

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.

Case: IPR2023-00438
Patent No. 8,620,413

**PETITION FOR *INTER PARTES* REVIEW
OF U.S. PATENT NO. 8,620,413**

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U.S. Patent No. 4,911,427 to Matsumoto <i>et al.</i> (“Matsumoto”)	1003
U.S. Patent No. 4,566,461 to Lubell <i>et al.</i> (“Lubell”)	1004
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Petitioner lululemon athletica canada inc. and lululemon usa inc. (“Petitioner” or “lululemon”) respectfully petition for *inter partes* review of claims 1-5, 7, 9, 12-14, and 17-19 of U.S. Patent No. 8,620,413 (“the ’413 patent” (Ex. 1001)) in accordance with 35 U.S.C. §§ 311-319 and 37 C.F.R. § 42.100 *et seq.*

I. INTRODUCTION

The challenged independent claims in the ’413 patent outline a way for exercisers to track workout intensity and heart rate. The purported invention prompts users to exercise at varying intensity levels, recording heart rate throughout to determine heart rate zones. The ’413 patent then prompts users to exercise in a particular heart rate zone and tracks whether the user succeeds.

This patent never should have issued. U.S. Patent No. 6,241,684 (“Amano” (Ex. 1002)) discloses exactly the limitations of independent claims 1, 12, and 17 of the ’413 patent. Amano describes a device that prompts a user to exercise at increasing intensity levels, measures heart rate, and determines zones of heart rates for optimal exercise. The device then prompts users to exercise in one of those zones, providing feedback to help them stay in the desired zone. Amano also anticipates dependent claims 5 and 7 by disclosing a body motion sensor that tracks a user’s distance traveled and speed.

U.S. Patent No. 4,911,427 (“Matsumoto” (Ex. 1003)) also discloses claims

1, 12, and 17 of the '413 patent. There, users exercise at increasing intensity levels while the device tracks their heart rate. The results of the workout are stored and used to determine heart rates at which the user will exercise in the future.

Matsumoto also anticipates dependent claims 5 and 7 by disclosing a rotation sensor that tracks both speed and distance traveled during a user's workout program.

The purported invention is also disclosed in U.S. Patent No. 4,566,461 ("Lubell" (Ex. 1004)). Users work through a predetermined, increasingly difficult exercise set while the device tracks their heart rate. The device creates zones of heart rates based on the result and prompts future exercise to maintain such a heart rate. In combination with a scientific paper on perceived exertion exercises ("Ceci" (Ex. 1005)) where users choose light, somewhat hard, and hard exertion levels, Lubell renders the '413 patent obvious.

The dependent claims of the '413 patent that involve communication using encoded data with unique identification (claims 2-4, 13, and 18) or time channels (9, 14, and 19) are also obvious. U.S. Patent No. 5,400,794 ("Gorman" (Ex. 1007)) discloses a heart rate monitor for exercise that uses encoded data and unique identification to improve communication. U.S. Patent Application Publication No. 2001/0023315 ("Flach" (Ex. 1008)) describes remote telemeters worn by patients that track physiological information and communicate via

timeslots. Combining these references with the references above renders the dependent claims of the '413 patent obvious.

Each of claims 1-5, 7, 9, 12-14, and 17-19 are anticipated or rendered obvious by the prior art. Therefore, Petitioner requests cancelation of these claims of the '413 patent.

II. BACKGROUND

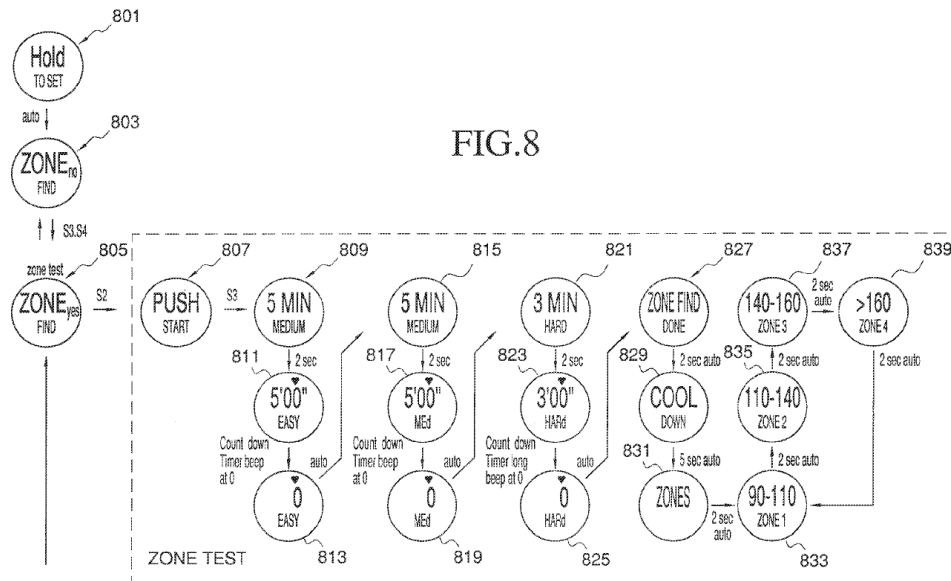
A. Summary of the '413 Patent

The '413 patent purports to solve “a need for a watch or other portable electronic console that will allow the user to employ a variety of different electronic sensors for measuring athletic performance indicators.” (Ex. 1001 at 2:61-64.) Among many other things, the '413 patent states that “the invention may automatically calculate various data values to be used by an athlete, such as heart rate zones.” (*Id.* at 3:55-57.) The '413 patent views a heart rate zone as an interval of heart rates bounded by at least a lower limit or an upper limit heart rate. (*Id.* at 17:32-52 (describing a zone between 90 beats per minute and 110 beats per minute and a zone greater than 160 beats per minute.) The '413 patent notes that simply shooting for a heart rate zone can be inaccurate for many users because that does not factor in a user's ability. (*Id.* at 15:5-17.)

The '413 patent includes three independent claims (Claims 1 (apparatus), 12 (method) and 17 (non-transitory computer readable medium)), which all share the

same limitations. (*Id.* at 18:60-19:9, 19:25-20:10.) The first primary element of independent claims 1, 12, and 17 is “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.” (*Id.* at 18:10-12.) The second primary element is “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.” (*Id.* at 18:13-16.) And the third primary element is “generate a prompt instructing a user to exercise while maintaining heart rate within a particular one of the plurality of heart rate zones.” (*Id.* at 18:17-19.) These elements are described with varying detail in the specification of the ’413 patent.

The ’413 patent discloses a device that prompts a user through self-selected easy, medium, and hard workouts. (*Id.* at 15:44-16:55.) The ’413 patent details how each exercise should feel. “[A]n easy level. . . should not feel challenging, but should instead feel as if the user is performing a warm-up routine.” (*Id.* at 15:52-57.) “[A] medium level of exertion is one that is more challenging than a warm-up, but not uncomfortable.” (*Id.* at 16:18-20.) “[A] hard level of exertion should significantly challenge the user . . . achievable, but not comfortable, and should feel like the user is exercising at a competitive pace. The user’s breathing should be heavy.” (*Id.* at 16:48-52.)



(*Id.*, Fig. 8 (showing how the device determines zones).)

By measuring heart rate throughout this exercise, the device calculates four heart rate zones, Z1-Z4. (*Id.* at 17:35-52.) Heart rates at different points during the exercise correspond to different upper or lower limits of the various zones. For example, the heart rate measured shortly after the user begins the easy section is used as the Z1 lower limit. (*Id.* at 16:1-7.) Or the heart rate found near the beginning of the medium workout corresponds to the upper limit of Z1 and the lower limit of Z2. (*Id.* at 16:30-35.) The upper limit of the final zone corresponds to the heart rate at the end of the hard period. (*Id.* at 17:2-7.)

With reference to the third primary element of claims 1, 12, and 17, the specification describes that “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.” (*Id.* at 14:61-63.) Additionally, “various heart rate monitors

will also allow a user to designate one or more various heart rate zones, and alert an athlete when his or her measured heart rate goes above or falls below a selected heart rate zone.” (*Id.* at 15:2-5.)

Claim 5 is a dependent claim that adds to the apparatus a speed sensor which provides speed information. (*Id.* at 18:32-35.) “With the speed/distance monitor, the measure[d] data may be combined distance and velocity information measured by the speed/distance monitor.” (*Id.* at 7:7-10.) This allows the device to give information to the user about their speed during an exercise.

Claim 7 is a similar dependent claim that adds a distance sensor that conveys distance information to the apparatus. (*Id.* at 18:39-42.) The specification regularly describes this in conjunction with the speed monitor. For example, “in the distance submode the watch obtains distance information from a connected speed/distance monitor.” (*Id.* at 10:13-14.)

Claims 2, 3, 4, 13, and 18 are dependent claims that add a communication system using encoded messages and identification data. (*Id.* at 18:24-20:18.) The specification explains that data sent from a sensor can be encoded to contain both a data section and a unique identification section. (*Id.* at 7:3-15.) This ensures that the device is receiving data from the appropriate sensor, “the computing device will only recognize data messages that can be properly decoded using the identification data for that sensor.” (*Id.* at 8:15-18.)

Claims 9, 14, and 19 are dependent claims that add communication using a time channel. (*Id.* at 18:46-20:21.) To do this, the device establishes times and delay periods for particular sensors to communicate with the device. (*Id.* at 8:23-38.) “[T]he watch determines what data messages are being sent, and thus what time channels are available for communication with the sensors.” (*Id.* at 8:51-54.)

B. Prosecution History of the ’413 Patent

The prosecution history for the ’413 patent spans over 10 years. With continuations and divisionals, the ’413 patent’s earliest claimed priority date is April 17, 2003. (Ex. 1001 at p. 1.) The application for the ’413 patent was filed on June 22, 2012. (*Id.*)

The Examiner issued a non-final rejection on February 14, 2013, rejecting the pending claims as anticipated by Lubell (Ex. 1004) discussed below. (Ex. 1011 at p. 2.) The dependent claims were rejected as obvious, combining Lubell with well-known heart rate monitors that use encoded messages and time channels. (*Id.* at p. 3.)

In May of 2013, Patent Owner amended claim 1 to add “prompt a user to exercise at multiple exertion levels” and “while the user exercises at the multiple exertion levels.” (Ex. 1012 at p. 3 (emphasis in original).) However, the Examiner issued a final rejection in June of 2013 as still anticipated by Lubell. (Ex. 1013 at pp. 3-4.)

In August, Patent Owner amended the claims again adding the requirement to “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 ~~multiple exertion levels~~; determine a plurality of heart rate zones based on first heart rate measurements received from a sensor while the user exercises at the ~~multiple~~ plurality of successive exertion levels; ...” (Ex. 1014 at p. 3 (underlining showing additions and strikethrough showing deletions).) Patent Owner argued that “Lubell automatically executes a predefined exercise test protocol that is not based on a level of physical fitness of a user.” (*Id.* at p. 8.) Patent Owner contrasted the subjective “easy,” “medium,” and “hard” instructions with the allegedly rigid test in Lubell. (*Id.*) The Examiner issued a notice of allowance on August 22, 2013. (Ex. 1015 at p. 3.) The patent issued on December 31, 2013. (Ex. 1001 at p. 1.)

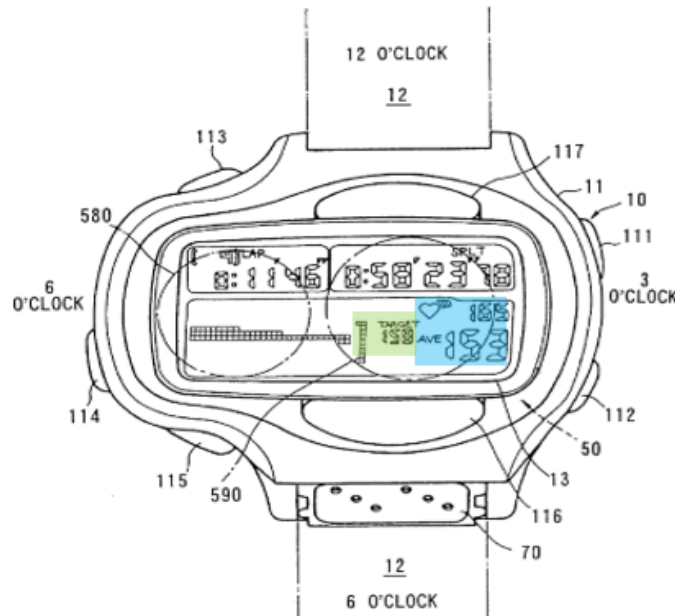
C. Prior Art

1. Amano

Amano discloses “an exercise workout support device suitably employed to prescribe appropriate exercise to the user.” (Ex. 1002 at 1:5-7.) This includes three primary objectives. “[It] 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... [I]ts second objective [is] the provision of a maximum oxygen uptake quantity estimating device... [I]ts third

objective [is] the provision of a portable pulse wave measuring device[.]” (*Id.* at 2:64-3:8.) These first two objectives are especially pertinent.

FIG. 31



(*Id.*, Fig. 31 (showing example of one display mode, annotated to show target heart rate (green) with current and average heart rate (blue).)

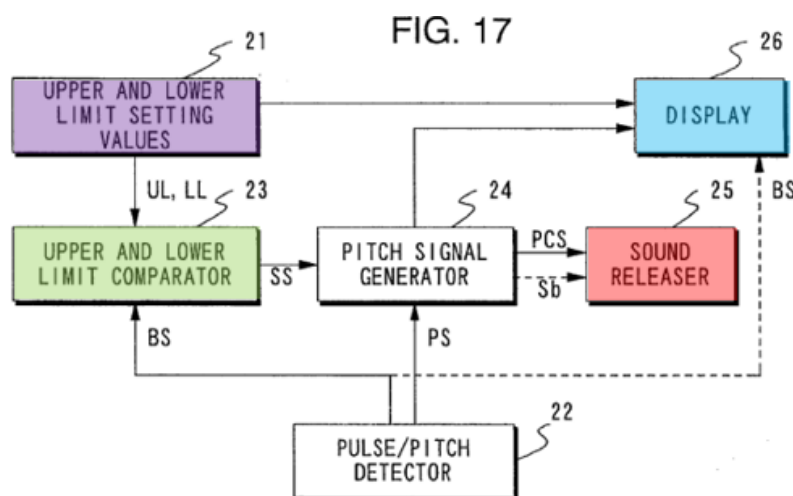
For its second objective, Amano describes estimating maximum oxygen uptake (VO_{2max}) for an exerciser. (*Id.*, at 6:5-16:15.) To find VO_{2max} , Amano must establish a straight-line relationship between heart rate and exercise intensity. (*Id.* at 6:60-63.) “In order to judge whether or not a straight line relationship exists, it is necessary to measure exercise intensity at at least three or more stages and determine heart beat rate at each stage.” (*Id.* at 6:63-66.) Amano calculates exercise intensity from body weight, stride length, and steps per minute. (*Id.* at 7:30-32.) The device obtains exercise intensity/beat rate pairs of data points in

order to extrapolate $VO_{2\max}$. (*Id.* at 12:22-24.)

The device notifies an exerciser to increase their exercise intensity after a certain amount of time at a particular intensity. (*Id.* at 13:30-34.) “[A]n order to increase the exercise intensity during running is directed at the test subject at fixed time intervals.” (*Id.* at 13:31-32.) Amano describes beeps that indicate to the subject the pace they should run. (*Id.* at 13:46-50.) Amano notes, “it is also acceptable for the test subject to vary exercise intensity according to his own preferences.” (*Id.* at 13:66-67.) After prompting a user through stages of exercise intensity, the device will have heart rate measurements that correspond with particular exercise intensities. (*Id.*, at 15:9-11.) The device estimates $VO_{2\max}$ from these pairs. (*Id.* at 15:11-16.)

For the first objective, Amano’s device shows upper and lower limit values for heart rate that correspond to a particular exercise intensity. This relies on $VO_{2\max}$ which a user may either enter or obtain from the process described above. (*Id.* at 19:49-51.) The device determines an intensity calculated in terms of percentage of $VO_{2\max}$, for example choosing 50% as an optimal workout target. (*Id.* at 19:40-43.) A microcomputer computes heart rates that correspond to 20% above and below a heart rate corresponding to this workout target. (*Id.* at 20:19-30.) For example, if the device chooses 125 as the target pulse, the upper limit is 150 and the lower limit is 100. (*Id.* at 20:19-28.)

Then, during exercise, the device displays (blue, below) the upper and lower limit pulse rates (purple) for an intensity. (*Id.* at Fig. 17, and 21:53-54.) It also beeps (red) to tell a user to increase or decrease pace during exercise, if the comparator (green) detects that pulse is outside the zone. (*Id.* at 25:52-26:18.) These prompts help an exerciser keep their pulse within the desired range during a workout.



(*Id.*, Fig. 17 (annotated).)

Amano also tracks distance information regarding a user during exercise. The device can “calculate the distance run by the test subject per unit time.” (*Id.* at 12:17-18.) “The distance run per unit time can be obtained by multiplying the test subject’s stride and pitch.” (*Id.* at 7:35-37.) The device includes a body motion detector which “is a sensor for detecting body motion when the test subject is running.” (*Id.* at 7:19-20.)

2. Matsumoto

Matsumoto involves an “exercise management machine in which the amount of exercise is control[led] according to the pulse of the user.” (Ex. 1003 at 1:6-8.) The machine displays exercise programs with target pulses based on personal physiological data and past exercise results. (*Id.* at 1:39-47.)

The first time a user exercises with the machine, they enter their age, sex, and weight. (*Id.* at 5:8-15.) From this, the machine chooses a workout with several target pulses, from warm-up to full-fledged training. (*Id.* at 5:25-61.) As a user progresses through the pulses, the machine displays “Continue for xx min at a Pulse of xxx p/m” and tells users to speed up or slow down if their heart rate is below or above the target. (*Id.*, 5:39-61.) A color-coded LED emits a signal to “inform the user whether he is above, below, or within the target pulse zone (e.g. target pulse $\pm$ 5).” (*Id.* at 7:48-51.) Speed, pulse, difference from target pulse, and distance are all tracked throughout the exercise. (*Id.* at 6:1-9.) “These results are used to calculate the exercise program for the next session and are then memorized.” (*Id.* at 6:10-11.) Target pulses are calculated using an exercise rating that is based on a user’s pulse while exercising, pulse at rest, and maximum pulse. (*Id.* at 8:55-9:7.)

During subsequent exercises, the machine will graphically display current pulse and target pulse and uses LEDs to indicate the zone of the pulse. (*Id.* at 9:23-

42.) “If the user’s pulse is within the target pulse zone, the LED emits green light, yellow light if it is below the target pulse zone, and red if it is above the target pulse zone.” (*Id.* at 9:35-39.)

Matsumoto also tracks the speed and distance traveled of a user during exercise. During training, “revolutions (R) are measured, and the speed (H) and distance traveled (K) are calculated.” (*Id.* at 6:1-3.) The device displays speed along with the other tracked metrics during an exercise program. (*Id.* at 9:25.)

3. Lubell

Lubell discloses two main aspects to its device. The first is a way to measure fitness capacity with successive periods of exertion. The second helps a user keep their heart rate in an optimal zone during a workout.

Lubell first describes a heart rate monitor that “calculates an appropriate fitness parameter (e.g., maximal oxygen uptake level or VO_{2max}) by automatically pacing the subject through a straightforward training protocol.” (Ex. 1004 at 2:46-51.) The protocol starts slow and prompts users through faster cadences while constantly measuring heart rate. (*Id.* at 3:36-44.) These heart rates can be used to estimate $\%VO_{2max}$. (*Id.* at 4:45-50.) Although Lubell describes one preferred protocol, it notes that it can be adapted for other circumstances using “a suitable submaximal exercise test protocol.” (*Id.* at 5:10-14.)

Second, after the test protocol, the device can also operate in pacer mode.

(*Id.* at 9:58-59.) The device makes noise, pacing tones, that stay normal so long as the current heart rate correlates to a range of 60% to 80% VO_{2max} . Outside that zone, the device makes higher or lower pitched tones to prompt the user back into the desired exercise zone. (*Id.* at 10:1-3.)

4. Ceci

Ceci¹ is a scientific study published over 30 years ago. Ceci examines the Ratings of Perceived Exertion (RPE) scale as a method to study workout intensity. “This scale has become a generally accepted subjective method in estimation studies, that is, studies in which subjects are asked to rate the degree of exertion they perceive as related to a certain physical intensity.” (Ex. 1005 at p. 732 (emphasis removed).) The study focuses on perceived exertion in treadmill workouts compared to outdoor workouts. Ceci is relevant here because of its methods.

In the study, subjects were asked to adjust their velocity to experience “light exertion,” then “somewhat hard,” then “hard.” (*Id.* at p. 734.) During the workout, the researchers measured heart rate at each of the self-determined exercise

¹ Exhibit 1005 is a copy of Ceci downloaded from the publisher at <https://journals.lww.com/acsm-msse/toc/1991/06000#-856692310>, a capture of which is attached as Exhibit 1006.

intensities. Figure 2 below shows the relationship between heart rate and RPE level. (*Id.*, at p. 735.) Although the comparison between treadmill and field workouts is not relevant here, this study shows that determining heart rate zones from subjective instruction was a common practice in the art well before the '413 patent.

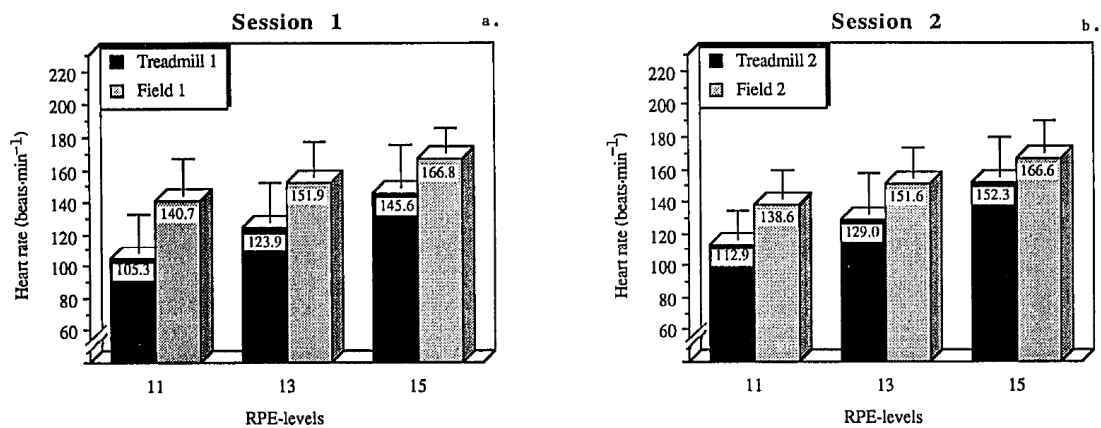


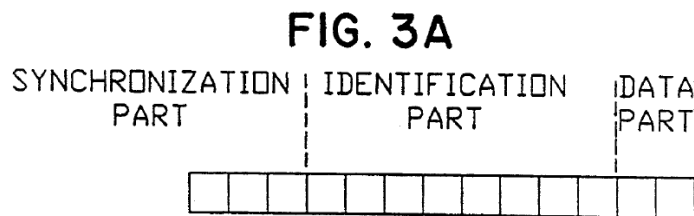
Figure 2—The obtained heart rates (in beats·min⁻¹) from sessions 1 (a) and 2 (b) are shown at the three RPE levels for both treadmill and field running. Mean values are shown and standard deviations indicated for each bar; *N* = 11.

(*Id.*, Fig. 2.)

5. Gorman

Gorman describes a device for measuring heart rate during exercise. “It is another object of this invention to provide a wireless heartbeat monitor which can be easily worn by a person engaged in all forms of physical exercise.” (Ex. 1007 at 3:33-35.) Gorman focuses on the communication between the sensor and a display device. “The apparatus includes a transmitter unit for producing an encoded digital signal representing the biomedical response and for wirelessly transmitting the encoded digital signal to a receiver unit for display of the

measured biomedical response. . . In a preferred embodiment, this monitor includes unique identification between a transmitter and an associated receiver.” (*Id.*, 4:17-29.) The communication is essentially an encoded signal that can include identification data unique to the sensor so the receiver knows the source of the message. Figure 3A shows a typical encoded message, with identification and data.

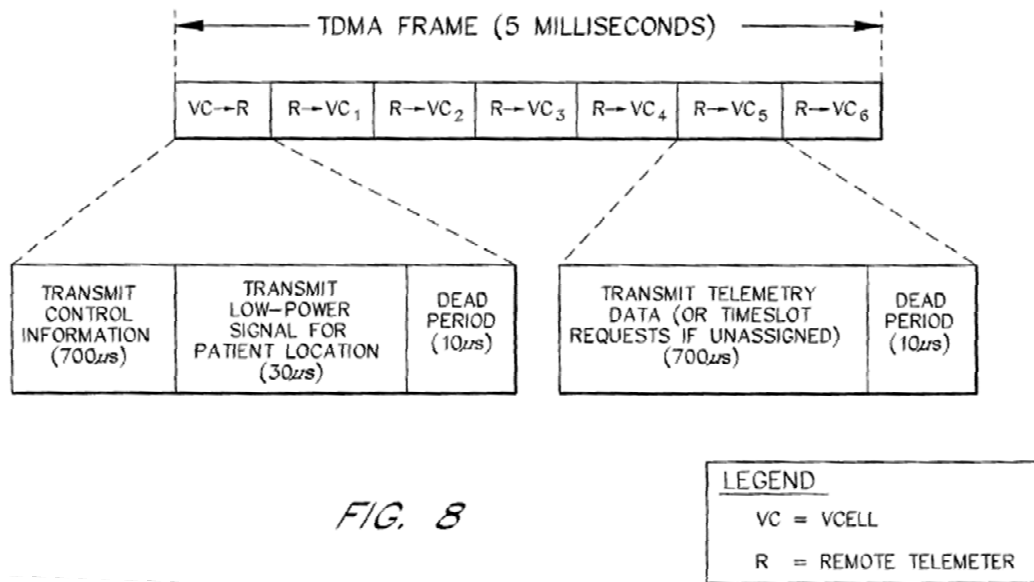


(*Id.*, Fig. 3A.)

6. Flach

Flach describes a communication system for medical devices, to track physiological data of patients. (Ex. 1008 at p. 1.) The communication system designates timeslots for communication between sensors and a hub. “The VC->R timeslots are used to broadcast information to the remote telemeters 102. (As described below, all VCELLs of the system are synchronized, and thus transmit at the same time.) The R->VC timeslots are assigned by the VCELLs 106 to individual telemeters 102, and are used to transfer information from the assigned telemeters to the VCELLs.” (Ex. 1008 at [0096].) Figure 8 below shows how this works. The system divides a time frame into slots during which the telemeters and

hub transfer particular sets of data.



(*Id.*, Fig. 8.)

III. CLAIM CONSTRUCTION

Petitioner does not propose any terms for construction because no constructions are necessary to resolve any disputes identified in this Petition. *See Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999).²

² If trial is instituted, Petitioner reserves its right to address construction of any terms raised at trial, or in the related district court action. Petitioner believes that the '413 patent claims are invalid under 35 U.S.C. §§ 101 and 112. Because those issues cannot be raised in an IPR, Petitioner has raised or reserves the right to raise those issues in the related district court action, *Nike, Inc. v. lululemon usa inc.*,

IV. LEVEL OF ORDINARY SKILL

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, wired and wireless communication, network-based applications and/or equipment, or the equivalent experience or education. (Ex. 1009, ¶ 41.)

V. PRECISE REASONS FOR RELIEF REQUESTED

Pursuant to 37 C.F.R. § 42.104(b), Petitioner requests cancellation of claims 1-5, 7, 9, 12-14, and 17-19 of the ’413 patent based on the following references:

Prior Art Reference	Abbreviation
U.S. Patent No. 6,241,684	“Amano” (Ex. 1002)
U.S. Patent No. 4,911,427	“Matsumoto” (Ex. 1003)
U.S. Patent No. 4,566,461	“Lubell” (Ex. 1004)
Ruggero Ceci & Peter Hassmén, <i>Self-monitored exercise at three different RPE intensities in treadmill vs field running</i> , 23 Medicine & Science in Sports & Exercise 732 (1991)	“Ceci” (Ex. 1005)
U.S. Patent No. 5,400,794	“Gorman” (Ex. 1007)

Prior Art Reference	Abbreviation
U.S. Patent Application Publication No. US 2001/0023315	“Flach” (Ex. 1008)

The statutory grounds for the challenge to each claim are set forth below.

All statutory citations are pre-AIA.

Amano issued on June 5, 2001, (Ex. 1002 at p. 1), Matsumoto issued on March 27, 1990, (Ex. 1003 at p. 1), Lubell issued on January 28, 1986, (Ex. 1004 at p. 1), Flach was published on September 20, 2001 (Ex. 1007 at p. 1), Ceci was published in 1991 (Ex. 1005 at p. 732), and Gorman issued on March 28, 1995.

All five qualify as prior art under Section 102(b).

Ground	35 U.S.C. §	Claims	Prior Art References
1	102	1, 5, 7, 12, 17	Amano
2	102	1, 5, 7, 12, 17	Matsumoto
3	103(a)	1, 12, 17	Lubell, Ceci
4	103(a)	2, 3, 4, 13, 18	Lubell, Ceci, and Gorman
5	103(a)	9, 14, 19	Lubell, Ceci, and Flach
6	103(a)	2, 3, 4, 13, 18	Amano and Gorman
7	103(a)	9, 14, 19	Amano and Flach
8	103(a)	2, 3, 4, 13, 18	Matsumoto and Gorman
9	103(a)	9, 14, 19	Matsumoto and Flach

Section 325(d) is not at issue. Although Lubell was considered by the

Examiner, Petitioner applies it differently here. The Examiner's analysis during prosecution did not consider the combination with Ceci. As shown below,

Petitioner's argument goes beyond what was addressed during prosecution.

Additionally, Flach was cited by the Examiner to show that some dependent claims were obvious. But those claims were not amended in order to gain allowance of the '413 patent, so the same analysis still applies. None of the other prior art references appear in the prosecution history.

VI. GROUND 1: AMANO ANTICIPATES CLAIMS 1, 5, 7, 12, AND 17

A. Apparatus Claim 1

1. Element 1[pre]

An apparatus comprising:

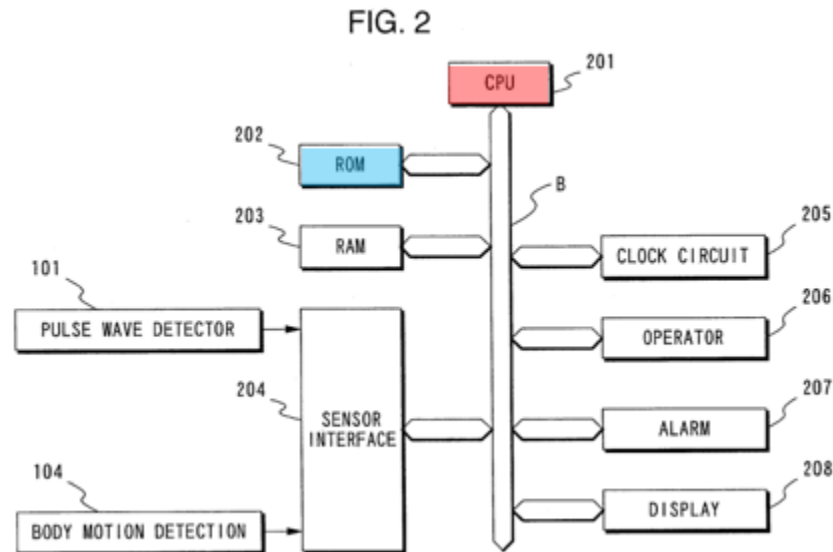
If limiting, Amano discloses an apparatus. (*See infra* §§ VI.A.1-VI.A.8.)

Amano describes “an exercise workout support device.” (Ex. 1002 at 1:5-6.) This device is a discrete system that qualifies as an apparatus.

2. Element 1[A]

a processor; and

Throughout, Amano describes a CPU (red) that controls the behavior of the device. (*Id.* at 7:56-58.)



(*Id.*, Fig. 2 (annotated).)

3. Element 1[B]

a memory storing instructions that, when executed by the processor, cause the apparatus at least to:

The device in Amano includes instructions in memory, “ROM 202 stores basic programs used by CPU 201.” (*Id.* at 7:61.) This ROM (blue above) contributes to both fitness level estimation and subsequent workout programs described below. (*Id.* at 8:21, 19:27.)

4. Element 1[C]

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;

“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.” (*Id.* 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].’

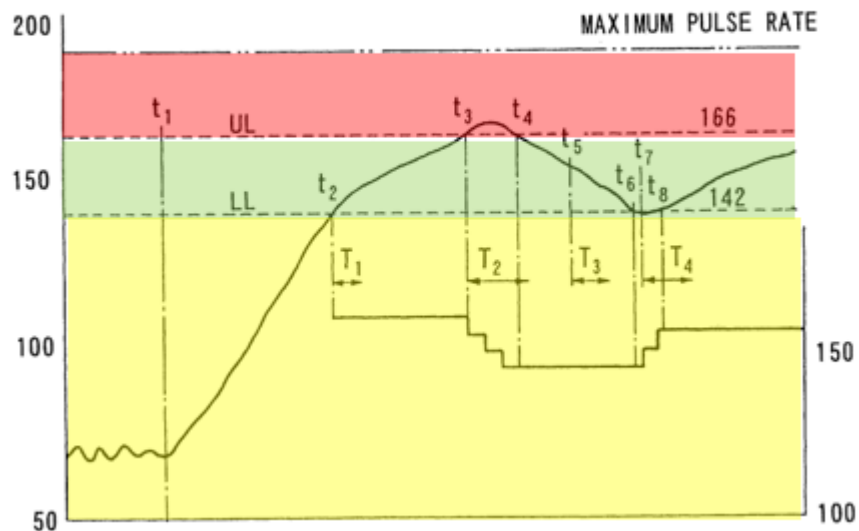
Amano also notes that a user can choose subjective exertion levels during this determination phase, similar to the ’413 patent. (*See, e.g.*, Ex. 1001 at 15:44-16:55.) “Moreover, it is also acceptable for the test subject to vary exercise intensity **according to his own preferences.**” (Ex. 1002, 13:66-67 (emphasis added).) A user exercising at subjective intensity levels mirrors the characterization in the ’413 patent. Amano describes exertion levels based on a user’s physical fitness both objectively and subjectively.

5. Element 1[D]

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;

Amano focuses on maximum oxygen uptake, a fitness measure with a direct correlation to heart rate zones. (Ex. 1002 at 19:32-33.) Amano describes how this is calculated for a particular subject. “[T]he 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.” (*Id.* at 11:66-12:3.) Using this estimated VO_{2max} , the microcomputer takes a pulse rate that corresponds to 50% VO_{2max} . (*Id.* at 19:40-43.) It calculates heart rates 20% above and below this rate and uses them as an upper and lower limit. (*Id.* at 20:19-28.) It thereby creates heart rate zones based on those first heart rate measurements. There is a zone below 40% VO_{2max} (yellow), from 40 to 60% (green), and greater than 60% (red).

FIG. 27



(*Id.*, Fig. 27 (annotated to show three heart rate zones in a workout).)

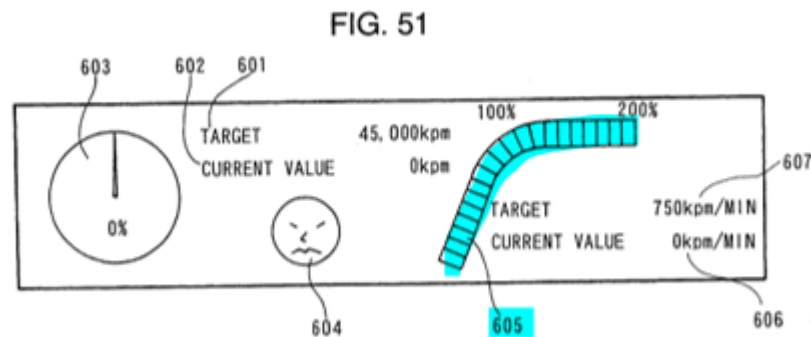
6. Element 1[E]

generate a prompt instructing a user to exercise while maintaining heart rate within a particular one of the plurality of heart rate zones;

After the device calculates heart rate zones as described above, Amano prompts exercise in a particular zone. Amano discloses that the device displays upper limit and lower limit heart rates that it has calculated, along with current heart rate. (*Id.* at 21:48-55.) The device also outputs a pitch to indicate if a user's heart rate is below, in, or above the desired range. (*Id.* at 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.

Amano also describes the device using LEDs to display an exercise target. (*Id.* at 38:40-41.) “From among the LEDs which compose exercise intensity meter 605 [blue], those corresponding to [10%-70%] are yellow, those corresponding to [80%-120%] are blue, and those corresponding to [130% or higher] are red.” (*Id.* at 39:14-17.)

Each of these are ways that the Amano device prompts a user to exercise while maintaining their heart rate in a measured zone.



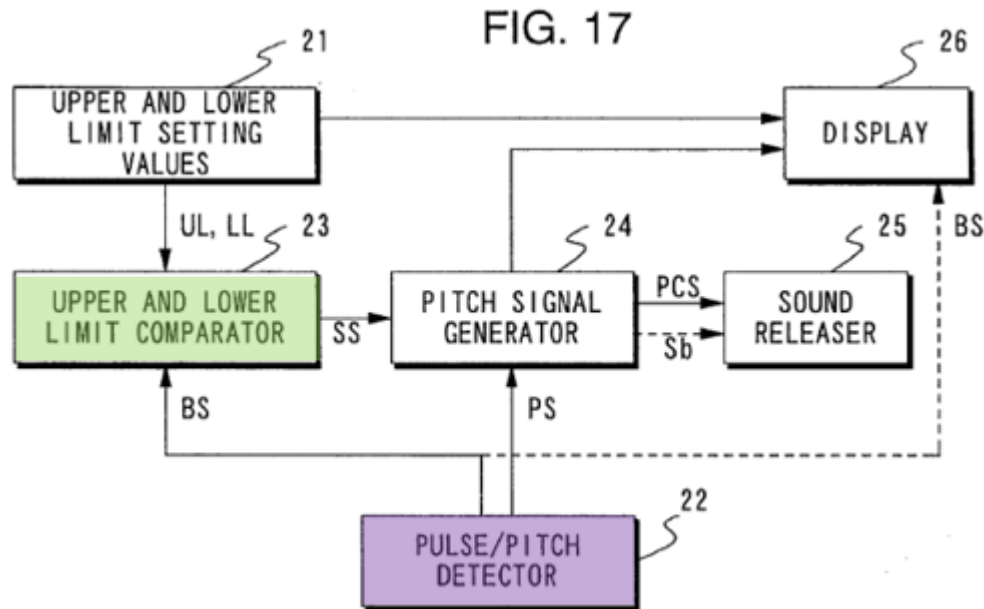
(*Id.*, Fig. 51 (annotated).)

7. Element 1[F]

process second heart rate measurements received from the sensor subsequent to generating the prompt; and

During exercise events after the first test, the Amano device regularly measures pulse. “Pulse rate/pitch detector 22 detects the pitch and pulse of the user during exercise, and outputs a pitch detection signal PS and a pulse detection signal BS showing these values.” (*Id.* at 20:55-57.) This pulse rate detector (purple) serves as the heart rate measurements from a sensor described in Element

1[F]. The device displays this measured heart rate alongside the upper and lower limit heart rates that prompt a user to exercise, as shown in Figure 17 below. (*Id.* at 21:48-55.) The device does this after it initially generates the prompt above and continues to process the heart rate measurements during exercise.



(*Id.*, Fig. 17 (annotated).)

8. Element 1[G]

determine whether the second heart rate measurements are within the particular heart rate zone.

Amano explains that “Upper and lower limit comparing element 23 [green] detects whether or not the pulse indicated by pulse detection signal. . . exceeds the lower limit LL or the upper limit LL [sic].” (*Id.* at 20:61-64.) Similarly, in an example from another embodiment, “the exercise intensity current value is... within $\pm 20\%$ of the exercise intensity target value. Thus, the corresponding green

LEDs in exercise intensity meter are illuminated.” (*Id.* at 39:39-42.) Both describe how Amano compares a current heart rate to the desired heart rate zone. This matches the way Element 1[G] determines whether heart rate is “within the particular heart rate zone.”

B. Claim 5

The apparatus of claim 1, wherein the instructions, when executed by the processor, cause the apparatus to receive a message from a speed sensor, wherein the message comprises speed information measured by the speed sensor.

Dependent claim 5 adds a speed sensor that sends speed information about a user to the device. Amano discloses that its sensors (e.g., motion detector 104) allow determination of “the distance run per unit time,” which is speed. (*Id.* at 7:30-37; *see also id.* at 12:15-18.)

C. Claim 7

The apparatus of claim 1, wherein the instructions, when executed by the processor, cause the apparatus to receive a message from a distance sensor, wherein the message comprises distance information measured by the distance sensor.

Dependent claim 7 adds a distance sensor that sends distance information to the apparatus. Amano also includes a sensor to measure distance. It discloses a body motion detector that can be an acceleration sensor that provides the device with the number of steps per unit time of a user. (*Id.* at 7:6-17.) “The distance run per unit time can be obtained by multiplying the test subject’s [sic] stride and

pitch.” (*Id.* at 7:35-37.) Therefore, Amano anticipates claim 7 of the ’413 patent.

D. Method Claim 12

A method comprising: prompting a user to exercise at a plurality of successive exertion levels. . .

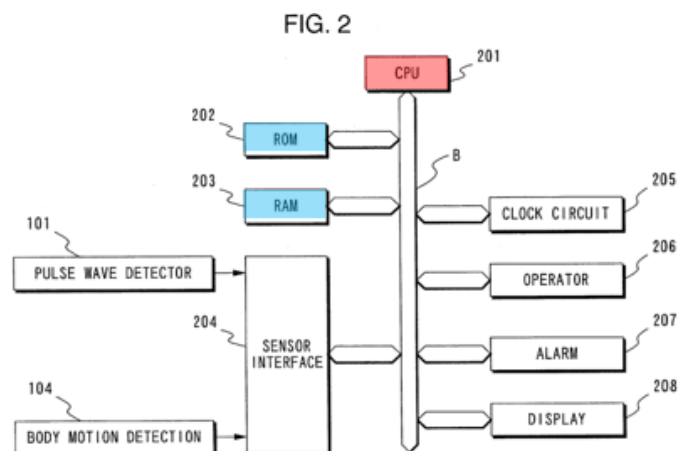
Claim 12 is claim 1 in method form. It repeats all the elements listed and discussed above. To the extent that “method” is limiting, Amano is one. Amano completes each step of claim 12. Amano prompts exercise at exertion levels, determines heart rate zones, prompts exercise in one of the zones, and checks to see if the user succeeds. Amano anticipates claim 12.

E. Non-transitory computer readable medium Claim 17

A non-transitory computer readable medium storing executable instructions that, when executed, cause a computing system at least to: prompt a user. . .

Claim 17 is a “non-transitory computer readable medium” version of claim

1. As shown previously, a CPU (red) with memory (blue) controls the Amano device. To the extent this new preamble limits claim 17, Amano anticipates it.



(*Id.*, Fig. 2 (annotated).)

VII. GROUND 2: MATSUMOTO ANTICIPATES CLAIMS 1, 5, 7, 12, AND 17

A. Apparatus Claim 1

1. Element 1[pre]

An apparatus comprising:

Matsumoto describes an “exercise management machine,” which qualifies as an apparatus. (Ex. 1003 at 2:4.)

2. Element 1[A]

a processor; and

Matsumoto includes “computer means.” (*Id.* at 11:15.) In Figure 11, 101 is a CPU (red).

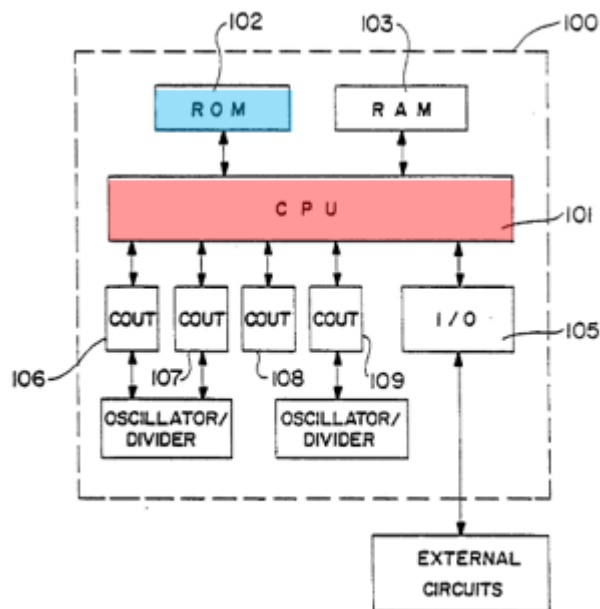


FIG. 11

(*Id.*, Fig. 11 (annotated).)

3. Element 1[B]

a memory storing instructions that, when executed by the processor, cause the apparatus at least to:

The figure above shows that the Matsumoto machine includes ROM (blue).

The patent discloses “memory means for storing a plurality of exercise programs.”

(*Id.* at 11:21-22.) The memory includes program data that determines a target pulse during exercise. (*Id.* at 5:24-27.)

4. Element 1[C]

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;

“Prompt a user to exercise at a plurality of successive exertion levels”:

In Matsumoto, a user first enters physiological information about themselves. (*Id.* at 5:8-15.) Then, the machine determines a program for the user and displays a prompt to the exerciser: “Continue exercising at xx p/m for 1 minute.” (*Id.*, at 5:24.) This, and subsequent similar prompts for more difficult exercise, are analogous to the ’413 patent’s prompts: “5 MIN EASY,” “5 MIN MEDIUM,” and “3 MIN HARD.” (Ex. 1001, Fig. 8, and at 15:44-16:55.) The machine in both initiates messages to prompt the user to do a certain type of workout with a certain increasing intensity.

A user, as described in Matsumoto, begins cycling at an intensity that correlates with the first prompted heart rate. (Ex. 1003 at 5:39-43.) After a

minute, the machine increases the intensity level and prompts the user to reach a new heart rate. (*Id.* at 5:51-54.) The machine repeats this escalation successively until the cyclist reaches the “full fledged training target pulse.” (*Id.* at 5:50-60.)

This is analogous to the '413 patent. The '413 patent's preferred embodiment describes only three exertion levels corresponding to subjective intensity levels. (Ex. 1001 at 15:44-16:55.) But the language of claim 1 does not specify a certain number of exertion levels. (*Id.* at 18:5-23.) Nor does the claim define the exertion levels beyond stating that they are based on a level of physical fitness of a user (discussed further below). (*Id.*) In Matsumoto, there is a plurality of initial levels—possibly three, possibly more, or possibly less. (Ex. 1003 at 5:45-57.) Therefore, the first program in Matsumoto prompts 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”: Before the first exercise, the Matsumoto user enters their sex, age, and weight. (*Id.* at 5:8-15.) This information is compared to typical fitness tables to estimate the physical fitness of the user. (*Id.* at 3:23-50, 5:17-18.) From this estimated fitness, the machine sets the initial exertion level targets. (*Id.* at 5:20-23.) Indeed, the stated objective of the invention is “providing an exercise program that is suited to the individual user’s physical fitness.” (*Id.* at 4:33-35.) The levels must be based on the physical fitness of the user. Matsumoto first

estimates fitness based on input parameters. (Ex. 1003 at 5:17-18). This estimate determines the first workout program. (*Id.*) Even though not subjective, Matsumoto's exertion levels are based on the physical fitness of a user, so the machine anticipates the language of Element 1[C].

5. Element 1[D]

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;

Matsumoto describes how the heart rates detected in the first exercise session helps determine the heart rates in the subsequent sessions. Throughout the first exercise regimen, the machine tracks how the user's current pulse relates to the target pulse. (*Id.* at 5:62-6:6.) "These results are used to calculate the exercise program for the next session and are then memorized." (*Id.* at 6:10-11.) Using pulse while exercising, pulse at rest, and maximum pulse rate, the device calculates an exercise rating and corresponding target pulses for a particular user for future programs. (*Id.* at 8:55-9:5.) Therefore, the determination of future exercise programs is based on the first heart rate measurements gathered during the first successive exertion level exercise.

The target pulses in an exercise program are not just a single heart rate but heart rate zones. There is a range around each target pulse so that a user knows whether they are "above, below or within the target pulse zone (e.g. target pulse $\pm$

5).” (*Id.* at 7:50-51.) Matsumoto regularly refers to target pulses in terms of zones, for example, “[i]f the user’s pulse is within the target pulse zone, the LED emits green light, yellow light if it is below the target pulse zone, and red if it is above the target pulse zone. (*Id.* at 9:36-40.) Just as in the ’413 patent, there is a lower limit heart rate and an upper limit heart rate that determine the bounds of a heart rate zone.

Since there are numerous pulse targets in an exercise program, the device is calculating a plurality of these heart rate zones. For example, Table 2 below shows different heart rate targets in an example exercise program.

TABLE 2							
N	0	1	2	3	4	5	6
PN	80	100	120	130	140	150	160

(*Id.*, at 5:29-33.)

As described above, each of these target pulses (PN) are really zones around each target. There is a plurality of zones calculated each time a new program is determined for a user. Since this plurality of zones is determined based on the first heart rate measurements, Matsumoto anticipates Element 1[D] of the ’413 patent.

6. Element 1[E]

generate a prompt instructing a user to exercise while maintaining heart rate within a particular one of the plurality of heart rate zones;

After an exerciser has finished at least one workout, “the individual’s exercise program can be displayed the next time he/she uses the machine.” (*Id.* at

6:40-42.) During the exercise program, the machine will prompt the user, “Continue for xx min at a Pulse of xxx p/m[.]” (*Id.* at 5:61.) As discussed above, a target pulse is really a heart rate zone around the target calculated specifically for this user. Therefore, this is a prompt to exercise while maintaining heart rate within one of the plurality of heart rate zones.

Matsumoto also discloses a graphical representation and flashing LEDs to show current heart rate compared to target heart rate. “While the user is pedaling, his/her pulse (bar graph and digital display) (28f[**purple**], 28f’ [**green**]), elapsed time (28g) and speed (28h) are measured and displayed along with the target pulse (28d) [**blue**] (level display) as shown in FIG. 13(c).” (*Id.* at 9:23-26 (annotations added describing figures shown below).) Also, LEDs can indicate red, green, or yellow depending on whether a user is above, at, or below the target pulse zone. (*Id.* at 9:27-40.) These displays further prompt the user to exercise in the target pulse zone.

FIG. 13(c)

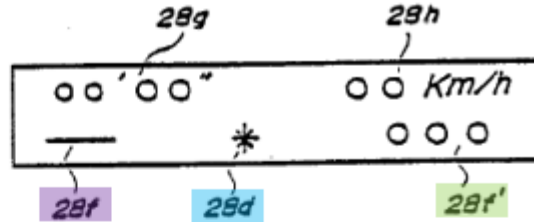


FIG. 13(d)

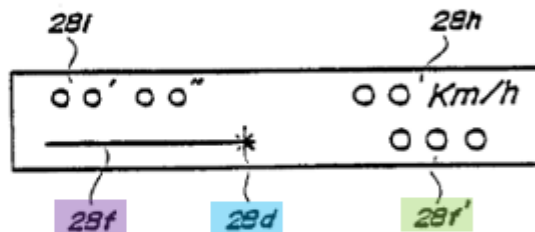
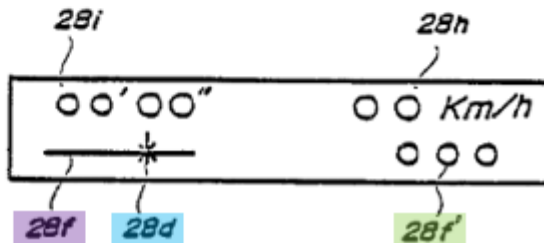


FIG. 13(e)



(*Id.*, Figs. 13(c), (d), (e) (annotated).)

7. Element 1[F]

process second heart rate measurements received from the sensor subsequent to generating the prompt; and

In Matsumoto, the machine measures a user's pulse throughout an exercise.

“When the user commences full fledged training, his/her pulse (Pi) is measured.”

(*Id.* at 5:62-63.) This is after the prompt of “Continue for xx min at a Pulse of xxx

p/m[.]” (*Id.* at 5:61-63.) A sensor measures the heart rate. (*Id.*, Fig. 4 (showing

Pulse Sensor 15 (purple)).) If “process” is limiting, the machine compares the

pulse to the target pulse, it displays the pulse, and uses the pulse for calculations,

all examples of processing. (*Id.* at 5:65-6:10.)

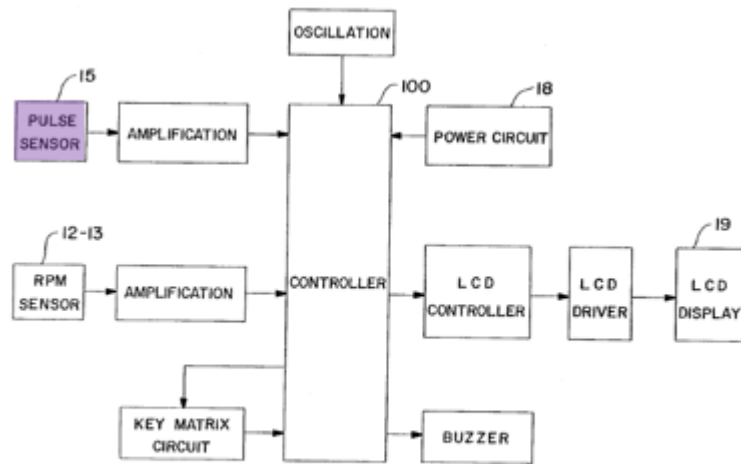


FIG. 4

(*Id.*, Fig. 4 (annotated).)

8. Element 1[G]

determine whether the second heart rate measurements are within the particular heart rate zone.

As described above, the machine measures pulse and compares it to the target pulse. “[T]he user’s pulse (P_i) is compared with the target pulse (P). . . The user’s pulse (P_i) at any given time, the target pulse (P), the difference between the two. . . are displayed[.]” (*Id.* at 5:64-6:7.) “If the user’s pulse ($28f$, $28f^1$) is within the target pulse ($28d$) zone, the LED (27) emits green light, yellow light if it is below the target pulse zone, and red if it is above the target pulse zone.” (*Id.* at 9:36-40.) In this way, Matsumoto determines whether the heart rate measurements are within the desired zone.

B. Claim 5

The apparatus of claim 1, wherein the instructions, when executed by the processor, cause the apparatus to receive a message from a speed sensor, wherein the message comprises speed information measured by the speed sensor.

Dependent claim 5 adds a speed sensor that sends speed information about a user to the device. The device in Matsumoto also tracks speed. The exercise bike described in Matsumoto includes “rotation sensors which measure rotation.” (*Id.* at 2:26.) From this sensor, the device measures rotations during exercise and calculates the speed of an individual. “The rpm is converted into speed and used to calculate the distance traveled.” (*Id.* at 2:55-56.) Speed, along with other measured parameters, is displayed to the user during exercise. (*Id.* at 4:6.) Matsumoto includes a sensor that measures speed and speed information and so anticipates claim 5 of the ’413 patent.

C. Claim 7

The apparatus of claim 1, wherein the instructions, when executed by the processor, cause the apparatus to receive a message from a distance sensor, wherein the message comprises distance information measured by the distance sensor.

Dependent claim 7 mirrors claim 5, but for distance. Matsumoto also tracks distance information of a user. Using information from the rotation sensor discussed above, the device calculates the distance traveled by an exerciser. (*Id.* at 6:9-10.) Therefore, Matsumoto anticipates claim 7 as well.

D. Method Claim 12

A method comprising: prompting a user to exercise at a plurality of successive exertion levels. . .

As noted previously, claim 12 matches claim 1 but in method form.

Matsumoto describes all the steps of such a method: the machine prompts exercise at varying exertion levels, determines heart rate zones, prompts exercise at a particular zone, and tracks the results. Therefore, Matsumoto anticipates claim 12.

E. Non-transitory computer readable medium Claim 17

A non-transitory computer readable medium storing executable instructions that, when executed, cause a computing system at least to: prompt a user. . .

Claim 17 repeats claim 1 with a new preamble. If limiting, Matsumoto includes a CPU (red) and memory (blue) to control the device. Matsumoto anticipates all other elements, as described above, and so anticipates claim 17.

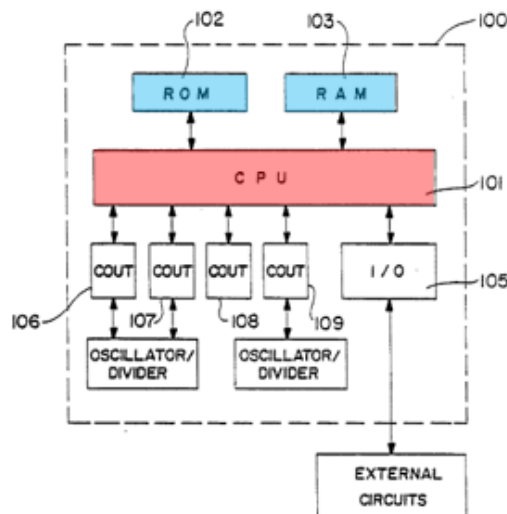


FIG. 11

(Id., Fig. 11 (annotated).)

VIII. GROUND 3: CLAIMS 1, 12, AND 17 ARE OBVIOUS OVER LUBELL IN VIEW OF CECI

As described above, the Examiner initially rejected the pending claims in the application that issued as the '413 patent as anticipated by Lubell. Only after amending the claims to include “based on a level of physical fitness of a user” did Patent Owner succeed. The main test described in Lubell is the same for every user, regardless of their fitness level.

However, it is obvious instead to direct a user to choose their exertion level, based on a perceived level of exertion tied to their innate fitness ability. Such a test is what the '413 patent describes. But such tests predate the '413 patent. Ceci describes such a test, and so fills the gap of Lubell, rendering the claims obvious.

A. Apparatus Claim 1

1. Element 1[pre]

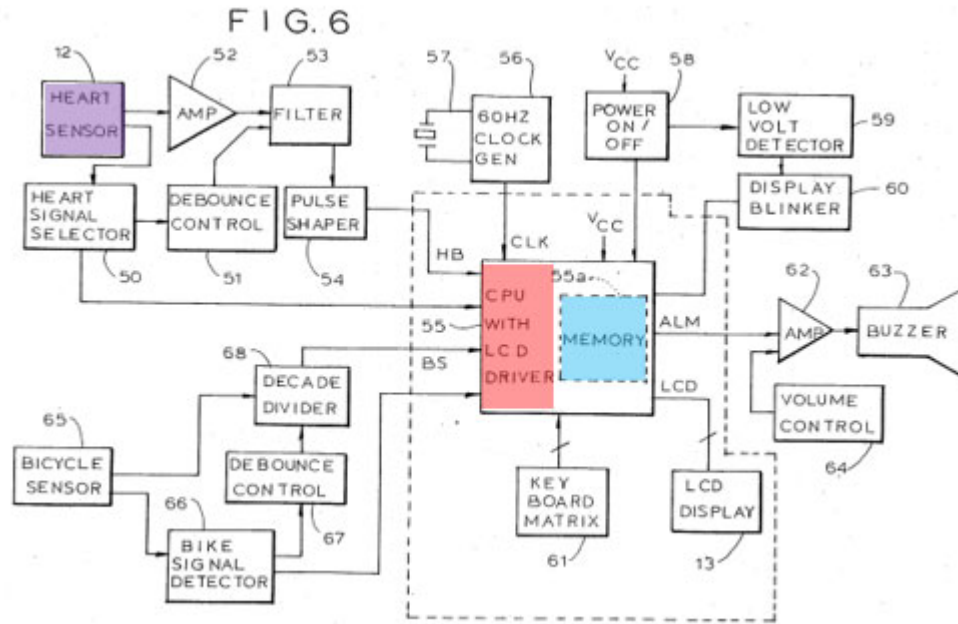
An apparatus comprising:

Lubell describes a “device for monitoring exercise training.” (Ex. 1004 at 1:6-7.) If the preamble is limiting, such a device is an apparatus.

2. Element 1[A]

a processor; and

Lubell includes a microprocessor, “At the core of the heart rate monitor is a microprocessor.” (*Id.* at 3:8-9.) The design layout figure for the patent shows a CPU (red).



(*Id.*, Fig. 6 (annotated).)

3. Element 1[B]

a memory storing instructions that, when executed by the processor, cause the apparatus at least to:

In Lubell, “This microprocessor also includes an internal memory storage area.” (*Id.* at 6:62-63.) The diagram above also shows memory in the structure of the device (blue).

4. Element 1[C]

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;

“Prompt a user to exercise at a plurality of successive exertion levels”:

The device in Lubell prompts a user to exercise: “The indicator then provides indications, such as pacing tones, to establish an exercise cadence. . . for the

subject at a predetermined pacing rate so that the subject can follow a graded submaximal exercise tolerance test.” (*Id.* at 3:30-34.) These pacing tones are a prompt to engage in the exercise tolerance test.

Lubell discloses “means for establishing an exercise protocol in which the subject exercises at a first relatively low effort level for a first period, and at progressively higher effort levels for corresponding successive periods.” (*Id.* at 14:48-52.) “In this exercise tolerance test, the exercise cadence is provided at a first, slow rate for a first period. . . and at progressively faster cadences for corresponding successive periods.” (*Id.* at 3:36-40.) The tolerance test that Lubell describes works users through successive exertion levels.

“Wherein an exertion level is based on a level of physical fitness of a user”: A user in Lubell must first enter physiological information such as weight, height, and sex. (*Id.* at 3:23-24.) Such information helps describe the physical fitness of a user and is used in calculating the exerciser’s fitness capacity. (*Id.* at 4:1-30.) But it is not used to set the exertion levels of the initial test.

The Examiner found convincing that the exertion level in the ’413 patent is self-selected. They originally found that Lubell anticipated the ’413 patent. (Ex. 1013 at p. 5.) After claim amendments, the Examiner distinguished Lubell.

“Therefore in this device and method, the user is given a prompt to exercise at a first level, for that first level chosen by the user, a heart rate zone is calculated. . .

Although this is a device and method which guides the user, the exertion level is chosen and maintained exclusively by the user and not in any way acted upon by the device.” (Ex. 1015 at p. 3.) Patent Owner had argued, “Lubell is directed to a *prescribed* exercise test. In other words, Lubell automatically executes a predefined exercise test protocol that is not based on a level of physical fitness of a user.” (Ex. 1014 at p. 8.)

The Examiner and Patent Owner mischaracterize the prior art and miss that self-regulated exercise, if not anticipated, is obvious. There is motivation in Lubell to use other tests in other circumstances. (Ex. 1009, ¶ 60.) Lubell does not disclose only one specific exercise, as argued by Patent Owner. Lubell describes one embodiment designed for running, but notes that “it is to be understood that a device embodying this invention could be suitably adapted for use when cycling, swimming, or some other exercise. . . In such a case, **a suitable submaximal exercise test protocol could be used.**” (Ex. 1004 at 5:8-13 (emphasis added).)

It is obvious, in light of Ceci, that such a test protocol could be a self-regulated exercise chosen by a user. (See Ex. 1009, ¶¶ 89-93.) “Perceived exertion” exercises were well known in the sport and exercise field before the ’413 patent. “Previous studies have shown that self-regulation of exercise, in which subjects are asked to produce exercise intensities based on feelings of perceived exertion, seems to function well in a number of exercise modes investigated.” (Ex.

1005 at p. 732.)

In Ceci, researchers asked test subjects to exercise at “light exertion,” then “somewhat hard,” then “hard.” (*Id.* at p. 734.) This closely matches the easy, medium, and hard workouts described in the ’413 patent. During the exercise period in Ceci, researchers constantly tracked heart rate and determined the ranges of heart rates associated with each level of perceived exertion.

A POSITA would combine this method of measuring fitness with the device of Lubell because it is a simple substitution of one test for another. (Ex. 1009, ¶¶ 89-93.) It is explicit in Lubell that a different exercise protocol could be used. (*Id.*, ¶ 90.) Ceci, and other examples of RPE literature, describe a test where subjects choose how hard to exercise. (*Id.*, ¶ 91.) The subjects in Ceci exercised at light, somewhat hard, and hard exertion levels, based on their own understandings of the difficulty. (Ex. 1005 at p. 734.) Simply substituting this alternative test protocol would render Element 1[C] obvious.

Additionally, a POSITA would combine these references because it is applying a known technique (RPE test protocol) to a known device (Lubell health fitness monitor). (Ex. 1009, ¶ 92.) A POSITA would be aware of the various techniques for directing people to exercise at successive, increasing exertion levels. (*Id.*) Configuring the Lubell device with another test would have the predictable result of providing users with another way of measuring their fitness and

determining appropriate exercise zones. (*Id.*) Combining a known fitness test with Lubell would be desirable and feasible. (*Id.*, ¶ 93.)

Also, there are disclosures in both pieces of art that provide some motivation for combining the references. (*Id.*, ¶¶ 90-91.) Ceci acknowledges that the RPE scale could be used to track exercise intensity with heart rate zones, and that “exercise intensity should vary between 65% and 90% of maximal heart rate reserve to reach optimal effectiveness.” (Ex. 1005 at p. 737.) Lubell, as mentioned above, discloses that other test protocols could be used with its device. (Ex. 1004 at 5:8-13.) These disclosures suggest that a POSITA would be motivated to combine the references.

5. Element 1[D]

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;

Lubell calculates heart rate zones but does so in terms of percentage of maximal oxygen uptake, VO_{2max} . (Ex. 1004 at 10:8-25.) Lubell focuses on the zone of 60 to 80 percent of VO_{2max} and tracks the zones of less than 60 percent and greater than 80 percent. (*Id.* at 10:33-38.) These zones are analogous to the zones determined in the '413 patent corresponding to easy, medium, and hard workouts.

Lubell uses the heart rate measurements from the first test during the successive exertion levels to determine these zones of $\%VO_{2max}$. (*Id.* at 10:14-19.)

During the first test, the device measures heart rate throughout, including resting heart rate and maximum heart rate. (*Id.* at 8:23-25, 8:50-9:10.) These heart rates bear a relationship to $\%VO_{2\max}$ as shown in the equation in Column 10. (*Id.* at 10:15.) So these first heart rate measurements, which are received from the sensor during exercise through the successive exertion levels, determine the three zones in Lubell. This matches Element 1[D].

It would also be obvious to use the heart rate zones found in an RPE test as described by Ceci. (Ex. 1009, ¶ 92.) There, heart rate was tracked during the periods of light, somewhat hard, and hard exertion. (Ex. 1005 at p. 733.) A POSITA could use these measured heart rates to directly determine heart rate zones. (Ex. 1009, ¶ 92.) Ceci tracks heart rate continuously throughout the exercise test, so a POSITA would have the necessary data to calculate heart rate zones corresponding to each level of exertion. (*Id.*, ¶ 91.) For the same reasons described above, a POSITA would be motivated to combine Ceci with Lubell to achieve this goal.

6. Element 1[E]

generate a prompt instructing a user to exercise while maintaining heart rate within a particular one of the plurality of heart rate zones;

After the initial fitness measuring test, Lubell describes subsequent workouts. “Once the test protocol is complete, the monitor device can be set into a ‘pacer’ mode.” (Ex. 1004 at 9:58-59.) In pacer mode, the device outputs a tone

prompting a user to run at a particular velocity but changes the tone depending on whether the measured heart rate is within the calculated zone. (*Id.* at 9:60-68.)

When the current heart rate corresponds to a %VO_{2max} between 60 and 80, the pitch of a pacer tone is normal. (*Id.* at 9:65-68.) “The pacer tones are provided at a higher pitch if the stress level (%VO_{2max}) is above 80%, and at a lower pitch if the stress level (%VO_{2max}) is below 60%.” (*Id.* at 10:1-3.) The tone prompts a user to exercise with a heart rate within a particular zone. Once again, this is what the ’413 patent claims.

7. Element 1[F]

process second heart rate measurements received from the sensor subsequent to generating the prompt; and

As noted above, the device constantly samples heart rate and calculates the corresponding stress level. (*Id.* at 9:67-68.) This information comes from the heart sensor (purple) in the diagram of Figure 6 shown previously. (*Supra* at VII.A.2.)

8. Element 1[G]

determine whether the second heart rate measurements are within the particular heart rate zone.

The device determines whether the measured heart rate falls within the desired exercise zone, as it alerts an exerciser if heart rate falls outside the zone. (*Id.* at 10:33-38.)

B. Method Claim 12

A method comprising: prompting a user to exercise at a plurality of successive exertion levels. . .

As with Amano and Matsumoto, Lubell plus Ceci also make this claim obvious. It is claim 1 put in method form. Since Lubell and Ceci include each step to the method, claim 12 is obvious.

C. Non-transitory computer readable medium Claim 17

A non-transitory computer readable medium storing executable instructions that, when executed, cause a computing system at least to: prompt a user. . .

Lubell includes a CPU and memory shown in Figure 6 above that serve as “a non-transitory computer readable medium storing executable instructions.” (*Supra* at VII.A.2.) As the discussed combination satisfies each other element, claim 17 is obvious.

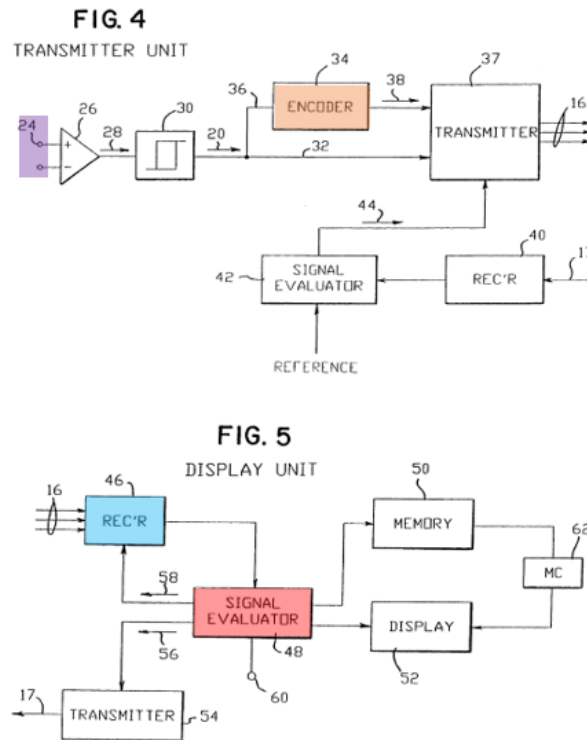
IX. GROUND 4: CLAIMS 2, 3, 4, 13, AND 18 ARE OBVIOUS IN LIGHT OF LUBELL, CECI, AND GORMAN

A. Claim 2

The apparatus of claim 1, wherein the first heart rate measurements and the second heart rate measurements are received in a plurality of encoded messages.

The sensor in Gorman transmits information to a receiver in encoded messages. “The apparatus includes a transmitter unit for producing an encoded digital signal representing the biomedical response and for wirelessly transmitting the encoded digital signal to a receiver unit for display.” (Ex. 1007 at 4:17-21.)

Figures 4 and 5 below show this as well, an encoder (orange) to send messages from the electrodes of the pulse sensor (purple) to the receiver (blue) in the display.



(*Id.*, Figs. 4, 5 (annotated).)

A POSITA would have the motivation and ability to combine this with any of the references described previously, for example the Lubell/Ceci combination discussed above. (Ex. 1009, ¶¶ 94-98.) Gorman describes a heart rate monitor for use in exercise, precisely the field of the '413 patent, the device in Lubell, and the research area of Ceci.

Gorman discloses a known technique related to communication in fitness devices that would be useful to improve the similar device in Lubell. (*Id.*, ¶ 96.) A

fitness device engineer considering changes to the device in Lubell would have reason to improve the communication system of the device. (*Id.*) To improve communication, a POSITA would use known techniques that optimized sensor communication. (*Id.*) Gorman makes explicit one way to improve sensor communication; heart rate data can be sent in encoded digital messages. (*Id.*, ¶ 95.)

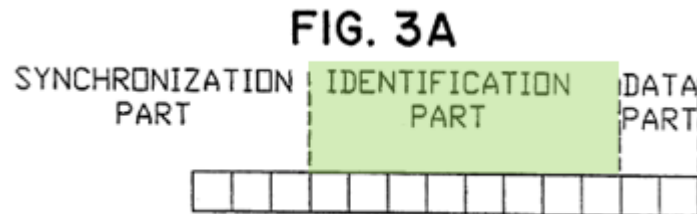
Additionally, this is a simple substitution of one communication method for another. The detailed communication method in Gorman can be used in place of the scantily described communication in Lubell. (*Id.*, ¶ 96.) A POSITA need only adjust the coding of Lubell's communication to implement the encoded messages with identification data in Gorman. (*Id.*, ¶ 97.) Therefore, this renders claim 2 obvious.

B. Claim 3

*The apparatus of claim 2, wherein the instructions, when executed by the processor, cause the apparatus to **decode** the **encoded messages** using **identification data** of the sensor.*

This claim adds to the previous with specific identification data that is encoded in the messages. Gorman discloses this as well. “In a preferred embodiment this monitor includes **unique identification** between a transmitter and an associated receiver.” (Ex. 1007 at 4:27-29.) “[A]fter the wrist unit receives the transmitted **encoded signal**, it **checks this signal** to see if it contains the **proper**

identification code.” (*Id.* at 4:60-62.) This maps onto the claim language: Gorman decodes the message by checking the signal for the proper identification. Figure 3A also shows this, that part of the encoded data is for identification.



(*Id.*, Fig. 3A and at 6:63-68 (annotated, “show[ing] a typical format of the encoded digital signal. . . consisting of a synchronization part, an identification part unique to this particular chest monitor and a data part unique to the person’s heartbeat.”).)

As above, a POSITA would be motivated and able to add this to their fitness device, such as the one in Lubell, to improve communication. (Ex. 1009, ¶ 96.)

C. Claim 4

The apparatus of claim 2, wherein the encoded messages comprise identification information of the sensor.

This claim is very similar to claim 3. It restates that the encoded messages include identification information of the sensor. As Figure 3A above shows, Gorman uses identification information in the encoded signals.

D. Claim 13

The method of claim 12, further comprising decoding a plurality of encoded messages using identification data of the sensor, wherein the first heart rate measurements and the second heart rate measurements are received in respective ones of the plurality of encoded messages.

Claim 13 extends the method of claim 12, essentially combining the aspects of claims 2, 3, and 4 into a single claim. As shown above, Gorman discloses each of the color-coded elements of the claim. Gorman discusses **decoding encoded signals** using **unique identification data**. The device **receives heart rate measurements** from the sensor in **encoded signals**. Combining these steps with the steps described in any of the previous devices would replicate the method claimed here.

E. Claim 18

*The computer readable medium of claim 17, wherein the executable instructions, when executed, cause the computing system to **decode** a plurality of **encoded messages** using **identification data** of the sensor, wherein the first **heart rate measurements** and the second **heart rate measurements** are **received** in respective ones of the plurality of **encoded messages**.*

Claim 18 is the “encoded messages” extension of the non-transitory computer readable medium in claim 17. Similarly to claim 13, Gorman discloses each of these limitations. In combination with one of the above exercise devices, such as Lubell/Ceci, Gorman renders claim 18 obvious.

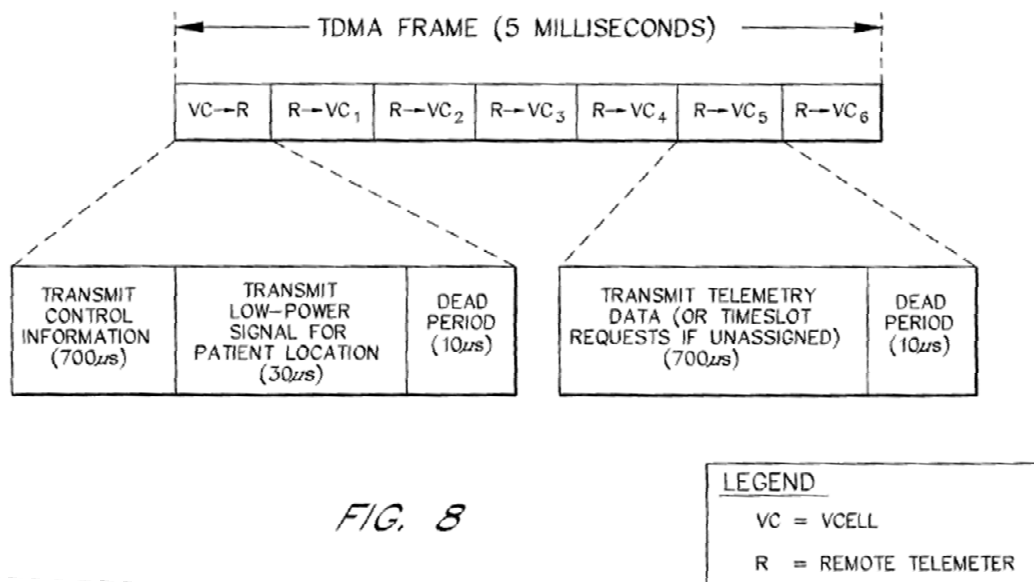
X. GROUND 5: CLAIMS 9, 14, AND 19 ARE OBVIOUS IN LIGHT OF LUBELL, CECI, AND FLACH

A. Claim 9

The apparatus of claim 1, wherein the instructions, when executed by the processor, cause the apparatus to determine that a message is from the sensor based upon a time at which the message is received.

Flach describes a system for tracking medical information of patients. “A medical telemetry system is provided for collecting the real-time physiologic data of patients.” (Ex. 1008 at p. 1.) Therefore, Flach is in the same field as the ’413 patent as both describe ways to measure and track physiologic data.

Flach is relevant here as it discloses time to manage communication. “The VC->R timeslots are used to broadcast information to the remote telemeters. (As described below, all VCELLs of the System are Synchronized, and thus transmit at the same time.) The R->VC timeslots are assigned by the VCELLs to individual telemeters, and are used to transfer information from the assigned telemeters to the VCELLs.” (*Id.* at [0096].) This is shown pictorially in Figure 8 below. Specific transfers of information happen during designated times.



(*Id.*, Fig. 8.)

A POSITA would have been motivated to combine this communication method with an exercise device such as the Lubell/Ceci combination described previously. (Ex. 1009, ¶¶ 99-104.) Such a change only requires a substitution of the known time division communication technique in Flach into the machine of Lubell. (*Id.*, ¶ 102.) A desire for smooth communication between sensor and device would motivate a designer. (*Id.*) Flach and Lubell are in a similar field since both involve physiological data sensors designed to be worn by individuals. (*Id.*, ¶ 100.) An engineer seeking to improve the communication methods in the Lubell device would be aware of the existing field of sensors and able to implement a timeslot communication design. (*Id.*, ¶ 103.) Therefore, claim 9 is obvious.

The Examiner during prosecution of the '413 patent thought similarly when initially rejecting these claims. “Flach, however, teaches of a time division multiple access protocol, in which data from specific sensors is sent during designated timeslots.” (Ex. 1013 at p. 6.) This dependent claim 9 was not amended after rejection. Therefore, the same analysis applies, and the claim is obvious in light of Flach.

B. Claim 14

The method of claim 12, further comprising designating a time channel for communicating with the sensor.

Claim 14 extends the method of claim 12 to include time channel

communication. As discussed above, Flach discloses the use of time channels for communication with heart rate devices. Therefore, claim 14 is obvious for the same reasons.

C. Claim 19

The computer readable medium of claim 17, wherein the executable instructions, when executed, cause the computing system to designate a time channel for communicating with the sensor.

Claim 19 extends the third independent claim. Flach discloses designating a time channel to communicate with a sensor. Therefore, as with claim 14 and claim 9, Flach makes claim 19 obvious.

XI. GROUND 6: CLAIMS 2, 3, 4, 13, AND 18 ARE OBVIOUS IN LIGHT OF AMANO AND GORMAN

For the same reasons described previously, the dependent claims that add encoded messages and unique identification data are obvious in light of Amano and Gorman. Gorman discloses all of the communication techniques that these claims use. (*Supra* at Section IX.)

It would have been obvious for a POSITA to combine Amano with Gorman for substantially the same reasons as explained above in Section IX. (Ex. 1009, ¶ 105.) Both involve heart rate sensors used in exercise. (*Id.*) 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. (Ex. 1009, ¶ 105.)

Therefore, a POSITA would have been able and motivated to perform this combination for the same reasons explained above in Section IX.

XII. GROUND 7: CLAIMS 9, 14, AND 19 ARE OBVIOUS IN LIGHT OF AMANO AND FLACH

The dependent claims that add communication using time channels are obvious in light of Amano and Flach. As discussed previously, Flach describes in detail a technique for sensors to communicate with a hub at predetermined times. (*Supra* at Section X.) Using this technique in the Amano device would render obvious claims 9, 14, and 19.

It would have been obvious for a POSITA to combine Amano and Flach for substantially the same reasons as explained above in Section X. (Ex. 1009, ¶ 106.) Amano gives less detail on the communication between its sensor and device. Flach provides a detailed explanation of how to implement sensor communication using timeslots. Therefore, it would be beneficial to improve the communication in Amano by using Flach's techniques. (*Id.*) A POSITA would be able and motivated to perform this straightforward substitution for the same reasons explained above in Section IX. (*Id.*)

XIII. GROUND 8: CLAIMS 2, 3, 4, 13, AND 18 ARE OBVIOUS IN LIGHT OF MATSUMOTO AND GORMAN

The claims directed to communication using encoded messages and identification data are also rendered obvious by Matsumoto with Gorman. Gorman discloses all of the communication techniques disclosed in claims 2, 3, 4, 13, and 18. (*Supra* at Section IX.) Combining those techniques with the exercise machine in Matsumoto makes those claims obvious. A POSITA would have found it obvious to perform this combination for substantially the same reasons as explained above in Section IX. (Ex. 1009, ¶ 107.) It would be a beneficial way to improve how Matsumoto's machine communicates with a sensor. (*Id.*) For the same reasons discussed with Lubell and Amano, a POSITA would be able and motivated to combine Matsumoto and Gorman.

XIV. GROUND 9: CLAIMS 9, 14, AND 19 ARE OBVIOUS IN LIGHT OF MATSUMOTO AND FLACH

The claims involving communication using a time channel are also obvious in light of Matsumoto and Flach. Flach discloses all of the aspects of communicating with a sensor at a particular time, as discussed above. (*Supra* at Section X.) It would be a beneficial combination to improve the communication in Matsumoto using the techniques described by Flach. (Ex. 1009, ¶ 108.) Just as with Lubell and Amano discussed above, it would have been obvious for a

POSITA to combine Flach with Matsumoto for substantially the same reasons as explained above in Section X. This renders claims 9, 14, and 19 obvious.

XV. MANDATORY NOTICES

A. Real Party-in-Interest

Pursuant to 37 C.F.R. § 42.8(b)(1), the real parties-in-interest in this proceeding are lululemon athletica inc., lululemon athletica canada inc., lululemon usa inc., and Curiouser Products, Inc. Only Petitioner has funded this Petition and has full and exclusive control over this proceeding.

B. Related Matters

Pursuant to 37 C.F.R. § 42.8(b)(2), Petitioner identifies the following related matter: *Nike, Inc. v. lululemon usa inc., et al.*, S.D.N.Y. Case No. 1:22-cv-00082-RA-OTW. Patent Owner is asserting the '413 patent against Petitioner in that case.

Pursuant to 37 C.F.R. § 42.104(a), Petitioner certifies that the '413 patent is available for *inter partes* review. Petitioner also certifies that it is not barred or estopped from requesting an *inter partes* review challenging the patent claims on the grounds identified in this Petition.

C. Lead and Back-Up Counsel and Service Information

Pursuant to 37 C.F.R. § 42.8(b)(3), Petitioner identifies the following counsel (and a power of attorney accompanies this Petition).

Lead Counsel for Petitioner	Backup Counsel for Petitioner
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Pursuant to 37 C.F.R. § 42.8(b)(4), service information for lead and backup counsel is provided above. Petitioner consents to electronic service by email to Lululemon-Nike-IPR@mofo.com.

The USPTO is authorized to charge any required fees, including the fee as set forth in 37 C.F.R. § 42.15(a) and any excess claim fees, to Deposit Account No. 03-1952 referencing Docket No. 5793100000.07.

XVI. CONCLUSION

Because there is a reasonable likelihood that Petitioner will prevail on at least one asserted ground with respect to at least one claim, Petitioner requests that the Board institute *inter partes* review of claims 1-5, 7, 9, 12-14, and 17-19 of the '413 patent.

Dated: January 4, 2023

Respectfully submitted,

/s/ Diek O. Van Nort

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Certification of Word Count (37 C.F.R. § 42.24)

I hereby certify that this Petition for *Inter Partes* Review has 10,904 words (as counted by the “Word Count” feature of the Microsoft Word™ word-processing system), exclusive of “a table of contents, a table of authorities, mandatory notices under § 42.8, a certificate of service or word count, or appendix of exhibits or claim listing.”

Dated: January 4, 2023

By: /s/ Diek O. Van Nort

Diek O. Van Nort

Certificate of Service (37 C.F.R. § 42.6(e)(4) and 42.205(a))

I hereby certify that the attached Petition for *Inter Partes* Review and supporting materials were served as of the below date by UPS, which is a means at least as fast and reliable as U.S. Express Mail, on the Patent Owner at the correspondence address indicated for U.S. Patent No. 8,620,413.

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Dated: January 4, 2023

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