UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

NINTENDO OF AMERICA, INC. and NINTENDO CO., LTD.,
Petitioner,

v.

iLIFE TECHNOLOGIES, INC.,
Patent Owner.

Case IPR2015-00115
Patent 7,479,890 B2

Before JACQUELINE WRIGHT BONILLA, MICHELLE R. OSINSKI, and HYUN J. JUNG, *Administrative Patent Judges.*

BONILLA, *Administrative Patent Judge.*

FINAL WRITTEN DECISION
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

I. INTRODUCTION

Nintendo of America Inc. and Nintendo Co., Ltd. ("Petitioner") filed a Corrected Petition requesting *inter partes* review of claims 1 and 11 of U.S. Patent No. 7,479,890 B2 (Ex. 1001, "the '890 patent"). Paper 4 ("Pet."). iLife Technologies, Inc. ("Patent Owner") filed a Preliminary Response. Paper 9 ("Prelim. Resp."). Upon considering those submissions, we instituted *inter partes* review of claims 1 and 11 of the '890 patent based on two obviousness ground. Paper 12 ("Dec. on Inst.").

After institution, Patent Owner filed a Response (Paper 14 ("PO Resp.")), and Petitioner filed a Reply (Paper 21 ("Reply")). Petitioner proffered a Declaration of Gregory Francis Welch, Ph.D. (Ex. 1002, "Welch Declaration") with its Petition and a Reply Declaration of Gregory Francis Welch, Ph.D. (Ex. 1013, "Welch Reply Declaration") with its Reply. Patent Owner proffered Declarations of Dr. Robert H. Sturges (Ex. 2006, "the Sturges Declaration"), Michael L. Lehrman (Ex. 2007), Michael D. Halleck (Ex. 2008), Michael E. Halleck (Ex. 2009), Alan Owens (Ex. 2010), Edward L. Massman (Ex. 2011), Don James (Ex. 2012), and Greg Younger (Ex. 2013) with its Response. Also, transcripts from depositions of Dr. Sturges (Ex. 1012) and Dr. Welch (Ex. 2038) were filed.

In addition, Patent Owner filed a Motion to Exclude seeking to exclude certain evidence. Paper 29 (" Mot. Excl."). Petitioner filed an Opposition to Patent Owner's Motion to Exclude (Paper 32) ("Opp. Mot Excl."), and Patent Owner filed a Reply (Paper 36).

Patent Owner also filed a Notice Regarding New Arguments and Belated Support (Paper 30), to which Petitioner filed a Response (Paper 33).

Patent Owner further filed a Motion for Observations (Paper 31), and Petitioner filed a Response (Paper 34) to that Motion.

A combined oral hearing in this proceeding and Cases IPR2015-00105, IPR2015-00106, IPR2015-00109, IPR2015-00112, and IPR2015-00113 was held on January 27, 2016; a transcript of the hearing is included in the record (Paper 38, "Tr.").

We have jurisdiction under 35 U.S.C. § 6(c). We issue this Final Written Decision pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons that follow, we determine that Petitioner has shown by a preponderance of the evidence that claims 1 and 11 of the '890 patent are unpatentable based on one obviousness ground. We also deny Patent Owner's Motion to Exclude.

A. Grounds of Unpatentability at Issue

Petitioner contends that challenged claims 1 and 11 are unpatentable under 35 U.S.C. § 103 based on the following grounds.

Claims Challenged	Basis	Reference(s)
1 and 11	§ 103	Yasushi (Ex. 1003)[1]
1 and 11	§ 103	Unuma (Ex. 1004)[2]

Dec. on Inst. 35.

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[1] Yasushi, Japanese Patent Application JP10-295649, published Nov. 10, 1998 (Ex. 1003).

[2] Unuma et al, European Patent Application EP 0 816 986 A2, published Jan. 7, 1998 (Ex. 1004).

B. Related Proceedings

The parties indicate that district court cases involving the ’890 patent include *iLife Technologies, Inc. v. Nintendo of America Inc.*, No. 3:13-cv-04987 (N.D. Tex.), as well as other cases involving other defendants including *iLife Technologies Inc. v. AliphCom*, No. 3:14-cv-03345 (N.D. Cal.); *iLife Technologies Inc. v. Body Media, Inc.*, No. 2:2014-cv-00990 (W.D. Pa.); and *iLife Technologies Inc. v. Fitbit, Inc.*, No. 3:2014-cv-03338 (N.D. Cal.). Pet. 1; Paper 7, 1.

Upon considering other Petitions filed by the same Petitioner on the same day, we also instituted *inter partes* review of claims in related U.S. Patent Nos. 6,307,481 B1 (Case IPR2015-00105), 6,703,939 B2 (IPR2015-00106), 6,864,796 B2 (Case IPR2015-00109), 7,095,331 B2 (Case IPR2015-00112), and 7,145,461 B2 (Case IPR2015-00113).

C. The ’890 Patent (Ex. 1001)

The ’890 patent relates to systems, and methods of operation thereof, for evaluating movement of a body relative to an environment, such as falls, irregular movement, inactivity, etc. Ex. 1001, 1:30–34, 2:47–50. The ’890 patent indicates that prior art methods fail to discern normal, acceptable, or unacceptable changes in levels of body activity. *Id*. at 1:58–64. The specification acknowledges that “accelerometers that measure both static and dynamic acceleration are known,” but states that “their primary use has heretofore been substantially confined to applications directed to measuring one or the other, but not both.” *Id*. at 2:24–27.

The specification distinguishes between “static acceleration, or gravity,” which is “a gauge of position,” versus “dynamic acceleration (i.e., vibration, body movement, and the like).” *Id*. at 2:20–24. The system of the

’890 patent includes a sensor associated with the body that operates to repeatedly sense dynamic and static accelerative phenomena of the body. *Id.* at 2:60–63. The sensor “senses one or more absolute values, changes in value, or some combination of the same” and may be “a plural-axis sensor” that “generates an output signal to the processor indicative of measurements of both dynamic and static acceleration of the body in plural axes.” *Id.* at 3:6–15, 6:36–44. In one embodiment, the sensor generates voltage signals that include “an alternating current (ac) voltage component proportional to G forces (i.e., dynamic acceleration component related to vibrations of sensor layer 31),” as well as “a direct current (dc) voltage component proportional to an angle relative to earth (i.e., static acceleration component related to gravity).” *Id.* at 7:9–23.

The system further includes a processor that processes “sensed dynamic and static accelerative phenomena as a function of at least one accelerative event characteristic and an environmental representation” to determine whether evaluated body activity is within “environmental tolerance.” *Id.* at 2:60–67. The ’890 patent defines “accelerative events” as “occurrences of change in velocity of the body (or acceleration), whether in magnitude, direction or both, and including cessation of activity or inactivity.” *Id.* at 6:12–16. The ’890 patent states that an accelerative event characteristic “will largely be defined by the specific application.” *Id.* at 10:52–56. The specification also defines “environmental representation” as “any mathematical or other suitable depiction, delineation, model or like measured description of the environment associated with the body.” *Id.* at 3:15–19.

The processor "generates state indicia relative the environment of interest, and determines whether the evaluated body movement is within tolerance in the context of that environment." *Id.* at 10:57–60. The '890 patent describes that "'tolerance' would . . . be very different for a monitored body of an elderly person . . . , a toddler, a box in a freight car, a container of combustible gas, etc." *Id.* at 10:60–64.

Figure 4 of the '890 patent is reproduced below.

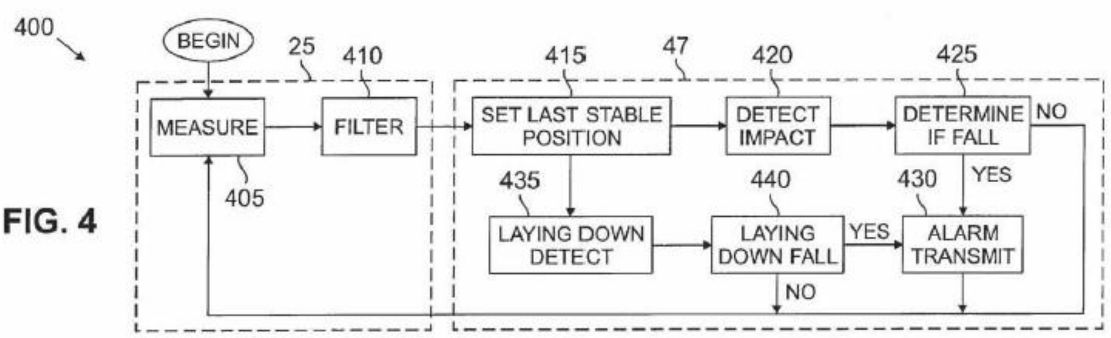

FIG. 4

Figure 4 depicts an operational flow diagram of exemplary method 400 of programming processor 47 in accordance with a fall detection application of the principles of the '890 patent. *Id.* at 5:24–28, 9:31–44. Step 405 involves generating a request for sampling measurements, either in response to an executing operations program or upon initiation by a user. *Id.* at 9:45–49. Sensor 25 senses x and y acceleration values and outputs measurement signals that are filtered in step 410 to reduce the probability that an out-of-tolerance abnormal movement will be determined incorrectly in response to a single sharp impact. *Id.* at 9:49–58. Step 415 involves processor 47 using the outputs from sensor 25 to determine a last stable position of the body. *Id.* at 9:59–61. In Step 420, processor 47 uses ac voltage components of each output from sensor 25 to check against a G force threshold value to see if the threshold is exceeded, and thus, qualifies as a potential fall. *Id.* at

10:10–15. In Step 425, processor 47 determines a fall by testing a post-impact stream of samples against a tolerance. *Id*. at 10:20–23. In Step 430, a change of body position greater than 45° or more from the last stable position may lead to classification of the event as a debilitating fall. *Id*. at 10:29–33.

In Step 435, processor 47 adds the absolute values of the x and y last stable positions and then determines whether the body is lying down if the added value exceeds a value corresponding to 90° plus or minus 25%, after setting the last stable position. *Id*. at 10:36–41. In Step 440, any impact that exceeds a G force threshold is treated as a debilitating fall. *Id*. at 10:41–45. "Exemplary processor 47 is programmed to distinguish between normal and abnormal accelerative events (e.g., walking, sitting, lying down, etc. versus tripping, falling down, inactivity over time, etc.), and, when an abnormal event is identified, indicates whether the abnormal event is tolerable, or within tolerance." *Id*. at 13:34–39.

D. Challenged Claims

Petitioner challenges independent claims 1 and 11 of the '890 patent, which are reproduced below.

> 1. A system that evaluates movement of a body relative to an environment, said system comprising:
>
> a sensor, associable with said body, that senses accelerative phenomena of said body relative to a three dimensional frame of reference in said environment,
>
> said sensor comprising a plurality of acceleration measuring devices; and
>
> a processor, associated with said sensor, that processes said sensed accelerative phenomena of said body as a function of at least one accelerative event characteristic

> to thereby determine whether said evaluated body movement is within an environmental tolerance, and
>
> to thereby determine whether said body has experienced no movement for a predetermined period of time.
>
> 11. A method of operating a system to evaluate movement of a body relative to an environment wherein a sensor is associated with said body, said method comprising the steps of:
>
> substantially continuously measuring dynamic and static acceleration of said body with a plurality of acceleration measuring devices relative to a three dimensional frame of reference and providing output signals indicative thereof;
>
> processing said sensed accelerative phenomena of said body as a function of at least one accelerative event characteristic
>
> to thereby determine whether said evaluated body movement is within an environmental tolerance; and
>
> determining whether said body has experienced no movement for a predetermined period of time.

Ex. 1001, 21:57–22:3, 46–61 (paragraph indentations added).

II. ANALYSIS

A. Claim Construction

In an *inter partes* review, "[a] claim in an unexpired patent shall be given its broadest reasonable construction in light of the specification of the patent in which it appears." 37 C.F.R. § 42.100(b); *In re Cuozzo Speed Techs., LLC,* 793 F.3d 1268, 1275–79 (Fed. Cir. 2015), *cert. granted sub nom. Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 890 (mem.) (2016). There is a presumption that a claim term carries its ordinary and customary meaning. *CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1366 (Fed. Cir. 2002); *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). A patentee may rebut this presumption, however, by acting as his own lexicographer, providing a definition of the term in the specification with “reasonable clarity, deliberateness, and precision.” *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994). In the absence of such a definition, limitations are not to be read from the specification into the claims. *In re Van Geuns*, 988 F.2d 1181, 1184 (Fed. Cir. 1993).

In the Decision on Institution, we interpreted various claim terms of the ’890 patent as follows:

Term	**Interpretation**
“dynamic accelerative phenomena”	“acceleration indicating vibration or movement”
“static accelerative phenomena”	“acceleration indicating position of the body relative to the earth”
“within environmental tolerance”	“acceptable based on criteria including a specified value given the environment for which body movement is being evaluated”

Dec. to Inst. 8–13.

Patent Owner states that “for purposes of this Response, the preliminary claim constructions from the Board’s Decision to institute trial (Paper 12) are used.” PO Resp. 28. Also, Petitioner presents no arguments disputing these preliminary claim constructions in its Reply. Based on our review of the complete record, we do not perceive any reason or evidence that now compels any deviation from these interpretations. In addition to the above, we provide other claim constructions below.

1. *"a sensor . . . that senses accelerative phenomena of said body relative to a three dimensional frame of reference in said environment"(claim 1)*

Petitioner advocates a construction for the above-referenced claim limitation in which a three-dimensional ("3D") frame of reference is "established by the sensor so that measurements can be taken relative to each of the three axes of the 3D frame of reference." Reply 4; *see also* Ex. 1013 ¶ 18 ("In order to constitute a sensor that senses relative to a 3D frame of reference as claimed, the sensor must have sensing capability in all three axes to establish the required 3D frame of reference.").

We authorized Patent Owner to file a sur-reply addressing the construction of "relative to a three dimensional frame of reference" in this proceeding. Paper 26 (Patent Owner's Supplemental Claim Construction Briefing). In the sur-reply, Patent Owner argues that a proper construction of the claim language "does not require sensing or measuring simultaneously in three directions or a three-dimensional coordinate system." *Id.* at 1; *see also* Ex. 2006 ¶ 106 ("The claim limitation recites sensing accelerative phenomena '*relative* to a three dimensional frame of reference in said environment,' not 'in each of three dimensions.'").

Patent Owner argues that Petitioner's construction would require at least three accelerometers, rendering the term "plurality" superfluous. Paper 26, 1 (citing *Leapfrog Enterprises, Inc. v. Fisher-Price, Inc.*, 485 F.3d 1157, 1159–60 (Fed. Cir. 2007)). We understand Patent Owner to be asserting that if "a sensor . . . that senses accelerative phenomena . . . relative to a three dimensional frame of reference" were to be construed to require sensing along three axes, this would necessarily require three accelerometers, thereby rendering it superfluous to recite that the "sensor compris[es] a plurality of acceleration measuring devices." Ex. 1001, claims 1 and 11. We are not persuaded by Patent Owner's argument.

Although the plurality of acceleration devices can be *three* accelerometers each aligned along one axis of a three dimensional coordinate system (Ex. 1001, 14:35–42), as discussed in more detail below, the plurality of acceleration devices can alternatively be *two* plural-axis accelerometers in which a first plural-axis accelerometer is aligned within a first plane of a three dimensional coordinate system and in which a second plural-axis accelerometer is aligned within a second plane, and this alternate configuration would also allow sensing along three axes (*id.* at 16:51–61). Thus, the reference to "a plurality of acceleration measuring devices" in claim 1 is inclusive of at least two alternate embodiments, where each comprise more than one, i.e., a plurality of, acceleration measuring devices. *See id.* at 14:35–42 ("In one arrangement . . . accelerometer 910 is aligned parallel to the x-axis . . . Accelerometer 920 is aligned parallel to the y-axis . . . Accelerometer 930 is aligned parallel to the z-axis"), 16:51–61 ("In an alternative advantageous embodiment . . . first axis of accelerometer 910 is aligned parallel to the x axis and the second axis of accelerometer [910] is aligned parallel to the y axis . . . first axis of accelerometer 920 is aligned parallel to the negative y axis and the second axis of accelerometer 920 is aligned parallel to the z axis"). Accordingly, we do not agree with Patent Owner's premise that Petitioner's claim construction would render the term "plurality" superfluous per se.

Although we are not persuaded by Patent Owner's arguments as set forth above, we consider that claim terms are given their ordinary and customary meaning as understood by one of ordinary skill in the art in the context of the entire disclosure. *Translogic Tech.*, 504 F.3d at 1257. The ordinary and customary meaning of the term "relative to" is "with regard to." *See The American Heritage Dictionary of the English Language*, available at https://www.ahdictionary.com/word/search.html?q=relative+to (last visited Apr. 26, 2016) (defining "relative to" as "[w]ith regard to; concerning") (Ex. 3003); *Merriam-Webster Dictionary*, available at http://www.merriam-webster.com/dictionary/relative%20to (last visited Apr. 26, 2016) (defining "relative to" as "with regard to: in connection with") (Ex. 3004); *The Oxford English Dictionary*, available at http://www.oed.com/view/Entry/161819?redirectedFrom=relative#eid (last visited Apr. 26, 2016) (defining "relative to" as "[h]aving application or reference to; relating to.") (Ex. 3005).

There is nothing in the specification that indicates a deviation from this ordinary meaning. Accordingly, the plain language of the claim means that the sensor senses accelerative phenomena of said body *with regard to* a three dimensional frame of reference. We also interpret "three dimensional frame of reference" to refer to "a system of axes (in three dimensions) in relation to which position or motion can be defined." *See The Oxford English Dictionary*, available at http://www.oed.com/view/Entry/317084?redirectedFrom=frame+of+reference#eid (last visited Apr. 26, 2016) (Ex. 3006) (defining "frame of reference" as "[a] system of coordinate axes in relation to which size, position, or motion, can be defined;" *see also* Ex. 1001, 2:48–50 ("the present invention introduces systems, as well as methods of operating such systems, for evaluating movement of a body relative to an environment"), 3:11–15 ("the sensor may be a plural-axis sensor that senses accelerative phenomena and generates an output signal to the processor indicative of measurements of both dynamic and static acceleration of the body in plural axes"). In other words, the plain language of the claim refers to a sensor that senses accelerative phenomena of said body *with regard to* a system of axes (in three dimensions) in relation to which position or motion can be defined.

The specification describes the term "sensor" broadly as "a device that senses one or more absolute values, changes in value, or some combination of the same, of at least the sensed accelerative phenomena." Ex. 1001, 3:6–9. The specification describes "an advantageous embodiment" in which "the sensor may be a plural-axis sensor that senses accelerative phenomena and generates an output signal to the processor indicative of measurements of both dynamic and static acceleration of the body in plural axes." *Id.* at 3:9–15. The specification explains that sensor 25 of Figure 1 is "for illustrative purposes only" (*id.* at 7:31–32), that "any sensor that is capable of sensing accelerative phenomena relative to a body may be used in lieu of, or even in conjunction with, sensor 25" (*id.* at 7:33–35), and that "alternate orientations of sensor 25 may be used for different applications" (*id.* at 7:35–36). Notably, the specification also describes that the x and y outputs of illustrative sensor 25 can distinguish a "fall" from "normal body movement" (i.e., "disruption of a stable position") "by a concussive force followed by a distinctly different ending stable position." *Id.* at 8:64–9:14. Thus, measurements taken along two axes (i.e., x and y axes) "sense," i.e., obtain information about, accelerative phenomena of a body relative to a 3D frame of reference, i.e., a fall.

Later on, the specification further describes "an alternate advantageous embodiment" with three acceleration measuring devices that may each comprise a plural axis measuring device. *Id.* at 14:4–16. In one arrangement, each acceleration measuring device is aligned parallel to the *x*-axis, *y*-axis, and *z*-axis, respectively, of a three dimensional Cartesian coordinate system, and measures accelerations in the *x* direction, *y* direction, and *z* direction, respectively. *Id.* at 14:35–42. The specification further describes another "alternate advantageous embodiment" in which a first plural-axis accelerometer has a first axis aligned parallel to the *x* axis and a second axis aligned parallel to the *y* axis, and a second plural-axis accelerometer has a first axis aligned parallel to the negative *y* axis and a second axis aligned parallel to the *z* axis. *Id.* at 16:51–61.

Even though the specification describes particular embodiments in which acceleration measuring devices are aligned parallel to (and accelerations are measured in) the *x* direction, *y* direction, and *z* direction of a three dimensional Cartesian coordinate system, we decline to import into the claims limitations based on specific embodiments in the specification. *See, e.g.*, *SuperGuide Corp. v. DirecTV Enters., Inc.*, 358 F.3d 870, 875 (Fed. Cir. 2004) ("[A] particular embodiment appearing in the written description may not be read into a claim when the claim language is broader than the embodiment."); *In re Van Geuns*, 988 F.2d 1181, 1184 (Fed. Cir. 1993) ("[L]imitations are not to be read into the claims from the specification.") (citations omitted).

We determine that the claim language is broader than the particular embodiments that measure acceleration along all three axes, and mirrors the specification's broader reference to the use of any sensor that is capable of sensing accelerative phenomena "relative to a body" (Ex. 1001, 7:31–35, 2:47–54). For example, as discussed above, the '890 patent describes a "fall detection application" (*id.* at 8:64–9:14), and indicates that the fall by a body is detected through movement of the body in a left/right and/or forward/back directions as well as position of the body, such as when a person is lying down (*id.*). Thus, in this embodiment, the '890 patent refers to taking measurements (using devices) from two axes to "sense" accelerative phenomena of the body relative to a three dimensional frame of reference, i.e., a "fall" of the body. *Id.*. The described fall detection application provides context for how one of ordinary skill in the art would understand the term "relative to." Construing the claims to encompass a system that measures acceleration along either two or three axes (using devices within the sensor), as way to "sense" acceleration phenomena of the body in relation to a three dimensional frame of reference (e.g., a fall), is consistent with the specification.

For the foregoing reasons, we are not persuaded that the claim should be construed to require the sensor to take measurements in all three axes, as asserted by Petitioner. Petitioner argues that the claim cannot simply mean "sensing or existing in 3D space regardless of the number of sensing axes on the sensor" because such a construction would essentially render the claim language meaningless. Reply 4. Petitioner argues that a two dimensional ("2D") sensor "exists in 3D space does not change the fact that it only senses relative to a 2D frame of reference defined by the two sensing axes 27 and 29." *Id.* (citing Ex. 1007, 68 (Fig. 1)). Petitioner's declarant, Dr. Welch, also states that "a 2D sensor only senses relative to a 2D frame of reference (the two axes defined by the 2D sensor)" and notes the examples of a tape measure and an altimeter that each exist in 3D space, but are only capable of measuring relative to the one-dimensional frame of reference established by each device. Ex. 1013 ¶¶ 17–18.

We are not persuaded by Petitioner's argument. As discussed above, not only does the specification describe a sensor that exists and operates in 3D space, but the specification also "show[s] use of a dual axis accelerometer to distinguish movement of a body left/right (x axis), forward/backward (y axis), and falling to the ground (z axis)." Paper 26, 2 (citing Ex. 1001, 8:66–9:17); *see also* Ex. 2006 ¶¶ 105–107. Accordingly, the sensor senses accelerative phenomena of a body with regard to a system of axes (in three dimensions) in relation to which position or motion can be defined. Thus, because we do not consider the recited sensor "to essentially mean sensing or existing in 3D space regardless of the number of sensing axes on the sensor" (Reply 4), Petitioner does not persuade us that a "proper reading of the claim language . . . requires that a 3D frame of reference be established by the sensor so that measurements can be taken relative to each of the three axes of the 3D frame of reference." *Id*. at 4.

Petitioner also argues that a person of ordinary skill in the art would understand that sensing relative to a three dimensional frame of reference requires three outputs from the sensor. Reply 4 (citing Ex. 1013 ¶ 17). Petitioner asserts that, for example, sensing position relative to a 3D frame of reference requires three outputs, X, Y, and Z in a 3D Cartesian frame of reference, or R, θ, Φ in a 3D Polar frame of reference, as supported by the specification. *Id.* at 4–5 (citing Ex. 1001, 14:22–15:16). We are not persuaded by Petitioner's additional argument. As discussed above, even if the specification describes specific embodiments in which a sensor obtains measurements along three axes, this does not mean that one of ordinary skill in the art would understand three outputs (i.e., three devices) must be present to meet the broader claim language of sensing *relative to* a three dimensional frame of reference.

For the foregoing reasons, we construe "a sensor . . . that senses accelerative phenomena of said body relative to a three dimensional frame of reference in said environment" as "a sensor that senses accelerative phenomena of a body with regard to a system of axes (in three dimensions) in relation to which position or motion can be defined in the environment." The recited "sensor" comprises a plurality of acceleration devices, i.e., at least two devices, that measure acceleration along at least two axes.

2. "measuring dynamic and static acceleration of said body with a plurality of acceleration measuring devices relative to a three dimensional frame of reference" (claim 11)

The above-mentioned term recited in claim 11 is similar to the corresponding limitation in claim 1 discussed above in that it refers to measuring acceleration, i.e., "dynamic and static acceleration" (claim 11) vs. "accelerative phenomena" (claim 1), "of said body . . . relative to a three dimensional frame" using "a plurality of acceleration measuring devices." We determine that "measuring dynamic and static acceleration," as opposed to "senses accelerative phenomena," does not affect our above-described analysis.

Thus, for the preceding reasons, we construe "measuring dynamic and static acceleration of said body with a plurality of acceleration measuring devices relative to a three dimensional frame of reference" as "measuring dynamic and static acceleration of a body with regard to a system of axes (in three dimensions) in relation to which position or motion can be defined in an environment."

3. *"accelerative event characteristic"*

The specification of the '890 patent defines "accelerative events" or "accelerative phenomena" as "occurrences of change in velocity of the body (or acceleration), whether in magnitude, direction or both, and including cessation of activity or inactivity." Ex. 1001, 6:13–16. Both parties cite the definition and propose it as the construction for "accelerative event" or "accelerative phenomena." Pet. 6 (citing Ex. 1001, 6:13–16); PO Resp. 29 (citing Ex. 1001, 6:13–16). Consistent with that definition, we construe an "accelerative event characteristic" as a characteristic of an accelerative event, as defined above.

B. Obviousness over Yasushi

Petitioner contends that claims 1 and 11 of the '890 patent would have been obvious over Yasushi. Pet. 11–24, 42–59. To prevail in its challenge of claims 1 and 11 as obvious over Yasushi, Petitioner must prove unpatentability by a preponderance of the evidence. 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d).

1. Priority Date

The '890 patent issued from an application, which is a continuation of application of U.S. patent application Ser. No. 10/057,739 ("the parent application") filed on Jan. 25, 2002, now U.S. Pat. No. 7,145,461, which Petitioner challenges in IPR2015-00113. Ex. 1001, 1:11–13. The parent application is a continuation-in-part of application 09/909,404 ("the grandparent application") filed Jul. 19, 2001, now U.S. Pat. No. 6,703,939 ("the '939 patent"), which Petitioner challenges in IPR2016-00106. *Id.* at 1:13–16. The grandparent application is a continuation-in-part of application 09/396,991 ("the great grandparent application") filed on

September 15, 1999, now U.S. Patent No. 6,307,481, which Petitioner challenges in IPR2016-00105. *Id.* at 1:16–21. The ’890 patent also claims priority to provisional application 60/265,521 filed on January 31, 2001. *Id.* at 1:4–7.

Petitioner argues that claims 1 and 11 of the ’890 patent “recite the feature of sensing or measuring acceleration ‘relative to a three dimensional frame of reference’” and “[t]his feature was first disclosed by Applicant in Provisional Application No. 60/265,521 filed January 31, 2001.” Pet. 10 (citing Ex. 1001, claims 1, 11; Ex. 1010). Petitioner asserts that the feature of sensing relative to a three dimensional frame of reference was not added until the grandparent application (the ’939 patent), filed July 19, 2001, with a priority claim to provisional application No. 60/265,521, filed January 31, 2001. Reply 3. Petitioner, thus, argues that “the earliest possible priority date to which the claims of the ’890 patent are entitled is January 31, 2001.” Pet. 10. Petitioner also states that Yasushi “was published on November 10, 1998” and “Yasushi is prior art under §102(b) to claims 1 and 11 of the ’890 patent.” *Id.* at 11.

In its Response, Patent Owner argues, and provides evidence, that it antedates Yasushi and eliminates the ground based on that reference by showing prior conception and reduction to practice of claims 1 and 11 before Yasushi’s date of publication on November 10, 1998. PO Resp. 35–41.

In order to receive benefit of the filing date of an application previously filed in the United States, the subsequent application for patent must be for an invention disclosed in the manner provided in 35 U.S.C. § 112, first paragraph. 35 U.S.C. § 120; *see also* 37 C.F.R. § 1.78; *Tronzo v. Biomet, Inc.*, 156 F.3d 1154, 1158 (Fed. Cir. 1998) (discussing requirements of claiming benefit of priority date of earlier application under 35 U.S.C. § 120). To satisfy 35 U.S.C. §112, first paragraph, the written description must convey with reasonable clarity to those skilled in the art that the inventor was in possession of the claimed invention. *Vas-Cath Inc. v. Mahurkar*, 935 F.2d 1555, 1563–64 (Fed. Cir. 1991). One shows "possession" of the invention by describing the invention using such descriptive means as words, structures, figures, diagrams, formulas, etc. that fully set forth the claimed invention. *Lockwood v. Am. Airlines, Inc.*, 107 F.3d 1565, 1572 (Fed. Cir. 1997). The issue of whether the written description requirement has been satisfied is a question of fact. *Wang Labs., Inc. v. Toshiba Corp.*, 993 F.2d 858, 865 (Fed. Cir. 1993).

We determine whether Patent Owner has provided sufficient evidence to support that the written description requirement has been satisfied with respect to the limitation of claim 1 for "a sensor, associable with said body, that senses accelerative phenomena of said body relative to a three dimensional frame of reference in said environment," as well as the limitation of claim 11 for "measuring dynamic and static acceleration of said body with a plurality of acceleration measuring devices relative to a three dimensional frame of reference" Ex. 1001, claims 1, 11. In its arguments regarding the construction of "relative to a three dimensional frame of reference in said environment," Patent Owner explains that the specification of the '890 patent "describes using two accelerometers oriented along perpendicular axes to evaluate movement of a body relative to a three-dimensional environment." Paper 26, 2. Patent Owner also explains that the specification "show[s] use of [a] dual axis accelerometer to distinguish movement of a body left/right (x axis), forward/backward (y axis), and falling to the ground (z axis)." *Id.* (citing Ex. 1001, 8:66–9:17).

The Sturges Declaration further explains that

> [t]he '481 Patent describes . . . two accelerometers as being employed to evaluate body movement "relative to an environment." IPR2015-00105, Exhibit 1001 at Abstract, 1:66 to 2:2. The '481 Patent also describes how measurements by the two accelerometers in the x and y directions allow inferences regarding body orientation with respect to three dimensions (x, y and z): when static acceleration measurements from either accelerometer change from less than 1 G (when a monitored person is standing upright) to about 1 G in the combined x and y directions (after the person has fallen). IPR2015-00105, Exhibit 1001 at 7:9–30 and 8:39–49. The x and y accelerometers described in the '481 Patent thus sense accelerative phenomena "*relative* to a three dimensional frame of reference in said environment."

Ex. 2006 ¶ 107; *see also* Ex. 1012, 200:21–201:1 ("[Using a two-axis accelerometer to measure acceleration or accelerative phenomena relative to a three-dimensional frame of reference] can be accomplished by understanding that gravity in this context is constant and in one direction and that if the X and Y axis are – are reading a number and one considers the overall magnitude of those two numbers taken together, one can conclude what the third axis would be reading."). *See also* Ex. 1007, 18 (the '481 patent referring to "FIGS. 3a to 3d illustrate exemplary strip chart records of output of the sensor introduced in FIGS. 1 and 2 taken during illustrative situations"); Ex. 1001; 5:21–23 (the '890 patent referring to "FIGS. 3A to 3D illustrate exemplary strip chart records of output of the sensor introduced in FIGS. 1 and 2 taken during illustrative situations").

Petitioner argues that Patent Owner is wrong that "the two axes sensor [of Figure 1] also senses along a third axis." Reply 5. We do not find this argument persuasive for the reasons discussed above in relation to claim construction. In view of how we have construed the claims at issue, Patent Owner does not need to show written description support in its priority documents for a system that measures acceleration along all three axes, but rather must show support for a sensor that senses accelerative phenomena with regard to a system of axes (in three dimensions) in relation to which position or motion can be defined. As discussed above, in certain embodiments, such sensing can be accomplished by measuring acceleration along two axes.

Petitioner also argues that "a third sensor would need to be added to a two axis accelerometer in order to sense relative to a 3D frame of reference." Reply 5 (citing Ex. 1012, 9:25–10:22; 26:20–27:8). Although Dr. Sturges indicates that he "would have had to add another accelerometer orthogonal to the other two" in order "to establish a three-dimensional coordinate system" (Ex. 1012, 10:18–22), we do not find this testimony persuasive to support that a third sensor would be needed in order to sense relative to a three dimensional frame of reference. This portion of testimony relates to how three accelerometers can establish a three-dimensional coordinate system, not whether acceleration measurements in two dimensions provides information regarding a body relative to a 3D frame of reference. *See id.* at 9:25–10:22. As discussed above, the '890 patent describes a system that specifically contemplates a fall detection application for a body, which contemplates the up/down (z axis) of interest, i.e., measures acceleration along two axes to obtain information about (sense acceleration phenomena of) a body relative to a 3D frame of reference. Ex. 1001, 8:64–9:17.

As to Dr. Sturges' further testimony that a dual-axis accelerometer would not establish a three-dimensional coordinate system (Ex. 1012, 27:4–8), we do not find this testimony persuasive to support a finding that a third sensor is needed in order to sense relative to a three dimensional frame of reference. A dual axis accelerometer alone, without additional information regarding the system/environment in which it will be operating, is different from a dual axis accelerometer defined to be in a particular orientation. For example, consistent with our discussion above regarding disclosures in the specification, Dr. Sturges has testified that a third axis could be defined even if there was no sensing along that axis. *See, e.g.*, Ex. 1012, 45:15–21 ("Q. So how is that Z axis—so it's drawn in there as a third dimension, but what is defining that Z axis? A. That those axes are relative to the space in which the instrument exists, and the axes are attached so that we can see the – the frame of reference clearly in that figure."). Accordingly, we determine that Patent Owner has shown sufficiently how the great-grandparent application (filed on September 15, 1999) describes sensing acceleration phenomena (claim 1), and measuring dynamic and static acceleration (claim 11), of a body relative to a 3D frame of reference, as recited in the challenged claims.

Petitioner also argues that two inventors of the '890 patent "confirmed that sensing acceleration relative to a 3D frame of reference requires sensing along three axes ('up and down, front to back, and side to side')" Reply 6 (citing Ex. 2007, 11; Ex. 2009, 15). We are also not persuaded by this argument, which essentially contends that disclosure of three acceleration measuring devices is required to establish written description support here.

As discussed above, a sensor that comprises two acceleration devices, which measure acceleration in two axes, can suffice to show written description support of the claims at issue. Accordingly, Petitioner has not persuaded us that the great-grandparent application, to which priority is claimed, lacks a sensor that senses accelerative phenomena relative to a three dimensional frame of reference, even if Patent Owner refers us a description of a relevant system in the priority document that is not exactly the same as a system described in the ’890 patent.

Petitioner also argues that inferring orientation in a third dimension does not meet the language of the claim that refers to a sensor that “*senses* accelerative phenomena . . . relative to a three dimensional frame of reference.” Reply 6. In other words, Petitioner argues that “[s]ensing (or measuring) is very different from inferring.” *Id.* (citations omitted). As explained above, we construe the claims to refer to a sensor that senses accelerative phenomena, or something that measures dynamic and static acceleration, of a body with regard to a system of axes (in three dimensions) in relation to which position or motion can be defined in the environment. There is nothing in this construction that would require sensing or measuring along each of the three axes. Petitioner does not dispute that there is sensing or measuring in at least the *x* and *y* directions of the frame of reference in the great-grandparent application to which priority is claimed, such that there is sensing of accelerative phenomena, or measuring dynamic and static acceleration, relative to a system of axes. Position or motion is then defined in the system of axes in three dimensions in order to detect a fall. Ex. 1007, 18 (4:13–16), 20 (7:9–45).

Petitioner further argues that that the disclosures in the ’481 specification:

> explain that the x and y outputs of the accelerometers, as shown in Figs. 3a to 3d, can be used to determine if the body has fallen over (or rotated) to the left or right, and/or has fallen over (or rotated) in the forward or backward direction. These disclosures confirm the well-known fact that accelerometers can be used as tilt sensors, for sensing pitch and/or roll of a body, due to the fact that gravity provides a constant acceleration (*i.e.*, ‘static acceleration’).
>
> Tellingly absent from the disclosure of the ’481 application is any suggestion that orientation around a third or vertical Z axis (often referred to as the up/down or ‘yaw’ axis) can be sensed or inferred through the use of accelerometers. This is because it is well-known to one skilled in the art that it is not possible to sense (or even infer) yaw rotation using the accelerometers disclosed in the ’481 application. (Ex. 1012, par. 27). Thus, contrary to Dr. Sturges’ declaration, sensing or even inferring orientation with respect to a 3D frame of reference is not possible using the accelerometers as disclosed in the ’481 application. Dr. Sturges even admitted this fact at his deposition. (*See* Ex. 1011 at 56:25–58:2; 71:20–72:3.)

Reply 7–8.

Petitioner’s argument does not persuade us the written description of the great-grandparent application lacked support for sensing accelerative phenomena of a body relative to a three dimensional frame of reference. Even if “yaw” (i.e., rotation about the *z* axis, as discussed in the block quote above) cannot be determined with the disclosed dual axis accelerometer, this does not take away from the fact that the sensor senses accelerative phenomena (and measures dynamic and static acceleration) of a body with regard to a system of axes (in three dimensions) in relation to which position or motion can be defined. The ’890 patent describes a relevant system that detects a fall, i.e., a movement along all three axes, including the up/down z axis, by sensing or measuring acceleration along the x and y axes, i.e., sensing accelerative phenomena, and measuring dynamic and static acceleration, relative to a three dimensional frame of reference. Ex. 1001, 8:64–9:17 (referring to “x and y outputs of sensor 25 during a fall by a body to the right”). The great-grandparent priority document likewise describes measuring movement along two axes to detect a fall. Ex. 1007, 18 (4:13–16), 20 (7:9–45).

For the foregoing reasons, we determine that Patent Owner has shown sufficiently that the written description of the great-grandparent application filed on September 15, 1999, conveyed with reasonable clarity that the inventors were in possession of a sensor that sensed accelerative phenomena, as recited in claim 1 (or measured dynamic and static acceleration, as recited in claim 11), of a body with regard to a system of axes (in three dimensions) in relation to which position or motion could be defined in the environment, in accordance with the construction of the claims as set forth above. Accordingly, we determine that claims 1 and 11 are entitled to a priority date of September 15, 1999.

A. Antedating Yasushi

Patent Owner bears the burden to establish the facts necessary to overcome Yasushi’s publication date.[3] *See In re Facius*, 408 F.2d 1396, 1403–04 (CCPA 1969) (holding, in a prosecution context, that an earlier

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[3] Even though Patent Owner bears the burden of production in antedating a reference, the burden of persuasion to prove unpatentability of the challenged claims remains with Petitioner. *See* 35 U.S.C. § 316(e).

filed reference was prima facie available as prior art and placing the burden on the party claiming prior invention to overcome that reference). Patent Owner may meet its burden by providing evidence that the publication date of the reference is not "before the invention thereof by the applicant for a patent," that is, antedating Yasushi. 35 U.S.C. § 102(a).[4]

Yasushi was published on November 10, 1998. As described above, claims 1 and 11 of the '890 patent are entitled to a priority date of September 15, 1999. Thus, Yasushi is available as prior art against these claims under 35 U.S.C § 102(a) unless Patent Owner establishes (i) a reduction to practice before November 10, 1998, or (ii) conception before November 10, 1998, followed by a diligent reduction to practice. *Purdue Pharma L.P. v. Boehringer Ingelheim GMBH*, 237 F.3d 1359, 1365 (Fed. Cir. 2001) ("To antedate . . . an invention, a party must show either an earlier reduction to practice, *or* an earlier conception followed by a diligent reduction to practice.") (emphasis added) (citation omitted).

Reduction to practice is a question of law predicated on subsidiary factual findings. *Brown v. Barbacid*, 276 F.3d 1327, 1332 (Fed. Cir. 2002). To establish an actual reduction to practice, the inventor must prove that: (1) an embodiment of the invention was constructed that meets all the limitations of the claims at issue; and (2) the inventor appreciated that the invention would work for its intended purpose. *Cooper v. Goldfarb*, 154 F.3d 1321, 1327 (Fed. Cir. 1998). The invention does not have to be at a commercially satisfactory stage of development for an actual reduction to practice, but must have been sufficiently tested to demonstrate that it will

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[4] Applications filed before March 16, 2013 are governed by pre-AIA 35 U.S.C. § 102 and 103. Manual of Patent Examining Procedure § 2159.01.

work for its intended purpose. *See, e.g.*, *Scott v. Finney*, 34 F.3d 1058, 1062 (Fed. Cir. 1994) (citing numerous cases wherein the character of the testing necessary to support an actual reduction to practice varied with the complexity of the invention and the problem it solved).

It is well settled that an inventor's testimony alone is insufficient to establish an earlier reduction to practice. *Medichem, S.A. v. Rolabo, S.L.*, 437 F.3d 1157, 1170 (Fed. Cir. 2006). Instead, the party seeking to prove an actual reduction to practice must proffer evidence corroborating that testimony. *Id.* "Sufficiency of corroboration is determined by using a 'rule of reason' analysis, under which all pertinent evidence is examined when determining the credibility of an inventor's testimony." *Id.* (citation omitted). Corroboration may be testimony of a witness, other than the inventor, to the actual reduction to practice, or it may consist of evidence of surrounding facts and circumstances independent of information received from the inventor. *Id.*

Patent Owner proffers declarations from listed inventors of the '890 patent (Exs. 2007–2011), who also are listed inventors of the grandparent application and, except for Mr. Massman, are listed inventors of the great-grandparent application.[5] Patent Owner also proffers the Declarations of Don James (Ex. 2012) and Greg Younger (Ex. 2013), who are identified as corroborating witnesses. Patent Owner further provides several supporting exhibits (Exs. 2015–2035).

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[5] Patent Owner states that "[a]ll the inventors filed certificates of correction . . . , reflecting that Michael L. Lehrman, Alan R. Owens, Michael D. Halleck, and Michael E. Halleck, were all co-inventors of all the iLife Patents." PO Resp. 19.

The inventor and witness declarations support a finding that the inventors constructed a working prototype of a relevant fall detection device, and tested it on human subjects in August 1998. Ex. 2007 ¶¶ 17–18 (stating that "the first prototype did include the same Analog Devices ADXL220 accelerometer, Texas Instruments MSP430PM microprocessor, and RF transmitter" and the "first prototype was actually tested on human subjects at HWI in August 1998"); Ex. 2008 ¶ 15; Ex. 2009 ¶ 15; Ex. 2010 ¶ 15; Ex. 2012 ¶ 19 (corroborating witness stating that the "first prototype was actually tested on human subjects at HWI in August 1998" and the "prototype used a dual-axis accelerometer to measure the person's movement and orientation, as well as a microprocessor with code configured to process the sensed static and dynamic acceleration to determine if the user had experienced a real fall"); Ex. 2013 ¶ 19. The inventors constructed a working prototype on a solderless breadboard instead of a printed circuit board, but included the same accelerometer, microprocessor, and RF transmitter as later designs. Ex. 2007 ¶ 17; Ex. 2008 ¶ 18; Ex. 2009 ¶ 18; Ex. 2010 ¶ 18; Ex. 2012 ¶ 18; Ex. 2013 ¶ 18. As stated by inventors, and corroborated by other witnesses, "the prototype used a dual-axis accelerometer to measure the person's movement and orientation, as well as a microprocessor with code configured to process the sensed static and dynamic acceleration to determine if the user had experienced a real fall as opposed to normal daily activities such as walking, sitting, standing, or lying down." Ex. 2007 ¶ 18; Ex. 2008 ¶ 19; Ex. 2009 ¶ 19; Ex. 2010 ¶ 19; Ex. 2012 ¶ 19; Ex. 2013 ¶ 19. The inventor and witness declarations further support the finding that the inventors tested the prototype in August 1998, and based on success in that testing, formal engineering drawings were prepared for production release. Ex. 2007 ¶¶ 18, 20–21; Ex. 2008 ¶¶ 21–22; Ex. 2009 ¶¶ 21–22; Ex. 2010 ¶¶ 21–22; Ex. 2012 ¶¶ 21–22; Ex. 2013 ¶¶ 21–22.

Inventor and corroborating witness declarations support a finding that the inventors prepared formal engineering drawings (Ex. 2031) that included a printed circuit board layout. Ex. 2007 ¶ 21 (citing Ex. 2030 ("Drawing Number Assignment Log")); Ex. 2008 ¶ 22; Ex. 2009 ¶ 22; Ex. 2012 ¶ 22. The inventors assembled additional field prototypes constructed of printed circuit boards, loaded them with code, and tested them by late September 1998. Ex. 2007 ¶¶ 26, 30. The inventors also built a prototype with the particular printed circuit board corresponding to drawing IAF680R1 on or around September 23, 1998. Ex. 2008 ¶ 28 (citing Ex. 2032); Ex. 2009 ¶ 28 (citing Ex. 2032); Ex. 2012 ¶ 28 (citing Ex. 2032); Ex. 2013 ¶ 28 (citing Ex. 2032). The inventors also created a new layout IAF683R1 on September 23, 1998. Ex. 2008 ¶ 29 (citing Ex. 2030); Ex. 2012 ¶ 29 (citing Ex. 2030); Ex. 2013 ¶ 29 (citing Ex. 2030). The prototypes "performed as expected and were suitable for their intended purpose of movement evaluation and fall detection when tested in August and September of 1998." Ex. 2007 ¶ 30; Ex. 2009 ¶ 28; Ex. 2012 ¶ 28; Ex. 2013 ¶ 28.

Accordingly, Patent Owner has provided declarations from inventors and corroborating witnesses supporting a finding that the inventors designed, made, and tested fall detection systems embodying the subject claims of the patent at issue in August and September of 1998. PO Resp. 3–18, 35–38 (citing Ex. 2007–2013). Patent Owner also has provided contemporaneous notes and records from this time period supporting that a finding that the inventors actually reduced to practice a first working embodiment in August

1998. *Id.* (citing Exs. 2015–2035). Patent Owner provides additional evidence that the inventors created a second generation embodiment with the same basic elements and component parts as the first embodiment on or about September 23, 1998. *Id.* at 16–18 (citing Ex. 2007 ¶ 26; Ex. 2008–2010, 2012–2013 ¶¶ 27–30; Exs. 2018, 2030, 2032), 37–38 (citing Ex. 2007 ¶¶ 26, 28; Exs. 2008–2010, 2012–2013 ¶¶ 28, 34).

Patent Owner's evidence also supports a finding that the first working embodiment "was an intelligent personal emergency response system ('iPERS') capable of monitoring the movements of an elderly person and automatically detecting real falls as opposed to normal daily activity." *Id.* at 35–36 (citing Exs. 2007–2010, 2012–2013 ¶ 4); *see also id.* at 11 (stating "[a]ll witnesses agree that the device worked for its intended purpose of distinguishing real falls from normal activities"). This corresponds to the claimed system "evaluates movement of a body relative to an environment" (Ex. 1001, claim 1) and "a system to evaluate movement of a body relative to an environment" (*id.* at claim 11).

Patent Owner's evidence supports a finding that the inventors created a working embodiment that used a dual-axis accelerometer to measure the person's movement and orientation. PO Resp. 36 (citing Ex. 2007 ¶ 19; Exs. 2008–2010, 2012–2013 ¶ 20); *see also id.* at 10–11. Patent Owner's evidence supports that the working embodiment was "configured to process the sensed static and dynamic acceleration." *Id.* at 37 (citing Ex. 2007 ¶ 18; Exs. 2008–2010, 2012–2013 ¶ 19). Patent Owner's evidence supports that the working embodiment "evaluated movement of the body relative to a three-dimensional frame of reference (up and down, front to back, and side to side)." *Id.* (citing Ex. 2007 ¶ 30; Exs. 2008–2010, 2012–2013 ¶ 34). This corresponds to the claimed "a sensor, associable with said body, that senses accelerative phenomena of said body relative to a three dimensional frame of reference in said environment, said sensor comprising a plurality of acceleration measuring devices" (Ex. 1001, claim 1) and "substantially continuously measuring dynamic and static acceleration of said body with a plurality of acceleration measuring devices relative to a three dimensional frame of reference" (*id.* at claim 11). As to a plurality of acceleration measuring devices in the working embodiment, Patent Owner has provided evidence indicating that its working embodiment included "multi-vector sensors," i.e., a plurality of sensors. *See, e.g.*, See, e.g. Ex. 2007 ¶ 30; Ex. 2008 ¶ 34; Ex. 2009 ¶ 34; Ex. 2010 ¶ 34; Ex. 2012 ¶ 34; Ex. 2031, 15 (depicting two accelerometers); *Cooper*, 154 F.3d at 1327 ("In order to establish an actual reduction to practice, the inventor must prove . . . he constructed an embodiment . . . that met all the limitations").

Patent Owner's evidence (Ex. 2007 ¶ 19; Exs. 2008–2010, 2012–2013 ¶ 20; Ex. 2019 at 1–2) supports a finding that the inventors conceived and actually reduced to practice, before the critical date, a working embodiment that used "a microprocessor with code configured to process the sensed static and dynamic acceleration to determine if the user had experienced a real fall as opposed to normal daily activities." PO Resp. 36 (citing Exs. 2007 ¶ 19; Ex. 2008–2010, 2012–2013 ¶ 20); *see also id.* at 10–11. This corresponds to the claimed "processor, associated with said sensor, that processes said sensed accelerative phenomena of said body as a function of at least one accelerative event characteristic" (Ex. 1001, claim 1) and "processing said sensed accelerative phenomena of said body as a function of at least one accelerative event characteristic" (*id.* at claim 11).

Patent Owner's evidence supports a finding that the "first working [prototype] . . . was an intelligent personal emergency response system ('iPERS') capable of . . . automatically detecting real falls as opposed to normal daily activity, such as walking, sitting, standing, and lying down" (PO Resp. 35–36 (citing Exs. 2007–2010, 2012–2013 ¶ 4)) and that "the device worked for its intended purpose of distinguishing falls from normal activities, such as walking, sitting, standing, and lying down" (*id.* at 37 (citing Ex. 2007 ¶¶ 23–24; Exs. 2008–2010, 2012–2013 ¶ 24–25)). *See also* Ex. 2019 at 1 (stating "it would be possible to tell if that person were standing or lying down or in a position somewhere between those two" and "[t]o accurately determine that the individual has fallen and not merely laying down or going down stairs etc, software intelligence is programmed into a microprocessor to accomplish the evaluation of the sensor output").

Patent Owner's evidence also supports that the working embodiment was "programmed to measure both static and dynamic acceleration forces to evaluate changes in the wearer's movement and orientation to determine if the person had fallen based on observed dynamic accelerative forces indicating a hard impact of at least 3Gs coupled with a change in static accelerative forces of at least 45 degrees within a specified timeframe." PO Resp. 36 (citing Ex. 2007 ¶ 23; Exs. 2008–2010, 2012–2013 ¶ 24) *see also id.* at 11. This corresponds to the phrase "to thereby determine whether said evaluated body movement is within an environmental tolerance." Ex. 1001, claims 1 and 11.

Patent Owner's evidence supports that the "newly-created system used both static and dynamic acceleration outputs from an ADXL202 dual-axis accelerometer to detect that a person wearing the sensor had fallen down, with such information then being used to activate an automatic telephone dialing module to call for help." PO Resp. 13 (citing Ex. 2019, 1; Ex. 2007 ¶ 23; Exs. 2008–2010, 2012–2013 ¶ 24); *see also* Ex. 2007 ¶ 30 (stating that "[a]ll of the prototypes from this timeframe (August to September 1998) included a sensor, attached to the monitored body, for sensing both static and dynamic acceleration experienced by the body, and a processor, associated with the body, for processing said sensed static and dynamic acceleration for specified acceleration characteristics" and "[a]ll of the prototypes from this timeframe (August to September 1998) generated and communicated information indicating whether the evaluated body was within tolerance to a base station for remote monitoring"); *see also* Ex. 2019, 1 (stating that the fall detector "detect[s] that a person wearing such a sensor has fallen down and this information can be used to activate an automatic telephone dialing module so as to alert others to the plight of the fallen individual"). This also corresponds to the phrase "to thereby determine whether said evaluated body movement is within an environmental tolerance." Ex. 1001, claims 1 and 11.

The filed declarations with associated exhibits sufficiently evidence that the inventors conceived and reduced to practice a physical construct of the invention, as well as engaged in testing of the invention in a manner that demonstrated that it worked for its intended purpose, by September 1998. Ex. 2007 ¶¶ 17–21; Ex. 2008 ¶¶ 18–22; Ex. 2009 ¶¶ 18–22; Ex. 2010 ¶¶ 18–22; Ex. 2012 ¶¶ 18–22; Ex. 2013 ¶¶ 18–22. Accordingly, Patent Owner has presented sufficient evidence to support that the inventors actually reduced to practice embodiments of claims 1 and 11 by September 1998, which is *before* the first publication of Yasushi on November 10, 1998. The full record indicates that Petitioner does not present adequate argument or evidence to challenge the sufficiency of the testimony and evidence submitted by Patent Owner that demonstrates an actual reduction to practice prior to November 10, 1998. Reply 2– 8 (Petitioner arguing that its construction of "relative to a three dimensional frame of reference" disqualifies the accelerometers of Patent Owner's reduction to practice evidence); *see also* Tr. 140:9–13 (Patent Owner's counsel stating "there is substantial uncontroverted, well corroborated evidence in the record, uncontroverted by the Petitioner, that establish iLife conceived and reduced to practice the invention before the publication date of Yasushi, November 10, 1998"). Thus, we determine that Yasushi does not qualify as prior art to the '890 patent.

Because Yasushi is not prior art as to claims 1 and 11, Petitioner has failed to demonstrate, by a preponderance of the evidence, that claims 1 and 11 would have been obvious over Yasushi under 35 U.S.C. § 103(a).

C. Obviousness over Unuma

Petitioner contends that claims 1 and 11 of the '890 patent would have been obvious over Unuma. Pet. 24–59. In its Petition, Petitioner provides a claim chart, and relies on Dr. Welch's Declaration (Ex. 1002). *Id.*

1. Unuma (Ex. 1004)

Unuma discloses a method and system for automatically recognizing motions and actions of moving objects, such as humans. Ex. 1004, Abstract, 2:3–6. Figures 1 and 2 of Unuma are reproduced below.

FIG. 1

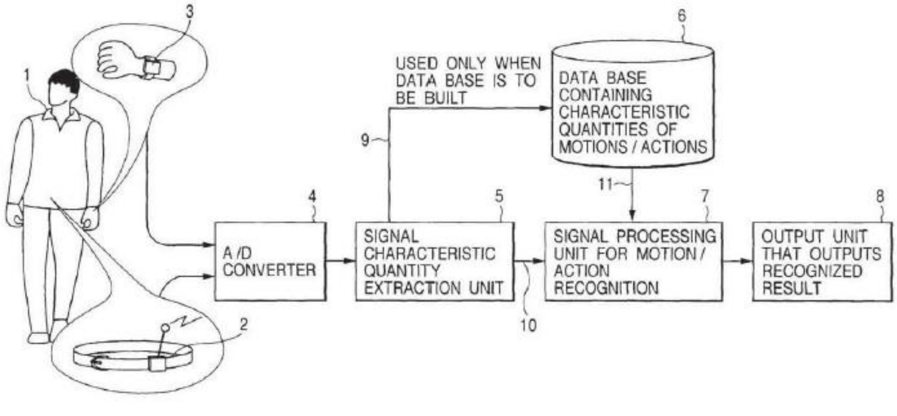


FIG. 2

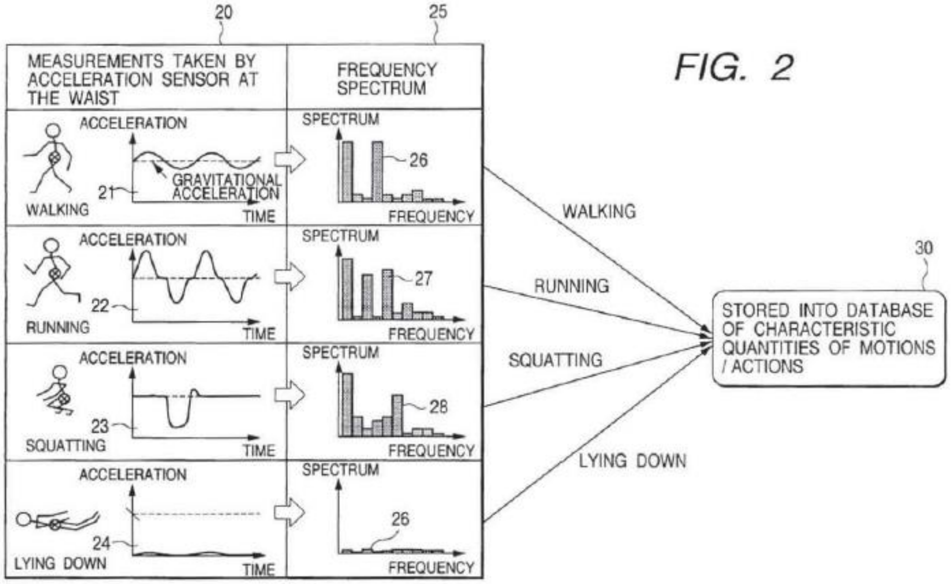


Figure 1 provides a block diagram of a motion and action recognition device, and Figure 2 depicts a view of outputs from an acceleration sensor attached to the waist of an object under observation. *Id*. at 4:23–25. The sensor in Figure 2 "takes measurements of acceleration applied to the human body in the direction of its height," and output results 20 indicate time series data derived from human motions, where "data items 21 and 22 denote cyclic acceleration changes during walking or running, data item 23 represents a single acceleration change, and data item 24 stands for a state of no acceleration in which gravitational acceleration is not detected because the object is lying down." *Id*. at 6:31–37.

When discussing Figure 2, Unuma explains that "[a]fter the above data items [21-24] are digitized by the A/D converter 4 [shown in Figure 1], the digitized data are subjected to time-frequency analysis (e.g., Fourier transformation), which is a typical technique of signal analysis." *Id*. at 6:38–39. The result of that time-frequency analysis "is a frequency spectrum body 25," such that "data items 21 through 24 are matched with frequency spectra 26, 27, 28 and 29 respectively." *Id*. at 6:39–41; Fig. 2. Unuma states that "[b]ar graphs of the analyzed result represent spectrum intensities of the frequency components acquired through Fourier transformation," where "frequency characteristic differs from one motion to another," and "[t]he differences constitute the characteristic quantities of the motions involved." *Id*. at 6:41–43.

Unuma goes on to state:

> With this embodiment, the characteristic quantities that serve as reference data used by the signal processing unit 7 for motion/action recognition are extracted and saved in advance from the motions and actions whose characteristic quantities are known. The reference data thus saved are stored into the characteristic quantity database 6 via a path 9 in Fig. 1 (process 30 in Fig. 2).
>
> The signal processing unit 7 for motion/action recognition continuously receives characteristic quantity data 10 from the characteristic quantity extraction unit 5, the data 10 being derived from the ongoing motions/actions of the object 1 under observation. The data 10 are compared with the reference data 11 made up of the stored characteristic quantities of various motions/actions in the database 6. That is, the currently incoming characteristic quantity is correlated with the stored characteristic quantities in the database 6. At any point

> in time, the motion/action corresponding to the characteristic quantity having the highest level of correlation is judged to be the motion/action currently performed by the object 1 under observation. The judged result is output by the output unit 8.

Id. at 6:44–54.

Unuma also teaches that "[o]ne way of correlating measurements with reference data is shown illustratively in Fig. 29, but is not limited thereto." *Id*. at 6:55. That correlation involves "acquiring a frequency component F(m) which corresponds to characteristic quantity data 10 in the form of measured waveform spectra representing the motions/actions of the object 1," where data 10 is "normalized so as to satisfy" a particular expression (i.e., equation), as presented on page 7 of Unuma. *Id*. at 6:55–7:54 (referring to frequency component F(m), corresponding to data 10, and frequency component G(m), corresponding to reference data 11, and that both are "normalized").

Figure 3 of Unuma is reproduced below:

FIG. 3

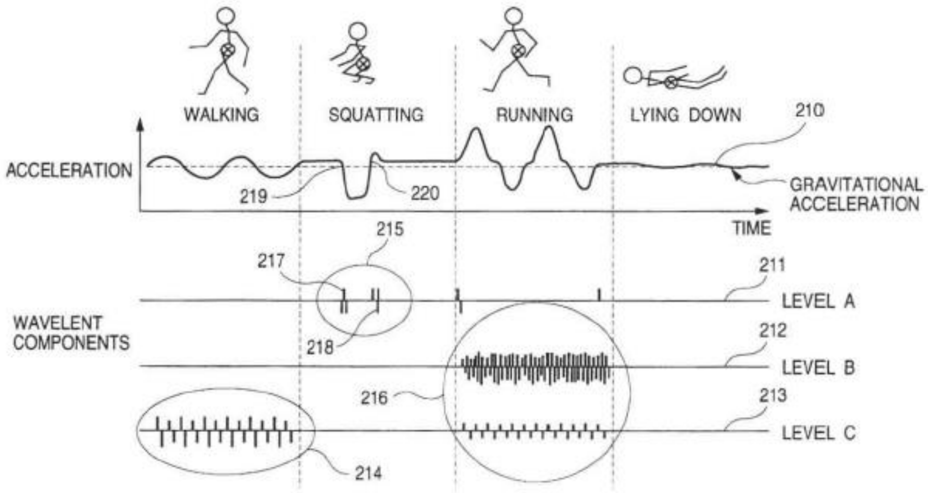


Figure 3 depicts "an explanatory view of typical results of time frequency analysis based on wavelet transformation." Ex. 1004, 4:26. As presented in Figure 1, processing unit 7 compares data 10 with reference data 11 made up of "stored characteristic quantities of various motions/actions in . . . database 6." *Id.* at 6:50–51. In accordance with a wavelet transformation analysis method illustrated in Figure 3, "a motion of 'walk' yields characteristic values 214 on level C (213)," "a 'squatting' motion produces characteristic values 215 on level A (211)," and "a 'running' motion generates characteristic values 216 on levels B (212) and C (213)." *Id.* at 8:14–16.

Unuma states that its system applies "to a setup where supervisors or custodians in charge of people who are socially vulnerable and need protection or of workers working in isolation are automatically notified of a dangerous situation into which their charge may fall for whatever reason." *Id.* at 16:5–7. Unuma discloses that a processing unit stores and continuously monitors "history data" in reference to "motion patterns" held in a specific motion pattern storage unit. *Id.* at 16:22–23. In this context, Unuma explains that:

> A specific motion pattern is a combination of multiple motions necessary for recognizing a specific action such as "a sudden collapse onto the ground" or "a fall from an elevated location."
>
> For example, the action of "a sudden collapse onto the ground" is recognized as a motion pattern made up of a motion of "a walking or standing still posture" followed by a motion of "reaching the ground in a short time" which in turn is followed by a motion "lying still on the ground." Similarly, the action of "a fall from an elevated location" is recognized as a motion pattern constituted by motions of "climbing," "falling," "hitting obstacles," "reaching the ground" and "lying still," occurring in that order.

Id. at 16:23–30.

In addition, Unuma discloses that its system allows “reporting or not reporting the recognized motion pattern depending on where the incident is observed,” which is “useful in averting a false alarm provoked by an apparent collapsing motion of the object under observation when in fact the object is lying on a couch for examination at a hospital or climbing onto the bed at home.” *Id*. at 17:3–7.

Unuma also presents Figures 33–36. Figures 33 and 36 are depicted below.

FIG. 33

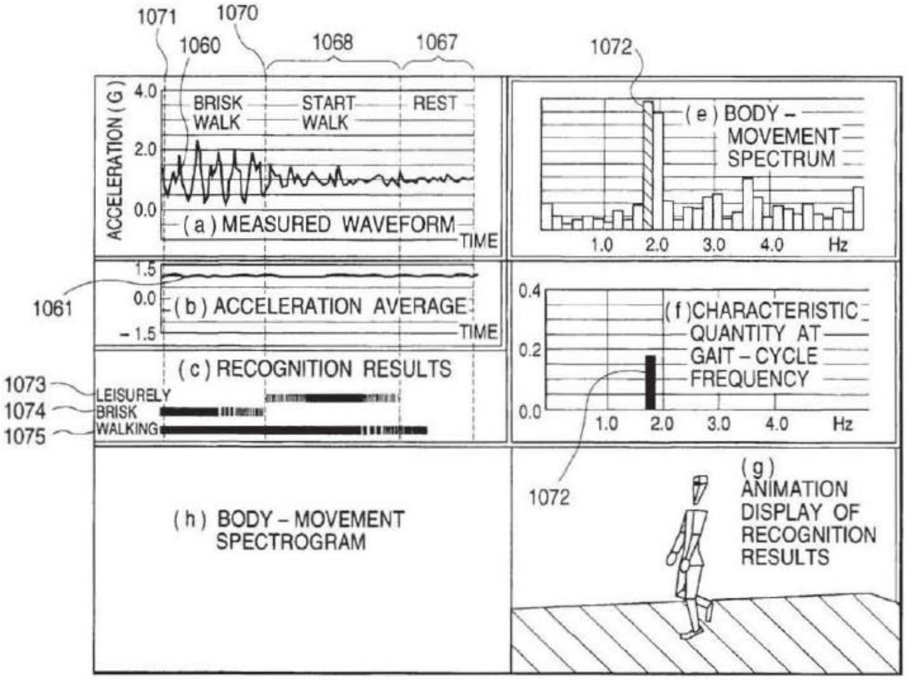
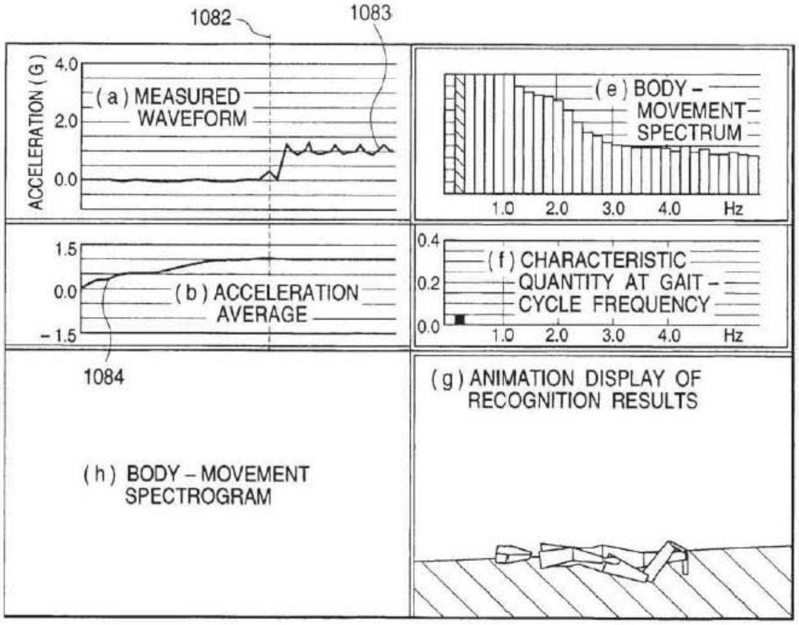


FIG. 36



Figures 33 and 36 each show "an example wherein a motion is recognized by using the method of recognition provided by the present invention," where "a result of the recognition is displayed by animation using computer graphics." *Id.* at 27:45–47. Specifically, diagram (a) in each figure shows a "measured waveform," where the horizontal and vertical axes represent time and acceleration, respectively. *Id.* at 27:53–55. "[D]iagram (b) shows an average value of the measured waveform shown in the diagram (a) or the direct-current component of the waveform." *Id.* at 27:56–58. Diagram (e) presents a body-movement spectrum "obtained as a result of carrying out a frequency analysis of the measured waveform shown in the diagram (a)," and diagram (g) "shows the result of the recognition by animation using computer graphics." *Id.* at 28:1–30. In Figure 33, diagram (g) depicts a computer animation of a subject in a briskly walking motion; in Figure 36, diagram (g) depicts a subject in a state of a lying-down posture. *Id*. at Figs. 33, 36.

Unuma further presents Figure 43, shown below.

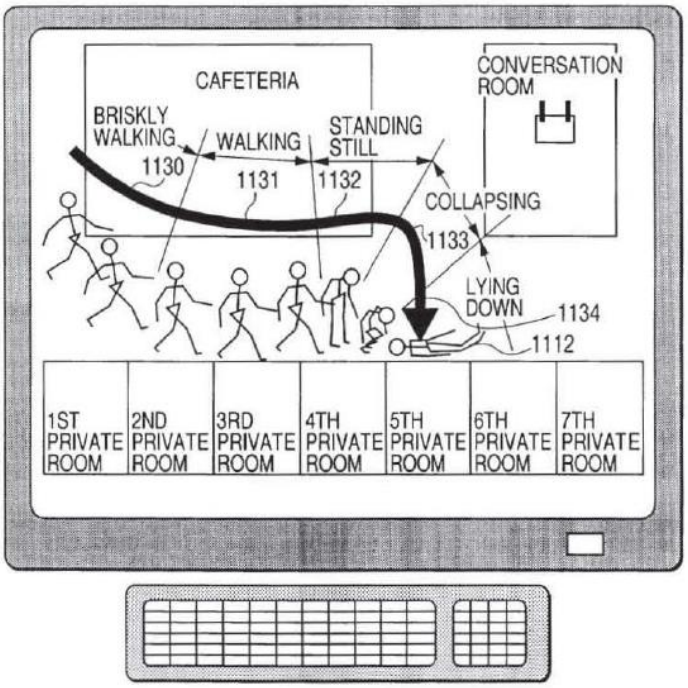


Figure 43 depicts a diagram showing a display of a sequence of motion states leading to an emergency. *Id*. at 5:47–48; 31:28–45. Figure 43 depicts time period 1130, during which a patient walks briskly; period 1131, during which the patient walks more slowly; period 1132, during which the patient stands still; period 1133, during which the patient collapses; and period 1134, during which the patient is "lying down and does not move any more." *Id*. at 31:36–39. Unuma states that, by repeating the process, "a sequence of motion states leading to the event of an emergency can be displayed repeatedly." *Id*. at 31:39–41.

In relation to Figures 47–49, Unuma teaches that the "state of a motion is recognized" (*id*. at 24:58) and, "[i]n addition, the gradient of a human body, that is, the state of the upright/leaning posture of the human body, can be recognized from an average value of variations in acceleration observed by an acceleration sensor. . . . The magnitude of the direct-current component is used to find the gradient of the human body which is, in turn, utilized for forming a judgment on the state of the upright/leaning posture of the human body. *Id*. at 24:58–25:26.

2. Analysis

Petitioner argues that Unuma teaches or suggests a system that comprises all recited elements of claims 1 and 11. Pet. 28. For example, Petitioner contends that Unuma discloses a system that evaluates movement of a body relative to an environment. *Id*. at 28–29, 34 (citing Ex. 1004, 2:3–6, 13:47–49, 30:30–32, Fig. 1; Ex. 1002 ¶ 73, 80, App. D). Petitioner contends that "signal processing unit 7," as depicted in Figure 2 of Unuma, corresponds to the "processor" of the challenged claims, and the "acceleration sensor," associated with processing unit 7 in Unuma, corresponds to the recited sensor. *Id*. at 29–31. Petitioner also contends that "even if a difference between Unuma and the claims could be shown, a [person of ordinary skill in the art] would have found any such alleged difference to be insignificant and obvious in view of Unuma." *Id*. at 28.

We discuss particular claim limitations below.

a. "sensor, associable with said body, that senses accelerative phenomena of said body relative to a three dimensional frame of reference in said environment, said sensor comprising a plurality of acceleration measuring devices; and a processor, associated with said sensor, that processes said sensed accelerative phenomena of said body as a function of at least one accelerative event characteristic" (claim 1)

or

> *"substantially continuously measuring dynamic and static acceleration of said body with a plurality of acceleration measuring devices relative to a three dimensional frame of reference and providing output signals indicative thereof; processing said sensed accelerative phenomena of said body as a function of at least one accelerative event characteristic" (claim 11)*

Petitioner contends that Unuma discloses a sensor attached to an object under observation. Pet. 29, 34 (citing Ex. 1004, 11:53–54). Petitioner argues that the sensor senses accelerative phenomena of the body relative to a three dimensional frame of reference in the environment. *Id*. at 29, 36–37 (citing Ex. 1004, 8:41–45, Fig. 8; Ex. 1002 ¶ 74, App. D). Petitioner further argues that the sensor comprises a plurality of acceleration measuring devices. *Id*. at 29–30, 36–37 (citing Ex. 1004, 6:26, 31). Petitioner also contends that Unuma's acceleration measuring devices provide output results 20, which are "output signals" indicative of dynamic and static acceleration, as recited in claim 11. *Id*. at 37 (citing Ex. 1004, 6:31–37, Fig. 2; Ex. 1002 ¶ 84, App. D).

In relation to the limitation in claim 11 of "substantially continuously measuring dynamic and static acceleration" of a body, Petitioner argues that Unuma's acceleration sensors continuously measure dynamic and static (gravitational) acceleration of the body. *Id*. 34–35. Petitioner contends that Figure 3 of Unuma shows that measurements are substantially continuous. *Id*. at 35. Petitioner also points to where Unuma discloses that its processor "for motion/action recognition *continuously* receives characteristic quantity data 10 from the characteristic quantity extraction unit 5, the data 10 being derived from the ongoing motions/actions of the object 1 under observation." *Id*. (emphasis added) (citing Ex. 1004, 6:48-50).

Petitioner further discusses Figure 2 in Unuma, depicting output results 20 indicating specific time series data items 21–24 derived from the motions of "walking," "running," "squatting," and "lying down." *Id*. at 35–36 (citing Ex. 1004, 6:31–37, Fig. 2). Petitioner points to "data item 24," for example, as indicating "a state of no acceleration in which gravitational acceleration is not detected because the object is lying down." *Id*. (citing Ex. 1004, 6:31–37).

In addition, Petitioner argues that Unuma's processing unit 7 processes "acceleration signals (i.e., sensed accelerative phenomena of a body) as a function of characteristic quantities of the motions involved (i.e., accelerative event characteristics)." Pet. 30, 37–38. Petitioner explains that Unuma discloses various analysis methods for the sensed data, such as Fourier transformation frequency analysis, wavelet transformation, time frequency analysis, or any other appropriate frequency analysis scheme. *Id*. at 30–31, 38 (citing Ex. 1004, 6:41–43, 8:7–10); *see also id*. at 25 (explaining that processing unit 7 correlates extracted data with reference data containing previously acquired characteristic quantities of motions and actions, and "[t]he motion or action represented by the characteristic quantity with the highest degree of correlation is recognized [as] an[] output.").

Petitioner argues that Unuma's "system is able to distinguish between various accelerative events using characteristics thereof." *Id*. at 31, 38. For example, Petitioner points out that motions of "climbing," "falling, "hitting obstacles," and "reaching the ground" can be recognized by their respective characteristics of "upward acceleration greater than gravitational acceleration," "zero acceleration in all directions (because of free fall)," "intense acceleration occurring in different directions in a short time," and "suffering a considerably strong acceleration." *Id*. at 31, 38–39 (citing Ex. 1004, 16:31–34). Consequently, Petitioner argues that Unuma discloses a processor that processes sensed accelerative phenomena as a function of an accelerative event characteristic. *Id*. at 30–31, 39 (citing Ex. 1002 ¶¶ 76, 85 App. D).

Patent Owner responds that the processor of Unuma only processes sensed dynamic acceleration information, but not both dynamic and static accelerative information/phenomena, as required in claims 1 and 11. Specifically, Patent Owner asserts "[i]n using the accelerometer output illustrated in Figures 2 and 3, *Unuma* processes **only** dynamic acceleration to recognize motion patterns and disregards or filters out static acceleration." PO Resp. 42. In support, Patent Owner relies on teaching in Unuma and a declaration by Dr. Sturges (Ex. 2006). *Id*. at 42–50.

Patent Owner contends that the time frequency analysis used in Unuma, such as Fourier or wavelet transformation, uses "only the dynamic (vibration) component of the sensed total acceleration" to create the frequency spectrum shown in Figure 2 or the wavelet components shown in Figure 3. *Id*. at 44–50 (citing Ex. 2006 ¶¶ 37–51, 56–58, 60–64, 72).

In support, in relation to Figure 3, for example, Patent Owner contends that "frequency components F(m) and G(m) form the sole basis for the comparison of the observed and reference motion using a correlation function H(m)." *Id*. at 44 (referring to Ex. 1004, 7:20–24; Ex. 2006 ¶¶ 56–58). According to Patent Owner, that comparison is what the processor 7 does when it processes data, and Unuma only processes frequency components generated from the dynamic acceleration information, and "does not suggest using any aspect of the sensed static acceleration data to correlate or recognize motions." *Id.* at 44 (citing Ex. 2006 ¶¶ 48–50), 47 (stating that "static acceleration information is effectively filtered out, and is not employed") (citing Ex. 2006 ¶¶ 39–42, 48). Patent Owner contends that "[e]ven with respect to lying down, the absence of wavelet components in Figure 3 merely indicates the absence of dynamic acceleration." *Id.* at 44–45 (citing Ex 2006 ¶ 49).

Patent Owner presents similar arguments regarding the "frequency analysis" depicted in Figure 2. PO Resp. 46–47. In relation to both Figures 2 and 3, Patent Owner repeats its contention that Unuma "teaches and encourages use of methods that filter out and disregard static acceleration." PO Resp. 48–49 (Ex. 2006 ¶¶ 42, 47). According to Patent Owner, Unuma does not "disclose or teach processing both dynamic and static acceleration to thereby determine whether motion is within environmental tolerance." *Id.* at 50.

In a related fashion, Patent Owner further contends that Unuma does not teach or suggest "processing sensed accelerative phenomena '*as a function of at least one accelerative event characteristic* to thereby determine whether said evaluated body movement is *within environmental tolerance*,'" as recited in claims 1 and 11. *Id.* at 50–55. Patent Owner discusses how the claim term "accelerative events" refers to "occurrences of change in velocity of the body (or acceleration), whether in magnitude, direction or both." *Id.* at 51. Patent Owner then argues that when Unuma normalizes "both the frequency components F(m) of observed motion and the frequency components G(m) of the reference motion," that normalization removes "magnitude information" for the sensed dynamic acceleration. *Id*. at 51–52 (citing Ex. 1004, 6:55–7:15, Ex. 2006 ¶ 55-56, 57). Patent Owner also argues that Unuma's "use of absolute values of the frequency component differences removes direction information from the sensed dynamic acceleration." *Id*. at 52–55 (discussing Ex. 1004, 6:55–7:24, Fig. 29). Thus, according to Patent Owner, Unuma does not process the recited phenomena "as a function of at least one accelerative event characteristic." *Id*. at 54; Ex. 1001, claims 1 and 11.

The analysis by Patent Owner and its expert, Dr. Sturges, however, does not persuade us that Unuma fails to teach processing of sensed or measured dynamic and static accelerative phenomena as a function of at least one accelerative event characteristic. For example, Unuma's system obtains data from an acceleration sensor, such as data items 21–24 in Figure 2, or acceleration changes 210 in Figure 3, for example—which include gravitational (static) acceleration information—and such data "are digitized by the A/D converter 4" and "subjected to time-frequency analysis." Ex. 1004, 6:31–39. Patent Owner proposes that the digitation and/or time-frequency analysis causes all static data to be "effectively filtered out" before any comparison/processing step takes place. PO Resp. 47; *see also*, *id*. at 42, 45, 48.

In support, Patent Owner and its expert rely on disclosures in Unuma regarding "[o]ne way of correlating measurements with reference data [that] is shown illustratively in Fig. 29." Ex. 1004, 6:55–7:54; PO Resp. 42, 44–45, 47–55 (referring to Ex. 1004, 6:55–7:54); Ex. 2006 ¶¶ 42, 49, 57. Patent Owner also cites to paragraphs in Dr. Sturges' Declaration discussing an "average value T (denoted by reference numeral 2003) of the powers of all spectrum components excluding the direct-current component (that is, the Oth-order harmonic)," as depicted in Figure 47C. Exhibit 1004, 21:22–34; PO Resp. 47–49 (referring to Ex. 2006 ¶ 42, which cites Exhibit 1004, 21:22–34).

We agree with Petitioner, however, that other disclosures in Unuma describe processing both "static and dynamic components of the acceleration signal to determine both movement of the body and the 'gradient' (position) of the body relative to earth." Reply 11. For instance, when discussing Figures 47–49, Unuma indicates that the "state of a motion is recognized" (Ex. 1004, 24:58), but also that "the gradient of a human body, that is, the state of the upright/leaning posture of the human body, can be recognized from an average value of variations in acceleration observed by an acceleration sensor." Ex. 1004, 24:58–25:26. Unuma states that "[t]he magnitude of the direct-current component is used to find the gradient of the human body which is, in turn, utilized for forming a judgment on the state of the upright/leaning posture of the human body." Ex. 1004, 25:24–26; *see also* Ex. 1001, 7:16–28 (describing a "direct current (dc) voltage component" as corresponding "to an angle relative to earth (i.e., static acceleration component related to gravity").

In addition, in Figures 33–36 of Unuma, "diagram (b) shows an average value of the measured waveform shown in the diagram (a) or the direct-current component of the waveform." Ex. 1004, 27:56–28:1; Reply 12–13. Unuma's teachings in relation to Figure 33 indicate that an acceleration average, as shown in diagram (b) of the measured waveform, can be calculated in order to analyze the static component of the waveform for purposes of determining the posture of the body relative to earth, as depicted in diagram (g), which shows "the result of the recognition by animation using computer graphics," i.e., body movement (dynamic acceleration) and posture (static acceleration). Ex. 1004, 28:1–30. Figure 36 depicts similar processing of such information, but presents a lying-down posture in diagram (g), rather than a brisk upright walking motion, as shown in diagram (g) in Figure 33.

Moreover, even to the extent that we were to agree that Unuma filters out static acceleration as part of its wavelet or frequency analysis, this in and of itself is an indication of processing, in that the processor would subject the static acceleration data to examination so as to filter it out. *See* Merriam-Webster Dictionary (defining "process" as "to subject to examination or analysis <computers *process* data>.") (Ex. 3008). Accordingly, even if "the absence of wavelet components in Figure 3 merely indicates the absence of dynamic acceleration" "[e]ven with respect to lying down" (PO Resp. 44–45 (citing Ex. 2006 ¶ 49)), for example, Unuma's processor would examine the static acceleration data so as to filter it out. Thus, even accepting the "filter out" argument by Petitioner, we find that Unuma processes both "sensed dynamic and static accelerative phenomena," as required in claims 1 and 11.

In addition, we agree with Petitioner that Unuma teaches or suggests, when discussing Figures 33–36, for example, processing sensed dynamic and static accelerative phenomena "as a function of at least one accelerative event characteristic" as recited in claims 1 and 11, i.e., teaches or suggests processing relevant accelerative phenomena as a function of magnitude and direction. Ex. 1004, 27:45–28:55; Reply 14.

As discussed above, in relation to its "normalization" position, Patent Owner refers us to "[o]ne way of correlating measurements with reference data [that] is shown illustratively in Fig. 29." Ex. 1004, 6:55–7:54; PO Resp. 44–45, 51–55 (referring to Ex. 1004, 6:55–7:54). Even assuming such "normalization" "scales all of the frequency component magnitudes so that the sum of all frequency components F(m) is equal to 1 and the sum of all frequency components G(m) is equal to 1" (PO Resp. 51), we are not persuaded that doing so eliminates any and all information regarding magnitude and direction from the sensed accelerations.

Petitioner presents responsive evidence that "the normalization data used by Unuma still has a magnitude, it is just in the form of a normalized magnitude." Reply 14 (citing Ex. 1012, 151:1–153:8) (Dr. Sturges agreeing "the sine is clearly used to get that average"); Ex. 1013 ¶¶ 65–66 (indicating that a "proper average cannot be calculated without using the magnitude and direction (up and down) values of the waveform").

Moreover, the processing of such "normalized" information results in an output corresponding to dynamic and static accelerative information, as depicted by computer graphics or pictures of sensed objects, as shown in Figures 1, 33–36 and 43 in Unuma. Because the processing results in such an output, Unuma's system must, at least in some capacity, "process" dynamic and static accelerative information as a function of occurrences of change in velocity or acceleration of the sensed body, in magnitude and/or direction. *See* Merriam-Webster Dictionary, available at http://www.merriam-webster.com/dictionary/process (defining "process" as "to take in and organize for use <Computers *process* data>") (Ex. 3009).

We determine that Petitioner establishes sufficiently that Unuma teaches or suggests "process[ing] said sensed accelerative phenomena of said body as a function of at least one accelerative event characteristic," as recited in claim 1 and 11.

b. "to thereby determine whether said evaluated body activity is within environmental tolerance" (claim 1 and 11)

Petitioner argues that Unuma's system determines whether the evaluated body movement is within environmental tolerance, as recited in both claims 1 and 11. Pet. 31–33, 39–40. In particular, Petitioner argues that Unuma's processing unit recognizes "a motion pattern made up of a motion of 'a walking or standing-still posture' followed by a motion of 'reaching the ground in a short time' . . . followed by a motion 'lying still on the ground'" as "the action of 'a sudden collapse onto the ground.'" Id. at 32, 39. Petitioner argues that Unuma's system makes a determination (in a hospital environment, for example) as to whether the body movement is indicative of an emergency state of collapse or, conversely, within environmental tolerance. *Id*. at 31–32, 39–40.

Petitioner also argues that the recognized motion pattern may, or may not, be reported as an emergency state of collapse "depending on where the incident is observed." *Id*. at 32, 40 (citing Ex. 1004, 17:3–7). Petitioner urges that "[a]t a minimum[,] a [person of ordinary skill in the art] would have found it obvious in view of Unuma's disclosed determinations regarding body movements within particular environments that trigger, for example, alarms and reports, to provide a determination of whether said evaluated body movement is within an environmental tolerance." *Id*. at 32–33, 40; *see also id*. at 46–47 (claim chart).

As Petitioner points out, Unuma's system recognizes "a motion pattern made up of a motion of 'a walking or standing still posture' followed by a motion of 'reaching the ground in a short time' . . . followed by a motion 'lying still on the ground'" as "the action of 'a sudden collapse onto the ground.'" Pet. 31–32 (citing Ex. 1004, 16:26–30, 13:26–34, Figs 39, 42 and 43). We agree with Petitioner that Unuma's system makes a determination (in a hospital environment, for example) as to whether the body movement is indicative of an emergency state of collapse or, conversely, within environmental tolerance. *Id.* We also agree with Petitioner that the recognized motion pattern may, or may not, be reported as an emergency state of collapse "depending on where the incident is observed." *Id.* (citing Ex. 1004, 17:3–7).

Patent Owner contends that Unuma "merely attempts to recognize different types of motions through pattern matching, without regard for whether that body movement is within tolerance." PO Resp. 55–56. Patent Owner contends that "mere recognition of movement as consistent with a fall is insufficient to determine whether such movement is acceptable, or within tolerance." *Id.* Patent Owner also argues that Unuma indicates that some collapses result in false alarms, and that Unuma "suggests various techniques for verifying that an apparent collapse" is state of emergency. *Id.* at 56. Thus, according to Patent Owner, Unuma fails to teach or suggest determining tolerability based on processing sensed static and dynamic acceleration. *Id.*

Patent Owner's contentions do not persuade us. In Figure 39, for example, Unuma discloses detecting whether a collapse corresponds to a state of emergency, which also involves determining whether body activity is within environmental tolerance, i.e., not in a state of emergency. Ex. 1004, 30:24–42, Fig. 39. When considering disclosures in Unuma regarding Figures 39 and 42, for example, we agree with Petitioner that "[a]t a minimum[,] a person of ordinary skill in the art would have found it obvious in view of Unuma's disclosed determinations regarding body movements within particular environments that trigger, for example, alarms and reports, to provide a determination of whether said evaluated body movement is within an environmental tolerance." Pet. 32–33; *see also* Ex. 1004, 17:3–7 (discussing "reporting"). Moreover, we are persuaded that the determination of whether said evaluated body movement is within an environmental tolerance is as a result of the previously described processing of sensed dynamic and static accelerative phenomena as a function of at least one accelerative event characteristic to satisfy the "thereby" language of the claims. *See* Oxford Dictionaries, available at http://www.oxforddictionaries.com/us/definition/american_english/thereby (defining "thereby" as "By that means; as a result of that") (Ex. 3007).

We determine that Petitioner establishes sufficiently that Unuma teaches or suggests "to thereby determine whether said evaluated body activity is within environmental tolerance," as recited in claims 1 and 11.

c. "to thereby determine whether said body has experienced no movement for a predetermined period of time" (claim 1 and 11)

Petitioner contends that Unuma's system determines whether a body "has experienced no movement for a predetermined period of time," as recited in claims 1 and 11. Pet. 27, 33, 40–41. For example, Petitioner points us to where Figure 43 in Unuma "includes time period 1134, during which 'the patient is lying down and does not move any more.'" *Id*. at 33, 40–41 (citing Ex. 1004 31:36–41, Fig. 43). In addition, Petitioner points us to where Unuma states that its "'recognition device is capable of recognizing a single motion or action that takes place within a limited period of time.'" *Id.* at 33, 40–41 (citing Ex. 1004, 16:18–19).

Based on the above, we determine that Petitioner establishes sufficiently that Unuma teaches or suggests "to thereby determine whether said body has experienced no movement for a predetermined period of time," as recited in claims 1 and 11. Patent Owner does not contend otherwise.

d. Conclusion

We determine that Petitioner has shown by a preponderance of the evidence that Unuma teaches or suggests a system comprising all limitations of independent claims 1 and 11. In view of the foregoing, we determine Petitioner has established by a preponderance of the evidence that independent claims 1 and 11 would have been obvious over Unuma under 35 U.S.C. § 103(a).

III. PATENT OWNER'S MOTION TO EXCLUDE EVIDENCE

The party moving to exclude evidence bears the burden of proof to establish that it is entitled to the relief requested, e.g., that the material sought to be excluded is inadmissible under the Federal Rules of Evidence. *See* 37 C.F.R. §§ 42.20(c), 42.62(a).

Patent Owner moves to exclude paragraphs 6, 14–35, and Appendix 1 of Exhibit 1013 (Reply declaration testimony of Petitioner's expert, Dr. Welch) as "conclusory" and presenting "legal arguments, not technical ones; therefore, this witness is not qualified to offer them." Mot. Excl. 2. Patent Owner also argues that the paragraphs comprise new claim construction arguments regarding "what is required to sense accelerative phenomena of a body 'relative to a three dimensional frame of reference in said in environment' in the context of claim 1." *Id*. at 2–3. According to Patent Owner, Petitioner should have presented such arguments in the Petition. *Id*. (citing 37 C.F.R. § 42.104(b)(3); 77 Fed. Reg. 48,756, 48,768; *The Scotts Co. v. Encap, LLC*, IPR2013-00110, Paper 79, 5–6 (PTAB June 24, 2014)).

Petitioner opposes and argues that "[a] motion to exclude is not a mechanism to argue that a reply contains new arguments." Opp. Mot. Excl. 2 (citing *Vibrant Media, Inc. v. General Electric Co.*, IPR2013-00170, Paper 56, 31 (PTAB June 26, 2014)). Petitioner further opposes and argues that it properly submitted Dr. Welch's Reply declaration testimony in direct response to arguments and evidence raised by Patent Owner in its Response. *Id.* More particularly, Petitioner points out that Patent Owner affirmatively asserted, in its Patent Owner Response, that Yasushi "does not qualify as prior art and cannot be used to invalidate the '890 patent." *Id*. (quoting PO Resp. 1).

Patent Owner also moves to exclude paragraphs 51–52 of Exhibit 1013 as comprising new claim construction arguments regarding "what is required to 'process' sensed static and dynamic accelerative phenomena in the context of claim 11." Mot. Excl. 3. In addition, Patent Owner moves to exclude paragraphs 53–57, 59, 63, 65–66, 68, and 77 of Exhibit 1013 as comprising new arguments discussing new portions of Unuma that were not presented in the Petition nor Dr. Welch's opening declaration (Exhibit 1002). Mot. Excl. 3–4. More particularly, Patent Owner argues that those paragraphs discuss Figs. 5(b), 33–36, and 48 along with their accompanying text in Unuma, but neither the Petition nor Patent Owner's Response examine those portions of Unuma. *Id*.

Petitioner opposes and argues that Dr. Welch's Reply declaration testimony is directly responsive to Patent Owner's assertion that the challenged claims were not obvious over Unuma "because the claims at issue require (1) sensing and processing of both body movement and changes in orientation of the body; (2) evaluation of movement according to accelerative event characteristics, which are vectors including magnitude, direction, or both; and/or (3) making an acceptability determination based on the specified criteria relative to the environment of interest—none of which is disclosed or taught by Unuma." Opp. Mot. Excl. at 3 (citing PO's Response at 1–2).

As Petitioner points out, normally, a motion to exclude is available to parties to explain why certain evidence is inadmissible, and is not the proper place to raise arguments regarding the scope of a reply. Trial Practice Guide, 77 Fed. Reg. 48756, 48767 (Aug. 14, 2012); *Liberty Mutual Insurance Co. v. Progressive Casualty Insurance Co.*, Case No. CBM2012-00002, Paper 66, slip op. at 62 (PTAB Jan. 23, 2014) (stating that a motion to exclude "is not a mechanism to argue that a reply contains new arguments or relies on evidence necessary to make out a prima facie case"). That said, rather than deny Patent Owner's motion on that basis, we address the points raised in the Motion to Exclude to clarify the issues raised therein.

As an initial matter, Patent Owner's assertions that the testimony is "conclusory" and presents "legal argument" (Mot. Excl. 1–2) might impact how we weigh the testimony, but does not persuade us to exclude it. Moreover, we determine that Patent Owner's Response contains affirmative contentions that Yasushi does not qualify as prior art in view of Patent Owner's proposed claim construction, and that Unuma fails to disclose sensing or measuring static acceleration, among other limitations of the claims (*see, e.g.*, PO Resp. 1–2, 35–38, 42–56). Such contentions differ from mere argument that Petitioner has failed to offer adequate evidence in its Petition to establish that Yasushi or Unuma discloses the subject matter of recited elements in claims 1 and 11. Thus, we determine that Petitioner properly submitted the identified paragraphs of Dr. Welch's Reply declaration to rebut Patent Owner's arguments made in its Patent Owner Response. Accordingly, we deny Patent Owner's Motion to Exclude.

IV. NOTICE REGARDING NEW ARGUMENTS AND BELATED SUPPORT

Patent Owner filed a "Notice Regarding New Arguments and Belated Support." Paper 30. Patent Owner contends that certain pages of Petitioner's Reply include new claim construction arguments regarding "what elements are required to sense accelerative phenomena 'relative to a three dimensional frame of reference within said environment.'" *Id*. at 1–2. In addition, Patent Owner contends that Petitioner's Reply includes new arguments regarding how Petitioner contends Unuma (i) "processes static acceleration;" (ii) "discloses processing magnitude and direction of acceleration;'" and (iii) "discloses using tolerances." *Id.* at 2. Patent Owner further contends that certain pages of Petitioner's Reply rely on certain portions of Unuma "not cited or mentioned in their Petition or supporting declaration." *Id.* Patent Owner contends that it "had no opportunity to respond [to] or address in its Response or responsive evidence" these new arguments and evidence. *Id.* at 1.

Petitioner filed a Response to Patent Owner's Notice, in which Petitioner asserts that its arguments "are directly responsive to PO's assertions that Yasushi allegedly 'does not qualify as prior art and cannot be used to invalidate the '890 patent.'" Paper 33, 1. In addition, Petitioner contends that its arguments "are directly responsive to PO's assertion that the challenged claims are allegedly not obvious over Unuma "because the claims at issue require" items (i)–(iii) discussed above. *Id*. at 1–2.

During trial, we stated that "[i]n rendering its Final Written Decision, the Board will determine what weight, if any, is to be given to all of the presented evidence and arguments in accordance with the rules of the Board." Paper 23, 3.

The mere fact that a petitioner submits rebuttal testimony that relies on new evidence not previously identified in the petition does not suffice to establish its impropriety. The very nature of a reply is to rebut the patent owner's response. 37 C.F.R. § 42.23(b). As described above in connection with our analysis of Patent Owner's Motion to Exclude, we determine that Petitioner's reliance on the identified arguments and evidence was responsive to arguments raised in the Patent Owner Response as to the entirety of the teachings of Yasushi and Unuma, and accordingly, have given appropriate consideration to the identified arguments and evidence relating to contentions regarding those references.

V. CONCLUSION

Taking account of the arguments and evidence presented during trial, we determine that Petitioner establishes by a preponderance of the evidence that claims 1 and 11 of the '890 patent are unpatentable as obvious over Unuma.

VI. ORDER

For the foregoing reasons, it is

ORDERED that claims 1 and 11 of the ’890 patent are unpatentable;

FURTHER ORDERED that Patent Owner’s Motion to Exclude is denied; and

FURTHER ORDERED that, because this is a Final Written Decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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