

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

LULULEMON ATHLETICA CANADA INC.
and LULULEMON USA INC.,
Petitioner,

v.

NIKE, INC.,
Patent Owner.

IPR2023-00438
Patent 8,620,413 B2

Before JOSIAH C. COCKS, GEORGE R. HOSKINS, and
STEPHEN E. BELISLE, *Administrative Patent Judges*.

COCKS, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
35 U.S.C. § 318(a)

I. INTRODUCTION

A. Background

Petitioner, lululemon athletica canada inc. and lululemon usa inc. (“Petitioner” or “lululemon”), filed a Petition (Paper 2, “Pet.”) requesting *inter partes* review of claims 1–5, 7, 9, 12–14, and 17–19 (“the challenged claims”) of U.S. Patent No. 8,620,413 B2 (Ex. 1001, “the ’413 patent”). We instituted the petitioned review. Paper 11 (“Institution Decision” or “Inst. Dec.”).¹

Patent Owner, Nike, Inc. (“Patent Owner” or “Nike”), filed a Patent Owner Response (Paper 22, “PO Resp.”) to oppose the Petition. Petitioner filed a Reply (Paper 26, “Pet. Reply”) to the Patent Owner Response. Patent Owner filed a Sur-reply (Paper 30, “PO Sur-reply”) to the Reply. A transcript has been entered into the record. Paper 37 (“Tr.”).

We have jurisdiction under 35 U.S.C. § 6(b)(4) and § 318(a). This Decision is a final written decision under 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73 as to the patentability of claims 1–5, 7, 9, 12–14, and 17–19 of the ’413 patent. We determine Petitioner has shown by a preponderance of the evidence that those claims are unpatentable.

B. Real Parties-In-Interest

Petitioner identifies the following as its real parties-in-interest:
lululemon athletica inc., lululemon athletica canada inc., lululemon usa inc.,

¹ We note that prior to our Institution Decision, Patent Owner filed a Preliminary Response. Paper 10 (“Prelim. Resp”). That Preliminary Response is referenced in this Decision as to matters of claim construction.

and Curiouser Products, Inc. Pet. 57. Patent Owner identifies Nike, Inc. (i.e., itself) as the only real party-in-interest. Paper 4, 2.

C. Related Matters

The parties identify *Nike, Inc. v. lululemon athletica inc. et al.*, No. 1:22-cv-00082-AJN (S.D.N.Y) as a related matter. Pet. 57; Paper 4, 2.

D. The '413 Patent

The '413 patent is titled "Adaptive Watch." Ex. 1001, code (54). The Abstract of the '413 patent reads as follows:

A watch or other type of portable electronic console that employs a number of different functions in order to improve its usability. The watch may, for example, allow a user to connect the watch to one or more remote electronic devices, such as an electronic performance sensor or MP3 player. The watch then displays information related to the connected electronic devices. Still further, the watch may allow a user to control the operation of one or more connected remote electronic devices. Thus, if the watch is connected to a remote speed/distance monitor employing a calibration variable, then the watch may allow the user to adjust the calibration variable.

Id. at code (57).

Figure 2 of the '413 patent is reproduced below:

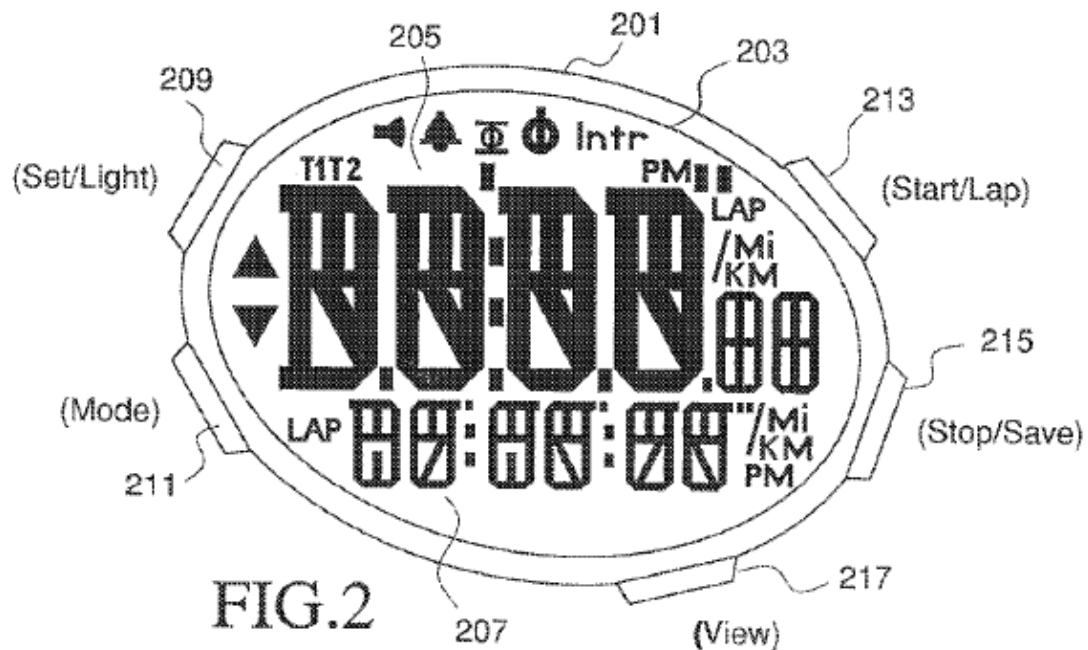


Figure 2 above “illustrates a user interface provided by a watch according to an embodiment of the invention.” *Id.* at 3:66–67.

As shown in Figure 2, watch 201 includes display 203 “which displays data values calculated by, or provided to” watch 201. *Id.* at 5:54–57. “[D]isplay 203 also includes a variety of icon displays for indicating operation processes of” watch 201. *Id.* at 5:59–60.

Figure 3A of the '413 patent is reproduced below:

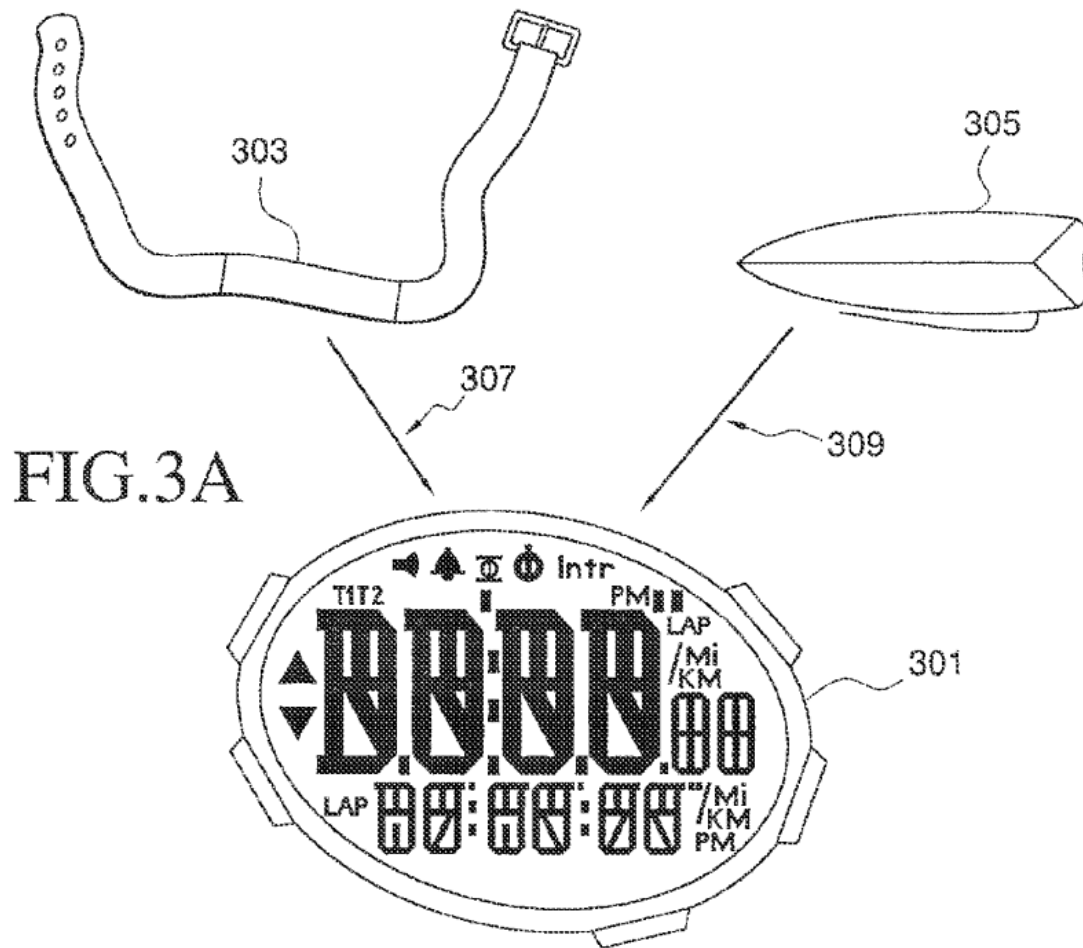


Figure 3A above illustrates interactions of a watch with multiple sensors. *Id.* at 4:1–3.

As shown in Figure 3A, watch 301 receives measured sensor data from two separate remote electronic sensors 303 and 305. *Id.* at 6:33–37. “[S]ensor 303 is a heart rate monitor, which monitors the rate at which a wearer’s heart beats.” *Id.* at 6:37–39. “[S]ensor 305 is a speed/distance monitor that measures a total distance traveled by the wearer.” *Id.* at 6:39–41. Heart rate data from sensor 303 may be used to calculate different “heart rate zones” of a user reflecting different performance characteristics or “gains” for the user. *Id.* at 14:49–61. The '413 patent further explains the following:

For example, an athlete may burn fat most efficiently by maintaining his or her heart rate within the zone that is 40% to 60% of the athlete's maximum heart rate. On the other hand, an athlete may improve his or her maximum possible rate of oxygen consumption by maintaining his or her heart rate within the zone that is 60% to 80% of the athlete's maximum heart rate.

Id. at 14:61–67.

Figure 8 of the '413 patent is reproduced below:

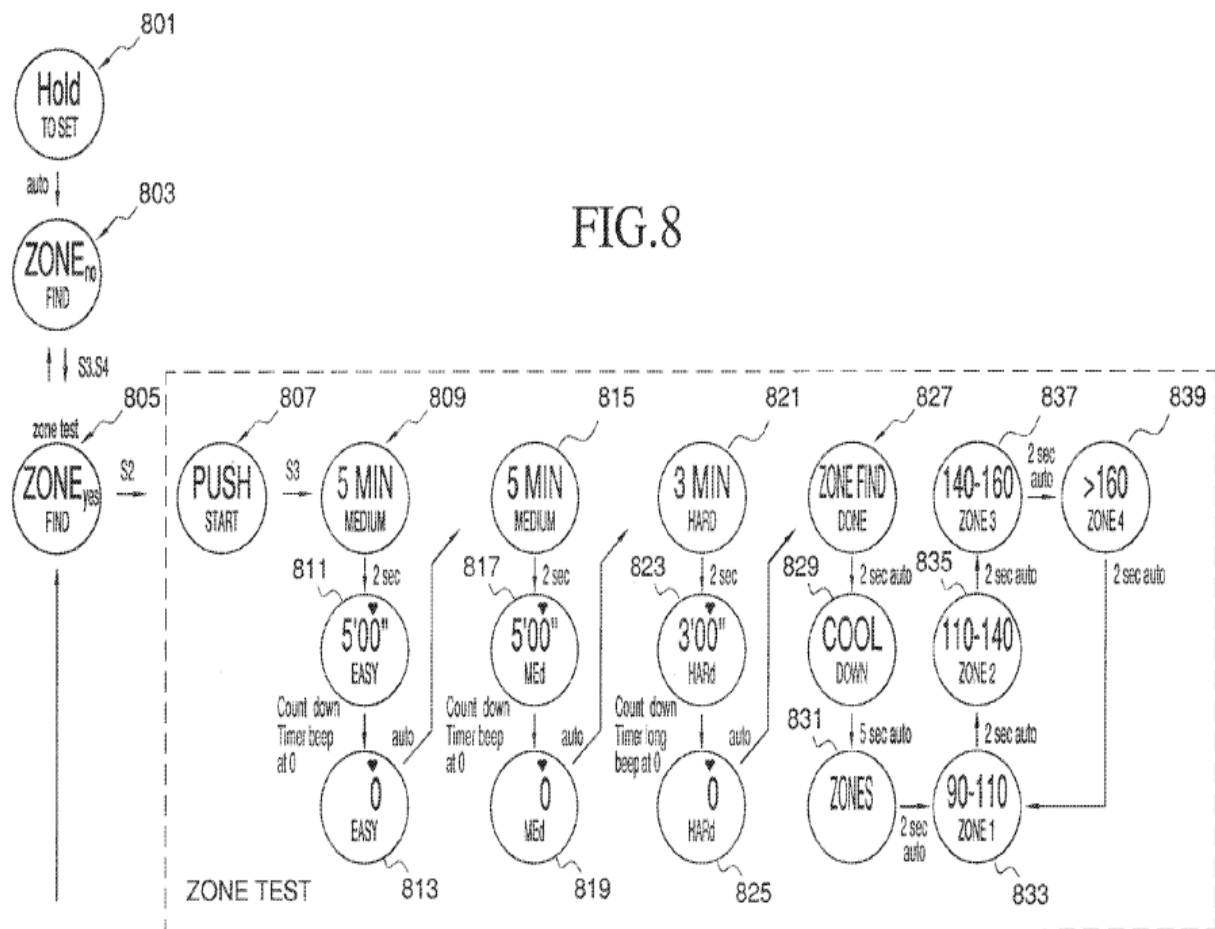


Figure 8 above “illustrates interface views that may be employed by various embodiments of the invention to automatically calculate heart rate zones.” *Id.* at 4:15–17.

As shown in Figure 8, the watch incorporates various “views” (e.g., 801–839), that can display information to a user that includes, *inter alia*, suggested exercise times such as “3 MIN” or “5 MIN,” (e.g., views 821, 815), suggested exercise intensity such as “EASY,” “MEDIUM” or “HARD,” (e.g., views 811, 809, 821), or heart rates zones reflecting different ranges of heart rates, (e.g., views 833, 835, 837, 839 (zones 1–4)).

E. The Challenged Claims

Petitioner challenges claims 1–5, 7, 9, 12–14, and 17–19 of the ’413 patent. Of those, claims 1, 12, and 17 are independent. Claim 1 is representative and is reproduced below:

1. [1PRE] An apparatus comprising:
 - [1A] a processor; and
 - [1B] a memory storing instructions that, when executed by the processor, cause the apparatus at least to:
 - [1C] prompt a user to exercise at a plurality of successive exertion levels, wherein an exertion level is based on a level of physical fitness of a user;
 - [1D] determine a plurality of heart rate zones based on first heart rate measurements received from a sensor while the user exercises at the plurality of successive exertion levels;
 - [1E] generate a prompt instructing a user to exercise while maintaining heart rate within a particular one of the plurality of heart rate zones;
 - [1F] process second heart rate measurements received from the sensor subsequent to generating the prompt; and

[1G] determine whether the second heart rate measurements are within the particular heart rate zone.

Ex. 1001, 18:5–23.^{2,3}

F. Asserted Grounds of Unpatentability

Petitioner asserts the following grounds of unpatentability:

Ground No. ⁴	Claims Challenged	35 U.S.C. §	Reference(s)/Basis
1	1, 5, 7, 12, 17	102 ⁵	Amano ⁶
2	1, 5, 7, 12, 17	102	Matsumoto ⁷

² We reproduce claim 1 with similar feature identification numbering used in both the Petition and the Patent Owner Response (i.e., “[1PRE]” through “[1F]”).

³ Independent claim 12 is drawn to “[a] method” and independent claim 17 is drawn to “[a] non-transitory computer readable medium storing executable instructions.” Claims 12 and 17 include features corresponding to those set forth in the apparatus of claim 1. *See* Ex. 1001, 18:60–19:9, 19:26–20:10.

⁴ Both parties number the Grounds 1 through 9. For clarity and convenience, we do the same in this Decision.

⁵ The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284, 287–88 (2011), amended 35 U.S.C. §§ 102 and 103 effective on March 16, 2013. Neither party argues that the outcome of this case would differ based on applying the pre-AIA or post-AIA versions of these laws.

⁶ US Patent No. 6,241,684 B1 issued June 5, 2001 (Ex. 1002, “Amano”).

⁷ US Patent No. 4,911,427 issued Mar. 27, 1990 (Ex. 1003, “Matsumoto”).

Ground No. ⁴	Claims Challenged	35 U.S.C. §	Reference(s)/Basis
3	1, 12, 17	103	Lubell, ⁸ Ceci ⁹
4	2, 3, 4, 13, 18	103	Lubell, Ceci, Gorman ¹⁰
5	9, 14, 19	103	Lubell, Ceci, Flach ¹¹
6	2, 3, 4, 13, 18	103	Amano, Gorman
7	9, 14, 19	103	Amano, Flach
8	2, 3, 4, 13, 18	103	Matsumoto, Gorman
9	9, 14, 19	103	Matsumoto, Flach

Pet. 19.

G. Testimonial Evidence

In support of its asserted grounds of unpatentability, Petitioner relies on the Declaration (Ex. 1009) and Reply Declaration (Ex. 1018) of Dr. Kevin Lynch, Ph.D.

In challenging the asserted grounds, Patent Owner relies on the Declaration (Ex. 2001) and Supplemental Declaration (Ex. 2008) of Dr. Bryan Bergeron, M.D.

⁸ US Patent No. 4,566,461 issued Jan. 28, 1986 (Ex. 1004, “Lubell”).

⁹ Ruggero Ceci & Peter Hassmén, *Self-monitored exercise at three different RPE intensities in treadmill vs field running*, 23 *Medicine & Science in Sports & Exercise* 732–738 (1991) (Ex. 1005, “Ceci”).

¹⁰ US Patent No. 5,400,794 issued Mar. 28, 1995 (Ex. 1007, “Gorman”).

¹¹ US Patent Application Publication No. 2001/0023315 A1 published Sep. 20, 2001 (Ex. 1008, “Flach”).

II. ANALYSIS

A. Principles of Law

A patent claim is unpatentable as anticipated under 35 U.S.C. § 102 “if each and every limitation is found either expressly or inherently in a single prior art reference.” *WhitServe, LLC v. Computer Packages, Inc.*, 694 F.3d 10, 21 (Fed. Cir. 2012) (quoting *Celeritas Techs., Ltd. v. Rockwell Int’l Corp.*, 150 F.3d 1354, 1361 (Fed. Cir. 1998)). To establish anticipation under 35 U.S.C. § 102, each element in a claim, arranged as is recited in the claim, must be found in a single prior art reference. *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1371 (Fed. Cir. 2008).

A claim is unpatentable under § 103(a) if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) when in evidence, objective indicia of non-obviousness (i.e., secondary considerations). *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).¹²

In an instituted *inter partes* review, a petitioner has the burden to show unpatentability by a preponderance of the evidence. 35 U.S.C. § 316(e). The burden of persuasion never shifts to Patent Owner. *Dynamic*

¹² Neither party presents any objective indicia of non-obviousness.

Drinkware, LLC v. Nat'l Graphics, Inc., 800 F.3d 1375, 1378 (Fed. Cir. 2015).

We analyze the asserted grounds with the above-noted principles in mind.

B. Level of Ordinary Skill in the Art

In determining the level of skill in the art, we consider the type of problems encountered in the art, the prior art solutions to those problems, the rapidity with which innovations are made, the sophistication of the technology, and the educational level of active workers in the field. *Custom Accessories, Inc. v. Jeffrey-Allan Indus. Inc.*, 807 F.2d 955, 962 (Fed. Cir. 1986); *Orthopedic Equip. Co. v. U.S.*, 702 F.2d 1005, 1011 (Fed. Cir. 1983).

Petitioner provides the following assessment as to the level of skill in the art:

A Person of Ordinary Skill in the Art (“POSITA”) for the technology of the ’413 patent would have had (1) a bachelor’s degree in engineering, computer science, industrial design, biomechanics, or a related field, and (2) at least two years of experience researching, developing, designing, and/or testing fitness or physiological sensors, wearable devices, physiological or biomechanical devices, remotely-controlled systems or interfaces, network-based applications and/or equipment, or the equivalent experience or education.

Pet. 18 (citing Ex. 1009 ¶ 41).

Patent Owner indicates that “[f]or purposes of this Response, Nike applies Petitioner’s proposed level of skill in the art.” PO Resp. 16.

We adopt Petitioner’s proposal of the level of ordinary skill in the art as reasonable and consistent with the prior art. *See Okajima v. Bourdeau*,

261 F.3d 1350, 1355 (Fed. Cir. 2001) (the prior art may reflect an appropriate level of skill in the art).

C. Claim Construction

We construe claims “using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. 282(b), including construing the claim in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.” 37 C.F.R. § 42.100(b) (2020); *see Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc).

In the Petition, Petitioner did not propose a claim construction for any term. *See* Pet. 17. In its Response, Patent Owner proposes a construction for the phrase “wherein an exertion level is based on a level of physical fitness of a user.” PO Resp. 19–29; PO Sur-reply 2–6.¹³ According to Patent Owner, the plain and ordinary meaning of the phrase is “an exertion level that takes into account an individual user’s particular physical fitness *condition*, as assessed by fitness condition criteria such as cardiorespiratory endurance.” PO Resp. 19–20 (citing Ex. 2008 ¶¶ 20–31) (emphasis omitted). Patent Owner contends that the meaning it advocates for the phrase in question is supported by intrinsic and extrinsic evidence. *Id.* at 19–29 (citing Exs. 1001, 1014, 1015, 2008–2012);¹⁴ PO Sur-reply 2–6. The

¹³ We note that the pertinent phrase appears in each of independent claims 1, 12, and 17. *See* Ex. 1001, 18:10–11, 18:62–63, 19:30–31.

¹⁴ Exhibits 1014 and 1015 are portions of the prosecution history of the ’413 patent. Exhibits 2009–2011 are excerpts of fitness related journals or

thrust of Patent Owner’s view on this matter is that “based on a level of physical fitness of a user” does not encompass what Patent Owner characterizes as “physical characteristics” such as “sex, age, and weight” and “stride length.” PO Resp. 20 (emphasis omitted); *see id.* at 19–29; PO Sur-reply 2–6.

Petitioner does not agree with Patent Owner’s proposed construction for the pertinent claim phrase. According to Petitioner, “[t]he correct construction is ‘wherein an exertion level is adaptive to a user’s physical fitness.’” Pet. Reply 1 (citing Ex. 1018 ¶¶ 7–13); *see id.* at 1–4. At its core, Petitioner’s view is that the claim phrase includes a person’s “physical attributes,” specifically including examples such as: (1) “sitting or resting heart rate” (*id.* at 1 (citing Ex. 1001, 15:54–56; Ex. 1017¹⁵, 28:3–9)); (2) “weight and height as expressed through BMI^[16]” which can be used to “estimate body composition” (*id.* at 2 (citing Ex. 1017, 52:9–13, 56:23–57:1)); and (3) “the user’s stride length and weight” (*id.* at 4). Petitioner contends that its proposal as to the meaning of the pertinent claim phrase is supported by intrinsic and extrinsic evidence. *See id.* at 1–4.

articles. Exhibit 2012 is the deposition transcript of Petitioner’s declarant, Dr. Kevin Lynch.

¹⁵ Exhibit 1017 is the deposition transcript of Patent Owner’s declarant, Dr. Bryan P. Bergeron.

¹⁶ “BMI” stands for “body mass index” and is calculated based on a person’s weight and height. *See, e.g.*, Ex. 2010, 35 (“body composition has been estimated by measuring body height and weight and calculating body mass index (weight/height²)”); Ex. 1017, 56:6–14 (“BMI is a loose estimation of body composition calculated by the - - dividing the weight or the mass of the person over their height squared [.]”)

At the outset, we note that the parties' claim constructions do not seem to refine the meaning of the pertinent claim phrase or add much clarity as to "an exertion level" being "based on a level of physical fitness of a user." In that regard, for reasons that are not made clear, Patent Owner: (1) substitutes "takes into account" for the claim term "based on"; (2) eliminates the term "level" in connection with the physical fitness of a user and substitutes "an individual user's particular physical fitness condition"; and (3) adds a clause pertaining to assessment "by fitness condition criteria such as cardiorespiratory endurance." It is difficult to discern how such substantial addition of words coupled with wholesale substitution of new terms and phrases is particularly meaningful in providing guidance as to the understanding of the claim phrase at issue. Indeed, rather than offering any type of clarity, Patent Owner's proposal seemingly injects ambiguity.

For its part, Petitioner's construction substitutes "is adaptive to a user's physical fitness" in lieu of the claimed "based on a level of a user's physical fitness." Thus, like Patent Owner, Petitioner omits reference to a "level" of a user's physical fitness. The reasoning for that omission is left unexplained. Moreover, left wanting from Petitioner's construction is adequate articulation as to why "is adaptive to" merits better understanding than "based on."

In an attempt to imbue some clarity to understanding the claims, and specifically, the pertinent claim phrase, we make the following observations. Patent Owner and both parties' declarants suggest that "based on," "takes into account," and "is adaptive to" all have the same meaning. *See, e.g.*, PO

Sur-reply 4–5; Ex. 1017, 73:13–22; Ex. 2013, 23:10–24:25,¹⁷ 36:19–37:7.

It, therefore, seems unnecessary in our view to contemplate claim constructions that substitute “takes into account” or “is adaptive to” for the actual claim language of “based on.” It is apparent from the record that has developed during trial that a core matter for resolution is whether an exertion level that is “based on” a level of a user’s physical fitness includes, at least in some fashion, a user’s physical characteristics or attributes as a part of assessing or understanding a level of a user’s physical fitness. From a general standpoint, it stands to reason that many of a person’s physical attributes, in at least some respect, do indeed provide for assessing the level of that person’s physical fitness.

To be sure, we agree with Patent Owner that certain *individual* attributes, such as any of sex, age, height, weight, and stride length, *taken alone* cannot necessarily be “equated” with a user’s level of physical fitness or constitute such a level. *See, e.g.*, PO Sur-reply 3 (quoting Ex. 2012, 148:5-149:16). But, the record reasonably suggests that such attributes when considered in conjunction with one another can provide meaningful guidance or basis for assessing the level of a user’s physical fitness. For instance, Petitioner contends that “weight and height as expressed through BMI can estimate body composition” which is a “component of physical fitness.” Pet. Reply 2. Petitioner’s declarant, Dr. Lynch, testifies that body

¹⁷ During cross-examination, Petitioner’s declarant Dr. Lynch testified: “So I am reading ‘based on a level,’ ‘takes into account an individual user’s’ and ‘adaptive’ to all - - all to mean depends on, at least in part, one or more attributes of physical fitness.” Ex. 2013, 23:16–19. In its Sur-reply, Patent Owner seems to express some favor or agreement with that testimony. *See* PO Sur-reply 4–5.

mass index (BMI) is a measurable attribute of a physical fitness. *See, e.g.*, 2012, 114:2–7; Ex. 2018 ¶ 10 (citing Ex. 2009, 126, 129). During cross-examination, Patent Owner’s declarant, Dr. Bergeron, agreed that body composition is a component of physical fitness (*see* Ex. 1017, 52:9–13), and that BMI was known as an estimation for body composition (*see id.* at 56:6–57:1). Thus, the record readily conveys that certain physical attributes, such as a person’s weight and height, are germane in evaluating a person’s physical fitness.¹⁸

We further note that Patent Owner’s construction seemingly intends to limit assessment of a level of a physical fitness to aspects surrounding “cardiorespiratory endurance.” We agree that aspects of cardiorespiratory endurance may be one form of information or insight as to a level of a user’s physical fitness. Patent Owner, however, does not explain adequately why cardiorespiratory endurance should be elevated to a singular focus in evaluating the claimed “level of physical fitness of a user,” which is not, by its own terms, so limited.

With the above-noted understanding in mind, we proceed to evaluate the grounds of unpatentability that have been asserted by Petitioner. In so doing, we determine that it is unnecessary to address or make explicit the meaning of any other claim term or phrase. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co. v. Matal*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (“we need only construe terms ‘that are in controversy, and only to the extent necessary to resolve the controversy’” (quoting *Vivid Techs, Inc. v. Am. Sci & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

¹⁸ Neither party challenges whether the other’s declarant is qualified as an expert to opine on human physical fitness and physiology matters.

D. Overview of Prior Art

1. Summary of Amano

Amano is titled “Exercise Workout Support Device.” Ex. 1002, code (54). Amano describes its invention as follows:

[T]he present invention is suitable for use in a maximum oxygen uptake quantity estimating device which enables the user to determine his own maximum oxygen uptake quantity easily; an exercise workout support device which shows the upper and lower limit values for a pulse rate corresponding to an appropriate exercise intensity; a portable pulse wave measuring device, which is provided to a portable device and measures pulse rate or other pulse wave information; or in the technique of sending information between a portable pulse wave measuring device and a data processing device, which processes the measurement data from the aforementioned portable pulse wave measuring device.

Id. at 1:9–20.

Amano characterizes its invention as having certain objectives. “The present invention . . . has as its first objective the provision of an exercise workout support device which can show the upper and lower limit values for the pulse rate corresponding to a suitable exercise intensity.” *Id.* at 2:64–67. “[T]he present invention has as its second objective the provision of a maximum oxygen uptake quantity estimating device, which does not require the user to be restricted to the device, and which can determine the maximum oxygen uptake quantity easily and without troublesome operations.” *Id.* at 3:1–6. Amano also explains that “in order to accurately estimate the maximum oxygen uptake quantity . . . it is necessary to establish a straight line relationship between the test subject[’]s exercise intensity and heartbeat rate.” *Id.* at 6:59–63. Amano further states that “it is necessary to measure exercise intensity at at least three or more stages, and

determine the heart beat rate at each stage.” *Id.* at 6:64–66. Further, “[o]nce a straight line relationship has been established between exercise intensity and beat rate during running, maximum oxygen uptake quantity (VO_{2max}/wt)^[19] is estimated from exercise intensity and heartbeat rate.” *Id.* at 13:15–18.

Amano’s Figure 5 is reproduced below:

FIG. 5

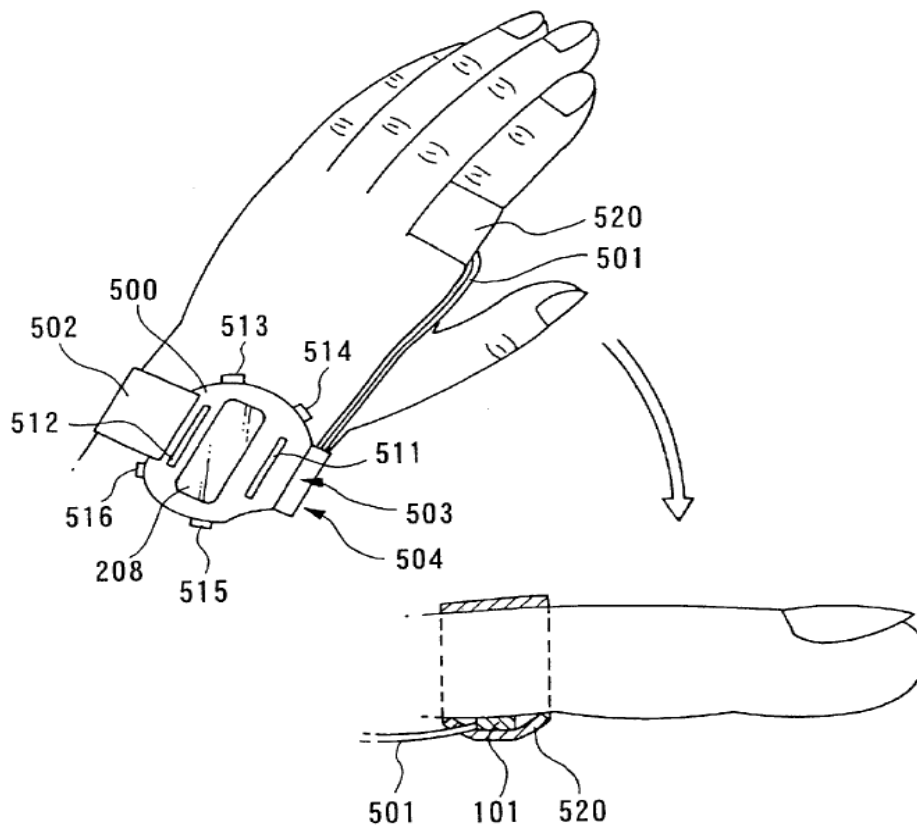


Figure 5 above “shows the external structure of the maximum oxygen uptake quantity estimating device” according to an embodiment of the invention. *Id.* at 4:8–9.

¹⁹ “ VO_{2max}/wt ” refers to “maximum oxygen uptake quantity . . . per unit body weight.” *See, e.g., Ex. 1002, 6:22–23.*

As shown in Figure 5, a wrist watch includes, *inter alia*, main body 500, cable 501 for connecting to pulse wave detector 101 underneath band 520, and display 208. *Id.* at 8:57–65, 9:43–53. Display 208 displays current time and date as well as “various information such as the estimated maximum oxygen uptake quantity (VO_{2max}/wt), modes, etc.” *Id.* at 9:10–14.

Additionally, Amano provides for an “exercise intensity increase notifying processing” as a feature of its device, including that “an order to increase the exercise intensity during running is directed at the test subject [i.e., a user] at fixed time intervals (120 sec, for example) after the test subject has started running.” *Id.* at 13:30–34. In that respect, Amano contemplates that after the subject starts running the subject is “notified to increase exercise intensity by 10% each time” a new interval is reached. *Id.* at 13:52–55. Amano also describes the use of a “beep alarm” to indicate the pace that a user should run. *Id.* at 13:44–50.

Further still, Amano discloses the use of a “body motion detector”, which “is a sensor for detecting body motion when the test subject is running.” *Id.* at 7:18–19. Signals from the body motion detector undergo a processing operation, and a subject’s “pitch during running, i.e., the number of steps per unit time, is obtained from the results of this processing.” *Id.* at 7:24–26. To that end, Amano characterizes its device as being “employed in a pitch maker.” *Id.* at 20:32–33. Also, as a part of the above-noted processing, an “upper limit UL” and a “lower limit LL” for pulse rate is determined. *Id.* at 24:57–62.

Amano's Figure 27 is reproduced below:

FIG. 27

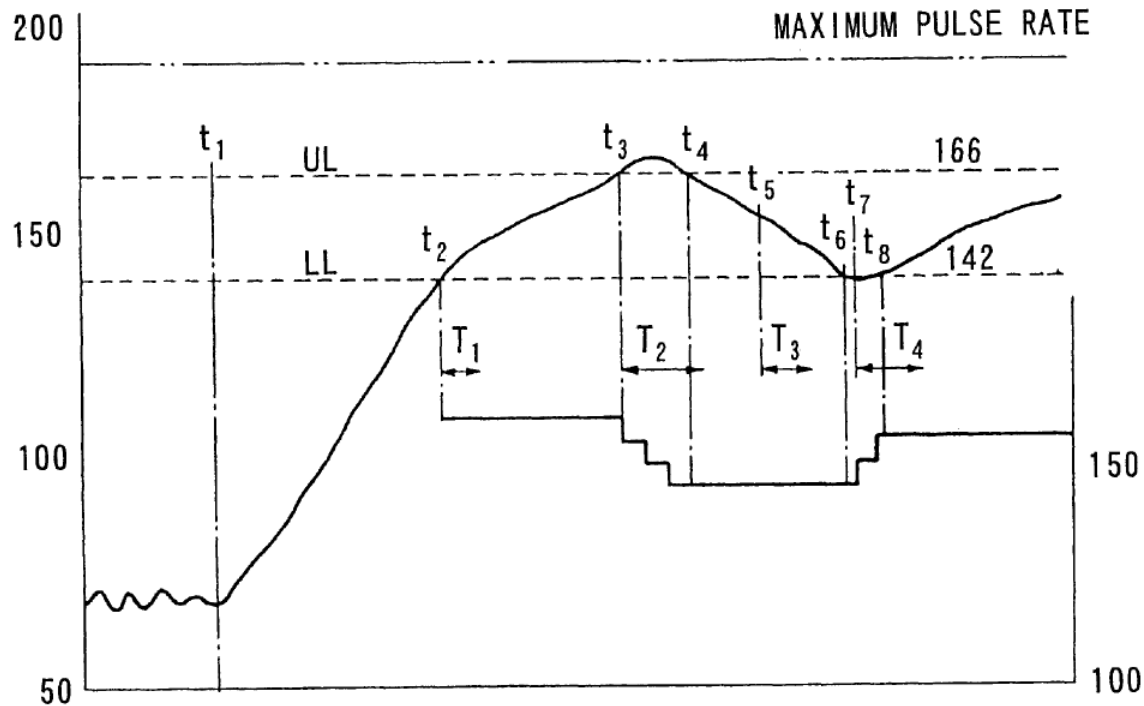


Figure 27 above shows a “timing chart for explaining the operation of the pitch maker.” *Id.* at 5:7–8.

Amano describes that its “pitch maker” compares a user’s “pulse rate” to “the user’s pitch at the current point in time,” e.g., “160 steps/min for the example shown in FIG. 27.” *Id.* at 24:55–56, 25:18–34. Based on that comparison, a “sound generator” generates sounds based on a user’s pulse rate, e.g., above lower limit LL or above upper limit UL. *Id.* at 25:18–26:34.

2. Summary of Gorman

Gorman is titled “Biomedical Response Monitor and Technique Using Error Correction.” Ex. 1007, code [54]. Gorman’s Abstract is reproduced below:

A monitor for measuring and displaying a biomedical response such as heartbeat rate, including a transmitting unit and a receiving unit. The monitor detects the response (heartbeat) and produces a digital pulse train representing this response. The digital pulse train is then encoded to produce an encoded digital signal having a first identification part identifying the transmitting unit and a second data part representing the person's response. This encoded digital signal is wirelessly sent to the receiving unit which reads the received signal to determine if it is from the transmitting unit. If it is from that transmitting unit, the data part is read. If there are too many errors in the data part, a new frequency of wireless transmission is used in the monitor. If the errors are within a reasonable bound, the data bits representing the biomedical response are sent to a memory and/or a display. If the received signal were not from the correct transmitting unit, the received signal is rejected. Interference from other monitors or electrical equipment is minimized, and the data displayed is very accurate.

Id. at code [57].

3. Summary of Flach

Flach is titled “Cellular Architecture and Data Transfer Methods for Real Time Patient Monitoring Within Medical Facilities.” Ex. 1008, code (54). Flach sets forth the following:

The present invention relates to digital wireless communications systems of the type which employ portable, battery-powered communications devices, such as remote telemeters worn by ambulatory hospital patients for monitoring purposes. More particularly, the present invention relates to a network architecture, and an associated TDMA (time division multiple access) communications protocol, for facilitating the efficient and reliable exchange of information between portable wireless devices and centralized monitoring stations.

Id. ¶ 3.

E. Anticipation By Amano (Ground 1)

1. Petitioner's Arguments

Petitioner contends that claims 1, 5, 7, 12, and 17 are anticipated by Amano and presents in detail where it believes all the features of claims 1, 5, 7, 12 and 17 are present in Amano. Pet. 20–28.

a) Claim 1

i. [1PRE], [1A], and [1B]

Petitioner explains how Amano discloses an apparatus that is an exercise workout device and includes a processor (CPU 201) and a memory (ROM 202) for storing instructions to be executed by the processor. Pet. 20–21 (citing Ex. 1002, 7:56–58, 7:62, 8:21, 19:27, Fig. 2).

ii. [1C] prompt a user to exercise at a plurality of successive exertion levels, wherein an exertion level is based on a level of physical fitness of a user;

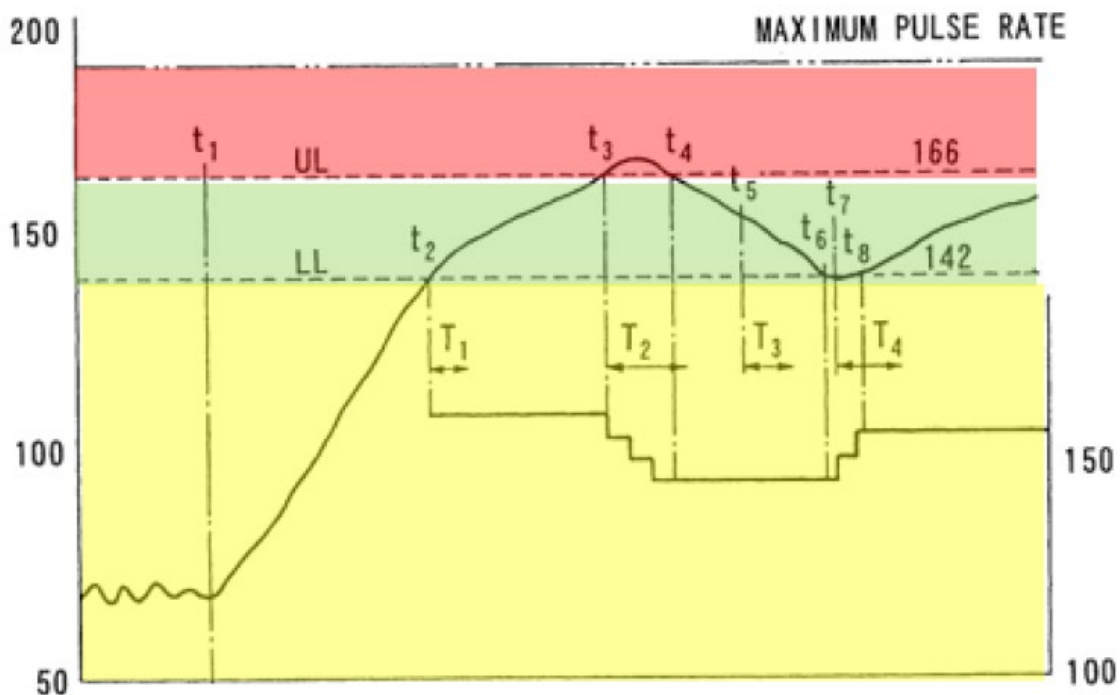
Petitioner contends that Amano prompts a user to exercise at a plurality of successive exertion levels as Amano's processor notifies a test subject to increase exercise intensity in stages. Pet. 22 (citing Ex. 1002, 12:31–33). Petitioner also contends that Amano discloses an embodiment in which a user is prompted to increase their intensity by 10% every 120 seconds, and that the “intensity, as measured and subsequently increased, is based on a user's stride length and weight, aspects of a user's physical fitness.” *Id.* at 22 (citing Ex. 1002, 13:53–55, 12:15–20). Petitioner, thus, submits that Amano accounts for an exertion level that is “based on a level of physical fitness of a user.” *Id.* In alternatively accounting for that aspect of claim 1, Petitioner draws attention to Amano's disclosure that a test

subject may vary exercise intensity “according to his own preferences.” *Id.* (citing Ex. 1002, 13:66–67).

- iii. [1D] determine a plurality of heart rate zones based on first heart rate measurements received from a sensor while the user exercises at the plurality of successive exertion levels;

Petitioner contends that Amano discloses use of heart rate measurements to determine upper and lower limits and thus create heart rate “zones” based on those measurements. Pet. 23. Petitioner provides the following annotated version of Amano’s Figure 27 said to illustrate “three heart rates zones in a workout.” *Id.* at 23–24.

FIG. 27



Annotated Figure 27 above is said to illustrate three heart rate zones, shown in red, green, and yellow. Pet. 24.

- iv. *[1E] generate a prompt instructing a user to exercise while maintaining heart rate within a particular one of the plurality of heart rate zones;*

Petitioner contends that Amano “prompts exercise in a particular zone” and that its device “outputs a pitch to indicate if a user’s heart rate is below, in, or above the desired range.” Pet. 24 (citing Ex. 1002, 21:48–55, 25:17–26:29). “By showing the limits of the intended zone and beeping at a user to keep them in that zone, the Amano device prompts exercise within a particular one of the heart rate zones.” *Id.* Petitioner also contends that Amano includes an LED display that includes different displayed colors (i.e., blue, yellow, and red) corresponding to different heart rate zones. *Id.* at 25 (citing Ex. 1002, 38:40–41, 39:14–17).

- v. *[1F] process second heart rate measurements received from the sensor subsequent to generating the prompt; and*

Petitioner contends that Amano’s device “regularly measures pulse” and displays pulse rate based on those measurements. Pet. 25–26 (citing Ex. 1002, 20:55–57; 21:48–55, Fig. 17). Petitioner, thus, contends that Amano accounts for this claim limitation.

- vi. *[1G] determine whether the second heart rate measurements are within the particular heart rate zone.*

Petitioner contends that Amano’s device determines if the upper and lower limits of pulse rate have been exceeded, and thus accounts for this claim limitation. Pet. 26–27 (citing Ex. 1002, 20:61–64, 39:39–42).

b) Claims 5, 7, 12, and 17

Petitioner also lays out why it believes each of claims 5, 7, 12, and 17 are anticipated by Amano. Pet. 27–28.

Claims 5 and 7 depend from claim 1. Claim 5 adds a limitation pertaining to a speed sensor and claim 7 adds a limitation in connection with a distance sensor. Petitioner points to disclosure in Amano at column 7 that is stated to account for those added limitations. *Id.*

Petitioner contends that “[c]laim 12 is claim 1 in method form,” and that “[c]laim 17 is a ‘non-transitory computer readable medium’ version of claim 1.” *Id.* at 28. Petitioner contends that both claims also are anticipated by Amano. *Id.*

2. Patent Owner’s Arguments

Patent Owner disputes that claims 1, 5, 7, 12, and 17 are anticipated by Amano. Patent Owner focuses its dispute on features [1C], [1D], and [1E] (and also by inference the corresponding features of claims 12 and 17). PO Resp. 29–38; PO Sur-reply 7–16. We consider Patent Owner’s arguments in these regards below.

3. Discussion

a) Claim 1

i. Limitation [1C]

Limitation [1C] recites “prompt a user to exercise at a plurality of successive exertion levels, wherein an exertion level is based on a level of physical fitness of a user.” Ex. 1001, 18:9–11. Patent Owner’s initial challenge is directed to limitation [1C], and specifically the requirement of prompting a user to exercise at exertion levels that are “based on a level of

physical fitness of a user.” PO Resp. 29–34; PO Sur-reply 7–9. Patent Owner characterizes its challenge as being based on “multiple reasons.” *See* PO Resp. 29. As discussed below, however, we do not discern that any of the proffered reasons have merit.

In the Petition, in accounting for limitation [1C], Petitioner describes, in-part, the following:

“Prompt a user to exercise at a plurality of successive exertion levels”: Amano describes how its device calculates maximum oxygen uptake quantity by measuring heart rate (along with other parameters) during different stages of exercise intensity. “[T]he test subject increases the intensity of exercise in stages during running in response to processing to notify the test subject to increase the intensity of exercise.” ([Ex. 1002] at 12:31-33.) The processor notifying the test subject is analogous to the ’413 patent’s device prompting a user. Increasing intensity of exercise in stages is analogous to a plurality of successive exertion levels.

“Wherein an exertion level is based on a level of physical fitness of a user”: Amano envisions multiple ways of progressing through the stages of intensity. In one embodiment, the device prompts a user to increase their intensity by 10% every 120 seconds. (*Id.* at 13:53-55.) Each 10% increase is an exertion level. This intensity, as measured and subsequently increased, is based on a user’s stride length and weight, aspects of a user’s physical fitness. (*Id.* at 12:15-20.) Therefore, this matches the claim language of Element 1[C].’

Pet. 21–22.

The cited portion of Amano at column 12, lines 15–20 is reproduced below:

In step Sa3,^[20] CPU 201 multiplies the test subject[']s stride which is stored in RAM 203 with the pitch detected on the

²⁰ “[S]tep Sa3” refers to a step of Amano’s Figure 7 that reads “CALCULATION OF EXERCISE INTENSITY.” Ex. 1002, Fig. 7.

immediately preceding step,^[21] to calculate the distance run by the test subject per unit time. This distance run is then multiplied by the user[']s body weight which is stored in RAM 203, to obtain exercise intensity [W]. This is then converted into [kpm/min].

Ex. 1002, 12:15–20; *see also id.* at 7:30–32 (“Exercise intensity calculator 108 calculates the exercise intensity from the obtained pitch, and the test subject[']s stride and body weight.”) Thus, Amano describes that a user’s “exercise intensity” is determined based on calculations involving a particular user’s “stride length,” “pitch,” and “body weight.” Amano then describes a scenario in which the user may be notified to increase their exercise intensity by 10% every 120 seconds. *Id.* at 13:53–55.

Patent Owner acknowledges that attributes such as “stride length and weight” may be physical characteristics, but contends that they: (1) do not “indicate a user’s physical fitness *condition*”; (2) are not “a level”; and (3) “do not indicate an individual’s capacity for exercising at a given exertion level.” PO Resp. 31. It is clear that Patent Owner leans into the construction that it proposes for “based on a level of physical fitness of a user,” in connection with those contentions, but we do not discern that Patent Owner adequately considers the appropriate scope of the noted term as we have assessed above (*see* § II.C). In that respect, we regard “based on a level of physical fitness” as broad phrasing, particularly when noting that

²¹ The preceding step in Figure 7 is step Sa2 which reads “PITCH DETECTION.” Ex. 1002, Fig. 7.

the Specification of the '413 patent provides no meaningful explanation of what is encompassed by “physical fitness.”²²

The record reasonably conveys that physical characteristics, such as those here including stride length and body weight, may be factored in as a part of an assessment of a person’s level of physical fitness. Although any one particular physical characteristic of a person may not be indicative of the person’s physical fitness, Amano provides that the interrelationship of at least a person’s stride length, initial pitch, and weight are associated with one another so as to establish that particular person’s exercise intensity. Amano also recognizes that there is a relationship between a person’s exercise intensity and heartbeat rate. *See, e.g.*, Ex. 1005, Fig. 4, 4:6–7 (FIG. 4 is a diagram showing the relationship between exercise intensity and heartbeat rate.”). Patent Owner agrees that heart rate may factor into determining a person’s level of physical fitness. *See, e.g.*, PO Sur-reply 4 (“The specification explains that ‘heart rate’ and ‘breathing’ can be used to determine a user’s physical fitness.”). Amano’s teachings in employing a person’s particular physical characteristics, e.g., stride length and body weight, alongside a person’s pitch, i.e., steps per minute, in the process of determining exercise intensity, which is related to heartbeat rate, in our view, reasonably form a basis for assessment of a level of a person’s physical fitness. *See, e.g.*, Ex. 1002, 12:15–20.

²² We observe that, outside of the claims, the term “fitness” appears to be present in only one sentence in the Specification of the '413 patent (Ex. 1001, 15:7–10).

Furthermore, we noted the following in our Institution Decision:

That the initial “intensity” determination is based on physical fitness characteristics of a particular user means that the subsequent 10% increases taught by Amano will vary based on the user. In other words, although the 10% increase in intensity may be “pre-set” as noted by Patent Owner, that 10% increase is, nevertheless, based on a level of physical fitness of a particular user as required by claim 1 (and claims 12 and 17).

Inst. Dec. 26.

We reiterate that Amano conveys that because the initial intensity is set based on particular characteristics of a user, i.e., that user’s pitch, stride length, and weight, the actual value of the resulting 10% prompting will vary based on the user. Patent Owner’s assertion that Amano’s “protocol uses 10% pitch increases for all users” and “the same increases apply to all users,” while it may be true, seemingly overlooks that the actual intensity value that the 10% increase represents varies based on the user. *See* PO Resp. 30; PO Sur-reply 7. For instance, for two people of equal body weight where one person has a large stride and pitch while the other has a smaller stride and pitch, it follows plainly from Amano’s teachings that the value of the 10% exercise intensity notification described at column 13 will be larger for the first person than for the second.

As we also observed in the Institution Decision (Inst. Dec. 26), we are again cognizant that Patent Owner attempts to distinguish the “exercise intensity” determination based on pitch, stride length and weight described by Amano at column 12 from the 10% “exercise intensity” increase at 120 second intervals discussed at column 13. *See* PO Resp. 29–33; PO Sur-reply 79. In Patent Owner’s view, Amano “uses ‘exercise intensity’ in two distinct contexts” such that the calculation of an “exercise intensity”

discussed at Amano's column 12 is somehow distinct from the 10% increase of "exercise intensity" discussed in columns 13–15. PO Resp. 30. As a part of that view, Patent Owner characterizes Amano's teachings at column 13 as referring to "pitch" rather than "exercise intensity," such that Amano's notification to a user to increase their exercise intensity is actually a notification to only increase the user's pitch. PO Resp. 31–33; PO Sur-reply 8–9.

Petitioner describes Patent Owner's contention and arguments that Amano uses the term "exercise intensity" to have different meanings throughout its disclosure as "complicated," "nonsensical," and "contorted." Pet. Reply 5. We agree to the extent that Patent Owner's proposed explanation does, in our view, appear to have both logical and evidentiary shortcomings. For instance, in addressing the "exercise intensity" in Amano's columns 13–15, Patent Owner cites to Amano's column 13, lines 56–60, which reads "[w]ith respect to exercise intensity during running, note that the exercise intensity is not obtained during exercise intensity notifying processing, but rather is obtained by measurements and calculation in steps Sa2 and Sa3 in the calculation display processing discussed above." Ex. 1002, 13:54–60. Thus, the portion of column 13 makes reference to prior calculations and steps, including step Sa3, that were discussed as a part of the calculation of "exercise intensity" at column 12 involving pitch, stride length, and body weight, and does not somehow equate "exercise intensity" with "pitch." It follows from Amano's disclosure, including that referenced above, that while an increase in exercise intensity may involve an increase in pitch, the record does not substantiate Patent Owner's contention that

Amano equates “intensity” and “pitch.” *See* PO Resp. 33 (stating that in Amano “‘intensity’ = ‘pitch’”).

On the matter of the interplay of “exercise intensity” and “pitch,” we are mindful of the conflicting testimony of Petitioner’s declarant, Dr. Lynch (Ex. 1018) and Patent Owner’s declarant, Dr. Bergeron (Ex. 2008). Dr. Lynch testifies, with substantial citation to Amano, how Amano refers to “exercise intensity” consistently throughout its disclosure as being defined by a calculation involving pitch, stride length, and body weight, and not that Amano uses “exercise intensity” interchangeably with “pitch” on some occasions. *See, e.g.*, Ex. 1018 ¶¶ 14–24. The record credibly supports the understanding that increase in pitch influences exercise intensity, but not that those terms are equated at times in Amano. *See, e.g.*, Ex. 1018 ¶ 23 (“Since Amano consistently defines exercise intensity as pitch times stride length times weight, a 10% increase in pitch equates to a 10% increase in exercise intensity.”)

In his Supplemental Declaration filed with the Patent Owner Response, Dr. Bergeron testifies at length as to his view of Amano’s disclosure vis-à-vis “exercise intensity” and “pitch.” *See, e.g.*, Ex. 2008 ¶¶ 40–42, 67–69. The main thrust of that testimony is that Amano has “multiple distinct usages of ‘intensity’” (*see, e.g., id.* ¶ 67), which includes a meaning of “pitch/speed” (*see, e.g., id.* at ¶ 42). We do not discern that, in the Supplemental Declaration, Dr. Bergeron provides testimony or insight as to why the record does not establish reasonably that “exercise intensity” and “pitch” have a relationship to one another, even if they are not terms understood as being equated with one another. As noted by Petitioner (Pet. Reply 8), during cross-examination, Dr. Bergeron expressed recognition that

“intensity” can be proportional to “pitch.” *See* Ex. 1017, 128:2–11.²³ That exercise intensity and pitch may be proportional to one another, but not equated, is, in our view, consistent with Petitioner’s contentions, Dr. Lynch’s testimony, and Amano’s disclosure. Patent Owner characterizes that proportionality position as “a non-sequitur” because Amano “only prompt users to increase their ‘pitch’.” PO Sur-reply 8 n.8. Yet, that statement appears to disregard or dismiss Amano’s express disclosure of “a test subject being notified to increase *exercise intensity* by 10% each time.” Ex. 1002, 13:53–55 (emphasis added).

We have considered the Declaration testimony of each of Dr. Bergeron and Dr. Lynch on the matter of Amano’s teachings pertaining to “exercise intensity.” For the foregoing reasons, we find Dr. Lynch’s testimony (*see, e.g.*, Ex. 1018 ¶¶ 14–24) more consistent with record evidence, including Amano’s express disclosure, than that of Dr. Bergeron (*see, e.g.*, Ex. 2008 ¶¶ 40–42, 67–69).

Having evaluated the record before us, including the parties’ briefings, and supporting evidence, and for the foregoing reasons, we determine that Petitioner has shown that Amano discloses limitation [1C], namely: “prompt a user to exercise at a plurality of successive exertion

²³ Q. Okay. So looking at the equation that you wrote on Exhibit 1016, if stride and weight are constant values, would you agree that exercise intensity is proportional to pitch?

MR. SWISHER: Object to form.

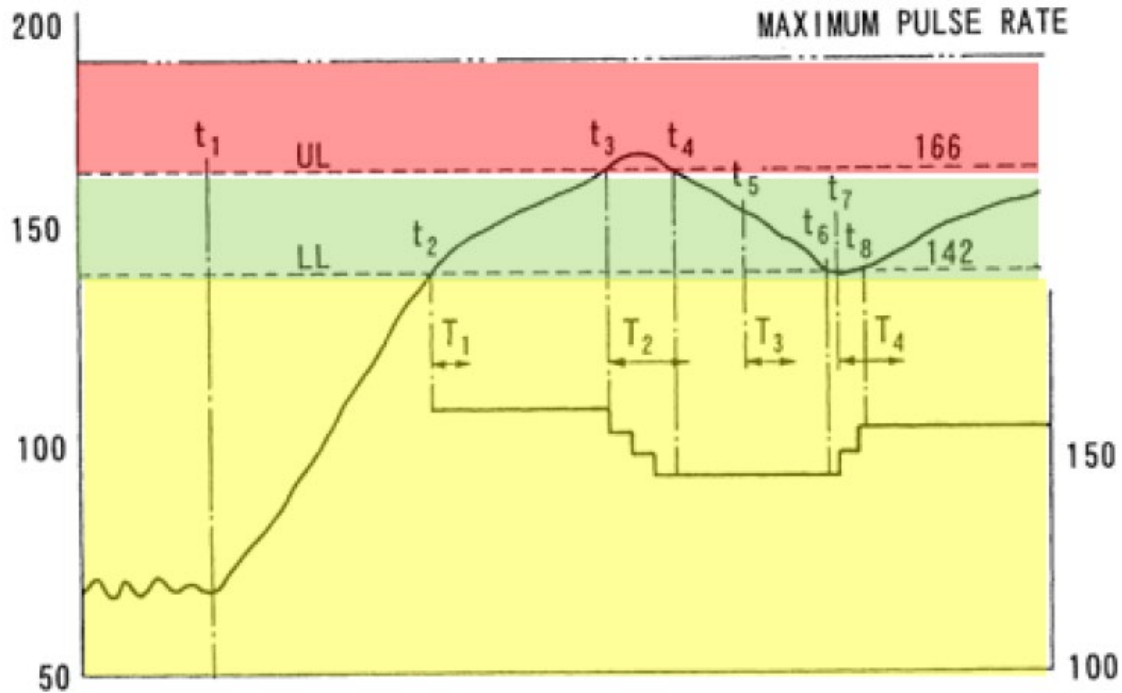
A. Well, if stride and weight are held constant and pitch is increased, which is the number of steps per minute or per time, then intensity would also increase in proportion to that according to this equation, yes.

levels, wherein an exertion level is based on a level of physical fitness of a user.” *See* Pet. 21–22; Ex. 1001, 18:9–11.

ii. Limitation [1D]

Limitation [1D] recites “determine a plurality of heart rate zones based on first heart rate measurements received from a sensor while the user exercises at the plurality of successive exertion levels.” Ex. 1001, 18:13–16. In accounting for that limitation, Petitioner relies on disclosure in Amano pertaining to the estimation of a test subject’s VO_{2max} based on “the test subject’s exercise intensity and heartbeat rate during running.” Pet. 23 (citing Ex. 1002, 11:66–12:3). Petitioner further contends that, in Amano, heart rates are calculated to establish “an upper and lower limit,” which “creates heart rate zones based on those first heart rate measurements.” *Id.* (citing Ex. 1002, 19:40–43, 20:19–28). Petitioner provides an annotated/colorized version of Amano’s Figure 27, showing “[t]here is a zone below 40% VO_{2max} (yellow), from 40 to 60% (green), and greater than 60% (red). *Id.* (colorizing of “yellow,” “green,” and “red” omitted). Petitioner’s annotated version of Figure 27 is reproduced below:

FIG. 27



Annotated Figure 27 above is said to illustrate three heart rate zones, shown in red, green, and yellow. Pet. 24.

During trial, Patent Owner does not appear to dispute that Amano's Figure 27 displays various heart rates zones. Rather, referring to Petitioner's annotated version of Amano's Figure 27, Patent Owner contends that "even if the ranges below, between, and above the upper ('UL') and lower ('LL') heart rate limits are considered 'zones,' Amano does not determine those upper and lower limits based on 'heart rate measurements,' *plural*, taken 'while the *user exercises*.'" PO Resp. 36 (citing Ex. 2008 ¶ 71). According to Patent Owner, any VO_{2max} values and pulse rate values in Amano are obtained from a "pulse rate table," such as that shown in Amano's Figure 14, that Patent Owner states "lists 'the pulse rate for an '*average person*' when

exercising at 50% of various $VO_{2\max}$ values.” *Id.* (citing Ex. 1002 19:40–46). As a result, Patent Owner argues that “Amano ***does not use*** the individual subject’s ‘heart rate measurements,’ plural, that were taken ‘while the ***user exercises***,’ to set the UL and LL. Instead, the UL and LL ***will be the same*** for every subject that enters a given $VO_{2\max}$ value.” *Id.* at 37 (citing Ex. 2008 ¶ 43).

We disagree. Amano characterizes its invention, in-part, as providing “an exercise workout support device which can show the upper and lower limit values for the pulse rate corresponding to a suitable exercise intensity.” Ex. 1002, 2:65–67. Amano states that its invention, in a “first preferred embodiment,”²⁴ “employs an Astrand-Rhyming nomogram” to estimate a test subject’s “maximum oxygen uptake quantity ($VO_{2\max}$ (liter/min)) . . . as [the] test subject is performing a specified exercise.” *Id.* at 6:3–23. Amano further describes the following:

In this nomogram, the exercise intensity and heartbeat rate are plotted on the right and left axes respectively. Maximum oxygen uptake quantity ($VO_{2\max}$) is indicated by the coordinates of the intersection of the middle line with a straight line drawn between the two axes. Parameters suitable for each of the two sexes are employed. In other words, by indicating the sex of the subject, the maximum oxygen uptake quantity ($VO_{2\max}$) can be estimated from a function which employs exercise intensity and heartbeat rate as arguments.

Id. at 6:29–38.

²⁴ Amano’s description of this “Embodiment 1” (Ex. 1002, 6:4) is organized into various section numbers “1.X” (*id.* at 6:4–16:4), and then Amano turns to other Embodiments (*e.g.*, *id.* at 16:15 (“2. Embodiment 2”)).

Amano further teachings the following:

The Astrand-Rhyming nomogram is formed by presupposing that there is a straight line relationship between the test subject[']s exercise intensity and heartbeat rate.

For this reason, in order to accurately estimate the maximum oxygen uptake quantity using the aforementioned nomogram, it is necessary to establish a straight line relationship between the test subject[']s exercise intensity and heartbeat rate. In order to judge whether or not a straight line relationship exists, it is necessary to measure exercise intensity at at least three or more stages, and determine the heart beat rate at each stage.

Id. at 6:56–64.

Amano further describes that as a part of a “calculation display processing” in its first embodiment, “the maximum oxygen uptake quantity (VO_{2max}/wt) is estimated at fixed intervals of time from the test subject[']s exercise intensity and heartbeat rate during running, and displayed on the display.” *Id.* at 11:64–12:3.

Thus, from Amano’s disclosure, including that referenced above, it is apparent that Amano conveys that estimation of VO_{2max} , as a part of a Astrand-Rhyming nomogram protocol, involves measuring a test subject’s exercise intensity at a certain number of stages (i.e., at least three), so as to determine the heartbeat rate at each stage. Thus, Amano provides that the VO_{2max} estimations involve measurements as to exercise intensity and heartbeat rate that are specific to a given test subject or user. Amano also makes explicit that the VO_{2max} estimations that result from the test subject’s exercise intensity and heartbeat rate occur during a specified exercise, e.g., an act of running. We also find that Amano reasonably discloses at least three heart rate zones, as seen, for instance, in Figure 27, namely, below lower limit LL, between lower limit LL and upper limit UL, and above

upper limit UL (i.e., the yellow, green, and red zones shown in Petitioner's annotated Figure 27, reproduced above).

In light of Amano's express teachings, it is difficult to reconcile Patent Owner's arguments, and Dr. Bergeron's testimony, that Amano's described estimation of VO_{2max} , nevertheless, does not involve measurements of a user's heart rate as a part of exercising. *See, e.g.*, PO Resp. 36–37; PO Sur-reply 9; Ex. 2008 ¶¶ 43, 71. Instead, as discussed above, Amano plainly describes its process of estimating a test subject's VO_{2max} and describes it as being based on multiple heart rate measurements made while the subject performs a specified exercise, e.g., running. *See, e.g.*, Ex. 1002, 6:29–64; 11:64–12:3. Patent Owner and Dr. Bergeron seemingly acknowledge that disclosure (*see, e.g.*, PO Resp. 36; Ex. 2008 ¶ 43), but nevertheless, discount its tracking of the requirements of limitation [1D]. In that respect, Patent Owner and Dr. Bergeron appear to suggest that claim 1 requires that heart measurements taken when a subject had previously exercised en route to determining a VO_{2max} value for that particular subject are somehow beyond the scope of claim 1. Yet, that argument is not well articulated or substantiated. Patent Owner also discounts Amano's disclosure on the basis that “the UL and LL will be the same for every subject that enters a given VO_{2max} ,” but, even if true, the VO_{2max} is determined individually for each subject based on exercise intensity and heartbeat measurements taken for each particular test subject while the subject exercises. *See* Ex. 1002, 6:29–64, 11:64–12:3. That is so even if in some situations the measurements made for different test subjects may result in the same VO_{2max} result.

Next, we are cognizant of Patent Owner's arguments and Dr. Bergeron's testimony made in connection with limitation [1D] that Petitioner's anticipation ground involving Amano requires impermissible selection of teachings from multiple embodiments (namely, the first, fourth, and eighth embodiments) that goes beyond a proper assessment of anticipation. *See* PO Resp. 35; PO Sur-reply 9–16; Ex. 2008 ¶¶ 70, 72. As Petitioner and Dr. Lynch observe, however, Amano, itself, connects its disclosures with respect to its various embodiments with one another. *See* Pet. Reply 10–11; Ex. 1018 ¶ 27. Specifically, as a part of its first embodiment, Amano describes, among other things, its procedure for estimating VO_{2max} . *See, e.g.*, Ex. 1002, 6:10–23. As a part of its fourth embodiment, Amano discloses that “[t]he user estimates his own VO_{2max} in advance using the methods explained in the first through third embodiments.” *Id.* at 19:49–51. In the eighth embodiment, Amano similarly explains that “[t]he user[']s VO_{2max} was obtained in the preceding first through third embodiments.” *Id.* at 38:23–24. Although Patent Owner and Dr. Bergeron characterize Amano's embodiments as being “distinct” from one another (*see, e.g.*, PO Sur-reply 10; Ex. 2008 ¶ 70), they do not discuss or address Amano's express disclosure linking those embodiments. Importantly, neither Patent Owner nor Dr. Bergeron explains why that express linking fails to convey to one of ordinary skill in the art that Amano's described embodiments constitute a homogenous disclosure conveying claim elements in the manner required by claim 1. *See Net MoneyIN*, 545 F.3d at 1371. We find more persuasive Petitioner's contentions in the Petition and Reply and Dr. Lynch's testimony as to what a

person of ordinary skill in the art would have understood Amano to disclose expressly.

For the foregoing reasons, we determine that Petitioner has shown that Amano discloses limitation [1D], namely: “determine a plurality of heart rate zones based on first heart rate measurements received from a sensor while the user exercises at the plurality of successive exertion levels.” Ex. 1001, 18:13–16.

iii. Limitation [1E]

Limitation [1E] recites “generate a prompt instructing a user to exercise while maintaining heart rate within a particular one of the plurality of heart rate zones.” Ex. 1001, 18:17–19. Petitioner points to Amano’s disclosure of both using pitch sounds and LED displays that Petitioner characterizes as “prompt[ing] a user to exercise while maintaining their heart rate in a measured zone.” *See* Pet. 24–25 (citing Ex. 1002, 21:28–55, 25:17–26:29, 38:40–41, 39:14–17, Fig. 51).

Patent Owner disagrees that Petitioner demonstrates anticipation of limitation [1E], but that disagreement is not directed at Petitioner’s assessment as to the above-noted disclosures of Amano. Rather, Patent Owner’s challenge in connection with limitation [1E] mirrors its challenge made with respect to limitation [1D] as to alleged improper combination of Amano’s first, fourth, and eighth embodiments. As with limitation [1D], neither Patent Owner nor Dr. Bergeron addresses Amano’s own disclosure tying its various embodiments to one another. Here too, we agree with Petitioner and Dr. Lynch that “Amano’s first, fourth, and eighth embodiments are all connected.” *See* Pet. Reply 10–11; Ex. 1018 ¶ 27.

We determine that Petitioner has shown that Amano discloses limitation [1E]. *See* Pet. 24–25.

iv. Remaining Elements of Claim 1

Patent Owner does not challenge Petitioner’s application of Amano’s teachings to any other element of claim 1. We find that Petitioner adequately accounts for those additional elements as a part of its anticipation ground based on Amano. *See* Pet. 20–21, 25–27.

v. Conclusion—Claim 1

Having considered the respective positions of the parties, including the associated briefing and supporting evidence, we determine that Petitioner has shown by a preponderance of the evidence that claim 1 is anticipated by Amano. *See* Pet. 20–27.

b) Claims 5 and 7

Claims 5 and 7 each depend from claim 1. Patent Owner does not present any separate arguments in connection with claims 5 and 7. Rather, Patent Owner contends that the arguments advanced with respect to independent claim 1 also apply to dependent claims 5 and 7. PO Resp. 38; PO Sur-reply 16. For the reasons discussed above, we are persuaded that Petitioner has established by a preponderance of the evidence that claim 1 is anticipated by Amano, and do not agree with Patent Owner’s countervailing arguments. We also find that Petitioner has established by a preponderance of the evidence that claims 5 and 7 are anticipated by Amano. *See* Pet. 27–28.

c) Claims 12 and 17

Claim 12 is directed to a method corresponding to the apparatus of claim 1. Ex. 1002, 18:60–19:9. Claim 17 discloses a “non-transitory computer readable medium storing executable instructions” corresponding to the apparatus of claim 1. *Id.* at 19:26–20:10. Claims 12 and 17 include similar corresponding limitations as to claim 1. Patent Owner does not offer any arguments as to claims 12 and 17 that are apart from those offered for claim 1. For the same reasons discussed above with respect to claim 1 (*see supra* § II.E.3.a)), we find that Petitioner has shown by a preponderance of the evidence that claims 12 and 17 are anticipated by Amano.

F. Obviousness Based on Amano and Gorman (Ground 6), and Amano and Flach (Ground 7)

Petitioner contends that claims 2, 3, 4, 13, and 18 are unpatentable based on Amano and Gorman, and that claims 9, 14, and 19 are unpatentable based on Amano and Flach. *See* Pet. 54–55 (referencing prior assessment of Gorman’s and Flach’s teachings in the Petition). Each of those claims depends from one of independent claims 1, 12, and 17. With respect to claims 2, 3, 4, 13, and 18, Petitioner contends that they “add encoded message and unique identification data.” *Id.* at 54. With respect to claims 9, 14, and 19, Petitioner contends that they “add communication using time channels.” *Id.* at 55.

Petitioner characterizes each of Gorman and Flach as providing communication device techniques in connection with a fitness device (Gorman) and a medical device (Flach) that a person of ordinary skill in the art would recognize as improving or optimizing other types of devices, such as Amano’s workout support device. For instance, with respect to Gorman,

Petitioner contends: “[t]o improve communication, a POSITA would use known techniques that optimized sensor communication. Gorman makes explicit one way to improve sensor communication; heart rate data can be sent in encoded digital messages.” Pet. 49 (internal citations omitted) (citing Ex. 1009 ¶¶ 95, 96).²⁵ Petitioner reasons that “[i]t would have been obvious for a POSITA to combine Amano with Gorman” and contends the following:

Both [Amano and Gorman] involve heart rate sensors used in exercise. Amano includes language that indicates using encoded data with identification, “When the pulse signal is sent from transmission device to the outside, this recognition number is imparted to the optical signal along with the pulse wave signal.” (Ex. 1002 at 37:8–11). It would be beneficial to improve this communication by substituting it with the well-defined technique disclosed in Gorman.

Pet. 54–55 (citing Ex. 1009 ¶ 105).

With respect to Flach, Petitioner states “Flach is relevant here as it discloses time to manage communication” and specifically points to disclosure in Flach pertaining to “VC->R timeslots” that “are used to broadcast information to the remote telemeters.” Pet. 52 (quoting Ex. 1008 ¶ 96).²⁶ Petitioner submits that “[i]t would have been obvious for a POSITA to combine Amano and Flach” stating:

Amano gives less detail on the communication between its sensor and device. Flach provides a detailed explanation of how

²⁵ This contention is offered in connection with ground 4 based in-part on Lubell and Gorman, but is referenced by Petitioner as applicable to ground 6 based on Amano and Gorman. *See* Pet. 54.

²⁶ These contentions are offered in connection with ground 5 based in-part on Lubell and Flach, but are referenced by Petitioner as applicable to ground 7 based on Amano and Flach. *See* Pet. 55.

to implement sensor communication using timeslots. Therefore, it would be beneficial to improve the communication in Amano by using Flach's techniques.

Id. at 55 (citing Ex. 1009 ¶ 106).

In its Reply, Petitioner further contends that “the teachings of Gorman and Flach: encoding, time slots (TDMA), and identification information, were all well known to a POSITA for both wired and wireless devices.” Pet. Reply 23 (citing Ex. 2012, 241:3–16; Ex. 1017, 24:1–5, 92:22–93:19; Ex. 1018 ¶¶ 30–31).

Patent Owner does not dispute that Gorman accounts for the added limitations of claims 2, 3, 4, 13, and 18, or that Flach accounts for the added limitations of claims 9, 14, and 19. Patent Owner does, however, offer two challenges to grounds 6 and 7.

First, Patent Owner contends that the above-noted dependent claims have not been shown to be unpatentable because “Amano does not disclose the independent claims.” PO Resp. 38. As discussed above, however, we do not agree that Petitioner has not shown by a preponderance of the evidence that Amano anticipates each of independent claims 1, 12, and 17. *See supra* §§ II.E.3.a) and c).

Second, Patent Owner contends that “the Petition does not provide any rationale whatsoever for combining the embodiments of Amano that Petitioner actually relies upon—**both** of which are **wired** devices—with the wireless communication teachings of Gorman or Flach.” PO Resp. 39; *see* PO Sur-reply 28–30. Patent Owner then proceeds to argue that the purported dichotomy between wired and wireless devices is so significant that a skilled artisan would not have had adequate reasoning to combine

Amano's wired device with Gorman and Flach's wireless devices, or a reasonable expectation of success in doing so. *Id.* at 39–42.

Patent Owner does not seemingly dispute that Gorman and Flach teach what Petitioner contends they teach. Rather, the core dispute that emerges between the parties is whether those teachings that are applied to wireless devices would also be applicable to wired devices. At the outset, we note that neither the Specification nor the claims of the '413 patent provides restriction as to any type of communication approach, i.e., wireless or wired communication, or that there is some type of fundamental distinction between those communication approaches that precludes combining aspects of one with the other. Indeed, as Petitioner notes, the '413 patent recognizes that wireless interfaces are “alternative[s]” for wired interfaces. Pet. Reply 22 (citing Ex. 1001, 5:27–32). And, Petitioner points out that the relevant dependent claims are not limited to wireless communication. *Id.* Patent Owner's assertion that wired communication versus wireless communication imposes some type of insurmountable obstacle to one of ordinary skill in the art in combining the teachings of the references is not adequately, if at all, tethered to the record at hand. Indeed, Amano, itself, presents iterations of its device that employ both wired technology (*see, e.g.*, Ex. 1002, Figs. 5, 16, 30, 40) and also wireless technology (*see, e.g., id.* at Fig. 44).

Patent Owner argues that implementing aspects of Gorman and Flach's wireless devices onto Amano's wired device “would have required complete redesigns and new components.” PO Resp. 42 (citing Ex. 2008 ¶¶77–78, 81–82) Given the recognition in the art, such as Amano, that a workout device may include either wired or wireless components, it is

difficult to reach the conclusion that “complete redesign” would be necessary. Nevertheless, that there may be some design considerations, or even challenges, that a skilled artisan may face in combining those two types of communication technology, does not end the obviousness inquiry. The parties agree that a person of ordinary skill in the art has significant engineering and design experience in connection with wearable workout devices. *See* Pet. 18, PO Resp. 16. Neither Patent Owner nor Dr. Bergeron adequately explains why any design challenges in combining aspects a wired workout device with a wireless workout device would have been beyond the skill or ordinarily skilled artisan, so as to preclude a determination of obviousness. *See KSR*, 550 U.S. at 417 (“if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.”).

We are cognizant that Dr. Lynch and Dr. Bergeron offer conflicting testimony as to whether Gorman’s teachings pertaining to “encoding, time slots (TDMA), and identification” (Pet. Reply 23) would apply to both wired and wireless devices. *Compare, e.g.*, Ex. 1009 ¶¶105–106 and Ex. 1018 ¶¶ 29–34 *with* Ex. 2008 ¶¶ 74–82. We observe that, as noted by Petitioner, in regard to the matter of “encoding,” during cross-examination Dr Lynch maintained his view that “whether the communication is wired or wireless, it needs to be encoded.” Pet. Reply 22 (citing Ex. 2012, 213:21–24, 214:3–6, 251:14–252:3). Also as noted by Petitioner during cross-examination, Dr. Bergeron seemed to imply that matters of encoding would generally apply to wired communication systems. *Id.* (citing Ex. 1017, 92:22–93:19). Although Patent Owner dismisses that testimony on the basis that the

questions posed to Dr. Bergeron pertained to a “wired communication system” generally and not specifically Amano (*see* PO Sur-reply 30), we nevertheless draw some inference from the testimony that aspects of wireless and wired systems are not entirely disassociated from one another. And, as noted above, prior art, such as Amano, suggests that a skilled artisan would recognize that devices, including a workout device, can be designed using either wireless or wired communication systems. *Compare* Ex. 1002, Figs. 5, 16, 30, 40 *with id.* at Fig. 44.

Accordingly, based on the entire record before us, we credit Dr. Lynch’s Declaration testimony (*see, e.g.*, Ex. 1009 ¶¶105–106; Ex. 1018 ¶¶ 29–34) over of that Dr. Bergeron (*see, e.g.*, Ex. 2008 ¶¶ 74–82) as we conclude that Dr. Lynch’s testimony as to the applicability of teachings pertaining to wireless communication systems with wired communication systems is more consistent with the record before us.

For the foregoing reasons, we are satisfied on this record that Petitioner has: (1) accounted for all the features of claims 2, 3, 4, 9, 13, 14, 18, and 19 in the prior art; (2) provided adequate reason to combine the teachings of Gorman and Flach with those of Amano; and (3) shown that a person of ordinary skill in the art would have had a reasonable expectation of success in so combining the teachings of the prior art. *See* Pet. 54–55; Pet. Reply 23–24. As a result, we conclude that Petitioner has shown, by a preponderance of the evidence, that claims 2, 3, 4, 13, and 18 are unpatentable based on Amano and Gorman, and that claims 9, 14, and 19 are unpatentable based on Amano and Flach.

G. Asserted Grounds of Unpatentability Based on Matsumoto (Grounds 2, 8, 9) and Asserted Grounds of Unpatentability Based on Lubell (Grounds 3, 4, 5)

Petitioner contends that: (1) claims 1, 5, 7, 12, and 17 are anticipated by Matsumoto (Pet. 29–38); (2) claims 2, 3, 4, 13, and 18 would have been obvious in view of Matsumoto and Gorman (*id.* at 56); and (3) claims 9, 14, and 19 would have been obvious in view of Matsumoto and Flach (*id.* at 56–57).

Petitioner also contends that: (1) claims 1, 12, and 17 would have been obvious in view of Lubell and Ceci (Pet. 39–47); (2) claims 2, 3, 4, 13, and 18 would have been obvious in view of Lubell, Ceci, and Gorman (*id.* at 47–51); and (3) claims 9, 14, and 19 would have been obvious in view of Lubell, Ceci, and Flach (*id.* at 51–54).

As discussed above, we conclude that all of the challenged claims (i.e., claims 1–5, 7, 9, 12–14, and 17–19) are unpatentable based on the grounds involving Amano. Therefore, resolution of this proceeding does not require additional assessment of the grounds involving either Matsumoto or Lubell. *See SAS Inst. Inc. v. Iancu*, 138 S. Ct. 1348, 1359 (2018) (holding that a petitioner “is entitled to a final written decision addressing all of the claims it has challenged”); *Bos. Sci. Scimed, Inc. v. Cook Grp. Inc.*, 809 F. App’x 984, 990 (Fed. Cir. 2020) (non-precedential) (recognizing that the “Board need not address issues that are not necessary to the resolution of the proceeding” and, thus, agreeing that the Board has “discretion to decline to decide additional instituted grounds once the petitioner has prevailed on all its challenged claims”). Accordingly, we do not reach the grounds involving either Matsumoto or Lubell.

III. CONCLUSION

In summary, we determine that a preponderance of the evidence establishes that claims 1–5, 7, 9, 12–14, and 17–19 of the '413 patent are unpatentable. That determination is shown in the following table:²⁷

Claim(s)	35 U.S.C. §	Reference(s)/Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1, 5, 7, 12, 17	102	Amano	1, 5, 7, 12, 17	
1, 5, 7, 12, 17	102	Matsumoto ²⁸		
1, 12, 17	103	Lubell, Ceci ²⁹		

²⁷ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. See 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. See 37 C.F.R. §§ 42.8(a)(3), (b)(2).

²⁸ We do not reach the anticipation ground based on Matsumoto as to claims 1, 5, 7, 12, and 17 because we determined those claims are unpatentable based on the Amano anticipation ground.

²⁹ We do not reach the ground based on Lubell and Ceci as to claims 1, 12, and 17 because we determined those claims are unpatentable based on the Amano anticipation ground.

2, 3, 4, 13, 18	103	Lubell, Ceci, Gorman ³⁰		
9, 14, 19	103	Lubell, Ceci, Flach ³¹		
2, 3, 4, 13, 18	103	Amano, Gorman	2, 3, 4, 13, 18	
9, 14, 19	103	Amano, Flach	9, 14, 19	
2, 3, 4, 13, 18	103	Matsumoto, Gorman ³²		
9, 14, 19	103	Matsumoto, Flach ³³		
Overall Outcome			1–5, 7, 9, 12– 14, 17–19	

IV. ORDER

It is

ORDERED that claims 1–5, 7, 9, 12–14, and 17–19 of the '413 patent have been shown to be unpatentable; and

³⁰ We do not reach the ground based on Lubell, Ceci, and Gorman as to claims 2, 3, 4, 13, and 18 because we determined those claims are unpatentable based the Amano and Gorman ground.

³¹ We do not reach the ground based on Lubell, Ceci, and Flach as to claims 9, 14, and 19 because we determined those claims are unpatentable based on the Amano and Flach ground.

³² We do not reach the ground based on Matsumoto and Gorman as to claims 2, 3, 4, 13, and 18 because we determined those claims are unpatentable based on the Amano and Gorman ground.

³³ We do not reach the ground based on Matsumoto and Flach as to claims 9, 14, and 19 because we determined those claims are unpatentable based on the Amano and Flach ground.

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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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