 3D pointing device is being used for probably a specific function over the communication device or the motion detector. The motion detector could be simply to detect motion of a person -- communication device, so I know something about where the device is located in the world. **The difference is 3D pointing device is actually something that's used in the orientation to support a number of activities, including pointing and also understanding -- or providing direction and/or orientation information that can be utilized to render graphical elements on a screen so that they'll move with respect to the device.**

Ex. 4 at 157:16–158:7 (emphasis added).² Contrary to its own expert's opinion, CyWee's construction would make it impossible to distinguish a 3D pointing device from any other type of electronic device with sensors. *See Gen. Elec. Co. v. Nintendo Co.*, 179 F.3d 1350, 1361–62 (Fed. Cir. 1999) (construing the term “bit-map display device” to have a specific meaning where the specification prevented reading the term to cover all types of display devices).

CyWee also incorrectly argues that the doctrine of claim differentiation applies to Claims 1 and 8. Opening Br. at 15. However, Claim 8 recites a narrower limitation where the deviation of the 3D pointing device translates to a movement pattern in a display reference frame that is “different from said spatial reference frame and based on a sensitivity input correlated to said display reference frame.” ’438 Patent, Claim 8. This limitation does not relate to whether a 3D pointing device must move a cursor or pointer on the display. As such, the doctrine of claim differentiation does not apply and regardless would not override the clear statements in the patents on the scope of a 3D pointing device. *Intellectual Ventures II LLC v. FedEx Corp.*, No. 2:16-CV-00980-JRG, 2017 U.S. Dist. LEXIS 196453, at *28 (E.D. Tex. Nov. 29, 2017) (claim differentiation does not apply where dependent claim is narrower than independent claim and cannot override clear statements of scope in patent specification).

² Dr. LaViola's later testimony that a 3D pointing device could be “integrated” or “included” within other devices is immaterial and fails to address any issue. Ex. 4 at 167:5–169:11. As Dr. LaViola testified, a 3D pointing device must perform a “pointing” function. *Id.*, 157:16–158:7.

Next, CyWee argues that the patents disclose embodiments “in which information need not be displayed.” Opening Br. at 16. Contrary to CyWee’s arguments, however, Figure 7 of the patents is a flow diagram purportedly showing a method by which the 3D pointing device obtains deviation angles. *See* ’438 Patent, 10:43–52. Figure 8 is a flow diagram purportedly showing a method by which the 3D pointing device obtains deviation angles and maps those angles to a display frame. *See* ’438 Patent, 15:26–58. Neither of these diagrams eliminates the requirement that the “3D pointing device” perform a pointing function.

CyWee’s reference to Figure 6 is equally unavailing. Figure 6 discloses an embodiment in which the display is integrated with the 3D pointing device. Yet, as even CyWee concedes, the display 682 of the integrated device in this embodiment still displays the movement pattern of the device. *See* ’438 Patent, 10:29–41; ’978 Patent, 13:46–57.

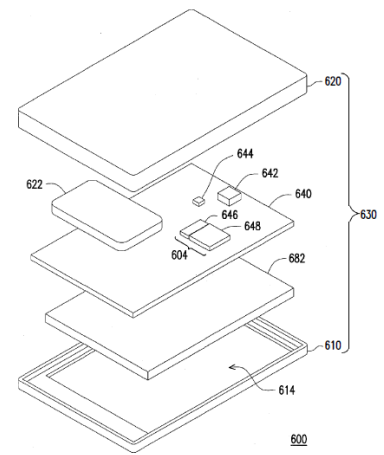


FIG. 6

Finally, CyWee concedes that while the patents may require the 3D pointing device to cause a “movement pattern,” “video effect” or “virtual object” to be displayed, this is not the same as a “pointer” or “cursor.” Opening Br. at 16–17; 25–26. CyWee’s argument misses the mark. The specific type of graphic that is displayed on the screen and controlled by the user is not at issue. Further, the meanings of the terms “pointer” and “cursor” are not as limited as CyWee suggests. *See SyncPoint Imaging, LLC v. Nintendo of Am. Inc.*, No. 2:15-cv-00247-JRG-RSP, 2016 U.S. Dist. LEXIS 677, at *31 (E.D. Tex. Jan. 5, 2016) (construing a “cursor” as “a visible mark that is generated by the computer and that indicates a position on the display for the visual output from the computer.”). For these reasons, the Court should reject CyWee’s construction.

E. “six-axis motion sensor” (’438 Patent, Claims 1, 5, 14, 15, 16, 17, 19)

Plaintiff’s Proposal	Defendants’ Proposal
This term need not be construed. In the alternative, this term may be construed as follows: “a rotation sensor comprising one or more gyroscopes for collectively generating three angular velocities and one or more accelerometers for collectively generating three axial accelerations where said gyroscope(s) and accelerometer(s) are mounted on a common PCB”	“a module consisting of two types of sensors: (i) a rotation sensor and (ii) one or more accelerometers”

Samsung’s construction adopts the specification’s express definition of “six-axis motion sensor.” *See Phillips*, 415 F.3d at 1321 (the specification “acts as a dictionary when it expressly defines terms used in the claims”); *Profectus Tech. LLC v. Huawei Techs. Co.*, No. 6:11-cv-474, 2014 U.S. Dist. LEXIS 53157, at *18–19 (E.D. Tex. Apr. 16, 2014) (adopting express definition of “picture frame” in specification). The only disclosure in the ’438 Patent of a “six axis motion sensor module” is a sensor module consisting of two types of sensors: a rotation sensor (342) and accelerometer (344). The ’438 Patent expressly defines the term “six-axis”: “The term ‘six-axis’ means the three angular velocities ω_x , ω_y , ω_z and the three axial accelerations A_x , A_y , A_z .” ’438 Patent, 10:10–12.

CyWee concedes that a “six-axis motion sensor module” contains a rotation sensor and accelerometers. CyWee inexplicably argues, however, that the module can also include other unspecified types of sensors. Opening Br. at 18–19. Despite this assertion, CyWee is unable to point to any portion of the ’438 Patent that discusses generating or using data from any other type of sensor. *Id.* Instead, CyWee’s construction further ignores the patentee’s clear and unmistakable disavowal of claim scope during prosecution. It is well-established that “where the patentee has unequivocally disavowed a certain meaning to obtain his patent, the doctrine of prosecution disclaimer attaches and narrows the ordinary meaning of the claim congruent with the scope of the surrender.” *Omega Eng’g, Inc. v. Raytek Corp.*, 334 F.3d 1314, 1324 (Fed. Cir. 2003).

The '978 Patent was originally rejected for double patenting based on the earlier filed '438 Patent. Ex. 8 at 9. In response, the patentee amended the application to make clear that the claims require a nine-axis motion sensor (versus the six-axis motion sensor claimed in the '438 Patent). *Id.* The patentee further made clear that the '438 Patent “includes the claimed subject matter of a six-axis motion sensor module without having and using measured magnetisms and predicted magnetisms” in order to “provide a clear line of demarcation” between the two patents. *Id.* at 9–10. The '978 Patent was then allowed based on this distinction. *See* Ex. 9.

CyWee's construction now seeks to blur this “clear line of demarcation” so that the “six-axis motion sensor” can include any other type of sensor—including magnetometers—in a belated attempt to recapture claim scope that was disclaimed during prosecution. CyWee thereby seeks to remove the only discernable way of distinguishing a “six-axis sensor chip” from a “nine-axis” sensor chip. In contrast, Samsung's construction removes any ambiguity regarding the intended meaning of the claim term and should be adopted.

F. “using the orientation output and the rotation output to generate a transformed output associated with a fixed reference frame associated with a display device” ('978 Patent, Claim 10)

Plaintiff's Proposal	Defendants' Proposal
This term need not be construed. In the alternative, this term may be construed as follows: “using the orientation output and the rotation output to generate a transformed output represented by 2-dimensional movement in a fixed reference frame that is parallel to the screen of a display device”	“using the orientation output and the rotation output to generate a transformed output representing a two-dimensional movement in a fixed reference frame that is parallel to the screen of the display device”

The parties generally agree on the construction of “using the orientation output and the rotation output to generate a transformed output associated with a fixed reference frame associated with a display device.” The parties generally also agree on the evidentiary bases for that construction. The sole apparent disagreement is whether the transformed output is a variable that represents two-

dimensional movement. It is unclear from CyWee's Opening Brief whether CyWee even disputes this point.

Samsung's construction is taken directly from the specification. Specifically, the '978 Patent states:

In step 1360, the computing processor 1420 uses the orientation output and the rotation output to generate a transformed output $\langle d_x, d_y \rangle$ associated with the fixed reference frame associated with the display device. **The transformed output $\langle d_x, d_y \rangle$ represents a 2-dimensional movement in a display plane in the fixed reference frame parallel to the screen of the display device, such as the display plane $X_D Y_D$ of the display device 120 shown in FIG. 1 and FIG. 2, wherein d_x represents the movement along the X_D axis and d_y represents the movement along the Y_D axis.** In addition, the transformed output $\langle d_x, d_y \rangle$ may represent a segment of movement in the display plane. Multiple segments of movement plotted by the 3D pointing device may constitute a movement pattern in the display plane and the display device may be controlled to move a virtual object or a cursor along the movement pattern.

'978 Patent, 31:51–32:3 (emphasis added).

It is clear from this passage that the “transformed output” $\langle d_x, d_y \rangle$ is a two-dimensional vector representing a two-dimensional movement. In the example given in the '978 Patent, d_x is the component of the vector representing movement along the X_D axis of the display screen in Figure 1, while d_y is the component of the vector representing movement along the Y_D axis of the display screen. *Id.*

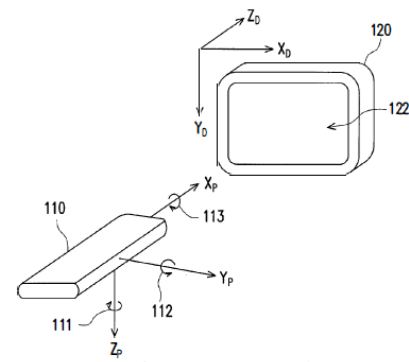


FIG. 1 (RELATED ART)

The bulk of CyWee's argument is devoted to attacking an interpretation that Samsung has never advanced. In fact, CyWee's argument appears to be directed to how the “transformed output” is generated (rather than the proper scope of the term itself). The fact that: (i) the sensors of the 3D pointing device are capable of measuring three-dimensional movement or that (ii) the “transformed

output” originates from the “orientation output” and the “rotation output” is immaterial. The “transformed output” is generated from these values, and the ’978 Patent makes clear that this “transformed output” is a two-dimensional vector representing two-dimensional movement.

G. “global reference frame associated with Earth” (’978 Patent, Claim 10)

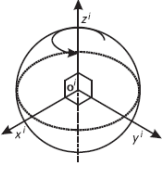
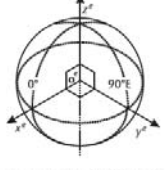
Plaintiff’s Proposal	Defendants’ Proposal
This term need not be construed. In the alternative, this term may be construed as follows: “reference frame with axes defined with respect to Earth”	“an Earth-centered coordinate system with an origin and a set of three coordinate axes defined with respect to Earth”

Samsung’s construction of “global reference frame associated with Earth” conforms to the term’s commonly understood meaning in the relevant art. In contrast, CyWee’s construction fails to give the jury proper guidance as to the meaning of the term. *See O2 Micro*, 521 F.3d at 1361. There are two key differences between the parties’ constructions.

First, Samsung’s construction requires three coordinate axes, while CyWee’s merely requires “axes.” The ’978 Patent, however, explicitly states in numerous places that a “global reference frame” must comprise a set of “three coordinate axes.” For example, the ’978 Patent describes one step of the “invention” as “generating an orientation output associated with an orientation of the 3D pointing device associated with the three coordinate axes of a global reference frame associated with the Earth.” ’978 Patent, 8:4–7. The ’978 Patent later states that the “orientation sensor” generates an “orientation output associated with three coordinate axes of a global reference frame associated with the Earth.” *Id.*, 30:50–54. *See also id.*, 7:57–61; 32:23–26.

Second, CyWee’s construction does not define the origin of the required axes, whereas Samsung’s requires “an Earth-centered coordinate system with an origin and a set of three coordinate axes defined with respect to Earth.” Samsung’s proposal is appropriate because of the “global” and “associated with Earth” language in the relevant limitation. However, to the extent this term is ambiguous, Samsung’s construction is appropriate because it accords with the extrinsic

evidence. *See Linex Techs., Inc. v. Belkin Int'l, Inc.*, No. 2:07-cv-222, 2009 U.S. Dist. LEXIS 10905, at *24 (E.D. Tex. Feb. 12, 2009) (consideration of extrinsic evidence is appropriate if ambiguities remain after consideration of all available intrinsic evidence). The extrinsic evidence uniformly shows that a “global reference frame associated with Earth” must be Earth-centered. As set forth in “Principles of GNSS, Inertial, and Multisensor Integrated Navigation Systems” (“Principles of GNSS”), “Earth frames” are used when “the user wants to know their position relative to the Earth[.]” *See* Ex. 10 at 20. As shown in Figures 2.2 and 2.3, in such frames, the origin of the reference frame is centered roughly at the Earth’s center of mass.

Figure 2.2	Figure 2.3
 Figure 2.2 Axes of the ECI frame. (From: [1]. © 2002 QinetiQ Ltd. Reprinted with permission.)	 Figure 2.3 Axes of the ECEF frame. (From: [1]. © 2002 QinetiQ Ltd. Reprinted with permission.)

Samsung’s construction is also supported by CyWee’s extrinsic evidence. “Fundamentals of Inertial Navigation, Satellite-based Positioning, and their Integration,” cited by CyWee, similarly defines only two “Earth” frames, both of which have origins at the center of the Earth’s mass. *See* Ex. 11, §§ 2.21–2.22.

CyWee’s argument that the extrinsic evidence also describes other frames of reference that can be defined with respect to Earth misses the point. Again, the ’978 Patent specifically requires a “**global** reference frame **associated with the Earth**” (emphasis added). Despite this, CyWee points to examples of a local navigation frame (*id.*, § 2.2.3) and a wander frame (*id.*, § 2.2.4) to argue that a “global reference frame associated with Earth” can encompass both of these reference frames (and many others) with axes “defined with respect to Earth.” Neither of these reference frames is global, however. *See id.*, Fig. 2.2 (depicting local-level reference frame in relation to Earth-centered frames)

and Fig. 2.3 (depicting wander frame with respect to local-level frame). Instead, they are both local reference frames, meaning that their coordinate axes and origin are defined with respect to the object whose movement is being tracked. *See id.* at 29 (origin of a local level frame coincides with the center of the sensor frame). Conversely, the Earth reference frame has its origin at the center of the Earth and its axes are fixed with respect to the Earth. CyWee's construction is therefore inappropriate because it writes "global" out of the claim entirely. *See K-2 Corp. v. Salomon S.A.*, 191 F.3d 1356, 1364 (Fed. Cir. 1999) ("Courts do not rewrite claims; instead, we give effect to the terms chosen by the patentee."). Indeed, CyWee's construction defines the term so broadly that there is no limit to the reference frames that will fit its definition. For these reasons, Samsung's construction should be adopted.

V. CONCLUSION

A claim limitation is indefinite if it is either mathematically impossible or subject to multiple interpretations. Here, each of CyWee's claims suffers from both deficiencies. Due to the undisputed fact that "axial accelerations" can have multiple meanings to a POSA, the key limitations: "utilizing a comparison to compare the first signal set with the second signal set"; "comparing the second quaternion in relation to the measured angular velocities ω_x , ω_y , ω_z of the current state at current time T with the measured axial accelerations A_x , A_y , A_z and the predicted axial accelerations A_x' , A_y' , A_z' also at current time 'T'; and "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" are subject to multiple interpretations, and CyWee does not point to any evidence showing which one is correct. Moreover, regardless of the interpretation chosen, the calculations required by these terms are mathematically impossible. Therefore, these limitations are indefinite for multiple independent reasons, and every asserted claim is invalid.

Samsung's constructions of the remaining terms accord with the intrinsic and extrinsic evidence. In contrast, CyWee seeks to broaden its claims beyond their proper scope. Therefore, Samsung requests that its proposed constructions be adopted.

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Respectfully submitted,

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CERTIFICATE OF SERVICE

I hereby certify that a true and correct copy of the foregoing document was filed electronically in compliance with Local Rule CV-5 on March 9, 2018. As of this date, all counsel of record had consented to electronic service and are being served with a copy of this document through the Court's CM/ECF system under Local Rule CV-5(a)(3)(A).

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