

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.

IPR2023-00424
Patent No. 10,923,225

DECLARATION OF DR. HENRY H. HOUH, Ph.D.

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1. My name is Henry Houh. I have been retained regarding an *inter partes* review proceeding involving U.S. Patent No. 10,923,225. Specifically, I have been asked to analyze how a person of ordinary skill in the art (“POSITA”) would have understood certain references before September 7, 2006, and whether a POSITA would have combined them. I identify the references that I considered and describe my opinions regarding them in this declaration. I understand that this declaration will be submitted as an exhibit to a petition for *inter partes* review of the ’225 patent.

2. I have personal knowledge of the facts and opinions set forth in this declaration and believe them to be true. If called upon to do so, I would testify competently thereto. I have been warned that willful false statements and the like are punishable by fine or imprisonment, or both.

3. I am being compensated for my time at my standard consulting rate. I am also being reimbursed for expenses that I incur during my work. My compensation does not depend on the results of my study and analysis, the substance of my opinions, or the outcome of any proceeding involving the Challenged Claims. I have no financial interest in the outcome of this matter or in any litigation involving the ’225 patent.

I. Qualifications

4. I am currently employed by Houh Consulting Inc. as an independent technical consultant. I also founded Einstein’s Workshop, a company that provides

supplemental science, technology, engineering, and mathematics (“STEM”) education to children of all ages.

5. My professional career has spanned more than 25 years. As set forth in my curriculum vitae, a copy of which is submitted as Exhibit A, during these years I have gained extensive experience in web sites, communications systems, networking, distributed systems, protocols and audio/video communications.

6. I was awarded a Ph.D. degree in Electrical Engineering and Computer Science in February 1998 from the Massachusetts Institute of Technology (MIT). I also received a Master of Science (M.S.) in Electrical Engineering and Computer Science (February 1991), a Bachelor of Science in Electrical Engineering and Computer Science (June 1989) and a Bachelor of Science in Physics (February 1990) from MIT.

7. I first worked in the area of communications in 1987 when I worked at AT&T Bell Laboratories as part of a five-year dual degree program at MIT. At Bell Labs, I first worked in a group supporting core telephony switching functions, then later I joined the Optical Computing group. In graduate school, I joined the Advanced Network Architecture (ANA) group at the Laboratory for Computer Science (LCS) at MIT, then headed by Prof. David Tennenhouse and senior research scientist David Clark. Dr. Clark is generally considered to be one of the fathers of the Internet Protocol, having acted as chief protocol architect for the development of

the Internet. My research and work experience in distributed systems, networking, and network architecture dates back to around 1991 when I joined ANA.

8. Later, when Prof. Tennenhouse formed his own research group, the Telemedia Network Systems (TNS) group, I joined TNS. The TNS group built a high-speed gigabit network and applications which ran over the network, such as remote video capture, processing, and display on computer terminals. I designed the core networking hardware and software, including the high-speed data links and the device drivers for the network interface cards.

9. TNS's research activities focused on high speed networking and the types of applications that require increased network bandwidth and computing power. One of the applications I investigated was live streaming video, and real-time processing of such video. My work was focused around the transport, switching, and routing of data (including video and audio streams), and the integration of TNS's network into the computing environment, including the protocols, IP/ATM integration, operating system software and device drivers. TNS created a computing environment where it was possible to stream audio/video live, and also created software processing modules to further process video to perform advanced functions such as green screening, scene change detection, motion detection, compression, video blending and video overlay, among the many features – all in real-time while displaying the processed video live. While the Internet at the

time did not have the capability for such applications to be widely deployed, my group at TNS researched what would be possible when the required network and computing power became available. As discussed above, my Ph.D. thesis work focused on studying the routing resources required to route streams of video through the network, proposing several alternative labeling strategies to speed up network routing, especially for popular applications such as web traffic.

10. During the early part of my graduate studies, a time when there were perhaps a hundred or so web servers in existence, I set up a web server on one of our lab computers, and created content rich web pages for my research group and my research activities. Eventually, I, together with others I was working with, added live video demonstrations to TNS's web site. TNS's web site was one of the first several hundred web servers to exist, and the first to offer live video demonstrations initiated from the web site to a user's remote computer. I helped to build the web pages that initiated these video sessions via a web interface. I started and maintained the "Commercial Sites Index," a listing of all the companies on the web. I later sold this list to OpenMarket, then a leader in web servers and eCommerce servers.

11. Vice-President Al Gore visited our group in 1996 and received a demonstration of – and remotely drove – a radio controlled toy car with a wireless video camera mounted on it; the video was encoded by TNS-designed hardware,

streamed over the TNS-designed network and displayed using TNS-designed software.

12. I authored or co-authored at least twelve papers and conference presentations on my group's research at TNS. I also co-edited TNS's final report on its gigabit networking research effort. Some of my papers about web site development were presented at the first World-Wide Web conference held in 1994 at CERN in Geneva, Switzerland. CERN is the birthplace of the Web, and the conference was chaired by Tim Berners-Lee, the inventor of the World-Wide Web. When Tim Berners-Lee formed the World Wide Web Consortium at the MIT LCS in order to manage the progression of web protocols and standards, I assisted him in obtaining the consortium's domain names and setting up the consortium's web server.

13. While I was an undergraduate senior, I became a teaching assistant (normally a role at MIT reserved for graduate students) for a core electrical engineering/computer science course, Computation Structures. Later, as a graduate student, I became head teaching assistant for the course. After graduating, I was invited to guest lecture and work with several MIT courses, including in circuit design and web application development. I also worked with a team of students mentoring them on their web application development project.

14. I started a web consulting business in 1994 and won contracts to set up and manage web sites for various companies, including Bay Networks and Data Communications Magazine. Our customers at the time were concerned about web server load, and how to scale their web sites in case the load became unmanageable for a single web server. My company investigated many methods of load balancing and distributing the load over multiple servers. My web company also created software for staging updates to the web site and pushing approved changes into production through a system of multiple servers.

15. I have also participated in various Internet Engineering Task Force (IETF) working groups, and attended IETF meetings in the mid-to-late 1990s.

16. I defended and submitted my Ph.D. thesis, titled "Designing Networks for Tomorrow's Traffic," in January 1998. As part of my thesis research, I analyzed local-area and wide-area flows to show a more efficient method for routing packets in a network, based on traffic patterns at the time. My thesis also addressed real-time streamed audio and video.

17. From 1997 to 1999, I was a Senior Scientist and Engineer at NBX Corporation, a start-up that made business telephone systems for streaming packetized audio over data networks instead of using traditional telephone lines. NBX was later acquired by 3Com Corporation, and the phone system I worked on at NBX was widely used by numerous businesses. As part of my work at NBX, I

designed the core audio reconstruction algorithms for the telephones, as well as the packet transmission algorithms. I also designed and validated the core packet transport protocol used by the phone system.

18. The NBX system also supported TAPI, the Telephony Application Programming Interface, thus allowing other computer programs to integrate with our system telephony features. The NBX system was among the first to support a web-browser interface to control features of the telephone by using a remote application that issued remote controls to the central controller. The web server in the NBX system accessed a back-end database which stored all the data related to the configuration and operation of the NBX system. Accessing the system controller's web server produced a representation of the telephone and allowed users to set speed dials and other features of the user's physical telephone such as a call forwarding number. The user could also access and initiate various telephone functions through the interface, such as initiating a conference call or initiating call forwarding.

19. The NBX system included an automated attendant and various IVR features including menu-driven call routing. It also supported routing calls to and ringing all the telephones in a user group, or ringing sequentially through the phones for a group of users. Two of the company founders and I obtained U.S. Patent No. 6,967,963, entitled "Telecommunication method for ensuring on-time delivery of packets containing time-sensitive data," as a result of part of the work I did at NBX.

20. From 1999-2004, I was employed by Empirix or its predecessor company, Teradyne. Empirix was a leader in test tools for telecommunications protocols and systems, providing functional testing tools as well as load testing tools. From 2000-2001, I conceived and built a test platform for testing Voice-over-IP (VoIP). The first application on this new test platform was a cloud emulator for simulating the effects of transmitting VoIP over a busy network.

21. My later work at Empirix involved software and services for testing complex web sites, such as those run by Dell (a full e-commerce web site for configuring and ordering computers) and H&R Block (a web site for filing income taxes for which users provided input for the tax application running on back-end servers). The software emulated individual users exercising the complex features of a web site. I was the architect for my division's next-generation web testing product, and helped write a Javascript interpreter for this product. In order to design a next-generation solution, I had to be familiar with the various features utilized by the thousands of customers' web sites that our software had to interact with. I also worked on certain products and services used in the call center market, for instance the "Hammer" tool used to automate calls through a call center, to test if the Automatic Call Distributor (ACD) or the Interactive Voice Response units were performing within specific operational parameters. One of my patents (U.S. Patent

No. 7,590,542) resulted from work I did with the vice president of engineering and two lead engineers of the call center division.

22. I worked at BBN Technologies from 2004 to 2009. BBN Technologies, formerly known as Bolt, Beranek and Newman, was a pioneer of the Internet and a long-established leader in speech recognition and natural language processing. BBN received the first contract to build components of a packet switched network as part of the ARPANET, a U.S. Department of Defense effort funded through the Advanced Projects Research Agency (ARPA). While this effort preceded my time at BBN by many years, BBN continued to maintain a strong presence in network research and development, including in wireless networking, device discovery, and protocols for a “body area network.”

23. In 2006, as part of my role at BBN Technologies, I helped found PodZinger Inc., now known as RAMP Inc. PodZinger utilized BBN’s speech recognition algorithms to search through the spoken words inside audio and video. After managing the creation of the initial prototype system, PodZinger built out a full web-based streaming audio and video search solution when I was the Vice President of Operations and Technology there. The web site had a full load-balanced back end that provided search and indexing solutions for our hosted multimedia (audio and video) content.

24. I also worked on commercializing a service offered by BBN to monitor call centers and provide analytical data on each call. The business became known as AVOKE Analytics and provided call center analytics for large organizations such as Dell and the Centers for Medicare and Medicaid Services (CMMS). For a time, during the rollout of the Affordable Care Act (though I was no longer working at BBN), AVOKE Analytics gathered data and provided call-by-call analytics for every call made to the CMMS main call center.

25. Within BBN, I created a social networking website, called “GroupOf” that focused on privately sharing content with people within specific circles. A user could upload photographs to the website for sharing, as well as comment on user postings and photographs. The website was purchased by Eons, Inc., a social networking web site company founded by Jeff Taylor who had previously founded Monster.com, the job search site, where I became the Chief Technology Officer. Eons was venture-funded, including investments from CRV (also funded Twitter and Ring), Sequoia Capital (also funded Google, Apple, NVIDIA, and Uber), and General Catalyst (also funded Airbnb and Snap).

26. In 2012, I founded Einstein’s Workshop, a science, technology, engineering and math enrichment program for kids of all ages. The Workshop teaches programming, robotics, “making” (akin to creating, building and tinkering), engineering, 3D CAD, mobile application development and many other subjects.

Einstein's Workshop teaches a variety of programming classes from Scratch to Java. We also teach game development for mobile devices, for which I evaluated a number of mobile application programming environments. I also developed a robotics programming class in which robots could be programmed to be autonomous or under direct wireless control.

27. Einstein's Workshop also created and developed BlocksCAD, a 3D CAD system for kids and adults. BlocksCAD is used world-wide and has more than 110,000 registered users and 350,000 total users. BlocksCAD is being used in maker spaces worldwide and is integrated into school curriculum in various school systems in the U.S. at elementary, middle and high school levels. BlocksCAD was spun out into a separate company that was part of the LearnLaunch business accelerator program for educational technologies, MIT Playlabs 2018 and the 2018 MassChallenge Boston Cohort. BlocksCAD also received Phase 1 SBIR funding.

28. I have been awarded several United States patents, and I have several patent applications pending, including U.S. Patent No. 6,967,963, which originated in the work I did at NBX, and is titled "Telecommunication method for ensuring on-time delivery of packets containing time-sensitive data." A full list of my U.S. Patents, European Patents and Patent Publications is included in my attached C.V.

29. Additional details of my work experience, awards and honors, and publications that may be relevant to the opinions I am expressing are set forth in my C.V. attached as Exhibit A to the end of my declaration.

II. Materials Considered

30. In performing my analysis and forming the opinions below, I considered the '225 patent (Ex. 1001), its prosecution history, and other materials listed as exhibits to the petition in this IPR.

III. Understanding of Relevant Legal Principles

31. I am not a lawyer, and I will not provide any legal opinions. Rather, I have been asked to provide my technical opinions based on how a person of ordinary skill in the art would have understood various references before the '225 patent's September 7, 2006 priority date. Although I am not a lawyer, I have been advised to apply certain legal standards in forming my opinions.

A. Claim Construction Standard

32. I understand that claim terms are given their ordinary and customary meaning, as they would be understood by a person of ordinary skill in the relevant art in the context of the patent's entire disclosure and prosecution history. A claim term, however, will not receive its ordinary meaning if the patentee acted as his own lexicographer and clearly set forth a definition of the claim term in the specification. In that case, the claim term will receive the definition set forth in the patent.

B. Anticipation and Obviousness

33. I understand that a patent claim is invalid if it is anticipated or obvious in view of the prior art. I further understand that invalidity of a claim requires that the claim be anticipated or obvious from the perspective of a person of ordinary skill in the art at the time the invention was made.

34. I have been informed that a patent claim is invalid if it would have been obvious to a person of ordinary skill in the art. In analyzing the obviousness of a claim, I understand the following factors may be taken into account: (1) the scope and content of the prior art; (2) the differences between the prior art and the claims; (3) the level of ordinary skill in the art; and (4) any so called “secondary considerations” of non-obviousness if they are present. I am not aware of any evidence of secondary considerations of non-obviousness relevant to the ’225 patent. I reserve the right to supplement this Declaration if Patent Owner introduces evidence of secondary considerations of non-obviousness.

35. I have been informed that a claim can be obvious in light of a single prior art reference or multiple prior art references. I further understand that exemplary rationales that may support a conclusion of obviousness include:

- combining prior art elements according to known methods to yield predictable results;

- simple substitution of one known element for another to obtain predictable results;
- use of known technique(s) to improve similar devices (methods or products) in the same way;
- applying a known technique to a known device (method or product) ready for improvement to yield predictable results;
- “obvious to try” – choosing from a finite number of identified, predictable solutions with a reasonable expectation of success;
- known work in one field of endeavor may prompt variations of the work for use in either the same field or a different field based on design incentives or other market forces if the variations are predictable to a person of ordinary skill in the art; and
- some teaching, suggestion, or motivation in the prior art that would have led a person of ordinary skill in the art to modify the prior art reference or to prior art reference teachings to arrive at the claimed invention.

36. I have been informed that, in considering obviousness, I may not use hindsight reasoning derived from the patent-at-issue.

IV. Background

A. Technical Background

37. By September 2006 (the earliest priority date appearing on the face of the '225 patent) the '225 patent acknowledged that a “wide variety of different electronic and/or communication devices [kept] users in touch with one another, entertained, and informed.” (Ex. 1001 at 1:58-60.) The patent also recognized that “[a]thletic performance monitoring systems” “enable[d] easy and convenient monitoring of many physical or physiological characteristics associate with exercise.” (*Id.* at 2:6-11.) These systems could track any number of known parameters. (*Id.* at 2:12-14.) The patent alleges, however, that these preexisting monitoring devices have deficiencies in “their portability, convenience, customizability, and/or user friendliness.” (*Id.* at 2:14-16.) Contrary to the patent’s assertion, the prior art described below shows that any such deficiencies had long since been addressed.

B. Overview of the '225 Patent

38. The '225 patent is a United States patent numbered 10,232,225. (Ex. 1001.) It is titled “ATHLETIC PERFORMANCE SENSING AND/OR TRACKING SYSTEMS AND METHODS” and was originally filed on May 1, 2018. (*Id.*) In broad terms, the '225 patent describes which portable equipment transmits data to a piece of exercise equipment, which can display the data and use

the data to generate controls for the exercise equipment. I summarize some, but not all, of the '225 patent's embodiments below.

39. The '225 patent discloses several devices, including various sensors that may be mounted on a person's body, provided in an article of clothing, or provided within equipment used by that person, such as a "bicycle, bat, racket, club, vehicle, ball, etc." '225 Patent at 10:6-35. The sensors collect "physical or physiological data associated with an athletic performance" and transmit data via "wireless data transfer or transmission element" to an "electronic interface device" and "the supplied to the process system (e.g., microprocessor) of the electronic device." *Id.* at 14:53-54, 15:9-15, 15:18-21.

40. The interface device may process data provided by the module and is connected to the electronic device. *Id.* at 17:8-12, 17:19-24. The electronic device may be, for example, a music playback device or cellular telephone (*id.* at 17:8-12) and may output data provided by the module (*id.* at 17:24-27).

41. Each of the module, interface device, or electronic device may transmit data to a piece of exercise equipment (*id.* at 19:34-37, 17:51-56), which may be "any type of exercise equipment," including, a treadmill, stationary bicycle, or weight lifting machine (*id.* at 17:56-59). The module, interface device, or electronic device may transmit data to the exercise equipment to control settings like resistance, incline, target distance, or speed." *Id.* at 19:47-55. The module, interface device, or

electronic device may also transmit data for display by the workout equipment. *Id.* at 20:1-7.

C. '225 Patent Prosecution History

42. I reviewed the prosecution history of the '225 patent. I did not see anything in the prosecution history of the '225 patent that affected my opinions in this declaration.

V. Level of Skill in the Art

43. In my opinion, a person of ordinary skill in the art ("POSITA") for the technology of the '225 patent would have had at least (1) bachelor's degree in engineering, computer science, industrial engineering, 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, and/or network-based applications and/or equipment, or the equivalent experience or education.

44. The foregoing level of education and experience would have provided a POSITA with adequate background to understand the '225 patent's technology. As I explained above, the '225 patent describes a straightforward system in which sensor data is collected, transmitted, and processed to generate outputs. This is basic computer science.

VI. Claim Construction

45. I have been instructed to perform my analysis with the understanding that the terms of the Challenged Claims should be afforded their plain and ordinary meaning. However, should Patent Owner and/or Patent Owner's expert choose to construe additional claim terms or challenge the ones herein, I reserve the right to provide my opinion regarding Patent Owner's construction(s) as well as the meaning that a POSITA would have ascribed to those claim terms.

VII. The Prior Art

46. I was asked to review each of Acres, Abbondanza, and Pyles. I provide a brief description summarizing my understanding of each reference below.

A. Acres

47. Acres is a United States Patent Publication numbered US 2005/0070809. (Ex. 1002.) In broad terms, Acres relates to "automating the process of defining appropriate exercise levels based on various factors of the person exercising." (*Id.*, ¶ 2.)

48. There is extensive overlap between Acres and the '225 patent. []

1. The Acres "Bug"

49. Acres discloses a "Bug" that an "electrical hardware component" the is "persistently associated with a user's profile." Ex. 1002 at [0023]. The Bug "communicates with the network through wired or wireless communication." *Id.* at

[0024]. The Bug “can have a heart rate monitor integrated within itself.” *Id.* at [0025]. The Bug is also “is capable of configuring and monitoring exercise performance on compatible exercise equipment including treadmills, elliptical trainers, stair machines, free weights, weight machines, stationary bicycles, rowing machines and other such devices found in the home and in athletic facilities.” *Id.* at [0028].

50. When a user “selects a piece of such exercise equipment to use,” the equipment “establish[es] a communication association with the Bug.” *Id.* at [0029], *see also* [0100]-[0101]. Once associated, “the Bug transmits signals to the exercise machine to increase or decrease the exercise workload in accordance with the dictates of the exercise program it carries and the current heart rate of the exerciser.” *Id.* at [0029]. The Bug “takes control of compatible exercise machine parameters that determine exertion level. When the Bug 601 is used with a compatible treadmill 150, the treadmill speed is controlled by the Bug’s own processor 420. If the Bug. 601 senses, based upon the exerciser’s heart rate, that exertion level should increase because the exerciser’s heart rate is below the target, the Bug 601 sends a command to the treadmill 150 telling it to increase speed by a specific amount. After a time, for example 30 seconds, the Bug 601 again tests the exerciser’s heart rate against the target. If the heart rate is still below target, the treadmill 150 is again instructed to increase speed by another amount. If the heart rate is within the target zone, the

treadmill 150 is instructed to maintain speed. If the heart rate is above target, the treadmill 150 is instructed to slow by a given amount. When the exercise period ends, the treadmill 150 is instructed to slow and stop.” *Id.* at [0089]-[0090].

51. Acres disclose that such control “frees the exerciser from worry about adjusting controls on the treadmill 150 and removes any need for the exerciser to monitor her heart rate.” *Id.* at [0091]. However, Acres also discloses that heart rate information is “optionally displayed, either through the treadmill 150 or through one of the ways of user communication 495 of the Bug, if the exerciser wishes to monitor it.” *Id.* at [0091]. Acres discloses that the Bug determines the current heart rate (*Id.* at [0084]), and that the current heart rate is used to provide instructions to the user to increase, maintain, or decrease exercise intensity to keep the current heart rate equal to the target rate (*Id.* at [0085]). A POSITA would understand that since communications is established between the Bug and the treadmill as described above, that the user’s heart rate data is transmitted to the treadmill so that it may be displayed through the treadmill, if the user chooses to monitor her heart rate. In addition, a POSITA would understand that the heart rate displayed is the current heart rate and thus is displayed in real time through the treadmill. Furthermore, a POSITA would understand that the treadmill has a display device so that the user may monitor her heart rate that is displayed through the treadmill.

2. The Acres exercise warm up

52. Acres discloses that the system described above “is especially useful in warm-up periods wherein heart rate ramps up to the target rate over a time. A typical warm-up period is fifteen minutes during which the exerciser's heart rate should gradually rise from its normal rate to the target rate. As an example, the exerciser has a heart rate of 75 Beats Per Minute when the workout session begins and a target of 150 BPM for the actual exercise period. The warm-up session should increase the heart rate approximately linearly from 75 BPM to 150 BPM over a period of approximately fifteen minutes, which is an increase of about 5 BPM/minute.” Ex. 1002 at [0092]. Acres also discloses that “if other warm-up durations are desired,” the warm-up duration may be altered using “parameters within the bug 601.” *Id.* at [0092]. In the context of Acres, a POSITA would have understood that the warm-up is a workout activity in a workout routine. The warm-up involves activity that raises the user’s heart rate and it is one phase of a larger activity.

53. Acres further describes how users may provide input to the Bug, with “multi-function usage of an input device 560 [that] is well known to those skilled in electronic or embedded software design.” *Id.* at [0063]. These inputs can provide information that allows the “Bug 601 [to] be configured to control any number of machine parameters.” *Id.* at [0096].

3. The Acres activity goals

54. Acres describes the use of activity goals with its system.

Embodiments of the invention eliminate the need for exercisers to calculate appropriate heart rate targets or to monitor heart rate exertion levels during exercise sessions. The current exertion level is compared against a *previously calculated exertion goal* and the user is instructed to increase, decrease, or maintain her exertion level. Embodiments of the invention also remove the need for record keeping by entirely automating the exercise monitoring process. Further, embodiments of the invention can automatically configure compatible exercise equipment, and automatically increase or decrease its exertion settings to bring the exerciser's heart rate to within the range of *the previously established exertion goal*, thereby removing that burden from the exerciser.

Id. at [0012] (emphasis added). And more specifically, Acres explains that a user can use the Bug to set exercise goals such that the Bug can ensure that a user reaches her or his goals. *Id.* at [0030], [0094]-[0095], [0108].

55. Acres' activity goals also include the goals related to a warm-up or cool down period as described in the previous section.

B. Abbondanza

56. Abbondanza is a United States Patent No. US 5,527,239. (Ex. 1003.) It is titled “PULSE RATE CONTROLLED EXERCISE SYSTEM” and was issued on June 18, 1996. (*Id.*)

57. Abbondanza discloses a “pulse controlled exercise system” which comprises a treadmill and a chest belt “which is equipped with a pulse rate sensor device 225 and a [sic] infrared pulse rate transmitter 227.” Ex. 1003 at 10:56-64. The “[p]ulse rate sensor 225 senses user 110’s pulse rate and infrared pulse rate transmitter 227 transmits user 110’s pulse rate to base unit 250.” *Id.* at 10:62-64. A controller residing “in base unit 250 processes...the user’s pulse rate received via infrared pulse rate transmitter 227. Base unit 250’s controller is equipped in such a way that it determines if the user’s pulse rate is within that user’s target heart rate range and instructs treadmill device 230 to either speed-up or slow-down ultimately to cause the user to either work harder (i.e. run faster on treadmill device 230) or work softer (e.g. run slower on treadmill device 230) respectively. Additionally, base unit 250’s controller will cause the user’s pulse rate to be displayed on monitor 160.” *Id.* at 11:13-25. A POSITA would understand that pulse rate information transmitted by the pulse rate sensor is a “set of data” as it is used to by the controller to display the pulse rate on the monitor.

C. Pyles

58. Pyles is a United States Patent Publication numbered US 2005/0272564. (Ex. 1004.) In broad terms, Acres relates to “an exercise apparatus that enables accurate and automatic tracking of number of steps taken by a user on and off of an exercise machine.” (*Id.*, ¶ 5.) The apparatus includes a step counter in communication with a console of an exercise machine. (*Id.* at [0029].) The exercise machine may be a treadmill. (*Id.* at [0032], Figs. 2, 3.) The step counter communicates the number of steps taken by the user to the console. (*Id.* at [0029].) The console includes a processor to perform calculations on the step count data it receives, including calculating progress toward a goal number of steps. (*Id.* at [0038]-[0039].) It also includes a memory means that may store historical data. (*Id.*)

59. Among the stated advantages of the Pyles invention is “to provide an exercise apparatus that enables a user to easily and accurately track number of steps taken each day in order to facilitate accomplishment of a goal number of steps” and “to further enable storing and analysis of historical data by user for the tracking of performance over time.” Ex. 1004 at [0013]. Such “[h]istorical data on number of steps taken 312 may, for example, be stored in a log format by date to enable tracking of the user's performance over time. This historical data may be used to calculate cumulative totals by day, month or year, average daily totals or the like. The user’s log and other data may be accessed by the user and displayed using the display 310

in table or other graphical formats (such as progress graphs and the like) to help motivate and encourage the user to stay with his or her program.” *Id.* at [0047].

60. Pyles also teaches that when there are multiple users in a single household, “a unique user identification (or, user ID) may be used and communicated to the console 300 from the user’s step counter 200 when the exercise machine 400 is used. In this way, historical data are stored in the memory means 500 by user in addition to by date and time (or other time period).” *Id.* at [0050]. A POSITA would understand that such a user ID would be associated with that particular user’s activity data so that user’s data may be accessed and displayed on the display to help motivate and encourage that particular user.

61. Furthermore, Pyles discloses that a user may start exercising on the treadmill but complete their step goal off the treadmill. *Id.* at [0062]. When the “exercise program is completed off the machine 400, the user may still initiate communication between the step counter 200 and console 300 at the end of the day, so that the daily progress may be recorded in the memory means 500 of the console 300 just as it would be if the machine 400 were used to complete a day’s program.” *Id.* at [0063]. A POSITA would understand that recording the steps take off the treadmill onto the memory of the console of the treadmill used by numerous household members would require usage of the user ID to store the steps in the

appropriate log associated with that user of the console/treadmill, otherwise the step data may be erroneously added to another user's log.

VIII. Obviousness

A. Acres

1. Obvious Modification to Acres

a) Increasing or Decreasing Exercise Time

62. To the extent that Acres' disclosure that the Bug can issue commands such as "stop exercise" or "terminating the exercise session" does not disclose that the Bug decreases the time period of a workout activity, a POSITA would have found it obvious to modify the Bug so that a user could terminate an exercise before it completed or to adjust the duration of an exercise session, such as the warm-up or cool down time. A POSITA would have been motivated to make such a modification because it would have increased the flexibility and usefulness of Acres' Bug by providing it additional common functionality (i.e., changing exercise duration or stopping an exercise) in a manner that is easy to use. For example, Acres explains that its Bug is worn on a user that is exercising. Ex. 1002 at [0047]. A POSITA would understand that having basic functionality like terminating an exercise or changing exercise duration in a device located on their person would be beneficial in case the type of exercise being performed does not allow the user to easily reach for controls on the exercise machine itself.

63. Acres already discloses that the Bug can handle any exercise duration desired. *Id.* at [0092] (“Of course, if other warm-up durations are desired, parameters within the bug 601 and/or central site 110 can be modified to accommodate.”). Additionally, Acres explains that “[o]nce a maximum recommended heart rate is determined, fitness goals are set that specify a particular target duration of exertion at a heart rate that is some fraction of the maximum rate.” (*Id.* at [0004].) Combined with Acres teaching that a user can input exercise goals into the Bug (*id.* at [0030]), Acres itself provides all the teaching that is necessary that would have motivated a POSITA to include the ability for the Bug to increase or decrease exercise duration. Additionally, making this modification to the Bug would have been relatively simple for a POSITA. The modifications would build on the user inputs and communication functions already present in the Bug. The only additional work would be some basic software changes that a POSITA could easily make in view of even basic programming skills.

64. Additionally, in my opinion, adjusting a setting of the treadmill workout to change the warm-up duration would have been obvious to a POSITA. Acres discloses that during a warm-up session, the heart rate of the exerciser should “increase the heart rate approximately linearly from 75 BPM to 150 BPM over a period of approximately fifteen minutes, which is an increase of about 5 BPM/minute.” Ex. 1002 at [0092]. A POSITA would understand that the warm-up

would be part of the exercise routine, as it involves raising the heart rate to the targeted exercise heart rate. Furthermore, Acres discloses that “[a]s an example, the exerciser has a heart rate of 75 Beats Per Minute when the workout session begins.” Ex. 1002 at [0092].

65. Acres further describes how users may provide input to the Bug, with “multi-function usage of an input device 560 [that] is well known to those skilled in electronic or embedded software design.” *Id.* at [0063]. A POSITA would have found it obvious to use the multi-function input device to alter the warm-up (or other exercise) duration within the bug, since there are a finite number of ways to provide input to the Bug, using the input as described, or providing the data over the network. *Id.* at [0061]-[0063]. A POSITA would have found it obvious to provide the input directly using input device 560 so that an active communication channel is not required to provide the input, particularly in cases where the network is not accessible or where no network connection exists. Adding such an input function for changing the warm-up duration parameter within the Bug would have been a simple matter of programming, which would be routine for a POSITA. Furthermore, a POSITA would have understood that any control of treadmill parameters in order to effectuate such a change in warm-up duration would be result in a corresponding adjustment of the settings of the treadmill at the appropriate times, since “the ramp

up in heart rate is handled automatically by the Bug 601 and treadmill 150.” *Id.* at [0093].

b) Establishing a Target Activity Goal

66. Changes in duration for the warm-up described in Acres matches the ’225 patent’s description of changing a “target distance (or other overall time length or duration)” (Ex. 1001 at 19:47-53) since changing the warm-up duration also changes the overall length of the workout. A POSITA would understand that Acres’ setting parameters such as duration of a part of workout is “establishing a target activity goal.” Accordingly, for the same reasons I explain in the previous section with respect to setting a duration of an exercise sessions (or a portion thereof such as the warm-up or cool-down), a POSITA would have been motivated to modify Acres to establish a target activity goal. For the same reasons that I explained in the previous section, this modification does nothing more than provide basic, common functionality, would build on the functionality already present in the Bug (*see id.* at [0030]), and would be well within the abilities of a POSITA

B. Acres and Pyles

1. How a POSITA Would Have Combined Acres and Pyles

67. Below I describe how a POSITA would have combined Acres and Pyles.

68. First, a POSITA would have modified the system of Acres to incorporate Pyles' storage of user-specific historical data at an exercise system. Acres teaches the storage of historical data at a central site. (*See* Ex. 1002 at [0032]-[0045].) This central site "maintains an account for each individual exerciser." (*Id.* at [0035].) The account includes information about the user, including an "exercise log." (*Id.*) Acres states that "[f]unctions illustrated within one particular component may be performed by other components in the system." (*Id.* at [0108].)

69. While a POSITA would recognize the design choice of moving this exercise log from the central site into the treadmill disclosed in Acres based on this disclosure, Pyles expressly teaches this design choice. (Ex. 1004 at [0050], [0052].) Pyles explains that a health-club version system may store data in a remote memory means, such as one associated with a website (*id.* at [0052], [0054], [0065]), whereas a home version of the system would store data in the console at the exercise machine (*id.* at [0048], [0054]).

70. Furthermore, as a POSITA would have understood that Acres would have been easily modified to store user-specific historical data at its disclosed treadmill as taught in Pyles. Acres and Pyles are in the same field of invention: exercise monitoring devices. (Compare Ex. 1002 at [0047], with, Ex. 1004 at [0005].) They both teach the use of sensors in communication with treadmills. (Compare Ex. 1002 at [0088]-[0089], with, Ex. 1004 at [0032]-[0033].) Both teach

that exercise data is associated with a specific user. (Compare Ex. 1002 at [0023]-[0024], with, Ex. 1004 at [0050]-[0054].) And they both teach the storage of user data in exercise logs. (Compare Ex. 1002 at [0035], with, Ex. 1004 at [0047].) Such a modification would have been routine for a POSITA, as both already store the data and changing the storage location would have been a simple matter of programming. Given the similarities between Acres and Pyles, a POSITA would have understood that Acres could be easily modified to incorporate the teachings of Pyles.

2. Motivation to Combine

71. In my opinion, a POSITA would have been motivated to combine the system of Acres with Pyles as described above for the following reasons.

72. First, a POSITA would recognize that Pyles' home version offers a simplified structure by reducing the number of separate components and eliminates the need to transfer activity data over an internet connection. A POSITA would recognize that without the need to transfer the activity data to a central server, there is no need to maintain such a central server that must be available around-the-clock with high availability in order to account for users' varying workout times and disparate locations through different time zones. In addition, a POSITA would recognize that without the need to transfer activity data over an internet connection, that the exercise equipment can be located at more locations, including those without any internet access, and appeal to users without any internet connection.

Furthermore, a POSITA would recognize that keeping the activity data on the local machine helps maintain a user's privacy with respect to health-related data that they may not want to share with a central server collecting all users' workout data. A POSITA would therefore be motivated to modify Acres to obtain these benefits.'

73. Also, a POSITA would recognize that associating the activity data with a user allows the user to review their historical data. Pyles teaches that "This historical data may be used to calculate cumulative totals by day, month or year, average daily totals or the like. The user's log and other data may be accessed by the user and displayed using the display 310 in table or other graphical formats (such as progress graphs and the like) to help motivate and encourage the user to stay with his or her program." *Id.* at [0047]. A POSITA would therefore be motivated to modify Acres to associate the activity data with their respective users to obtain these benefits.

C. Abbondanza

1. Obvious Modification to Abbondanza

74. Abbondanza discloses that "part of control center 140 is user interface 460 which is connected to microprocessor/microcontroller 470. User interface 460 may incorporate rotary dials or switches, LED displays, LCD displays, push button switches, keypads, and other similar conventional input/output means for gathering and displaying information relating to a user's work-out regimen." Ex. 1003 at 8:4-

10. Abbondanza discloses that the control center 140 is “mounted on treadmill device 130.” *Id.* at 6:65-66. Furthermore, Abbondanza discloses that the information shown on the display within the control center 140 “may also be displayed on monitor 160.” *Id.* at 8:13-14. Since Abbondanza discloses that the pulse rate is displayed on the monitor (*id.* at 5:1-6) it would have been obvious to a POSITA that the pulse rate is also displayed on the control center display on the exercise system. For example, including the pulse rate on the control center display would allow a user to still monitor pulse rate information if monitor 160 is not available or not operating.

75. To the extent that Abbondanza does not teach that the user’s pulse rate is displayed on the exercise system’s display, POSITA would find it obvious to incorporate monitor 160 into the treadmill. Abbondanza discloses that “monitor 160 may be a television set of any number of varieties or may even be a projection television set.” Ex. 1003 at 11:35-38. Abbondanza also incorporates by reference several disclosures in which a monitor is incorporated within a piece of workout equipment. For example, Abbondanza discloses that the exercise cycle of U.S. Patent Number 4,998,710 (the “’710 patent”) “incorporates a custom display panel which is used to report a user’s heart rate as he or she progresses through his or her exercise regimen.” Ex. 1003 at 3:52-56. Abbondanza also discloses that “in the SEARS AND ROBUCK catalog is a treadmill/monitor combination in which a

user's pulse rate is monitored and displayed on a custom display device which appears to incorporate a built-in LED or LCD display panel.” *Id.* at 4:30-34. Reviewing these disclosures, a POSITA would find it obvious to incorporate the monitor 160 within the treadmill of Abbondanza. *See, e.g., id.* at Fig. 3. A POSITA would have been motivated to do so that the treadmill would not have to be co-located with a television, and so that moving the treadmill would also not involve moving the television. A POSITA would have recognized that many people would not want to locate their exercise equipment in the room they normally use to watch television. Thus, a POSITA would have understood that incorporating a display onto the treadmill would be less expensive than purchasing a separate television or projector television, which have components such as tuners, multiple inputs, connectors, and speakers that add unnecessary expense.

76. Abbondanza also teaches that the “[i]t is yet a further object of the present invention to provide a pulse controlled exercise system which allows a user of the system to constantly be aware of his pulse rate as he or she progresses through his or her work out regimen by displaying the user's pulse rate on a monitor which is capable of displaying image formed from television signals.” *Id.* at 5:1-6. It would thus have been obvious to a POSITA that after integrating the display with the treadmill, to show the pulse rate on the integrated display.

D. Abbondanza and Pyles

1. How a POSITA Would Have Combined Abbondanza and Pyles

77. Below I describe how a POSITA would have combined Abbondanza and Pyles.

78. A POSITA would have combined the historical data storage feature of Pyles with the exercise system of Abbondanza. The exercise system of Abbondanza already comprises a microcontroller that is used to control the user interface and displays the user's pulse rate as "a bar chart graphic image which represents user 110's pulse rate over time." Ex. 1003 at 7:27-33. Programming logic for the microprocessor used to control user interfaces is stored in local memory. *Id.* at 8:23-28. Adding the feature of Pyles to store historical data would have been a simple matter of programming for a POSITA, along with the addition of non-volatile memory for storing the data. Non-volatile memory is part of many systems and a POSITA would have known how to add such memory to the microcontroller subsystem, and a POSITA would have had an expectation of success since adding resources and programming the microcontroller to store a user's pulse rate would have been a simple task for a POSITA.

2. Motivation to Combine

79. A POSITA would have recognized that Pyles's storage of historical data is a way to further achieve Abbondanza's object of "enhance[ing] exercise

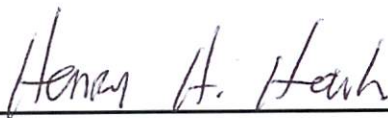
results and satisfaction.” *See* Ex. 1003 at 5:52-54. For example, Abbondanza shows an example of a screen image that would be used to motivate an exerciser to maintain their workout level. *Id.* at Fig. 7, 18:23-28. The image uses vertical bars to represent the user’s pulse rates at particular points in time during the user’s exercise regimen. *Id.* at Fig. 7, 18:15-17. A POSITA would recognize that a natural extension of storing and displaying pulse rates during a user’s exercise regimen would be to store and display pulse rates from a user’s previous exercise regimen. As Pyles explains, the display of historical data “help[s] motivate and encourage the user to stay with his or her program.” Ex. 1004 at [0064]. A POSITA reviewing Abbondanza would therefore be motivated to use Pyle’s storage and display of historical data as an additional feature to motivate the user. Furthermore, as a POSITA would have understood that Abbondanza would have been easily modified to store user-specific historical data at its disclosed treadmill as taught in Pyles. Abbondanza and Pyles are both directed to exercise systems. *Compare* Ex. 1003 at Abstract, with, Ex. 1004 at [0005]. They both teach the use of sensor devices in communication with treadmills. *Compare* Ex. 1003 at 10:62-64, 11:17-25, with, Ex. 1004 at [0032]-[0033]. Given the similarities between Acres and Pyles, a POSITA would have understood that Acres could be easily modified to incorporate the teachings of Pyles. For at least these reasons, a POSITA would have been motivated to combine

Abbondanza and Pyles and would have had a reasonable expectation of success in doing so.

In signing this Declaration, I recognize that the Declaration will be filed as evidence in a contested case before the Patent Trial and Appeal Board of the United States Patent and Trademark Office. I also recognize that I may be subject to cross-examination in the case. If required, I will appear for cross-examination at the appropriate time.

I declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and that these statements were made with knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code.

Dated: January 3, 2023



Dr. Henry H. Houh