No. 20-1683

United States Court of Appeals for the Federal Circuit

APPLE INC.

Appellant,

v.

QUALCOMM INCORPORATED

Appellee.

APPEAL FROM THE UNITED STATES PATENT AND TRADEMARK OFFICE, PATENT TRIAL AND APPEAL BOARD IN INTER PARTES REVIEW NO. IPR2018-01276

APPELLANT APPLE INC.'S NON-CONFIDENTIAL PRINCIPAL BRIEF

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Claim 1, U.S. Patent 8,971,861 ("'861 patent), Appx56-81

1. A method for selecting content for delivery, the method comprising:
receiving, by a host computer system, from a mobile device, physiological state data collected from a user of the mobile device;
analyzing, by the host computer system, the physiological state data collected from the user of the mobile device;
selecting, by the host computer system, content from a plurality of predefined content to deliver to the mobile device at least partially based on the physiological state data collected from the user, the selected content not including the physiological state data collected from the user; and
transmitting, by the host computer system, the selected content to the mobile device.

CERTIFICATE OF INTEREST

Counsel for Appellant Apple Inc. ("Apple") certifies the following:

1. The full name of all entities represented by undersigned counsel in this case is:

   Apple Inc.

2. The full names of all real parties in interest for the entities listed in No. 1:

   Not applicable

3. All parent corporations for the entities in No. 1 and all publicly held companies that own 10% or more stock in the entities:

   None

4. The names of all law firms, partners, and associates that (a) appeared for the entities in the originating court or agency or (b) are expected to appear in this court for the entities (excluding those who have already entered an appearance in this court):

   Fish & Richardson P.C.: W. Karl Renner, Timothy W. Riffe, Thomas Rozylowicz, Noah C. Graubart, Michael A. Amon, Ryan Chowdhury

5. The case titles and numbers of any case known to counsel to be pending in this court or any other court or agency that will directly affect or be directly affected by this court's decision in the pending appeal:

   The following appeals involve common issues related to jurisdiction and standing: *Apple Inc. v. Qualcomm Incorporated*, No. 20-1561 (Fed. Cir.); *Apple Inc. v. Qualcomm Incorporated*, No. 20-1642 (Fed. Cir.); *Apple Inc. v. Qualcomm Incorporated*, Nos. 20-1763, -1764 (Fed. Cir.); and *Apple Inc. v. Qualcomm Incorporated*, No. 20-1827 (Fed. Cir.).

   In addition, common issues related to jurisdiction and standing are presented, or are expected to be presented, in connection with motions to intervene in the following appeals: *Qualcomm Incorporated v. Intel Corporation*, 20-1587, -1588, -1654 (Fed. Cir.); *Intel Corporation v. Qualcomm Incorporated*, No. 20-1664 (Fed. Cir.); *Intel Corporation v. Qualcomm Incorporated*, No. 20-1828, -1867 (Fed. Cir.); *Intel Corporation v. Qualcomm Incorporated*, No. 20-2092, -2093 (Fed. Cir.);

***Intel Corporation v. Qualcomm Incorporated*, 20-2239 (Fed. Cir.); *Intel Corporation v. Qualcomm Incorporated*, 20-2240 (Fed. Cir.); and *Intel Corporation v. Qualcomm Incorporated*, 20-2242 (Fed. Cir.).**

No other case is known to the undersigned counsel to be pending in this or any other court or agency that will directly affect or be directly affected by this Court's decision in the pending appeal.

6. Any information required under Fed. R. App. 26.1(b) (organizational victims in criminal cases) and 26.1(c) (bankruptcy case debtors and trustees):

Not Applicable

September 24, 2020 */s/ Lauren A. Degnan*
Lauren A. Degnan

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The public version of this document redacts highly confidential information describing certain details about the 2019 settlement of Apple's and Qualcomm's worldwide dispute. The redactions appear on pages 3, 32, 55-57, and 60-61.

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STATEMENT OF RELATED CASES

Pursuant to Federal Circuit Rule 47.5, the undersigned counsel states as follows:

No appeal has previously been taken from the proceedings below.

The following appeals involve common issues related to jurisdiction and standing: *Apple Inc. v. Qualcomm Incorporated*, No. 20-1561 (Fed. Cir.); *Apple Inc. v. Qualcomm Incorporated*, No. 20-1642 (Fed. Cir.); *Apple Inc. v. Qualcomm Incorporated*, Nos. 20-1763, -1764 (Fed. Cir.); and *Apple Inc. v. Qualcomm Incorporated*, No. 20-1827 (Fed. Cir.).

In addition, common issues related to jurisdiction and standing are presented, or are expected to be presented, in connection with motions to intervene in the following appeals: *Qualcomm Incorporated v. Intel Corporation*, 20-1587, -1588, -1654 (Fed. Cir.); *Intel Corporation v. Qualcomm Incorporated*, No. 20-1664 (Fed. Cir.); *Intel Corporation v. Qualcomm Incorporated*, No. 20-1828, -1867 (Fed. Cir.); *Intel Corporation v. Qualcomm Incorporated*, No. 20-2092, -2093 (Fed. Cir.); *Intel Corporation v. Qualcomm Incorporated*, 20-2239 (Fed. Cir.); *Intel Corporation v. Qualcomm Incorporated*, 20-2240 (Fed. Cir.); and *Intel Corporation v. Qualcomm Incorporated*, 20-2242 (Fed. Cir.).

No other case is known to the undersigned counsel to be pending in this or any other court or agency that will directly affect or be directly affected by this Court's decision in the pending appeal.

JURISDICTIONAL STATEMENT

This appeal arises from an IPR in which the Patent Trial and Appeal Board issued a Final Written Decision on February 3, 2020. *See* Appx1–55. Apple timely filed a notice of appeal on April 6, 2020 (Appx2246–2251), within the 63-day deadline set by the applicable statutes and regulations. *See* 35 U.S.C. § 142; 37 C.F.R. § 90.3(a)(1). This Court thus has jurisdiction under 28 U.S.C. § 1295(a)(4)(A) and 35 U.S.C. § 141(c).

Qualcomm has challenged Apple's standing to bring this appeal and previously filed a motion to dismiss, which this Court denied without prejudice. Apple thus addresses the standing issue in Section II of the Argument below.

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STATEMENT OF THE ISSUES

1. Whether the Board erred in concluding that a prior art reference does not render obvious transmitting content to a mobile device, where: (a) the Board applied a rigid obviousness analysis ignoring motivations specifically suggested by the prior art and Apple's expert; and (b) the Board faulted Apple for failing to provide a motivation to combine but ignored pages of analysis regarding motivation in Apple's petition and accompanying expert declaration.

2. Whether the Board erred in concluding that a prior art reference fails to teach "selecting" predefined content and transmitting that content where: (a) the Board erroneously concluded—based on no evidence—that the reference transmits some other content; and (b) where the Board's obviousness analysis itself reveals that transmitting the content is one of only a few, known obvious design choices.

3. Whether Apple has Article III standing to challenge the '861 patent's validity, where Qualcomm has already asserted it against Apple in litigation and is likely to do so again after a Settlement Details license, under which Apple continues Settlement Details, expires or is terminated?

INTRODUCTION

The '861 patent claims simple technology—collecting data from a user, analyzing that data to glean information about the user, and serving the user contextually relevant information, such as advertising. Below, there was little dispute that the prior art references relevant to this appeal teach these basic steps. One prior art reference (Hoffman) teaches that a user's physiological data can be used to serve advertising relevant that user's physical activities. The other (Hjelt) teaches collecting physiological data from a user and using it to develop customized work-out programs. Both teach (as claimed by the '861 patent) collecting data from the user, analyzing that data, and serving the user information based on an analysis of the data.

Despite the simplicity of the claimed invention and the clear teachings of the prior art, the Board held the challenged claims patentable. The Board's analysis is marred by an overly-rigid approach to obviousness. As to the first prior art reference (Hoffman), the Board applied exactly the type of rigid obviousness analysis that *KSR* and this Court's precedents prohibit—requiring Apple to provide a granular motivation for every decision a skilled artisan would have made while ignoring that the challenged claims recite merely a well-known and obvious implementation of the reference's teachings. The Board also faulted Apple for failing to address the motivations of a skilled artisan notwithstanding pages of Apple's petition doing exactly that. As to the second prior art reference (Hjelt), the Board acknowledged that the reference teaches selecting pre-defined content that

existed prior to the receipt of the physiological data—as the Board construed the claim to require—but nonetheless concluded that the reference does not teach the transmitting the selected content to a mobile device because it thought the reference explicitly discloses only one of only a few known, predictable ways for the content to be transmitted.

Because the Board erred with respect to each of the grounds it considered, this Court should vacate the Board's decision, reverse as to certain limitations, and remand for the Board to consider the remaining claims and argument not addressed by the Board's decision.

STATEMENT OF THE CASE

I. The Challenged Patent: Using Physiological Data To Provide Targeted Information to Users

A. The '861 Patent Broadly Describes Giving a User Targeted Information Based on Information Collected About That User

The '861 patent attempts to claim the basic idea that the more contextual data a company has about a user of its products, the better it can target information that the user is more likely to find useful. Appx68 (1:16–20). Nothing about this idea is new. Since the dawn of advertising, companies have tried to put their advertising dollars to their best use by targeting populations of people that the company believes are most likely to buy their products. *See, e.g.,* Appx462–464 ¶¶61–64. Television networks have long collected data about who watches certain programs in order to allow advertisers to provide contextually relevant information to potential consumers. *See id.* Websites collect all sorts of data about users who visit, including the kind of computer the user is using and the approximate location of the user (based on the user's IP address)—all in the name of providing more targeted advertising and other information. *See id.* The '861 patent simply takes this idea and implements it for the modern world—a world where users walk around with tiny computers in their pockets (or on their wrists) that collect immeasurable amounts of information about their lives, including where they go, what they see, the websites they visit, and even their heartrates and other physiological data.

As the ’861 patent explains, “[t]he more closely related content, such as an advertisement, is to a person’s interests, the person’s activities, the person’s location, and/or the person’s state of mind, the more likely the person will be interested in and/or influenced by the content.” Appx68 (1:16–20). The purported invention of the ’861 patent is a way to provide this targeted information based on data is collected about a user. *See, e.g.*, Appx68 (1:33–54). This data may include “physiological state data captured from the user of [a] mobile device captured at a time,” which may include information obtained from “[o]ne or more physiological sensors, such as electrocardiogram (ECG) sensors, galvanic skin response (GSR) sensors, plethysmography (PPG) sensors, skin temperature sensors (SKT) and/or electromyogram (EMG) sensors.” Appx68 (1:37–39); Appx71 (7:54–61). Notably, the ’861 patent neither purports to have invented any of these sensors nor limits its description to these examples, explaining that physiological state data may consist of any “data about a user’s physical condition.” Appx71 (7:54–55).

The captured physiological state data is transmitted to a computer, which analyzes it to determine, among other possibilities, the “end user’s emotional and/or physical state,” which is then used to provide contextual information to the user, such as advertising based on the user’s physical or emotional state. Appx68 (1:56–65); Appx71 (7:61–67). For example, the physiological state data may allow the computer to determine that a user is stressed. Appx71 (8:34–36). “When physiological state data of the user indicates a high amount of stress, a service, such as a massage, and/or a relaxing product, such as an iced mocha latte,

may be offered to the user via content presented on the mobile device." Appx71 (8:39–43). "Similarly, if during normal work hours physiological state data indicates the user is likely tired, an advertisement and/or sugared product may be offered to the user." *Id.* (8:46–49). As another example, the physiological state data (either alone or combined with other data, such as location or an accelerometer on the phone) may indicate that a user is exercising. Appx71 (8:58–64). "In response, a product directed to help the user may be advertised, such as an advertisement for water, a sports drink, and/or an energy bar," or, alternatively, the computer may suggest a "'treat' as a reward to the user, such as an advertisement for an ice cream sundae." Appx71–72 (8:64–9:1). The written description characterizes these scenarios as exemplary uses of the collected physiological state data. Appx72 (9:33–37).

The specification also describes various kinds of collected data about the user. The written description discusses using location data (collected from the GPS on a user's phone), *e.g.*, Appx71 at 7:30–35, or data from images captured from the camera on the phone, remotely activated, *e.g.*, Appx70 at 6:55–58. The patent calls this type of information "environmental data." Appx70 (6:52–55). The specification also contemplates using "[s]tored user data, such as data stored in a user database at a host computer system" regarding "the user's sex, age address, ethnicity, income level, job, religious affiliation, and/or travel patterns." Appx71 (8:1–10).

Finally, the ’861 patent describes the targeted information that is provided to the user based on the captured data in expansive terms. Although the primary use of the data is for advertising, the specification also explains that “[m]any other possible applications of relevant content delivery using environmental and physiological state data are possible.” Appx72 (9:35–37).

The allegedly inventive method disclosed and claimed by the ’861 patent is shown in Figure 4, reproduced below.

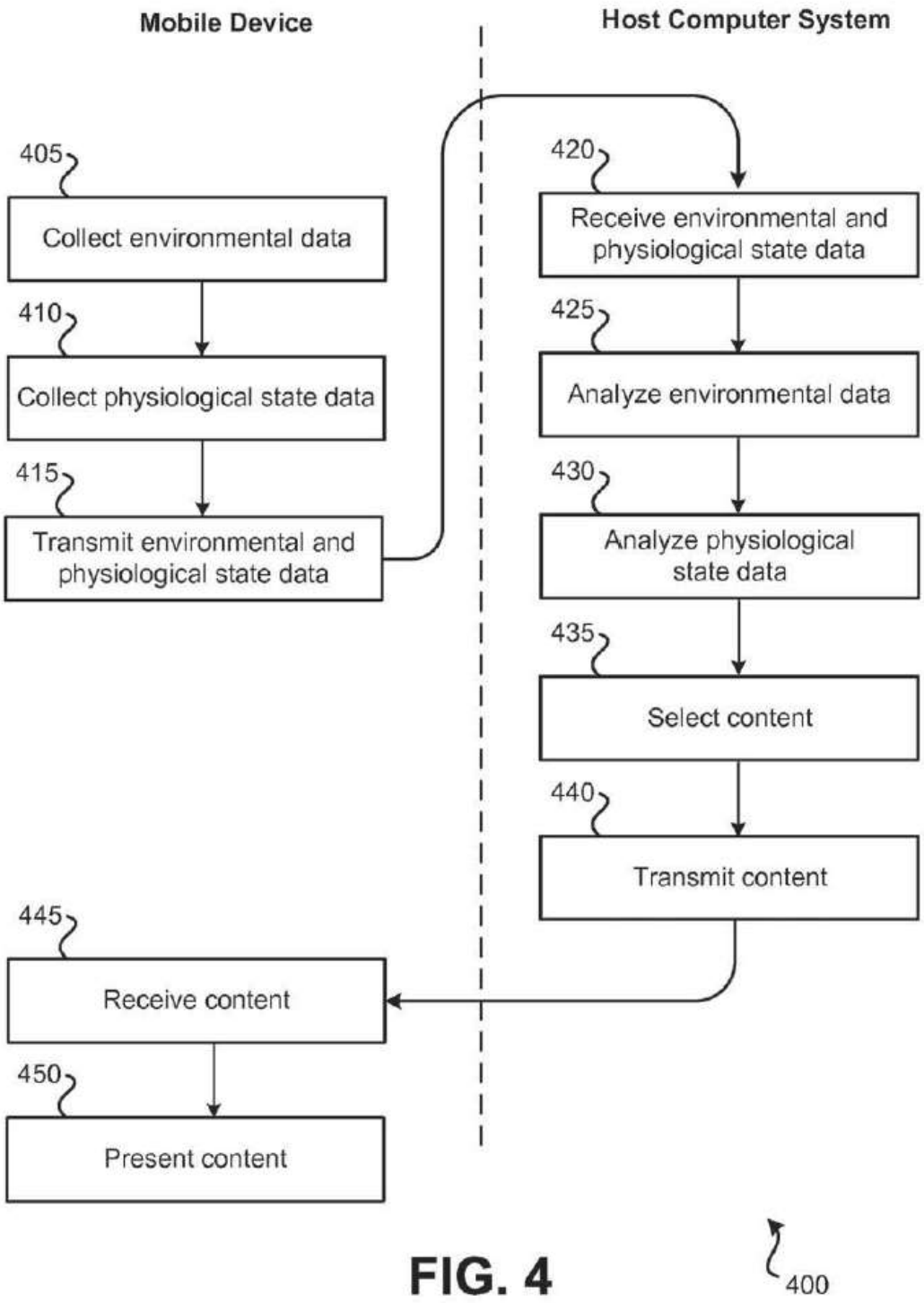

FIG. 4

Appx63. The left side of the figure depicts the steps that the user's mobile device performs, such as collecting environmental and physiological state data. *See*

Appx63; *see also* Appx74 (14:52–65). The user's mobile device then transmits this data to a host computer (via any known method), which performs the steps shown on the right-hand side of the figure. *See* Appx63; Appx74–75 (14:66–15:5). Namely, the host computer receives data transmitted by the mobile device, analyzes it, and then selects content to present to the user based on the collected data. *See* Appx63; Appx75 (15:6–16); Appx75 (15:40–46). The host computer then transmits the content to the mobile device. Appx63; Appx75 (15:53–16:10). The mobile device, in turn, presents it to the user. *Id.*

B. The Challenged Claims Recite Using Physiological State Data To Target Content to a User

The claims broadly recite using physiological data to present targeted content to a user. Claim 1 is representative of the claims Apple raises on appeal, and is reproduced below, with the limitations at issue on appeal shown in emphasis:

> 1. A method for selecting content for delivery, the method comprising:
>
> > receiving, by a host computer system, from a mobile device, physiological state data collected from a user of the mobile device;
> >
> > analyzing, by the host computer system, the physiological state data collected from the user of the mobile device;
> >
> > ***selecting, by the host computer system, content from a plurality of predefined content*** to deliver to the mobile device at least partially based on the physiological state data collected from the

> user, the selected content not including the physiological state data collected from the user; and
>
> ***transmitting, by the host computer system, the selected content to the mobile device***.

Appx79 (24:6–20). The claim recites the steps performed by the host computing device as shown in Figure 4 excerpted above: (1) receiving physiological state data from the user's mobile device; (2) analyzing the received data; (3) selecting "predefined content" to deliver to the mobile device based on that analysis; and (4) transmitting the content to the mobile device. *See id.*

The '861 patent contains two other independent claims relevant for this appeal. Independent claim 10 recites "[a] system for selecting content for delivery" comprising processors and memory storing instructions to perform the method of claim 1. *See* Appx80 (25:9–28). Independent claim 19 recites "[a] non-transitory processor-readable medium for selecting content for delivery, comprising processor-readable instructions configured to cause one or more processors" to perform the method recited by claim 1. *See* Appx80 (26:21–34). Neither of these claims add anything of substance, as they simply recite generic computer equipment for storing and/or executing computer instructions to perform the steps of claim 1.

The '861 patent also recites apparatus claims, claim 26 and its dependents, which Apple challenged in the IPR proceeding. *E.g.* Appx81 (27:13–25). These apparatus claims recite limitations that both parties and the Board agreed were means-plus-function limitations. *E.g.*, Appx92–93; Appx1162–1166; Appx1488–

1489; *see also* Appx12–14. The Board below dismissed Apple's challenge to these claims because, in the Board's view, Apple had failed to identify algorithms from the specification as corresponding structure in its petition. Appx15–16.

Apple does not seek to disturb this conclusion on appeal because any failure to identify corresponding algorithms lies not with Apple, but with the '861 patent's specification, which itself fails to disclose any such algorithms. Claims 26–34 are therefore invalid as indefinite. Because section 112 may not serve as a basis for cancelling claims in an IPR, the Board did not hold these claims unpatentable and Apple may not raise this issue on appeal. Thus, these means-plus-function claims are not relevant to this appeal.

II. The Prior Art Teaches Using Physiological State Data To Provide Contextual Information to Users

In the IPR leading to this appeal, Apple asserted that the '861 patent's claims were unpatentable based on: (1) anticipation or obviousness over U.S. Patent Publication No. 2012-0041767 by Michael T. Hoffman et al. ("Hoffman," Appx561–602); and (2) anticipation or obviousness over U.S. Patent 7,278,966 to Kari Hjelt et al. ("Hjelt," Appx705–741). Neither reference was disputed to be prior art, and each teaches or suggests the steps of the methods claimed by the '861 patent.

A. Hoffman Teaches Transmitting, in Response to Receiving Physiological State Data Measured by a Mobile Device, Personalized Information to a Device To Be Displayed to a User

Hoffman teaches an "athletic information monitoring device 201" that includes an "athletic parameter measurement device 207," a "digital music player 203," and an "electronic interface device 205" that allows the measurement device to talk to the digital music player, as shown below:

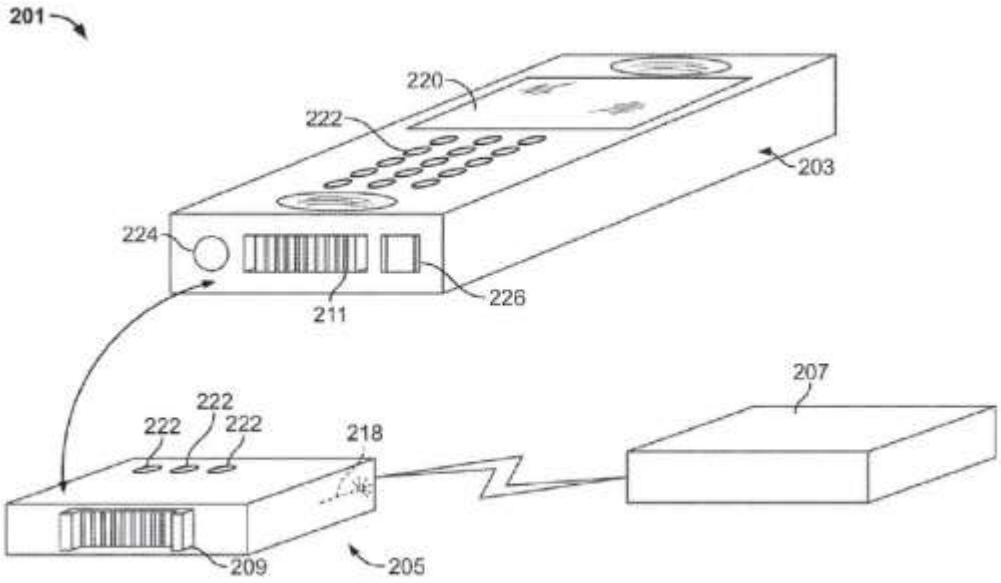

FIG. 2

Appx563; *see also* Appx585 ¶37. The measurement device includes sensors for sensing physiological data, including for example a "heart rate monitor, a blood oxygen monitor, a satellite positioning device . . ., a device for measuring the electrical activity of the user (e.g., an EKG monitor), or any other device that measures one or more physical parameters of the user." *E.g.*, Appx585–586 ¶¶38–

39; Appx587 ¶48. The physiological data is then transmitted via the interface to the "music player"—e.g., a smartphone-like device that "may further include a display 220 and/or user input system 222" (such as "touchscreens, or the like") as well as "wireless communications, infrared input, microphone input, or other devices." *See* Appx586–587 ¶¶40–41, 45–46.

Hoffman also teaches that all of this functionality could be combined into a single smartphone-like device, explaining that, "while the athletic parameter measurement device 207 has been described as being separate from the digital music player 304 or other portable electronic device that receives the signals from the athletic parameter measurement device 207, with some implementations of the invention the athletic parameter measurement device 207 ***may be incorporated into the*** digital music player 203 or other ***portable electronic device***." Appx587 ¶49 (emphases added). In such an implementation, the combined device "may employ a music player, mobile telephone, watch or personal digital assistant that incorporates accelerometers, a satellite positioning device, or any other desired device for measuring athletic activity." *Id.* Thus, Hoffman teaches a single smartphone-like device that is capable of measuring physiological information and displaying content.

As another option, Hoffman teaches that the measurement device may take the form of a wrist-worn sports smartwatch, as shown in Figures 7A and 7B excerpted below.

FIG. 7A

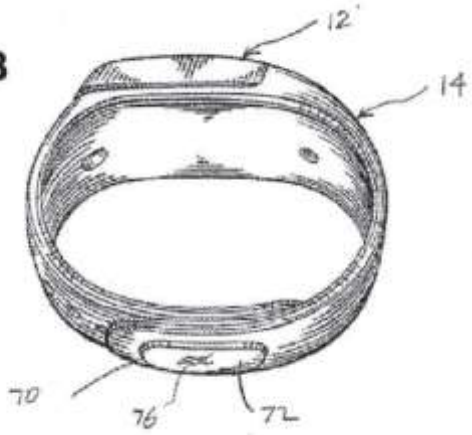

FIG. 7B

Appx568; *see also* Appx589 ¶62. Sensors such as "accellerometers, pedometers, heart-rate sensors and the like may be included in the watch," which also contains both a display and communication infrastructure that sends the data to a separate computing device (e.g., a server). *See* Appx589 ¶62. Like the smartphone-like device described above, this instantiation also contains sensors and a way to display content.

Hoffman teaches that the "athletic parameter measurement device" collects physiological data from a user, such as the user's heartrate, and transmits that physiological data to a computing device. *See, e.g.*, Appx585–586 ¶¶37–38 (describing the "athletic information monitoring device" which contains "sensors . . . for measuring an athletic parameter associated with a person wearing or otherwise using the parameter measurement device"); Appx584 ¶27 (describing that the athletic information obtained from the sensors may be transferred to a separate computing device); *see also* Appx483–484 ¶¶104–105.

As relevant to this appeal, Hoffman teaches (among other uses for the collected information) that the physiological data can be sent to a remote server

and analyzed so as to provide the user contextually-relevant advertising and other information. *See* Appx489–491 ¶¶117–119. Specifically, Hoffman teaches a "performance monitoring system 801" that "provide[s] a variety of services and features including a platform that maintains user account information; analyzes user behavior and performance; manages events in which users may participate; reports information to other systems, applications and devices; measures user activity; and controls access to stored information." Appx590 ¶69. System 801 interacts with the athletic monitoring device to collect the user's physiological information (as well as other information such as "on-line browsiting statistics" and "shopping preferences") in order to "formulate a digital portrait of the user." Appx590 ¶¶69–70. Based on that portrait, "system 801 may submit content such as articles, posts in forums, entertainment content and/or social network content that may be branded with the various services provided by system 801 or to other sites or systems." *Id.* ¶70. For example, if the physiological data received from the user indicates that the "user frequently plays basketball," then the computer selects and sends "advertisements that relate to basketball events, sales, and products." Appx591 ¶72.

The functions of system 801 are shown in Figure 8B, reproduced below:

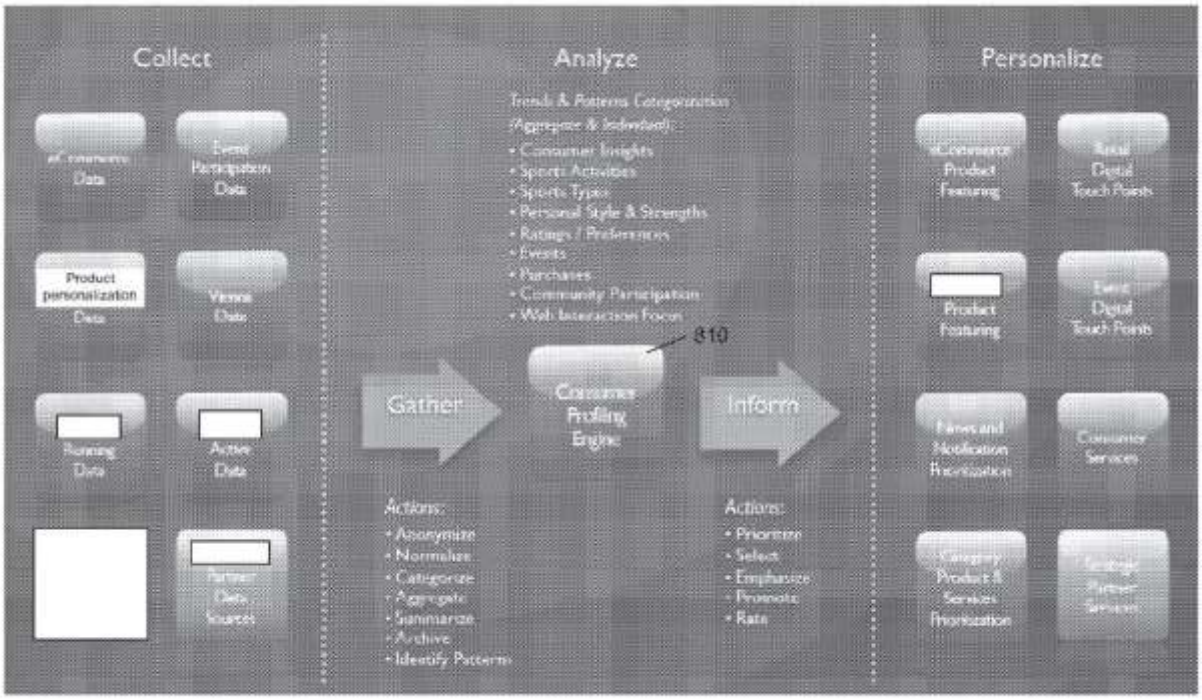

FIG. 8B

Appx570. Consistent with Hoffman's description, these functions fall into three main operations: (1) "Collect" information, such as "Running Data" and "Active Data," as shown on the left-hand side of the diagram; (2) "Analyze" that data to glean "Consumer Insights" such as "Sports Activities," "Sports Types," and "Personal Syle and Strengths"; and (3) "Personalize" information for the user by offering "eCommerce Products Featuring[s]," Retail Digital Touch Points," and "News and Notification Prioritization[s]." *See id.*; *see also* Appx591 ¶¶73–74.

Hoffman contempates that this content may be transmitted back to either the smartphone-like measurement device or the watch described above. *See* Appx494–495 ¶128. Specifically, Hoffman explicitly teaches that this content-delivery system contains "interfaces" for transmitting the content to various

devices to be displayed to the user. *See* Appx590 ¶70. Even if not explicitly disclosed, as Apple's expert explained, a POSITA would have found it obvious to display advertising and other content on a mobile device as of the date of Hoffman in 2012 (five years after the release of the iPhone) because doing so was routine and conventional. *See* Appx495–497 ¶¶129–31.

B. Hjelt Teaches Selecting Pre-Defined Content Based on Physiological Data Received from a User and Transmitting That Content to the User's Mobile Terminal

Hjelt teaches "[a] system for managing physiological information" that includes "a mobile terminal and at least one destination" (e.g., a host computer) that "receiv[es] the physiological information" and "perform[s] at least one operation based upon the physiological information," including selecting content to be sent back to the mobile terminal. Appx705, Abstract. The "destination" then "can return content to the terminal" where the terminal "performs at least one operation based upon the content." *Id.* In other words, Hjelt teaches receiving physiological data from a user, analyzing that data to select content, and then sending that content back to the mobile device. *See id.*

Hjelt illustrates these teachings using a primary embodiment of a mobile fitness device that provides a user fitness programs based on physiological data received from the user. *See, e.g.*, Appx723 (2:54–56). The primary embodiment consists of a mobile terminal that "can be carried in a pocket of clothing" or "belted or otherwise strapped to a wrist, waist or ankle of the user"—such as a fitness watch like that shown in Figures 2C and 6A below:

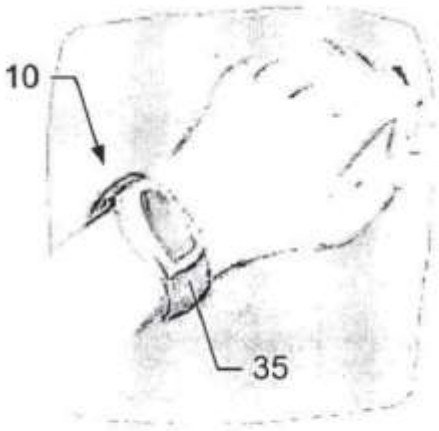

FIG. 2C.

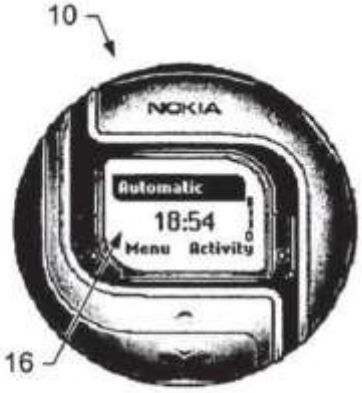

FIG. 6A.

Appx708; Appx713. As Hjelt explains, the mobile terminal can include a processor for processing information, Appx725 (5:26–27); a memory for storing data including "personal information regarding a user of the terminal," *id.* (6:12–14); a microphone capable of receiving voice input, *id.* (5:45–46); a touch display for displaying information and receiving touch input, *id.* (5:49–50); wireless communications for "sharing and/or obtaining data from [other] electronic devices," *id.* (5:52–55); and sensors for detecting the "ambient conditions of the terminal" and for detecting "physiological conditions of the terminal user" including "a heart rate sensor," *id.* (6:29–45). In other words, one embodiment of Hjelt's mobile terminal is a modern-day fitness smartwatch.

As Hjelt teaches, the mobile terminal (e.g., watch) collects environmental and physiological data using an "activity detection application" and then "transfer[s] one or more pieces of physiological information to one ore more

desitinations via a mobile station." Appx733 (22:41–62); *see also* Appx518–519 ¶179. Such an arrangement is shown in Figure 17 from Hjelt, reproduced below:

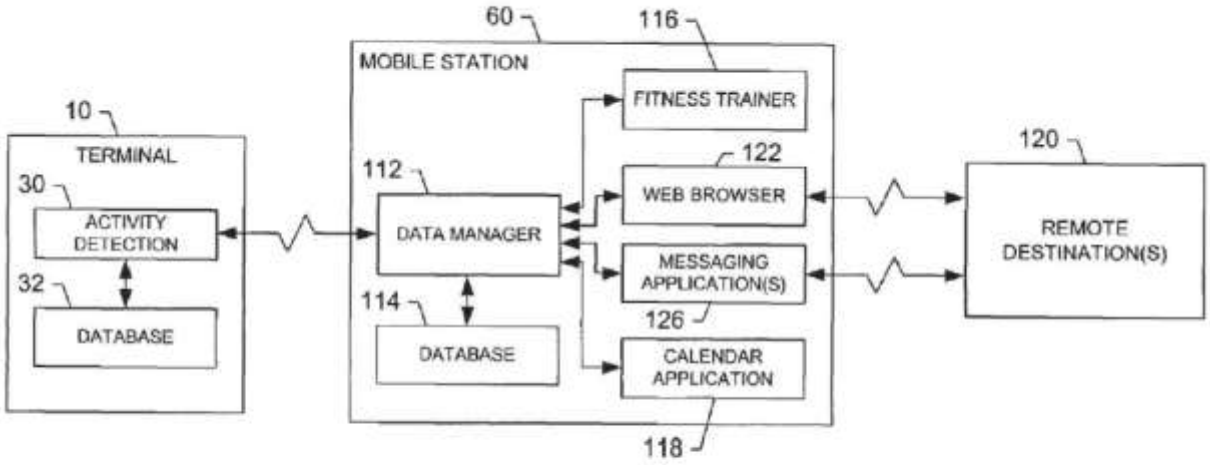

FIG. 17.

Appx721.

On the left of Figure 17 is the mobile terminal 10 (e.g., the smartwatch), which contains an Activity Detection application 30 that collects physiological and other data from the sensors on the mobile terminal. Appx726 (7:18–45); *see also* Appx519 ¶180. The mobile terminal device then communicates this physiological data to a mobile station 60 (e.g., a smartphone), which contains a data manager 112 "capable of interfacing the activity detection application with one or more destinations local to the mobile station and/or one or more destinations remote from the mobile station." Appx733 (22:50–54). In such an arrangement, "the data

manager 112 of the mobile station 60 can directly interface the activity application 30 of the terminal 10 to [a] remote destination(s) 120," such as a applications on a remote server computer. *Id.* (22:63–66); *see also* Appx734 (23:38–43). Through this link, "content is provided or otherwise transferred from a terminal to one or more destinations via the mobile station, or vice versa." Appx734 (23:24–26).

As relevant to this appeal, Hjelt teaches that the mobile terminal 10 (e.g., the smartwatch) collects physiological data and communicates it to a remote destination 120 (e.g., a remote server computer) via the mobile station 60 (e.g., smartphone). *See* Appx731 at 18:22–27; Appx733 at 22:19–25; Appx518–519 ¶179. The remote server "can thereafter manage or otherwise utilize the physiological information in any number of different manners." Appx733 at 22:25–27. "For example, the destination(s) can be capable of viewing the physiological information, as well as creating, modifying, or otherwise customizing workout programs or routines, including setting reminders, alarms or the like" based on an analysis of the received physiological data. *Id.* at 22:27–31; *see also* Appx520–521 ¶¶182–183. Hjelt also teaches that this content—namely workout programs, reminders, or alarms—are then "return[ed] or otherwise transfer[red] to the terminal 10." Appx733–734 at 22:63–23:9. Hjelt thus teaches that the remote server receives physiological state data from the fitness smartwatch, analyzes that data to determine an appropriate workout routine, selects an appropriate workout routine or other content based on the physiological data, and then transfers that content back to the fitness smartwatch.

Hjelt also teaches selecting content to send to the user from a library of pre-existing content based on physiological data. Specifically, Hjelt teaches, among other teachings, that the remote server can modify an existing program and goals in response to the analysis of the physiological data—meaning that the workout program being modified exists prior to the remote server's receipt of physiological data. *See, e.g.*, Appx733–734 at 22:63–23:9; *see also* Appx521–522 ¶¶185–186. For example, if "a user has a weekly goal of walking 70,000 steps" equating to a daily goal of 10,000 steps and "the user has only walked a total of 10,000" steps "over the first five days," the remote server "can adjust the daily goal of the user over the remaining two days of the week to 30,000 steps per day" in order to encourage the user to meet the goal of his or her exercise program. *See* Appx730 (16:13–22). Hjelt teaches that exercise programs can also be modified by, for example, "changing the activity from running to walking" and/or adjusting "one or more other schedule[d] activities of the exercise program (e.g., increasing/decreasing the duration of other scheduled activities, and/or modifying one or more other activities)." Appx736 (28:50–59). In other words, a pre-existing workout program or goal is (1) selected in response to the physiological data, (2) modified by selecting pre-existing activities (such as walking/running), and then (3) transmitted "via the communications device and the user's mobile station" to the user. Appx736 (28:59–67).

C. Apple Cited Other Prior Art To Address Limitations in Dependent Claims and Claims Not Relevant to this Appeal

In addition to Hoffman and Hjelt, Apple cited other references that teach various aspects of dependent claims and the means-plus-function claims not raised in this appeal. For example, with respect to dependent claims 6 and 15, Apple proposed combining Hoffman with U.S. Patent No. 7,962,604 to Harry W. Morris et al. ("Morris," Appx603–637) and U.S. Patent Application Publication 2010/0179865 by Patrick N. Lundqvist et al. ("Lundqvist," Appx638–671). As to dependent claims 2, 11, and 20, Apple proposed combining Hjelt with U.S. Patent Application No. 2008/0292151 to Andrew F. Kurtz et al. ("Kurtz," Appx742–775). Because the Board's final written decision does not address these dependent claims or their additional limitations, this brief does not address them.

Apple additionally proposed combinations of references that teach the apparatus claims, including the means-plus-function limitations. As noted above, Apple does not appeal the Board's determinations with respect to the apparatus claims, as Apple believes they are invalid as indefinite—an issue that cannot be addressed in an IPR. Accordingly, the Court need not evaluate the other prior art that Apple asserted rendered those claims obvious.

III. THE PROCEEDINGS BELOW

A. Apple's Petition, Qualcomm's Preliminary Response, and the Board's Institution Decision

In June 2018, Apple petitioned the Board to institute IPR of the '861 patent, challenging all claims as unpatentable based on grounds anchored by Hoffman and

Hjelt. Appx82–153; *see also* Appx89 (listing grounds). With its petition, Apple submitted a declaration from Dr. Brian Anthony—a medical engineering and mechanical engineering research scientist at the Massachusetts Institute of Technology with over 25 years' experience in developing instrumentation for medical diagnostics and imaging systems. *See* Appx437–535; *see also* Appx437–440 ¶¶1–7 (listing Dr. Anthony's extensive qualifications). In the petition and the accompanying expert declaration, Apple and Dr. Anthony explained how each of the challenged claims is anticipated and/or rendered obvious by the prior art.

Apple challenged each of the independent claims raised on appeal as anticipated and/or obvious over Hoffman.[1] Apple's petition explains that Hoffman teaches the challenged claims because it discloses using physiological state data obtained from sensors on a mobile device to choose contextually-appropriate advertising to send to the user. *See, e.g.*, Appx101–113; Appx480–497 ¶¶99–131. Apple specifically emphasized that Hoffman teaches many different embodiments for its disclosed system, which can be combined, as Hoffman explicitly teaches. Appx99–101; *see also* Appx466–469 ¶¶68–72. Apple further explained that, in an instantiation where the sensors used to collect physiological data are combined with a mobile device used to display data (*i.e.*, either a smartphone-like device or a smart watch), content is delivered to the mobile device for the user. *See, e.g.*, Appx111–113; Appx494–497 ¶¶127–131.

[1] Apple asserted that claims 1, 3–5, 10, 12–14, 19, 21, 22, 26, and 28–30 were anticipated or rendered obvious by Hoffman alone. *See* Appx89.

Apple also asserted anticipation and/or obviousness over Hjelt.[2] As Apple and Dr. Anthony explained, Hjelt anticipates or renders obvious the challenged claims because Hjelt discloses a computing device (a "destination") receiving physiological state data obtained from sensors in a mobile terminal. *See, e.g.*, Appx136–138; Appx517–519 ¶¶177–180. Hjelt's system then analyzes that data to select an appropriate workout routine, and transmits that content back to the mobile device. *See, e.g.*, Appx138–142; Appx519–524 ¶¶181–189. Apple did not propose a construction for "pre-defined content" in the petition. However, Apple did emphasize that the workout routines selected by Hjelt's system were "pre-defined content" as required by the claims because the routines are selected from "a library of content that is defined" and because Hjelt explicitly teaches modifying a workout routine, suggesting that the routine exists before the destination device receives the physiological data and selects the workout routine for modification. *See, e.g.*, Appx140–141; Appx521–523 ¶¶185–187.

In its pre-institution response, Qualcomm argued that Hoffman should be limited to specific disclosed embodiments rather than the sum whole of its teachings. *E.g.*, Appx1180–1185. Qualcomm also proposed that "a plurality of predefined content" be construed to mean "multiple content items exiting prior to the reception of physiological state data." Appx1161. However, despite acknowledging that Hjelt teaches that its system can use the physiological data to

[2] Specifically, Apple asserted that claims 1, 3-5, 10, 12-14, 19, 21, and 22 were unpatentable over Hjelt alone.

modify a selected pre-existing exercise program, Qualcomm argued that Hjelt does not select from "predefined content" because neither a new exercise program nor modifications to an existing program is "fixed" before the device receives the physiological data. *See* Appx1199.

Although the Board expressed doubt about Apple's Hoffman-based arguments, *e.g.*, Appx1332–1336, the Board nonetheless instituted on all grounds because the Board believed that Apple was likely to succeed with the Hjelt-based grounds, even construing "a plurality of predefined content" to mean "multiple content items that exist prior to receiving the physiological state data"—as Qualcomm had urged. *See* Appx1318–1320. It did so because, at the time, the Board correctly recognized that "[s]election of, e.g., an exercise program or an alert reasonably appears to fall with the scope of this limitation, because the program or alert appears to exist prior to receiving the physiological state data." Appx1343–1344.

B. Post-Institution Briefing

As relevant to this appeal, in their post-institution briefing, the parties focused on the "transmitting . . . selected content to the mobile device" limitation for the Hoffman-based grounds and the "selecting . . . content from a plurality of predefined content" limitation for the Hjelt-based grounds.

As to Hoffman, Qualcomm's arguments post-institution echo the arguments it had made in its pre-institution response. Specifically, Qualcomm argued that, because Hoffman discloses discrete embodiments that could not be combined, it

does not teach transmitting content back to the mobile device. *E.g.* Appx1494–1504, Appx1507–1511. In reply, Apple emphasized the extensibility of Hoffman's teachings, which allow for interchanging and combining various hardware, including merging the sensors with a display in a smartphone-like device or a smartwatch. Appx1780–1784. In addition, Apple argued that, given the extensibility of Hoffman's teachings, transmitting advertising content, which had been selected in response to the received athletic information, to a mobile device would have at least been obvious, if not explicitly taught. Appx1778–1791. In sur-reply, Qualcomm again argued that a skilled artisan would not have thought to combine Hoffman's embodiments. Appx2049–2053. In its post-institution briefing, Qualcomm did not separately address whether Hoffman teaches and/or renders obvious any of the dependent claims.

As to the Hjelt-based grounds, Qualcomm offered the same construction of a "plurality of pre-defined content" that it had offered pre-institution—asking the Board to construe the term to require content that exists prior to the receipt of the physiological data. Appx1484. However, Qualcomm's argument concerning Hjelt itself relied on an even narrower interpretation of the term. Instead of addressing the claims' requirement that the pre-existing content be "selected" in response to receipt of physiological data, Qualcomm argued that the exercise programs were not "pre-defined" because they did not exist on what Apple had mapped to the claims "host computer system" prior to the receipt of the physiological state data. *E.g.*, Appx1520. Qualcomm also argued that Apple's discussion of a library of

predefined content in connection with its obviousness grounds was irrelevant. Appx1530.

Apple explained in its reply that Qualcomm's proposed construction does not require that the pre-defined content exists in any particular location—only that it exists prior to the receipt of the physiological data. Appx1771. Hjelt unquestionably discloses such content because it teaches that pre-existing exercise programs can be modified in response to the physiological data. *Id.* ("[S]ome aspect of the exercise programs . . . necessarily existed when the 'physiological information' was received."). Qualcomm's sur-reply offered no real substantive response to this point. Rather, Qualcomm argued that, because Hjelt does not expressly disclose that exercise programs exist before physiological data is received, Apple was required to prove inherency, which (according to Qualcomm) Apple had not done. Appx2057–2058.

C. The Board Holds All Claims Patentable, Erroneously Applying This Court's Precedents Regarding a Motivation To Combine

After an oral hearing, the Board issued its Final Written Decision holding that Apple had not shown the challenged claims to be unpatentable. Appx1–55.

As to Hoffman-based grounds, the Board found that Hoffman does not teach the "transmitting" limitation. Appx27–32. Despite acknowledging that Hoffman teaches sending advertising content selected in response to physiological data ***somewhere***, the Board deemed Hoffman's teaching insufficient because Hoffman does not explicitly state how or where that content is transmitted and does not state that it is sent to the mobile device. Appx27–28. The Board rejected Apple's

obviousness contentions because, despite accepting that Hoffman's teachings that various embodiments and hardware aspects of its system were interchangeable, Apple had not demonstrated a specific enough reason as to why advertising and other customized content would be transmitted to Hoffman's smartphone-like measurement device or watch. Appx28–31.

As to Hjelt-based grounds, the Board acknowledged that, "in order to create 'modifications or adjustments'" to an exercise program, "an original, base program already exists" prior to the receipt of physiological data—exactly as the Board had construed the claim to require. *See* Appx12; Appx46. Nonetheless, the Board concluded that Hjelt fails to teach selected pre-defined content because (according to the Board) Apple had not shown that the content transmitted back to Hjelt's mobile device was the same as the data that was "predefined." Appx47–48. The Board did not consider whether sending portions of the original exercise program along with modifications would satisfy the claim or would have been an obvious design choice; nor does the Board's decision consider that both new and modified exercise programs are made up of "pre-defined" activities, such as walking or running.

Apple now appeals.

SUMMARY OF THE ARGUMENT

This Court should vacate the Board's decision because it rests on multiple errors with respect to both grounds it analyzed.

As to Hoffman, the Board legally erred in its application of this Court's precedents regarding a motivation to combine. As the Board acknowledged, Hoffman explicitly teaches that physiological state data may be analyzed to determine contextually-appropriate advertising to display to the user. The Board also acknowledged that Hoffman explicitly teaches that the measuring device may contain a display for displaying content, and accepted that such a device would be compatible with the contextually-appropriate advertising system. Yet, the Board ignored this clear motivation from the reference itself and Apple's other explanations regarding the motivations of a skilled artisan, holding that Hoffman fails to teach or render the "transmitting limitation" obvious.

As to Hjelt, the Board acknowledged that Hjelt teaches that, in order to create a customized or modified exercise program, an original program must already exist. Yet, the Board concluded that the selected pre-defined content was absent because, according to the Board, Hjelt fails to teach or render obvious transmitting the pre-existing original program. Contrary to the Board's conclusion, Hjelt explicitly teaches sending portions of the original program along with modifications; and, in any event, transmitting portions of the original program along with modifications was one of two known and obvious choices. The Board also erred in failing to consider that the exercise programs themselves (both new

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and/or modified) are made up of pre-defined content—namely pre-defined activities such as walking or running.

As to standing, Apple has standing in this appeal because it is presently benefits from a promise by Qualcomm Settlement Details the '861 patent as long as Apple continues to Settlement Details under a licensee and because Apple faces an imminent risk of suit once the license expires or is terminated. Both harms are attributable to Qualcomm, and this appeal would redress both by removing the '861 patent as an impediment to Apple's being able to sell its products without having to Settlement Details or face the threat of an infringement suit from a patent Apple believes is invalid.

STANDARD OF REVIEW

This Court reviews the Board's decisions "under the standards provided in the Administrative Procedure Act ("APA"), 5 U.S.C. § 706." *Unwired Planet, LLC v. Google Inc.*, 841 F.3d 1376, 1379 (Fed. Cir. 2016). Under the APA, "the Board's actions . . . are to be set aside if 'arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law' or 'unsupported by substantial evidence.'" *Pride Mobility Prod. Corp. v. Permobil, Inc.*, 818 F.3d 1307, 1313 (Fed. Cir. 2016). Pursuant to these standard, this Court reviews questions of law, such as the Board's ultimate determination of obviousness, *de novo* and underlying factual determinations for substantial evidence. *See Merck & Cie v. Gnosis S.P.A.*, 808 F.3d 829, 833 (Fed. Cir. 2015). Substantial evidence "means such relevant evidence as a reasonable mind might accept as adequate to support a conclusion." *Consol. Edison Co. of N.R. v. Nat'l Labor Relations Bd.*, 305 U.S. 197, 229 (1938).

ARGUMENT

I. THIS COURT SHOULD VACATE THE BOARD'S PATENTABILITY DETERMINATIONS

A. This Court Should Set Aside the Board's Holding that Hoffman Does Not Render Obvious Transmitting Content to the Mobile Device

Although the Board accepted, as Apple had proposed, that Hoffman teaches various aspects of a single system, the Board still required Apple to provide some reason, beyond Hoffman's own disclosures, as to why a person of skill would have utilized the portions of Hoffman's disclosure relating to customizing advertising and other content with the portions of Hoffman describing a smartphone-like device used to measure physiological information and display content. Because the disclosure itself provides such motivation, *KSR* and this Court's precedent required no more. In any event, Apple did provide ample reasons why a skilled artisan would have used the various aspects of the Hoffman's system, which the Board's decision simply ignores. These errors require this Court to reverse the Board's conclusions regarding motivation to combine and Hoffman's teaching of the "transmitting" step and to remand to resolve the remaining arguments and claims unaddressed by the Board's Final Written Decision.

1. The Board Took an Overly-rigid Approach to Its Obviousness Analysis that Departed from *KSR*'s Mandate

a. The Scope and Content of Hoffman

As the Board's decision appears to acknowledge, Hoffman teaches all of the parts necessary to put together the claimed invention. Hoffman teaches a mobile

device—either in the form of a smartphone-like device or a watch—that can display content. *E.g.*, Appx563 (showing the smartphone-like device); Appx585 ¶37; Appx568; Appx589 ¶62. Hoffman explicitly teaches that these mobile devices may include sensors that gather physiological and other data, which is then sent to an offsite server for analysis. Appx587 ¶49. As Hoffman explains, "while the athletic parameter measurement device has been described as being separate from the . . . portable electronic device," "with some implementations of the invention[,] the athletic parameter measurement device 207 may be incorporate into the . . . portable electronic device," which displays content. *Id.*; *see also* Appx587 ¶50 ("[T]he athletic information collection and display device [] may both collect and display athletic data."). Thus, Hoffman explicitly teaches a ***single mobile device*** that can collect physiological data and display content—*i.e.*, the mobile device recited in the challenged claims.

In addition to teaching a single device that can sense and transmit physiological data to a remote computer and can display content, Hoffman teaches that a remote computer may use that physiological information to select advertising to display to the user. *See, e.g.*, Appx590–591 ¶¶69–72. Specifically, Hoffman teaches that a remote computer (corresponding to the host computer device of the challenged claims) can analyze the received physiological data to "customize a user's experience with a service to improve their interest and motivation." Appx590 ¶69. This remote computer may also "include a marketing engine that leverages activity information collected from users to identify consumer interests,

activity patterns and trends." Appx591 ¶72. "This information," in turn, "may be used to determine what information to display to users and what products or services to advertise." *Id.* Thus, Hoffman plainly teaches a host computer device that analyzes physiological or other information to select pre-defined content to display to a user.

Nothing in the Board's decision suggests that it took any issue with any these facts. The Board's decision likewise makes no findings that these teachings are directed to disparate parts of different systems. To the contrary, the Board explicitly stated that it "accept[ed] Petitioner's contention that Hoffman discloses optional aspects of ***a single system***." Appx31 (emphasis added). What the Board took issue with, and where the Board believed Apple failed to connect the dots, was with respect to whether Hoffman teaches or renders obvious transmitting the content from the remote computer (which selects the customized advertising and other content) to the mobile device that collects and displays information. *See* Appx27–31.

Specifically, the Board found that Hoffman failed to anticipate because, according to the Board, although Hoffman teaches that the marketing engine includes "interfaces . . . that allow remote devices (e.g., watch 10 of Figs 7A and 7B) to submit and ***receive*** information," Appx590 ¶70 (emphasis added), and that the marketing engine 810 selects advertisement information to display to a user, Appx590 ¶72, Hoffman does not explicitly state that advertising content is sent to

the mobile device or how such content is displayed to a user. Appx27–28.[3] The Board held that displaying advertising content on a mobile device would not have been obvious because, according to the Board, Apple failed to identify a reason why a person of skill the art would have found it obvious to integrate "***this particular*** feature or service, i.e. transmission of 'selected content.'" Appx30 (emphasis in original).

b. Apple Showed Sufficient Motivation Under *KSR*

As this Court and the Supreme Court have explained, a person of ordinary skill in the art is "not an automaton" that blindly follows only what is *in haec verba* laid out in a prior art reference. *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007). To the contrary, this Court's precedents require an "expansive and flexible" approach to obviousness that recognizes "the inferences and creative steps that a person of ordinary skill in the art would employ" and "not only permits, but ***requires***, consideration of common knowledge and common sense." *E.g. Randall Mfg. v. Rea*, 733 F.3d 1355, 1362 (Fed. Cir. 2013) (emphasis in original, internal quotation marks and citations omitted). Thus, "[i]n making the determination of 'obviousness,' it is important to remember that the criterion is measured not in terms of what would be obvious to a layman, but rather what would be obvious to one reasonably skilled in (the applicable) art"—taking account of both what the references explicitly teach and "the inferences and

[3] To streamline the issues, Apple does not appeal the Board's finding on anticipation.

creative steps that a person of ordinary still in the art would employ." *Dann v. Johnston*, 425 U.S. 219, 229 (1976) (internal quotation marks omitted); *KSR*, 550 U.S. at 418.

Here, the Board's decision applies exactly the type of "rigid formula dissociated from the consideration of the facts of this case" that *KSR* and this Court decision's forbid. *Leapfrog Enters., Inc. v. Fisher-Price, Inc.*, 485 F.3d 1157, 1161 (Fed. Cir. 2007). Rather than looking to how a skilled artisan would read and understand Hoffman's teachings as a whole, the Board improperly focused "only on minor distinctions between the prior art and the claimed invention" and granularly required Apple to provide a specific reason as to why a skilled artisan would have found it obvious to implement the various aspects of Hoffman's system. *See PlaSmart, Inc. v. Kappos*, 482 F. App'x 568, 573 (Fed. Cir. 2012); Appx29. Specifically, although the Board accepted that Hoffman teaches that the mobile device is capable of receiving and displaying content,[4] Appx21, Appx27, and that Hoffman discloses a marketing engine that selects customized advertisement information to display to a user,[5] Appx23, the Board thought these

[4] *See, e.g.*, Appx590 at ¶70 ("[S]ystem 801 may further include interfaces 803 that allow remote devices (e.g., watch 10 of Figs 7A and 7B) to submit and ***receive*** information." (emphasis added)); Appx587 at ¶50 ("[T]he athletic information collection and display device [] may both collect and display athletic data."); Appx568 at Fig. 7A.

[5] "System 801 may, in one or more arrangements, include a marketing engine that leverages activity information collected from users to identify consumer interests, activity patterns and trends. This information may be used to determine what information ***to display to users*** and what products or services to advertise." Appx591 at ¶72 (emphasis added).

teachings insufficient because not every use of a device suggested by the prior art is "obvious merely because the device is so capable." Appx29. The Board thus believed that a skilled artisan in 2012 could not have figured out or been motivated to send advertising from a server to a mobile phone—despite accepting that doing so was nothing more than a routine application of known techniques.

The Board gave the skilled artisan far too little credit. As Apple's expert explained, both the mechanisms and benefits of "content delivery systems for mobile platforms were well-known in the art as of the Critical Date." Appx496 ¶131. As support for this opinion, Apple's expert cited other prior art that "included various technologies that provide users with access to content through a mobile device," including art that identifies a need to provide users with contextually-relevant information, at the time it is needed, through a mobile device. *See* Appx496 ¶131; *see also* Appx904 (1:39–41 (identifying a need to "provide users with many services and functions that are related to, or based on" contextual information about the user such as "the user's location or changes in location"). These teachings, especially in light of Hoffman's suggestion that the mobile device can be used in conjunction with the contextual advertising system, Appx591 ¶71, are more than sufficient to give a skilled artisan the necessary roadmap.

Indeed, this is a textbook case of obviousness under *KSR* because pursuing any one of "a finite number of identified, predictable solutions" to a particular problem is typically not inventive. 550 U.S. at 421. There are only limited options

for displaying content—all of which were known and predictable. One option was in a web browser, where a user may go to the optional website to view his workout data. *See, e.g.* Appx587–588 ¶¶50, 54.[6] Hoffman explicitly discloses this option with its discussion relating to the marketing engine, as that portion of the reference also discusses collecting browsing data. *See* Appx590 ¶69 (explaining that "users may allow system 801 to collect user information and activity information such as workout data, on-line browsing statistics, shopping preferences").

The only other options for displaying the content are other devices that have screens—*i.e.*, the smartphone-like device or the watch—which Hoffman teaches are connected to the marketing engine via interfaces. *See* Appx494–495 ¶128; Appx590 ¶70 (explaining that the advertising system "may further include interfaces 803 that allow remote devices . . . to submit and receive information"). "Because a person of ordinary skill has good reasons to pursue the known options within his or her technical grasp, § 103 bars the patentability of such obvious variations" because choosing between the known options would be nothing more than a "simple design choice." *Uber Techs., Inc. v. X One, Inc.*, 957 F.3d 1334, 1340 (Fed. Cir. 2020) (citing and quoting *KSR*, 550 U.S. at 417, 421, internal quotation marks omitted); *see also CRFD Research, Inc. v. Matal*, 876 F.3d 1330,

[6] Notably, as was common in 2012, the user could have simply visited this web portal on his or her smartphone-like device as Hoffman teaches that the web portal may be accessed by "a conventional browser program," such as those on a standard smartphone. Appx589 at ¶59.

1346-47 (Fed. Cir. 2017); *ACCO Brands Corp. v. Fellowes, Inc.*, 813 F.3d 1361, 1367 (Fed. Cir. 2016); *PlaSmart*, 482 F. App'x at 573.

Underscoring the simplicity of what a skilled artisan had to figure out here, the '861 patent's specification provides no details regarding how content is transmitted from the host computer to its mobile device. All the specification says about the method of transmission is that any kind of networking will do—without providing any of the technical details the Board required from Hoffman's disclosure. *See, e.g.*, Appx72 at 9:64–10:14. The reason for this lack of detail is plain—the basics of networking were well-known by the time the '861 patent was filed (as Apple's expert testimony discussed above shows) and the '861 patent's specification simply assumes that a skilled artisan would be able to fill in the blanks regarding how to transmit advertising to a mobile device. Yet, when considering the teaching of the prior art, the Board required all the details to be laid out *in haec verba* for a skilled artisan, demanding a level of detail that the "[p]atent itself does not disclose." *See Lockwood v. Am. Airlines*, 107 F.3d 1565, 1570 (Fed. Cir. 1997.)

As the Supreme Court has explained, "[a] person of ordinary skill is also a person of ordinary creativity." *KSR*, 550 U.S. at 421. Here, the Board robbed the skilled artisan of any creativity by applying a rigid obviousness analysis that required every detail to be laid out pedantically in the prior art, including those already part of the skilled artisan's knowledge. As a result, the Board's reasoning

cannot stand, and this Court should reverse the Board's conclusion regarding a motivation to combine. *See, e.g.*, *PlaSmart*, 482 F. App'x at 573.

2. The Board Also Ignored Apple's Explanations as to Why a Skilled Artisan Would Have Used the Various Parts of Hoffman Together

The Board's decision also fails to acknowledge the many other reasons Apple provided as to why a skilled artisan would have been motivated to use the various parts of Hoffman together in the way claimed by the '861 patent, despite "accept[ing] Petitioner's contention that Hoffman discloses optional aspects of a single system," Appx31.

Apple's petition, and the accompanying expert declaration, contain pages of discussion regarding how and why a skilled artisan would have been motivated to use the advertising and other content customization mechanisms taught by Hoffman with the display-enabled mobile devices disclosed in Hoffman. *See* Appx99–101; Appx467–470 ¶¶69–73. For example, Apple's expert explained that Hoffman itself suggests such a combination because Hoffman "teaches that components from different figures can perform the same functions and/or interoperate with one another to provide certain advantages." Appx467 ¶69. Apple's expert further explained that combining Hoffman's advertising mechanism with the mobile device "would have resulted in a system that is capable [of] achieving the advantages discussed throughout [Hoffman's] disclosure," such as "customizing a user's experience . . . to improve user engagement and increase the user's motivation to continue performing athletic activities." Appx468–469 ¶71.

Apple's expert explained that a person of ordinary skill would have been motivated to combine the different components shown in Hoffman's figures—such as the advertising aspects of Hoffman with a mobile device—to customize a user's experience "because the functions performed by the components were each well-known as of the Critical Date." Appx469 ¶72. Indeed, the expert cited other prior art showing that "[c]ollecting and monitoring athletic information and customizing a user's experience through a computer device" were well-known. *See id.*

The Board dismissed this extensive discussion as "not applicable" to the whether a skilled artisan would have been motivated to use the various parts of Hoffman—such as the part disclosing communicating advertising content to a user display and the part disclosing a user's mobile device with a display—together in the way claimed by the '861 patent. Appx31–32. The Board addressed the substance of these reasons in a single footnote, where it dismissed Apple's provided motivations because, according to the Board, Hoffman teaches other ways of achieving the goals articulated by Apple's expert. *See* Appx32 n.10.

But this misses the point entirely. Apple relied on the fact that Hoffman teaches multiple ways of achieving its goals as one of the reasons as to why a skilled artisan would have been motivated to pick and choose from among the various options disclosed by Hoffman. *See, e.g.,* Appx468 ¶70. The fact that Hoffman discloses that its stated goals can be accomplished in several different ways cannot legally support the Board's conclusion that each of those ways is

nonobvious. To the contrary—as discussed above—implementing one of several known ways of accomplishing a goal is a quintessential example of an obvious variation. *See KSR*, 550 U.S. at 417.

B. This Court Should Set Aside the Board's Holding that Hjelt Does Not Render Obvious Selecting "a Plurality of Pre-Defined Content" and Transmitting That Content

The Board's determinations with respect to Hjelt also rest on legal and factual errors. The Board concluded that Hjelt fails to teach "selecting . . . content from a plurality of predefined content," which the Board construed to require selecting content that exists prior to the receipt of physiological state data. Appx12. Despite finding that Hjelt does teach that an original exercise program must exist prior to the receipt of physiological data, the Board nonetheless held this limitation not satisfied because, according to the Board, Hjelt fails to teach or render obvious transmitting any portion of the original program to the mobile device. The Board's conclusion is contrary to Hjelt's teachings and this Court's precedents regarding obvious design choices. These errors require this Court to reverse the Board's conclusion that Hjelt fails to teach or render obvious the "transmitting . . . the selected content" limitation and to remand to resolve the remaining arguments and claims unaddressed by the Board's Final Written Decision.

1. Under the Board's Construction of the Selecting Limitation, Hjelt Teaches Selecting "Predefined" Content at Least Through Its Disclosure of Modified Exercise Programs

According to the Board's stated construction, selecting "content from a plurality of predefined content" requires only that the selected content exist prior to the receipt of physiological data by the host computer. Appx12. Under a faithful application of this construction, there can be no question that Hjelt teaches this limitation—as the Board's own fact-finding shows.

a. The Original, Base Exercise Program Qualifies as Predefined Content that Exists Before Physiological State Data Is Received

As the Board acknowledged, "Hjelt explains that after operations are performed on the received physiological information, the destination," e.g., a remote server, "may select content to transmit to the terminal, such as 'modifications or adjustments to an existing exercise program (including one or more activities of an existing program).'" Appx46 (quoting Appx735–736 (26:65–27:7)). As the Board also acknowledged, Hjelt thus teaches that "an original, base exercise program already exists" prior to the receipt of the physiological data—satisfying the requirement for content that is "pre-defined." *See* Appx46. That content is undoubtedly "selected" in response to the physiological state data because, in order to modify an exercise program, the exercise program must first be selected. *See* Appx522 ¶186 (explaining that "because the 'destination 120' is described to modify an existing workout program for the user, the customized or modified workout program is selected f[rom] 'predefined content' in that the

content is [a] modified form of existing content when the 'destination' performs the modification").

The Board's findings here are strongly supported by Hjelt. Hjelt explains that "the destination(s)," e.g., the remote computers, are "capable of viewing the physiological information, as well as creating, modifying or otherwise customizing workout programs or routines." Appx733 (22:25–33). Towards that end, Hjelt describes new and modified exercise programs that consist of various "aerobic fitness and/or strength enhancing exercises." Appx723 at 1:49–53 ("The apparatus is configured for generating an exercise program based upon physical parameters, such as physiological information (e.g., information relating to aerobic fitness) of a user, where the exercise program can include aerobic fitness and/or strength enhancing exercises."). The process of generating an exercise program includes selecting various types of ***pre-existing exercises***; for example, "selecting a mix of exercises of different intensity classes, where the ratios of the mix of intensities are determined by the aerobic fitness value" or "selecting exercises based upon a strength value, where the strength value can be determined based upon the input physiological information." Appx723 at 2:9–12; Appx723 at 2:19–22; *see also* Appx723 at 1:57–59 ("The apparatus can be configured to generate a program that includes a plurality of exercise definitions, each including a variable exercise duration parameter."); Appx736 (27:2–7 (explaining that the content transferred to the terminal includes "one or more activities of an existing program")).

As Hjelt also explains, after a workout program is created, "the destination(s) can be adapted to continuously modify or adjust [the] existing exercise program during the terminal user's performance of an activity of the exercise program, such as by adjusting the goals for the terminal user with respect to the activity based on the user's progress through the activity, or more generally, the exercise program." Appx736 (28:10–16). Adjustments to exercise programs may consist of, for example, substituting one pre-defined activity for another—such as walking for running (or vice versa). *See* Appx736 (28:55–56).

This disclosure meets the selecting limitation. As construed by the Board, the challenged methods require "selecting . . . content from a plurality of predefined content"—*i.e.*, from content that exists prior to the receipt of the physiological data by the host computer. Appx79 (24:13–14); Appx12. As described above, and as the Board found, Hjelt performs this function by selecting a pre-existing workout program to modify/customize. Appx46.

b. Stored Activities that Make Up an Exercise Program Qualify as Predefined Content that Exists Before Physiological State Data Is Received

Hjelt also meets this limitation by implementing such a modification by selecting one stored predefined activity (e.g., walking) to substitute for an activity already part of the workout program (e.g., running). As Hjelt explains, the "activities" that make up the exercise programs consist of pre-defined activities, such as "walking, running, dancing, . . . sporting activity (e.g. aerobics, badminton, basketball, football, soccer, gold, weight training, hiking, jumping rope, . . . etc."

Appx726 (7:50–56). As Hjelt also explains, modifying a pre-existing exercise program may simply consist of substituting one predefined activity for another. Appx736 (28:52–59). Thus, even if the Board were correct that Hjelt's system transmits only the modifications, those modifications would still be "predefined content" because the activities themselves exist prior to the receipt of physiological data.

These substitution exercises would be stored in a library of pre-defined content. As Apple's expert explained, Hjelt contemplates storing a library of predefined content. Appx552-553 ¶¶186-187. It would simply make no sense to require a computer to re-invent walking or running every time it wanted to modify an exercise program—a person of skill would unquestionably understand that these activities must be stored in some sort of a "'pre-defined' library of content from which content is selected and transmitted to the 'terminal 10' based on received physiological information.'" *See* Appx522–523 ¶187.

Even Qualcomm's expert acknowledged that a modified exercise plan consists of predefined activities, which include things like "walking" and "running." *See* Appx1727–1728 ¶122 (quoting Appx726 (7:44–56)); Appx1729 ¶127 (citing Appx735–736 (26:65–27:7)[7]); Appx1730 ¶128 (noting that a generated exercise program includes "activities" selected by the user "or

[7] "[A] fitness trainer application may have a new exercise program, and/or modifications or adjustments to an existing exercise program (including one or more activities of an existing program), to transfer to the terminal." Appx735–736 (26:65–27:7).

automatically detected at the terminal 10," citing Appx735 (26:18–29)).[8] The Board appeared to have accepted Apple's evidence that Hjelt contemplates storing libraries of predefined content, but judged it irrelevant. Appx48 ("[e]ven accepting this as true").

2. The Board's Analysis of the Transmitting Limitation Violates *KSR*'s Mandate and Lacks Substantial Evidence

Despite these disclosures in Hjelt and its own findings, the Board determined that Hjelt's disclosure relating to modified exercise programs fails to disclose the recited "selected content" because the claims require that "the selected content must have 'exist[ed] prior to receiving the physiological state data' ***and*** must be transmitted to the terminal." Appx46 (brackets and emphasis in original). According to the Board, Apple did not show that "the original, base exercise program—upon which the modifications were made—is transmitted to the terminal along with the modification," *id.*, or "why an ordinarily skilled artisan would have found it obvious to select predefined content [stored in a library of predefined content] . . . for transmission to the terminal," Appx48. Both conclusions are in error.

[8] Qualcomm's expert also acknowledged that these predefined activities exist prior to the receipt of the physiological data. *See* Appx1726–1728 at ¶¶121–123.

a. Hjelt Teaches or Renders Obvious Transmitting the Original, Base Exercise Program as Part of Transmitting a "Modified" or "Customized" Workout Program

Hjelt explicitly teaches that the remote server is "capable of communicating with the terminal to transfer content to the terminal, such as the created, ***modified*** or otherwise ***customized*** workout programs or routines," thus "providing a better" and more customized "experience for the user." Appx733 (22:33–40 (emphases added)). Hjelt's "modified exercise program" unquestionably includes portions of the original, base program:

> [A]fter performing one or more operations based upon the piece(s) of physiological information, one or more destinations may select or otherwise determine content to ***return or otherwise transfer to the terminal 10*** based upon the operation(s) performed by the destination(s), as shown in block 136. For example, a fitness trainer application may have a new exercise program, and/or ***modifications*** or adjustments to an existing exercise program (***including one or more activities of an existing program***), ***to transfer to the terminal***.

Appx735–736 (26:65–27:7 (emphases added)); Appx522 ¶186 (describing Hjelt's customized or modified workout program as "content [that] is [a] modified form of existing content when the 'destination 120' performs the modification"); Appx2236:4–2237:13).

Indeed, Hjelt draws a distinction between "creating" an exercise program and "modifying" one, and between a "new" exercise program and a "modified" one. *E.g.*, Appx733 (22:33–40); Appx736 (27:3–7 ("For example, a fitness trainer application may have a new exercise program, and/or modifications or adjustments to an existing exercise program . . . to transfer to the terminal"). Hjelt's use of the

term "modified" with reference to the exercise program signifies that the "modified exercise program" includes portions of the original, base program. Otherwise, Hjelt would call such a program a "created" or "new" program.

Hjelt also teaches that exercise programs can be "customized" in response to physiological data—further emphasizing that portions of the original program must be transmitted. *See, e.g.*, Appx735 (26:21–25 (stating "based on the piece(s) of physiological information," the destination can "modify, customize or otherwise adjust the program")); Appx732 (22:28–30 ("[T]he destination(s) can be capable of . . . modifying ***or otherwise customizing*** workout programs.") (emphasis added)). Unlike a "modified" program—where adjustments are made to a program that the user is already implementing—a "customized" program would include a program that is new to the user, but created by selecting an original base program and adding customizations. *See id.* Because a program is being "customized" for the user (as opposed to simply modifying an existing ongoing program)—the entirety of the program must be transmitted.

In an effort to circumvent these clear teachings, the Board mused, without citing any evidentiary support, that "if an original, base program is modified based on received physiological data, transmission of the original, base program, or a portion thereof, is likely unnecessary; it is the ***modified*** program or portion that needs transmission." Appx47–48 (emphasis in original). Notably, the Board itself raised the issue of whether, when Hjelt discloses that the modified exercise program is transmitted to the mobile device, only the changed parts are transferred.

Qualcomm's expert did not interpret Hjelt's disclosure in this manner. Appx1729–1731; Appx1734–1736. This determination—which appears to be based solely on speculation by the Board—lacks substantial evidence. As this Court has explained, the "deferential judicial review" this Court applies "under the Administrative Procedure Act does not relieve the agency of its obligation to develop an evidentiary basis for its findings." *TQ Delta, LLC v. CISCO Sys., Inc.*, 942 F.3d 1352, 1357–58 (Fed. Cir. 2019) (explaining that because "the APA requires meaningful review," courts should not "simply rubber-stamp[]" agency fact findings unsupported by evidence); *see also In re Gartside*, 203 F.3d 1305, 1312 (Fed. Cir. 2000) (explaining that "'substantial evidence' review involves examination of the record as a whole, taking into account evidence that both justifies and detracts from an agency's decision").

More importantly, this conclusion ignores *KSR*'s teachings that pursuing any one of "a finite number of identified, predictable solutions" to a particular problem is typically not inventive. 550 U.S. at 421. Even the Board's discussion acknowledges only two, predictable ways for a modified program to be transmitted—the new portions would be sent either with or without original portions. Appx47–48. Accordingly, under *KSR*, both options would have been obvious. *See, e.g.*, *Uber Techs.*, 957 F.3d at 1340; *CRFD Research*, 876 F.3d at 1346-47; *ACCO Brands*, 813 F.3d at 1367.

Because Hjelt discloses sending modified data with the original, base exercise program, that is sufficient to meet the claims. The fact that Hjelt's system

sends additional data with the selected content (portions of the original exercise program) is of no moment. Claim 1 recites a method "comprising" several steps, including the selecting step and the transmitting step. As a result, even if the prior art teaches "additional steps interleaved between the recited steps," the prior art still teaches the claimed method. *See, e.g., In re Affinity Labs of Texas, LLC*, 856 F.3d 902, 907 (Fed. Cir. 2017); *Exergen Corp. v. Wal-Mart Stores, Inc.*, 575 F.3d 1312, 1319 (Fed. Cir. 2009) (finding that a claim requiring a particular method step was anticipated by prior art that performed additional steps because of the claim's use of "comprising").

The Board's decision thus rests on a misapplication of *KSR*'s teachings and lacks substantial evidence. Accordingly, this Court should vacate the Board's decision insofar as it is based on the Board's conclusion that Hjelt's modified exercise program does not disclose or render obvious the "transmitting . . . the selected content" limitation and reverse the Board's conclusion that this limitation would not have been obvious over Hjelt.

b. Hjelt Teaches or Renders Obvious Transmitting "Predefined" Activities as Part of an Exercise Program

Finally, the Board's finding—that "it is the modified program or portion that needs transmission," Appx47-48 (emphasis omitted)—shows that Hjelt's scenario where the modification of an original base exercise program is substituting one predefined activity (e.g., walking) for another that is already part of the program (e.g., running) renders the "selected content" limitation obvious. As explained

above, the exercise programs themselves are made of up pre-defined activities (*i.e.* predefined content); and modifying an exercise program may consist of simply substituting one pre-defined activity for another. *S*ee Appx726 (7:50–56); Appx736 (28:55–56). In such a scenario, the modification, "walking," is transmitted and is, itself, predefined content. Even Qualcomm's expert acknowledges that a modified exercise plan consists of predefined activities, such as walking, *see* Appx1729–1730 ¶¶127–128, which exist prior to the receipt of the physiological data, *see* Appx1726–1728 ¶¶121–123.

Importantly, the Board did not consider how an exercise program itself was generated, which was undisputed because Qualcomm's expert acknowledged that "Hjelt . . . discloses that the 'generated' exercise program includes 'one or more selected activities'" that exist prior to the receipt of physiological data. *See* Appx1729 ¶128; Appx1726–1728 ¶¶121–123. Thus, activities that comprise the program (*i.e.*, the content that makes up the program) are selected from a set of predefined content. *See* Appx522–523 ¶187. Where the modifications are merely substituting one activity for another, such activities are obtained from the predefined library of content.

The Board faulted Apple and its expert for not explaining why a skilled artisan would have found it obvious to select content from a pre-defined library of content for transmission. Appx48. But, against the backdrop of Hjelt's disclosure of how exercise programs are created and modified, Apple and its expert's discussion of a library of predefined content stored in a database amply shows that

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such content would have been selected to accomplish modifications such as those Hjelt explicitly teaches, including substituting one activity for another in the program. Appx736 (28:50–59). The Board's conclusion to the contrary lacks substantial evidence because, among other reasons, the Board "appears to have misunderstood" or at least failed to address whether the activities themselves constitute "pre-defined content" selected in response to the receipt of physiological data. *Polygroup Ltd. MCO v. Willis Elec. Co.*, 780 F. App'x 880, 883 (Fed. Cir. 2019).

II. APPLE HAS STANDING TO BRING THIS APPEAL

Qualcomm previously filed a motion challenging Apple's standing to maintain this appeal. (*See* D.I. 22.) This Court denied the motion, but directed the parties "to address standing in their merits briefs" (D.I. 32 at 2).

"To satisfy standing, the plaintiff must allege (1) an injury-in-fact, i.e., a harm that is concrete and actual or imminent, not conjectural or hypothetical, (2) that is fairly traceable to the defendant's conduct, and (3) redressable by a favorable decision." *Prasco, LLC v. Medicis Pharm. Corp.*, 537 F.3d 1329, 1338 (Fed. Cir. 2009). Apple readily meets these elements because it presently benefits from a promise by Qualcomm Settlement Details the '861 patent as long as Apple continues to Settlement Details under a licensee and because Apple faces an imminent risk of suit once the license expires or is terminated. Both harms are attributable to Qualcomm, and this appeal would redress both by removing the '861 patent as an impediment to Apple's being able to sell its products without

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having to Settlement Details or face the threat of an infringement suit from a patent Apple believes is invalid.

A. Apple Has Standing as a Licensee to the '861 Patent

Apple plainly has standing to bring this appeal because it is a party to an agreement with Qualcomm which requires Apple to Settlement Details as a condition for Qualcomm not to assert the '861 patent, which Apple believes is invalid. *See, e.g.*, *MedImmune, Inc. v. Genentech, Inc.*, 549 U.S. 118, 130-34 (2007) (holding a licensee is not required to terminate or breach its license agreement to have standing to bring a suit challenging validity of a patent). As this and the Supreme Court have consistently held, this is a sufficiently concrete injury that gives rise to an Article III case or controversy. Indeed, in *MedImmune Inc. v. Genentech, Inc.*, the Supreme Court held that a patent licensee has Article III standing to challenge the licensed patents' validity. 549 U.S. 118, 130-37 (2007). Here, as part of the global agreement that concluded litigation between the parties, Qualcomm granted Apple a six-year license agreement, and required Apple to Settlement Details as a condition for Qualcomm Settlement Details the '861 patent. Appx2253. That alone establishes Apple's standing. *Cf. Phigenix, Inc. v. Immunogen, Inc.*, 845 F.3d 1168, 1173 (Fed. Cir. 2017) (suggesting Phigenix could have demonstrated standing by arguing it was "an actual or prospective licensee of the patent"); *see also, e.g.*, *Arkema Inc. v. Honeywell Int'l, Inc.*, 706 F.3d 1351, 1358 (Fed. Cir. 2013); *Baseload Energy, Inc. v. Roberts*, 619 F.3d 1357, 1364 n.5

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(Fed. Cir. 2010) (holding that under *MedImmune*, a "Settlement Agreement did not bar an invalidity challenge").

In previous briefing, Qualcomm dismisses *MedImmune* because the license there did not arise from litigation. Under Qualcomm's reasoning, a licensee who has never been accused of infringement has standing to challenge the patent's validity, but a licensee who has not only been accused but actually sued does not. Such a view turns Article III's requirements on their head. The existence of prior litigation does not negate the Article III controversy; it further confirms the controversy. *E.g.*, *Arkema*, 706 F.3d at 1358; *Baseload Energy*, 619 F.3d at 1364 n.5 (holding that under *MedImmune*, a "Settlement Agreement did not bar an invalidity challenge").

Serta Simmons Bedding, LLC v. Casper Sleep Inc., 950 F.3d 849 (Fed. Cir. 2020), does not, and cannot, limit *MedImmune* to non-litigation licenses. Rather, *Serta* involved the narrower question of whether settlement mooted further litigation over the particular infringement claims at issue. 950 F.3d at 852-53. Thus, its mootness holding was expressly limited to "the settled issues." *Id.* at 852. As the continuing litigation concerning the validity of Qualcomm's patents shows, the pending IPR proceeding was not among the "settled issues" resolved by the Apple-Qualcomm agreement. *See, e.g.*, Appeal Nos. 20-1561, 20-1558, 20-1560, 20-1642; *see also* Appx2254 ¶¶3-4. Indeed, during settlement discussions, Qualcomm refused Apple's request for an Settlement Details to or other Settlement Details rights in all patents subject to pending IPRs. Appx2254 ¶5.

Furthermore, the parties agreed that the IPR at issue in this appeal would continue through final resolution, including appeal. *See* Appx2254 ¶4. *Serta* is inapplicable here.

Qualcomm is also wrong to argue that *MedImmune* is inapposite because Apple's license is to a portfolio of patents. *See, e.g.*, Reply In Support of Motion To Dismiss, *Apple Inc. v. Qualcomm Inc.*, Dkt. 31, Case No. 20-1683 (Fed. Cir. Aug. 17, 2020). The constitutionally-sufficient injury in *MedImmun*e was the risk of treble damages, attorneys' fees, and injunctive relief based on a finding of infringement under the relevant patent if the licensee ceased payment of royalties. 549 U.S. at 122, 131-34. Regardless of what other remedies Qualcomm might have under other patents or in contract if Apple ceases to pay royalties, cancellation of the '861 patent would unquestionably eliminate Apple's risk of treble damages, attorneys' fees, and/or injunctive relief based on alleged infringement of the '861 patent. Under *MedImmune*, that is sufficient to satisfy Article III. *Id.* at 134.

In addition, even if Qualcomm's other potential remedies involving other patents were relevant (they are not), this Court has previously "allow[ed] adjudication to remove one legal barrier to the plaintiff's obtaining the concrete alleviation of harm it seeks, notwithstanding potential independent barriers to achieving that result, as long as such other potential barriers are not unduly likely to deprive the adjudication of concrete effect." *Apotex, Inc. v. Daiichi Sankyo, Inc.*, 781 F.3d 1356, 1364–65 (Fed. Cir. 2015). Thus the fact that other patents

may also be included in a license does not and should not prevent Apple from removing one of the patents included in the license, as that patent is certainly one legal barrier standing in the way of Apple not having to pay a license fee to Qualcomm.

This case thus aligns with others where courts allowed a plaintiff to seek removal of one barrier to its proposed action even if others remain. *See Arlington Heights v. Metropolitan Housing Development Corp.*, 429 U.S. 252 (1977) (developer had standing to challenge a zoning ordinance that blocked a potential construction, because "[i]f [the developer] secures the injunctive relief it seeks, that barrier will be removed," and there was "substantial probability" that the "project w[ould] materialize," even though other barriers, like the ability to secure financing, remained); *Apotex*, 781 F.3d at 1365–66 (ANDA applicant had standing to challenge a patent that had been disclaimed, because a win in that suit would clear a barrier to it obtaining a statutory exclusivity period, even though another barrier, obtaining tentative FDA approval for the product, remained). Were it otherwise, Article III's requirements would be defeated even during active infringement litigation by the mere fact that each patent in dispute must be challenged in separate IPR proceedings. There is no basis in Article III to so drastically curtail the jurisdiction of the Federal courts.

B. The Real and Concrete Threat of Future Infringement Allegations Gives Rise to an Article III Case or Controversy

Apple also has standing to challenge the validity of the '861 patent because of the real and concrete threat that it will face future allegations that its products

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infringe it. The '861 patent does not expire until 2031—well after the six-year Apple-Qualcomm agreement expires. In the context of a covenant-not-to-sue, the test for whether Article III remains satisfied is whether the plaintiff "'could not reasonably be expected' to resume its enforcement efforts." *Already, LLC v. Nike, Inc.*, 568 U.S. 85, 92 (2013). Because Qualcomm's promise Settlement Details the '861 patent is, in Settlement Details, a Settlement Details covenant-not-to-sue, the same standard applies to the Apple-Qualcomm settlement.

Qualcomm already sued Apple for alleged infringement of the '861 patent, and, in settling those cases, the parties expressly included a time limit on the license agreement. Appx2253 ¶¶3-4. Apple, therefore, "reasonably . . . expect[s]" that Qualcomm will "resume its enforcement efforts," which is sufficient to give rise to a justiciable controversy. *See Already, LLC v. Nike, Inc.*, 568 U.S. at 92; *see also Cardinal Chem. Co. v. Morton Int'l Inc.*, 508 U.S. 83, 99-100 (1993).

Grit Energy Solutions, LLC v. Oren Technologies, LLC, 957 F.3d 1309, 1320 (Fed. Cir. 2020), is instructive. In *Grit Energy*, this Court found that Grit Energy had standing to appeal because the appellee "previously sued Grit Energy for infringement [and] is free to reassert those infringement claims." *Id.* at 1320. The appellee specifically noted that it had "not stipulated that it [would] not reassert its previous . . . infringement allegations" as to a certain time period. *Id.* at 1320 & n.2. The settlement agreement here similarly provides that Qualcomm agrees Settlement Details the '861 patent only so long as Apple continues to Settlement Details

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Settlement Details. Appx2253 ¶¶4-5.[9] If Apple Settlement Details, Qualcomm could thus "pursue its previous claims of infringement in the future." *Grit Energy*, 957 F.3d at 1320.

Furthermore, the license agreement here does not contain an Settlement Details Settlement Details or any other Settlement Details rights in the '861 patent because Qualcomm refused to provide such rights. Appx2254 ¶5. This refusal shows that Qualcomm harbors a tangible intent to pursue claims for infringement if Apple the license agreement expires or is terminated. Qualcomm's refusal is tantamount to a threat of litigation, especially given that Qualcomm filed six complaints in the U.S. alone against Apple alleging infringement of twenty-two patents (collectively) after certain agreements under which Apple paid royalties expired.[10] The controversy is therefore not moot.

In other briefing, Qualcomm asserts that whether it will continue its enforcement efforts are "pure conjecture" because the license agreement does not expire until 2025. What matters, though, is whether an injury is "inevitable," even where the injury might not be experienced for years. *See Altaire Pharm., Inc. v. Paragon Bioteck, Inc.*, 889 F.3d 1274, 1283 (Fed. Cir. 2018), *remand order*

[9] Apple has not transferred ownership of the accused products, suggesting it suffers a greater injury in fact than that of *Grit Energy*.

[10] *See* First Amended Complaint at ¶¶102-125, 137-142, *Apple Inc. v. Qualcomm Incorporated*, Case No. 3:17-cv-00108-GPC-MDD (S.D. Cal. June 20, 2017), ECF No. 83; *see also Qualcomm Incorporated v. Apple Inc.*, Case No. 3:17-cv-02403 (S.D. Cal.); Case No. 3:17-cv-02402 (S.D. Cal.); Case No. 3:17-cv-02398 (S.D. Cal.); Case No. 3:17-cv-01375 (S.D. Cal.); Investigation No. 337-ITC-1065; Investigation No. 337-TA-1093.

modified by stipulation, 738 F. App'x 1017 (Fed. Cir. 2018). Indeed, this Court has previously held that, where an infringement suit was "inevitable" at the end of a contractual relationship, the injury arising from the threat of a suit was of sufficient immediacy to give rise to standing to appeal an adverse PTAB decision. *See id.*; *see also PPG Indus., Inc. v. Valspar Sourcing, Inc.*, No. 2016-1406, 2017 WL 526116, at *1 (Fed. Cir. Feb. 9, 2017) (non-precedential) (finding that a party had standing to appeal from adverse inter partes reexamination because the petitioner "had a legitimate concern that its manufacture and sale of [potentially infringing products] would draw an infringement action by" the patent owner).

Of course, Qualcomm could moot this appeal with a simple promise that it will not sue Apple on the '861 patent in the future. No such promise is found in Qualcomm's briefing or in the agreement between Apple and Qualcomm. Qualcomm's silence speaks volumes. Given Apple's concrete plans to continue its previous activities—activities which Qualcomm already alleged infringed its patent—the only reasonable conclusion is that Qualcomm will re-allege infringement at the termination of the agreement.

C. The Potential for Estoppel Reinforces Apple's Injuries

Although Qualcomm may be able to re-raise its infringement allegations in the future, this appeal is Apple's only chance to challenge the '861 patent in IPR. Moreover, because this IPR resulted in a final written decision, Apple's future ability to challenge the validity in the district court may be severely hampered by the estoppel arising from IPRs. *See, e.g.*, 35 U.S.C. § 315(e)(2). As this Court has

recognized, the estoppel effect of the FWD on appeal in this case "compound[s]" Apple's injury giving rise to standing. *Altaire*, 889 F.3d at 1283; *see also PPG*, 2017 WL 526116, at *2 (noting that a party's "stake" in an inter partes reexamination is "enhanced by the estoppel provisions contained within the inter partes reexamination statute"). Apple will suffer that harm today, because this is its one and only chance to appeal the Patent Office's decision here, even if the infringement litigation did not begin until the license expires. That makes this case far different from one where estoppel is not in play.

CONCLUSION

For the reasons set forth above, the Board's decision should be vacated and this Court should (1) reverse the Board's determination regarding motivation to combine and Hoffman's teaching of the "transmitting" step, (2) reverse the Board's conclusion that Hjelt fails to teach the "transmitting . . . selected content" limitation, and (3) remand to resolve the remaining arguments and claims unaddressed by the Board's Final Written Decision.

Dated: September 24, 2020

Respectfully submitted,

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ADDENDUM

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571-272-7822

Paper No. 32
Entered: February 3, 2020

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner,

v.

QUALCOMM INCORPORATED,
Patent Owner.

IPR2018-01276
Patent 8,971,861 B2

Before MICHELLE N. WORMMEESTER, AMANDA F. WIEKER, and SCOTT B. HOWARD, *Administrative Patent Judges*.

WIEKER, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining No Challenged Claims Unpatentable
35 U.S.C. § 318(a)

I. INTRODUCTION

A. Background

Apple Inc. ("Petitioner") filed a Petition requesting an *inter partes* review of claims 1–34 ("challenged claims") of U.S. Patent No. 8,971,861 B2 (Ex. 1001, "the '861 patent"). Paper 2 ("Pet."). Qualcomm Incorporated ("Patent Owner") filed a Preliminary Response. Paper 6 ("Prelim. Resp."). We instituted an *inter partes* review of challenged claims 1–34 on all five grounds of unpatentability presented in the Petition, pursuant to 35 U.S.C. § 314. Paper 7 ("Inst. Dec.").

After institution, Patent Owner filed a Response (Paper 17, "PO Resp."), Petitioner filed a Reply (Paper 21, "Pet. Reply"), and Patent Owner filed a Sur-reply (Paper 23, "PO Sur-reply"). An oral hearing was held on November 14, 2019, and a transcript of the hearing is included in the record. Paper 31 ("Tr.").

We issue this Final Written Decision pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons set forth below, Petitioner has not shown by a preponderance of the evidence that challenged claims 1–34 of the '861 patent are unpatentable.

B. Related Proceeding

The parties identify the following matter related to the '861 patent (Pet. 66–67; Paper 4, 1; Paper 15, 1):

Qualcomm Inc. v. Apple Inc., 3:17-cv-2402 (S.D. Cal.) (dismissed).

C. The '861 Patent

The '861 patent, titled "Relevant Content Delivery," issued on March 3, 2015, from U.S. Application No. 13/863,714, filed April 16, 2013. Ex. 1001, codes (21), (22), (45), (54).

According to the '861 patent, "[t]he more relevant content is to a user, the more likely the user may be to interact with the content." *Id.* at 6:21–22. Thus, the '861 patent discloses a method and system for delivering relevant content to a user. *Id.* at code (57).

The '861 patent discloses that a user's "mobile device, such as a cellular phone, can collect environmental data and physiological state data of the user to assist in providing relevant content, such as advertisements, recommendations, and applications to a user of the mobile device." *Id.* at 6:35–39. Examples of "environmental data" include "the location of the mobile device, motion of the mobile device (e.g., speed and patterns), the temperature of the mobile device, objects in the vicinity of the mobile device, etc." *Id.* at 6:52–55. Examples of "physiological state data" include "heart rate data, heart rate variability data, skin conductance level data, number of electrodermal responses data, or change in skin temperature." *Id.* at 2:51–54.

Figure 4 of the '861 patent is reproduced below.

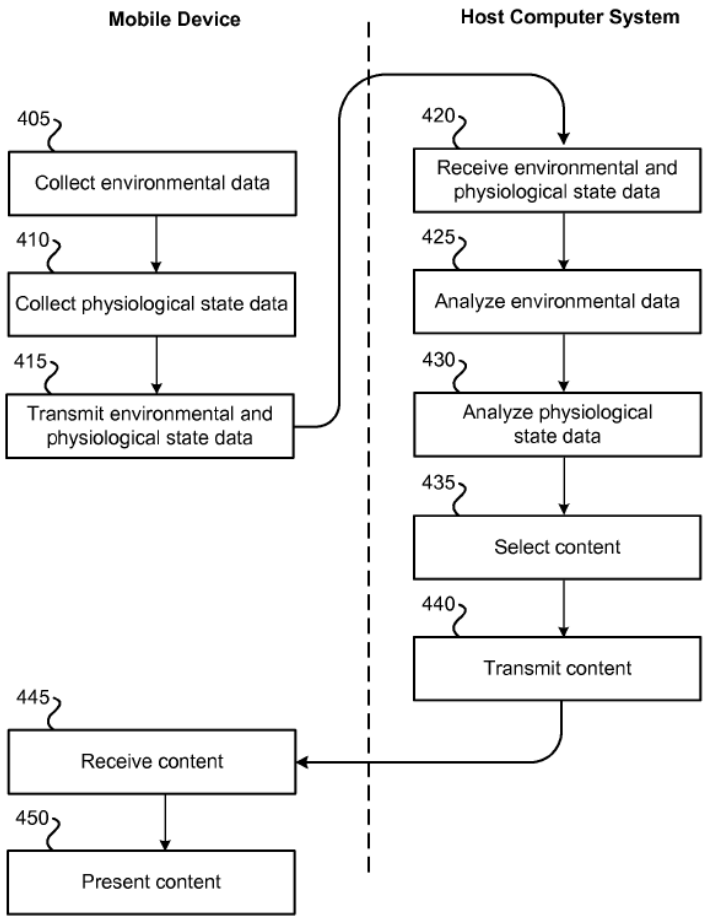

FIG. 4

Figure 4 is a flow-chart depicting a method for delivering relevant content to a mobile device. *Id.* at 6:7–8. As shown in Figure 4, a mobile device collects environmental and physiological state data through various sensors (steps 405, 410). *Id.* at 14:41–65 (e.g., a positioning (GPS) sensor and an electrocardiogram (ECG) sensor); *see also* Fig. 1 (sensors 112, 114). This data is transmitted to a host computer system (step 415). *Id.* at 14:66–15:5; *see also id.* at Fig. 1 (computer 140).

Once the data is received at the host computer (step 420), it is analyzed (step 425). *Id.* at 15:6–39 (e.g., identifying objects within an

image, interpreting accelerometer data, or determining user activity). The results of this analysis may be used to select relevant content for delivery to the mobile device (step 435). *Id.* at 15:40–52 (content is relevant when, e.g., "the content in the content database is similar to the analyzed data"); *see also id.* at Fig. 3A–3C (depicting entries in a content database, from which relevant content is selected). The selected content is transmitted to, and received by, the mobile device (steps 440, 445), and presented to the user (step 450). *Id.* at 15:51–65 (e.g., displaying text or playing audio); *see also id.* at 7:5–22 (presenting advertisements for various drinks, e.g., a sports drink, an energy drink, or a soft drink, depending upon the user's physiological state, e.g., engaging in physical activity, tired, or normal).

D. Illustrative Claims

The '861 patent includes 34 claims, all of which are challenged. Claims 1, 10, 19, and 26 are independent claims. Claims 1 and 26 are illustrative and are reproduced below.

> 1. A method for selecting content for delivery, the method comprising:
>
> receiving, by a host computer system, from a mobile device, physiological state data collected from a user of the mobile device;
>
> analyzing, by the host computer system, the physiological state data collected from the user of the mobile device;
>
> selecting, by the host computer system, content from a plurality of predefined content to deliver to the mobile device at least partially based on the physiological state data collected from the user, the selected content not including the physiological state data collected from the user; and
>
> transmitting, by the host computer system, the selected content to the mobile device.

> 26. An apparatus for selecting content for delivery, the apparatus comprising:
>
> means for receiving, from a mobile device, physiological state data collected from a user of the mobile device;
>
> means for analyzing the physiological state data collected from the user of the mobile device;
>
> means for selecting content from a plurality of predefined content to deliver to the mobile device at least partially based on the physiological state data collected from the user, the selected content not including the physiological state data collected from the user; and
>
> means for transmitting the selected content to the mobile device.

Ex. 1001, 24:6–20, 27:13–25. Independent claims 10 and 19 recite a "system" and a "non-transitory processor-readable medium," respectively, with similar limitations as those recited in claim 1. *Id.* at 25:9–29, 26:21–34.

E. Applied References

Petitioner relies upon the following references (Pet. 2):

Hoffman et al., U.S. Patent Application Publication No. 2012/0041767, filed August 11, 2010, published February 16, 2012 (Ex. 1004, "Hoffman");

Morris et al., U.S. Patent No. 7,962,604 B1, filed October 17, 2000, issued June 14, 2011 (Ex. 1005, "Morris");

Lundqvist et al., U.S. Patent Application Publication No. 2010/0179865 A1, filed January 9, 2009, published July 15, 2010 (Ex. 1006, "Lundqvist");

Lin et al., U.S. Patent Application Publication No. 2010/0125492 A1, filed November 14, 2008, published May 20, 2010 (Ex. 1007, "Lin");

Hjelt et al., U.S. Patent No. 7,278,966 B2, filed May 25, 2004, issued October 9, 2007 (Ex. 1008, "Hjelt"); and

Kurtz et al., U.S. Patent Application Publication No. 2008/0292151 A1, filed May 22, 2007, published November 27, 2008 (Ex. 1009, "Kurtz").

Petitioner relies upon the Declaration of Dr. Brian Anthony (Ex. 1003) and Patent Owner relies upon the Declaration of Dr. John Villasenor (Ex. 2003). The parties also rely upon the July 12, 2018, deposition of Dr. Villasenor (Ex. 1026), from the related litigation (*see supra* I.B); the July 26, 2019, deposition of Dr. Villasenor (Ex. 1028); and the May 7, 2019, deposition of Dr. Anthony (Ex. 2002).

F. Asserted Grounds of Unpatentability

We instituted an *inter partes* review based on the following grounds. Inst. Dec. 8, 40.

Reference(s)	Basis	Claims Challenged
Hoffman	§§ 102/103	1, 3–5, 10, 12–14, 19, 21, 22, 26, 28–30
Hoffman, Morris, Lundqvist	§ 103	6, 15, 31
Hoffman, Lin	§ 103	7–9, 16–18, 23–25, 32–34
Hjelt	§§ 102/103	1, 3–5, 10, 12–14, 19, 21, 22, 26, 28–30
Hjelt, Kurtz	§ 103	2, 11, 20, 27

II. DISCUSSION

A. Claim Construction

For petitions filed before November 13, 2018, such as this one, we interpret the claims of an unexpired patent that will not expire before issuance of a final written decision using the broadest reasonable interpretation in light of the specification. 37 C.F.R. § 42.100(b) (2017); *see also* Changes to the Claim Construction Standard for Interpreting Claims in Trial Proceedings Before the Patent Trial and Appeal Board, 83 Fed. Reg. 51,340 (Oct. 11, 2018) (codified at 37 C.F.R. § 100(b) (2019)). "Under a broadest reasonable interpretation, words of the claim must be given their plain meaning, unless such meaning is inconsistent with the specification and prosecution history." *Trivascular, Inc. v. Samuels*, 812 F.3d 1056, 1062 (Fed. Cir. 2016).

Claim limitations that include the terms "means" or "means for" are presumed to invoke 35 U.S.C. § 112 ¶ 6. *See Williamson v. Citrix Online*,

LLC, 792 F.3d 1339, 1348 (Fed. Cir. 2015) (en banc in relevant part). Claims subject to 35 U.S.C. § 112 ¶ 6 are construed in a "two-step process," whereby we "first identify the claimed function," and then "determine what structure, if any, disclosed in the specification corresponds to the claimed function." *Id.* at 1351. Accordingly, the rules governing this *inter partes* review require that Petitioner "identify the specific portions of the specification that describe the structure, material, or acts corresponding to each claimed function." 37 C.F.R. § 42.104(b)(3).

It is well established that "the corresponding structure for a § 112 ¶ 6 claim for a computer-implemented function is the algorithm disclosed in the specification." *Aristocrat Techs. Austl. Pty Ltd. vs. Int'l Game Tech.*, 521 F.3d 1328, 1333 (Fed. Cir. 2008) (quoting *Harris Corp. v. Ericsson Inc.*, 417 F.3d 1241, 1249 (Fed. Cir. 2005)); *see also EON Corp. IP Holdings, LLC v. AT&T Mobility LLC*, 785 F.3d 616, 623 (Fed. Cir. 2015) ("A microprocessor or general purpose computer lends sufficient structure only to basic functions of a microprocessor. All other computer implemented functions require disclosure of an algorithm.").

1. "physiological state data" and "environmental data"

In our Institution Decision, we preliminarily construed "physiological state data," which appears in independent claims 1, 10, 19, and 26, as "data about the user's physical condition," consistent with Petitioner's proposal and the intrinsic record. Inst. Dec. 9–10; Pet. 5–6. We also preliminarily construed "environmental data," which appears in dependent claims 3, 4, 12, 13, 21, 22, 28, and 29, as "data about the environment," consistent with Patent Owner's arguments and the intrinsic record. Inst. Dec. 9–10; Prelim. Resp. 12–14. In their post-institution papers, neither party disputes these

constructions. PO Resp. 13–15; Tr. 27:9–17. For the reasons below, we maintain our constructions from the Institution Decision.

The '861 patent Specification defines "physiological state data" as "data about the user's physical condition." Ex. 1001, 7:54–55. The '861 patent provides several examples of such data, e.g., "heart rate data, heart rate variability data, skin conductance level data, number of electrodermal responses data, or change in skin temperature," and discloses various sensors for capturing this data. *Id.* at 2:51–60, 7:55–60. Accordingly, the intrinsic record confirms our construction of "physiological state data" as "data about the user's physical condition."

The '861 patent Specification describes "environmental data" as including data about the environment, for example, "the location of the mobile device, motion of the mobile device (e.g., speed and patterns), the temperature of the mobile device, objects in the vicinity of the mobile device, etc." *Id.* at 6:52–55. The '861 patent also discloses various sensors and devices for capturing this data. *Id.* at 6:55–57 (camera), 7:23–26 (accelerometer or gyroscope), 7:31–32 (GPS receiver), 9:50 (magnetometer). Accordingly, the intrinsic record confirms our construction of "environmental data" as "data about the environment."

Additionally, the '861 patent Specification and claims confirm that "environmental data" and "physiological state data" have different meanings. Indeed, the claims recite these phrases separately. "Where a claim lists elements separately, 'the clear implication of the claim language' is that those elements are 'distinct component[s]' of the patented invention." *Becton, Dickinson & Co. v. Tyco Healthcare Group, LP*, 616 F.3d 1249,

1254 (Fed. Cir. 2010). Accordingly, the intrinsic record confirms our construction of these phrases as encompassing different types of data.

2. "a plurality of predefined content"

In our Institution Decision, we preliminarily construed "a plurality of predefined content," which appears in independent claims 1, 10, 19, and 26, as "multiple content items that exist prior to receiving the physiological state data," consistent with the intrinsic record and the positions taken by the parties in related litigation. Inst. Dec. 10–12; Prelim Resp. 14; Ex. 2001, 21 (Ex. A at 5). In their post-institution papers, neither party disputes this construction. PO Resp. 15–16; *see*, *e.g.*, Pet. Reply 2, 6. For the reasons below, we maintain our construction from the Institution Decision.

The parties' positions taken in district court litigation are consistent with our preliminary construction.[1] For example, Petitioner proposed that this phrase be construed as "[m]ultiple content items that are fixed or determined prior to receiving the physiological state data or environmental data from the mobile device." Ex. 2001 at 21 (Ex. A at 5). Similarly, Patent Owner proposed that this phrase be construed as "multiple content items existing prior to reception of the physiological state data." *Id.* Both proposed constructions require that the predefined content exists prior to receiving at least "the physiological state data."

The '861 patent Specification does not use the phrase "a plurality of predefined content." However, the '861 patent explains that content may be stored in a database, such as content database 150-2, shown in Figure 1.

[1] The district court did not issue a claim construction order before the case was terminated. Tr. 36:22–37:3.

Ex. 1001, 9:39–43, Fig. 1 (also depicting user database 150-1, pricing database 150-3). "Content database 150-2 may contain the content that host computer system 140 has available to deliver to mobile devices, such as mobile device 110. Content in content database 150-2 may be textual, graphic, and/or auditory." *Id.* at 10:48–57. According to the '861 patent, this content database "may be searched to identify content that most closely relates to the analyzed environmental and physiological state data. . . . If relevant content is identified . . . the content may be transmitted to the mobile device." *Id.* at 15:40–52; *see also id.* 6:30–42, 19:44–48. Thus, the '861 patent explains that searchable content exists in a database *prior to receiving* physiological state data and/or environmental data, for comparison.[2]

Accordingly, the intrinsic record confirms our construction of "a plurality of predefined content" as "multiple content items that exist prior to receiving the physiological state data."

3. Means-Plus-Function Limitations in Claims 26–34

Independent claim 26 recites several limitations that utilize the phrase "means for," presumptively invoking 35 U.S.C. § 112 ¶ 6. *Williamson*, 792 F.3d at 1348. For example, claim 26 recites "means for receiving . . . physiological state data . . . ," "means for analyzing the physiological state data . . . ," "means for selecting content from a plurality of predefined content . . . ," and "means for transmitting the selected content . . . ."

[2] Although the patent discusses searching the stored content against received environmental and/or physiological state data, the challenged independent claims do not recite environmental data and, as such, environmental data is not included in our construction of this phrase.

Ex. 1001, 27:13–25. Dependent claims 27, 28, 30, 31, and 32 include eight additional means-plus-function limitations. *See id.* at 27:26–28:36. 37 C.F.R. § 42.104(b)(3) requires that, for each means-plus-function limitation, "the petition must . . . identify the specific portions of the specification that describe the structure, material, or acts corresponding to each claimed function."

As noted above, "the corresponding structure . . . for a computer-implemented function is the algorithm disclosed in the specification." *Aristocrat*, 521 F.3d 1333. In our Institution Decision, we preliminarily found that the Petition had not identified sufficient corresponding structure for the means-plus-function limitations recited in claims 26–34 because Petitioner had not identified algorithms for performing the recited functions. Inst. Dec. 14–15. As a consequence, we preliminarily found that Petitioner also failed to demonstrate that the prior art satisfied the claim limitations because Petitioner failed to show the existence of the corresponding structure—i.e., the disclosed algorithms—in the prior art. *Id.* at 28–29, 37–38; *Fresenius USA, Inc. v. Baxter Int'l, Inc.*, 582 F.3d 1288, 1299–1300 (Fed. Cir. 2009) (challenger "must prove that the corresponding structure—or an equivalent—was present in the prior art").

In its Response, Patent Owner agrees with the Board that Petitioner failed to identify corresponding algorithms and, consequently, "failed to perform the correct analysis against the disclosures of Hoffman, Hjelt, or the other prior art." PO Resp. 16–19. Additionally, Patent Owner identifies what it alleges to be algorithms corresponding to certain means-plus-function limitations. *Id.* at 19–23. For example, Patent Owner contends that the algorithm disclosed in the '861 patent for performing the function

associated with the "means for analyzing the physiological state data . . ." is found "at step 430 of Figure 4, step 535 of Figure 5, or step 640 of Figure 6 and described in the Specification at 15:13–39, 17:7–11, or 19:15–41." *Id.* at 19 (citing Ex. 1001, 15:13–24 ("'using the physiological state data to identify a likely physiological state of the user,' and may also include identifying an intensity level"); Ex. 2003 ¶¶ 42–45).[3]

Petitioner acknowledges that an algorithm is required for many of the means-plus-function limitations of claims 26–34. Pet. Reply 14; Tr. 16:11–13. In the Reply and at the oral argument, Petitioner argues that the Petition's identification of "computer components from the specification," coupled with a string citation to portions of the '861 patent specification, is sufficient to comply with 37 C.F.R. § 42.104(b)(3). Pet. Reply 8; Tr. 15:15–16:20.[4] Petitioner also argues that because Petitioner put forth a string citation to the patent Specification, *the Board* should have reviewed those citations to identify and articulate the algorithms that correspond to the claimed functions, and to determine whether those algorithms are present in the asserted prior art. Tr. 15:15–16:20.

[3] The Response indicates that the parties agreed, in district court, that the corresponding structure for the "means for receiving, from a mobile device, physiological state data" is "communications subsystem 830 of computer system 140/800," and equivalents. PO Resp. 16 n.1 (citing Ex. 2001, 55). Patent Owner's counsel represents the parties' agreement that communications subsystem 830 is a "specific structure," obviating the need for an algorithm. Tr. 37:5–22. We need not resolve that issue. We focus our analysis on other means-plus-function limitations, as discussed herein.

[4] Petitioner's additional contentions regarding these limitations, and Patent Owner's Sur-reply arguments, are discussed below. Pet. Reply 8–15; PO Sur-reply 3–5; *see infra* II.D.3, II.F.3.

Our rule 37 C.F.R. § 42.104(b)(3) requires that *the petition* identify the corresponding structure for each means-plus-function limitation. Considering, for example, the "means for analyzing the physiological state data," the Petition identified the corresponding structure[5] as "host computer system 140 and a computer system 800 containing one or more processors, storage devices, input devices, output devices, communications subsystems, and memory" and cited the following portions of the '861 patent Specification: Ex. 1001, 10:15–33, 15:1–7, 15:13–39, 17:7–11, 19:15–41, and Figures 4–6. Pet. 7–8 (internal quotations omitted) (identifying the same structure for "means for selecting content . . .").

However, the structure identified by Petitioner consists entirely of general-purpose computer components, i.e., host computer system 140, computer system 800, and various general-purpose components like processors and memory. *Id.* at 7. This structure does not provide *any* algorithmic detail about how the recited function is accomplished. In particular, Petitioner does not show how host computer system 140, computer system 800, and/or the identified general-purpose computer components actually "analyz[e] the physiological state data collected from a user of the mobile device," without some type of special programming. *See EON Corp.*, 785 F.3d at 623 ("A microprocessor or general purpose computer lends sufficient structure only to basic functions of a microprocessor. All other computer implemented functions require disclosure of an algorithm."); *Finisar Corp. v. DirecTV Grp., Inc.*, 523 F.3d

[5] The parties agree the function is "analyzing the physiological state data collected from a user of the mobile device." Pet. 7; PO Resp. 19 ("*the* user").

1323, 1340–41 (Fed. Cir. 2008) ("Simply reciting 'software' without providing some detail about the means to accomplish the function is not enough."); *see also Blackboard, Inc. v. Desire2Learn, Inc.*, 574 F.3d 1371, 1382 (Fed. Cir. 2009).

An algorithm may be expressed in "any understandable terms including as a mathematical formula, in prose, or as a flow chart, or in any other manner that provides sufficient structure." *Finisar*, 523 F.3d at 1340. We do not agree, however, with Petitioner's contention that the Board should have discerned an algorithm on its own, from portions of the Specification offered in a string citation in the Petition. It is plainly Petitioner's burden—not the Board's—to make such an identification. 37 C.F.R. § 42.104(b)(3).

Moreover, a string citation lacking any explanation whatsoever is imprecise and vague. For example, Petitioner's citation to Figures 4–6 directs us to three flowcharts depicting three embodiments for performing the *entire claimed invention*, with 38 individual steps. Pet. 7; Ex. 1001, 6:7–14. It is unclear what algorithm should be divined from these figures. And although Petitioner's citations to other portions of the Specification (Pet. 7 (citing Ex. 1001, 10:15–33, 15:1–7, 15:13–39, 17:7–11, 19:15–41)) are more specific than its blanket citation to three figures, they are presented without explanation or further direction indicating what Petitioner regards as a corresponding algorithm. "Judges are not like pigs, hunting for truffles buried in briefs"; nor will we hunt for truffles buried in string citations, offered in briefs. *Anderson v. Eppstein*, 59 USPQ2d 1280, 1287 (BPAI 2001) (citing *United States v. Dunkel*, 927 F.2d 955, 956 (7th Cir. 1991)).

Moreover, as discussed in detail below, *see infra* III.D.3 and III.F.3, *even if* the Board identified an algorithm contained within the cited portions of the Specification, it is unclear how *the Petition* could have mapped the prior art to that previously unidentified algorithmic structure, given that the Petition itself did not identify the algorithm. *See* Tr. 16:21–17:7 (arguing that the Petition mapped the prior art to the claims "in the functional sense"); *but see Fresenius*, 582 F.3d at 1299 ("It is firmly established . . . that a structural analysis is required . . . [and] a functional analysis alone will not suffice.").

Accordingly, we maintain our finding that the Petition fails to identify sufficient corresponding structure, including an algorithm, for means-plus-function limitations recited in, *inter alia*, independent claim 26, including "means for analyzing the physiological state data" and "means for selecting content." Inst. Dec. 15.

B. Principles of Law

A claim is unpatentable under 35 U.S.C. § 102 if a prior art reference discloses every limitation of the claimed invention, either explicitly or inherently. *Glaxo Inc. v. Novopharm Ltd.*, 52 F.3d 1043, 1047 (Fed. Cir.1995). To establish inherency, the extrinsic evidence "must make clear that the missing descriptive matter is necessarily present" in the single anticipating reference. *Continental Can Co. v. Monsanto Co.*, 948 F.2d 1264, 1268 (Fed. Cir. 1991).

A claim is unpatentable under 35 U.S.C. § 103(a) if "the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said

subject matter pertains." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) objective evidence of nonobviousness.[6] *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). When evaluating a combination of teachings, we must also "determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue." *KSR*, 550 U.S. at 418 (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)). Whether a combination of elements would have produced a predictable result weighs in the ultimate determination of obviousness. *Id.* at 416–417.

"Both anticipation under § 102 and obviousness under § 103 are two-step inquiries. The first step in both analyses is a proper construction of the claims. . . . The second step in the analyses requires a comparison of the properly construed claim to the prior art." *Medichem, S.A. v. Rolabo, S.L.*, 353 F.3d 928, 933 (Fed. Cir. 2003) (internal citations omitted). In the context of claims that invoke 35 U.S.C. § 112 ¶ 6, "a challenger who seeks to demonstrate that a means-plus-function limitation was present in the prior art must prove that the corresponding structure—or an equivalent—was present in the prior art." *Fresenius*, 582 F.3d at 1299–1300. "It is firmly established . . . that a structural analysis is required . . . [and] a functional analysis alone will not suffice." *Id.*

[6] Patent Owner does not identify any objective evidence of nonobviousness in this case.

In an *inter partes* review, the petitioner must show with particularity why each challenged claim is unpatentable. *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016); 37 C.F.R. § 42.104(b) (2019). The burden of persuasion never shifts to Patent Owner. *Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015). To prevail, Petitioner must support its challenge by a preponderance of the evidence. 35 U.S.C. § 316(e) (2012); 37 C.F.R. § 42.1(d) (2019).

We analyze the challenges presented in the Petition in accordance with the above-stated principles.

C. Level of Ordinary Skill in the Art

In our Institution Decision, we adopted the assessment of the level of ordinary skill in the art, offered by Petitioner, such that a person of ordinary skill in the art:

> would have had a Bachelor of Science degree in an academic discipline emphasizing the design of electrical, computer, or software technologies, in combination with training or at least one to two years of related work experience with capture, processing and transmission of data or information, including but not limited to physiological monitoring technologies, or a Master of Science degree in the same discipline.

Pet. 4–5 (citing Ex. 1003 ¶ 15); Inst. Dec. 17–18.

Patent Owner offers a slightly different assessment of the appropriate skill level (PO Resp. 23), but states that "the differences between the Board's definition of level of skill in the art and Patent Owner's definition [are] not significant." *Id.* at 23–24 (identifying the skill level as "a bachelor's of science degree in electrical engineering, computer science, computer engineering, or a closely-related field, and at least two years of

work or research experience in the field of content delivery to a mobile device or a closely related field") (citing Ex. 2003 ¶¶ 25, 29).

Accordingly, we apply the assessment offered by Petitioner and applied in our Institution Decision, which is supported by evidence of record. Pet. 4–5; Inst. Dec. 17–18; Ex. 1003 ¶ 15; Ex. 2005 ¶ 29.

D. Anticipation by or Obviousness over Hoffman

Petitioner contends that claims 1, 3–5, 10, 12–14, 19, 21, 22, 26, and 28–30 of the '861 patent are unpatentable as anticipated by and/or obvious over Hoffman. Pet. 12–32. Patent Owner opposes. PO Resp. 25–43.

1. Overview of Hoffman (Ex. 1004)

Hoffman is titled "Athletic Activity User Experience and Environment." Ex. 1004, code (54). Hoffman discloses that "the invention relate[s] to the measurement, collection, display and management of athletic and non-athletic information. . . . Typically, an athletic information monitoring device will incorporate a sensor for measuring parameters relating to the person being monitored, and a computing device for processing the parameters measured by the sensor." *Id.* ¶ 26.

Hoffman discloses computer 101, which may connect to, e.g., a mobile device, such as a digital music player or a smartphone. *Id.* ¶¶ 30, 33–34, Figs. 1–2. Hoffman also discloses athletic information monitoring device 201, which includes digital music player 203, interface device 205, and athletic parameter measurement device 207, with sensors 301A–B. *Id.* ¶¶ 37–38 (e.g., speed or distance sensors 301), 48 (heart rate measurement device 207), Figs. 2–4. In operation, interface device 205 obtains processed information from measurement device 207, optionally processes it further,

and provides it to digital music player 203 for storage and/or download. *Id.* ¶¶ 37, 39–40, 43. Hoffman also discloses collection and display device 501, which receives data from monitoring device 201 and transmits it to display and configuration device 601, which may store and/or configure that data for display. *Id.* ¶¶ 51–57, 58–61 (describing the display process), Figs. 5–6.

Additionally, in Figures 7A and 7B, Hoffman discloses athletic activity monitoring watch 10, which includes an accelerometer and/or GPS receiver, and which communicates with various sensors, e.g., heart rate or shoe sensors (including those "within other devices such as device 201 of FIG. 2"). *Id.* ¶¶ 62–64.

Hoffman also discloses "computing environments through which both athletic and non-athletic activities may be monitored, collected, stored, analyzed and rewarded." *Id.* ¶ 69. Figure 8A is reproduced below.

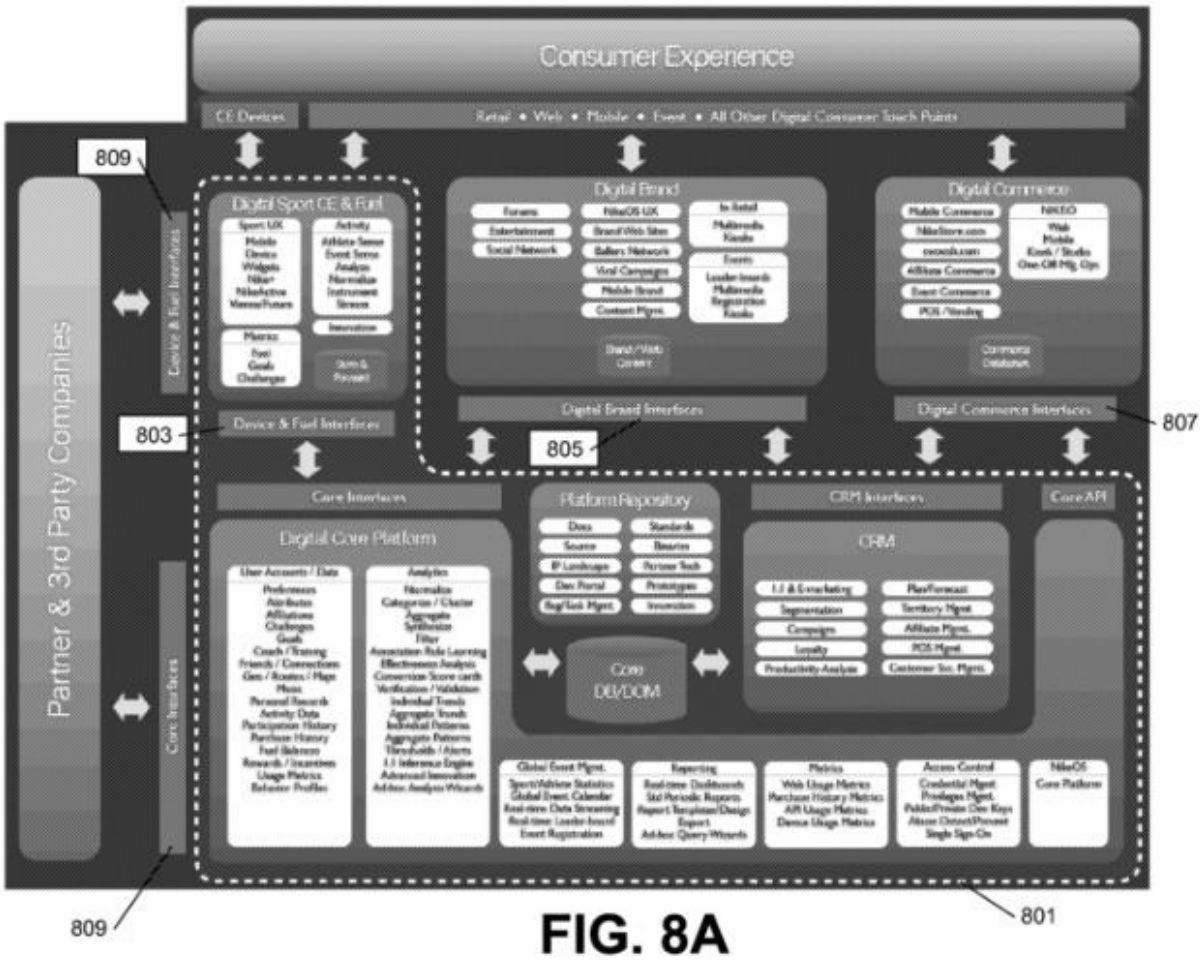

FIG. 8A

Figure 8A depicts "athletic activity monitoring system [801] and engines thereof that may be used in an athletic activity monitoring environment." *Id.* ¶ 17. Athletic performance monitoring system 801 tracks and monitors athletic performance and other activity, e.g., online browsing and shopping preferences. *Id.* ¶ 69. This information may be analyzed "to better customize the user's experience with system 801 and/or the services provided thereby." *Id.*

Figure 8A also depicts "interfaces 803 that allow remote devices (e.g., watch 10 of FIGS. 7A and 7B) to submit and receive information"—for example, detected athletic activity may be transmitted from watch 10 to system 801, for analysis and storage. *Id.* ¶ 70. Hoffman explains that

"[s]ystem 801 may further interface with various sources of information . . . For example, system 801 may submit content such as articles, posts in forums, [etc.] . . . to other sites or systems through interfaces 805." *Id.* Additionally, "system 801 may include digital commerce interfaces 807 that provide an outlet for consumers to purchase products and services" offered by companies sponsoring the services provided by system 801. *Id.* Furthermore, "[s]ystem 801 may further allow partner and third party entities to interface with system 801 to provide additional products or services that leverage and/or interoperate with the features offered by system 801 through interfaces 809." *Id.* ¶ 71. "For example, tennis balls may include sensors to detect a force of a user's stroke. Such information may be transmitted from the tennis ball to another device or to system 801 for analysis, storage and/or monitoring." *Id.*

Hoffman also explains that system 801 may include a marketing engine that leverages collected activity information "to determine what information to display to users and what products or services to advertise." *Id.* ¶ 72. "For example, if a user frequently plays basketball and purchases basketball related equipment, a service may be able to better target the user with advertisements that relate to basketball events, sales and products." *Id.* Hoffman discloses additional analytical engines that process athletic activity information, shopping behavior, and/or browsing trends "to customize the user experience." *Id.* ¶ 73. With reference to Figure 8B, Hoffman discloses that engine 810 collects "eCommerce data, event participation data, workout information, music selection information and the like to produce insights into various aspects of the user," which are used to "customize . . . a user's experience using system 801 including suggesting various products (or a

color scheme thereof), services, events and the like for the user," or by "prioritiz[ing]" relevant information "for display to the user based on the user profile." *Id.*

2. Independent Claims 1, 10, and 19

Independent claim 1 recites, *inter alia*, "selecting, by the host computer system, content . . . to deliver to the mobile device at least partially based on the physiological state data . . . and transmitting, by the host computer system, the selected content to the mobile device." Ex. 1001, 24:13–20. Independent claims 10 and 19 include similar limitations. *Id.* at 25:22–28, 26:28–34.

i. Contentions

Petitioner contends that Hoffman's system 801 includes interfaces 803 "that allow 'remote devices (e.g., watch 10 of FIGS. 7A and 7B) to submit and receive information' such as content that is customized based on a user's 'athletic information.'" Pet. 26. Thus, according to Petitioner, Hoffman "contemplates that the 'watch 10' can be used as an output device on which the user accesses . . . the customized content" of system 801. *Id.* Petitioner also contends that "customized content that can be accessed through the 'system 801' can be provided to the 'device 201' for access by the user on the 'device 201.'" *Id.* (citing Ex. 1003 ¶¶ 127–128).

Alternatively, Petitioner contends that Hoffman renders obvious the "transmitting" limitation. Pet. 26. As an initial matter, Petitioner contends that although a skilled artisan would understand Hoffman to describe "optional aspects of a single system," to the extent these optional aspects are considered distinct embodiments, it would have been obvious to combine them because: (1) this would have achieved advantages, e.g., "monitor[ing]

athletic information for a user as he/she performs an activity . . . and customizing a user's experience to improve user engagement and increase the user's motivation to continue performing athletic activities";
(2) Hoffman teaches that different software functions can be implemented on different hardware, and the embodiments are capable of interfacing with each other; and (3) this would have been the application of a known technique to a known system to yield predictable results. *Id.* at 13–15.

With respect to the "transmitting" limitation specifically, Petitioner also contends that this limitation would have been obvious because a person of ordinary skill in the art would have understood that Hoffman's "'device 201' is capable of operating as both an input device (e.g., a device that collects 'athletic information') and as an output device (e.g., a device that provides access to customized content through the 'user activity environment')." *Id.* at 26–27 (citing Ex. 1003 ¶¶ 129–131). In support, Petitioner relies upon Hoffman's teachings that "wearable monitoring devices or sensors may integrate one or more features or services provided by system 801," and "a partner or third party entity may produce sensors or wearable athletic performance monitoring devices that are compatible with the services offered by system 801." *Id.* (citing Ex. 1004 ¶ 71).

In our Institution Decision, we explained that we were unpersuaded, at least preliminarily, by Petitioner's contentions. Inst. Dec. 24–29.

In its post-institution Response, Patent Owner contends that the customized content identified by Petitioner, whether media content or external content, is transmitted only through interfaces 805, 807, or 809; according to Patent Owner, none of this content is transmitted through interface 803, which is the only interface in communication with watch 10.

PO Resp. 33–34. Moreover, Patent Owner acknowledges that although a user's athletic activity may be transmitted, via interface 803, to system 801, "Hoffman provides no disclosure of what specific content is transmitted *back to* the 'remote devices' at all, much less transmission of any 'selected content' as required." *Id.* at 34–35 (emphasis added). With respect to obviousness, Patent Owner argues that Petitioner fails to show that a person of ordinary skill in the art would have combined Hoffman's different embodiments, and fails to explain why the "transmitting" limitation would have been obvious. *Id.* at 37–42.

In its Reply, Petitioner argues, *inter alia*, that the Board's Institution Decision improperly focused on whether it would have been obvious to *modify* Hoffman to satisfy the "transmitting" limitation, where the Petition instead proposed that a skilled artisan would have found it obvious to *supplement* Hoffman's teachings. Pet. Reply 23.[7] Specifically, Petitioner alleges:

> [T]he Petition's alternative obviousness contention seeks to supplement this missing teaching—i.e., Hoffman's silence "regarding what is transmitted to the remote device"—through obviousness based on the knowledge of APOSITA to understand that the "device 201" could be configured to receive the "customized content." But configuring the "device 201" in this manner does not require a modification to Hoffman's teachings since nothing in Hoffman suggests that the configuration would involve removing or changing an existing teaching. Rather, the configuration involves adding a feature—transmission of "customized content" from the "system 801" to a remote device

[7] Petitioner alleges that Patent Owner does not dispute the obviousness of these limitations. Pet. Reply 22. The record is to the contrary. *See* PO Resp. 39–42.

> through the "interface 803"—that Hoffman neither teaches away from nor explicitly disparages.

Id. at 23–24 (citing Ex. 1003 ¶¶ 127–128) (emphasis omitted). According to Petitioner, other portions of Hoffman not considered by the Board demonstrate that it would have been obvious to "configure the 'system 801' to transmit 'customized content' back to a 'remote device.'" *Id.* at 24 (citing Pet. 26–27). For example, Petitioner identifies Hoffman's disclosure of providing a user with "activity points" to encourage a user to perform athletic activity. *Id.* at 25 (citing Ex. 1003 ¶ 69; Ex. 1004 ¶¶ 4–10, 108). According to Petitioner, "[c]ombining these portions of Hoffman together, there is recognition that information collected through the 'system 801' (e.g., 'activity points' corresponding to 'athletic activity') is transmitted back to the 'mobile device.'" *Id.* at 25–26 (citing Ex. 1003 ¶¶ 129–131; Ex. 1004 ¶¶ 77, 108; Pet. 26–27) (emphasis omitted).

ii. Anticipation

Considering the record anew, we are not persuaded that Hoffman discloses transmitting selected content to the mobile device. Hoffman's system 801 includes several different interfaces: interfaces 803, 805, 807, 809. Ex. 1004 ¶¶ 70–71. However, interface 803 is the only interface disclosed as permitting communication with "remote devices (e.g., watch 10 of FIGS. 7A and 7B) to submit and receive information." *Id.* ¶ 70. Thus, although Hoffman explains that information may be transmitted to a mobile device, via interface 803, Hoffman does not disclose *the type of information* that is transmitted through that interface, and certainly does not disclose transmission of the claimed "selected content." *Id.* Hoffman is silent regarding what is transmitted to the remote device. *Id.* The only detail

provided by Hoffman regarding the information transmitted through interface 803 concerns information transmitted *from* the remote device, which is not relevant to the claim language ("transmitting . . . *to* the mobile device"). *Id.* ("detected athletic activity may then be transmitted to system 801 for analysis and storage").

Additionally, even if we accept Petitioner's contention that Hoffman discloses that content may be customized for a user—e.g., articles, advertisements, or customized products, services, or events (Pet. 22–24)—Hoffman does not disclose that any of this content is transmitted to the remote device. Rather, Hoffman explains that articles may be posted to other sites through interface 805 (Ex. 1004 ¶ 70), products and services may be offered through interface 807 (*id.*), and additional interoperable products and services may be offered through interface 809 (*id.* ¶ 71). Likewise, although Hoffman's marketing engine 810 may display advertisement information to a user (*id.* ¶ 72), Hoffman does not disclose *how* this information is displayed, i.e., Hoffman does not disclose that this content is transmitted to a remote device. Unlike interface 803, Hoffman does not disclose that any of interfaces 805, 806, 809, or engine 810, communicate with remote devices. Dr. Anthony's testimony does not persuade us otherwise. *See* Ex. 1003 ¶¶ 127–128 (similar contentions).

For the foregoing reasons, we are not persuaded by Petitioner's contention that Hoffman discloses the "transmitting" limitation of independent claim 1, or the similar limitations of claims 10 and 19.

iii. Obviousness

In the Petition and in its Reply, Petitioner argues that Hoffman discloses optional aspects of a single system. Pet. 13–15; Pet. Reply 15–19.

For sake of argument, we accept Petitioner's contention. However, *even if* Hoffman discloses optional aspects of a single system, Petitioner still has not shown that Hoffman renders obvious the "transmitting" limitation.

In the Petition, Petitioner alleged that it would have been obvious to transmit "selected content" to Hoffman's remote device because "'device 201' is capable of" receiving such information. Pet. 26. This contention, however, fails to explain *why* a person of ordinary skill in the art would have been motivated to supplement Hoffman's teachings such that "selected content" is transmitted to device 201.[8] Surely, device 201 is capable of other uses—including receiving other types of non-selected transmitted content—yet every such use is not rendered obvious merely because the device is so capable. In its Reply, Petitioner contends that "the [proposed] configuration involves adding a feature—transmission of 'customized content' from the 'system 801' to a remote device through the 'interface 803'—that Hoffman neither teaches away from nor explicitly disparages." Pet. Reply 24 (emphasis omitted). Again, this is not affirmative reasoning to explain *why* a person of ordinary skill would have implemented the proposed configuration.

"[T]he PTAB must make a finding of a motivation to combine when it is disputed. Although identifying a motivation to combine 'need not become [a] rigid and mandatory formula[ ],' the PTAB must articulate a *reason why* a [person of ordinary skill in the art] would combine the prior art

[8] We are unpersuaded by Petitioner's attempt to distinguish an alleged "modification" to a reference from a "supplementation" of a reference. Pet. Reply 23. A "supplementation" is a "modification." Regardless, it was incumbent upon Petitioner to explain *why* a skilled artisan would have found it obvious to expand upon what is disclosed in Hoffman.

references." *In re Nuvasive, Inc.*, 842 F.3d 1376, 1382 (Fed. Cir. 2016) (internal citations omitted); *see also id.* at 1383 ("'[C]onclusory statements' alone are insufficient and, instead, the finding must be supported by a 'reasoned explanation.'" (citing *In re Lee*, 277 F.3d 1338, 1343–45 (Fed. Cir. 2002)); *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1367–68 (Fed. Cir. 2016). Petitioner offers no such "reason why." Petitioner's contentions that (1) Hoffman is capable of receiving selected content, and (2) does not disparage receiving selected content, are not *reasons why* an ordinarily skilled artisan would have been motivated to transmit selected content to Hoffman's remote device. Pet. 26; Pet. Reply 24. Rather, these arguments suggest only that an ordinarily skilled artisan *could have* configured such a system. *See Belden Inc. v. Berk-Tek LLC*, 805 F.3d 1064, 1073 (Fed. Cir. 2015) (obviousness concerns whether a skilled artisan not only could have made, but would have been motivated to make, the combination or modification to arrive at the claimed invention); *In re Giannelli*, 739 F.3d 1375, 1380 (Fed. Cir. 2014) ("[T]he mere *capability* of pulling the handles is not the inquiry that the Board should have made; it should have determined whether it would have been obvious to modify the prior art apparatus to arrive at the claimed rowing machine.").

The Petition's citations to other portions of Hoffman's disclosure are unpersuasive as well. Although Hoffman discloses that "wearable monitoring devices or sensors may integrate one or more features or services provided by system 801" (Pet. 27 (quoting Ex. 1004 ¶ 71)), neither Hoffman nor Petitioner explains why a person of ordinary skill in the art would have found it obvious to integrate *this particular* feature or service, i.e., transmission of "selected content," as Petitioner proposes. Likewise,

Hoffman's disclosure that partners may produce compatible devices fails to provide a rationale for the particular configuration proposed by Petitioner. *See* Pet. 27 (quoting Ex. 1004 ¶ 71). Dr. Anthony's testimony is unpersuasive for the same reasons. *See* Ex. 1003 ¶¶ 129–130.[9]

Moreover, Hoffman's disclosure of "activity points," discussed in the Reply, is insufficient to demonstrate obviousness. Pet. Reply 24–26. Petitioner contends that "there is recognition that information collected through the 'system 801' (e.g., 'activity points' corresponding to 'athletic activity') is transmitted back to the 'mobile device.'" *Id.* at 25. This contention is unpersuasive for two reasons. First, the Petition did not present this reasoning. *See* Pet. 25–27. This argument is made only in the Reply and is therefore untimely. *See* 37 C.F.R. § 42.23(b). Second, this contention is not supported by any evidence of record. Although the Reply cites Dr. Anthony's declaration, *see* Pet. Reply 25–26 (citing Ex. 1003 ¶¶ 69, 129–131), the cited portions do not contend that an ordinarily skilled artisan would have recognized that activity points would have been transmitted to Hoffman's remote device. Likewise, the cited portions of Hoffman do not discuss transmission of activity points to a user. Ex. 1004 ¶¶ 4–10, 77, 108.

Finally, as noted above, we accept Petitioner's contention that Hoffman discloses optional aspects of a single system. As such, the portion of the Petition contending that an ordinarily skilled artisan would have been motivated to combine Hoffman's different embodiments (Pet. 13–15) is not

[9] Moreover, even if this configuration was "well-known," this is not a *reason* to supplement Hoffman's system as proposed. Ex. 1003 ¶ 131.

applicable to the proposed configuration directed to the "transmitting" limitation (*id.* at 25–27). Nonetheless, that reasoning is unpersuasive.[10]

For the foregoing reasons, we are not persuaded by Petitioner's contention that Hoffman renders obvious the "transmitting" limitation of independent claim 1, or the similar limitations of claims 10 and 19.

3. Independent Claim 26

Claim 26 recites "means for selecting content" and "means for transmitting the selected content." Ex. 1001, 27:19–25. Even temporarily ignoring that these limitations presumptively invoke 35 U.S.C. § 112 ¶ 6, *see supra* II.A.3, Petitioner's contentions regarding claim 26 fail for the same reasons discussed above regarding claims 1, 10, and 19. *But see Medichem*, 353 F.3d at 933. Namely, Petitioner relies upon the same teachings of Hoffman, and the same reasoning discussed above, which we find insufficient to demonstrate that an ordinarily skilled artisan would have found it obvious to transmit selected content. *See* Pet. 30 ("While there are some minor differences in claim language, the limitations are substantially similar and are therefore anticipated and/or rendered obvious for the same reasons discussed above."), 31–32 (alleging Hoffman's "'computer 101'

[10] Even if Hoffman suggests that different embodiments can be implemented together and that this would be the application of a known technique to a known system to yield predictable results (Pet. 14–15), that alone is not sufficient to demonstrate obviousness because this does not demonstrate a *reason why* such a modification would have been made. Moreover, Hoffman's data display configuration device 601, utilized in Figures 2 and 5, already customizes a user's experience by configuring data. Ex. 1004 ¶¶ 51, 55, 57. Likewise, system 801, utilized in Figures 8A–C, already monitors athletic information for a user. Ex. 1004 ¶¶ 69, 70, 73 75. As such, this is not a persuasive reason to combine embodiments. Pet. 13–14.

performs functions analogous to the 'host computer system 140' and 'computer system 800' of the '861 Patent"). For the foregoing reasons, we are not persuaded by Petitioner's contention that Hoffman discloses or renders obvious the "means for selecting content" and "means for transmitting content" of claim 26.

Moreover, as discussed in II.A.3, claim 26 presumptively invokes 35 U.S.C. § 112 ¶ 6, and the Petition does not identify specific structural algorithms corresponding to the functions of, e.g., the "means for analyzing the physiological state data" and the "means for selecting content." Because Petitioner has not identified sufficient structure corresponding to the functions recited in claim 26, we cannot ascertain the differences between the claimed invention and the asserted prior art, as required by *Graham v. John Deere*, i.e., we cannot determine whether the prior art includes the corresponding structural algorithm or equivalents. *See, e.g.*, *Fresenius*, 582 F.3d at 1299–1300; *BlackBerry Corp. v. MobileMedia Ideas, LLC*, IPR2013-00036, Paper 65, 19–20 (PTAB Mar. 7, 2014) (explaining that a functional analysis is insufficient, and "an obviousness determination based on less than all of the claimed elements is speculative as to the meaning or scope of the claims" (citing *In re Steele*, 305 F.2d 859, 862–63 (CCPA 1962))).

Petitioner disagrees, and makes two arguments, each of which is unpersuasive. First, Petitioner contends that the Board "need not resolve claim construction issues for claims 26–34 to reach the merits of the unpatentability grounds presented in the Petition." Pet. Reply 14–15.

However, our reviewing court clearly instructs the opposite. The Federal Circuit is clear that evaluation of an obviousness ground is a two-step process. The first step "is a proper construction of the claims"; the

second step "requires a comparison of the properly construed claim to the prior art." *Medichem*, 353 F.3d at 933. In the context of a means-plus-function claim, this requires a challenger to "prove that the corresponding structure—or an equivalent—was present in the prior art. . . . [A] functional analysis alone will not suffice." *Fresenius*, 582 F.3d at 1299–1300.

Petitioner does not persuade us that this firmly established approach differs in practice before the Board. Pet. Reply 14–15. Petitioner's only support for this argument is its citation to *Samsung Electronics Co. LTD v. Affinity Labs of Texas, LLC*, IPR2014-01181, Paper 36 at 28–29 (PTAB Jan. 28, 2016). In that case, the petitioner did not construe the "means for recharging [an] internal battery" in the petition but, in its reply, identified corresponding structure as a "battery recharger." *Id.* at 28. The panel found that this structure was incorrect, because the challenged patent disclosed recharging through "an interface that provides both recharging power and data communications," e.g., a USB port. *Id.* at 28–29. However, because the petitioner provided evidence showing that an ordinarily skilled artisan "would have sought to add both rechargeable batteries and a USB interface—which provides both recharging power and data connectivity—to [the prior art]," the panel determined that the limitation was satisfied, "under either Petitioner's proposed construction or the structure for recharging the internal battery set forth in the [challenged] patent." *Id.* at 29.

Contrary to Petitioner's argument, *Samsung* does not stand for the proposition that the Board "need not resolve claim construction issues . . . to reach the merits of the unpatentability grounds." Pet. Reply 14–15. To the contrary, the *Samsung* panel resolved claim construction prior to reaching the merits of the prior art ground. *Samsung*, Paper 36 at 29. Moreover, that

the prior art in *Samsung* taught corresponding structure in the form of discrete, off-the-shelf components (a rechargeable battery or a USB interface) is not persuasive in this proceeding, where we must determine whether the prior art teaches an algorithm not identified by Petitioner in its Petition (or in its Reply).

We find the decision in *Syrinix, Inc. v. Blacoh Fluid Control, Inc.*, IPR2018-00414, Paper 33 at 43 (PTAB May 22, 2019), identified by Patent Owner, to be more probative. PO Sur-reply 3–5. The petitioner in *Syrinix* also failed to identify corresponding structure in the petition, but identified corresponding structure in its reply. *Syrinix*, Paper 33 at 42–43. The panel found that the petitioner failed to comply with 37 C.F.R. § 42.104(b)(3) by failing to provide an identification in the petition, and also failed to comply with 37 C.F.R. § 42.23(b) because the reply exceeded the proper scope. *Id.* at 43. The panel declined to consider the new, reply contentions but also noted that, "[e]ven if we did consider Petitioner's new contentions, they would be insufficient. Petitioner identifies alleged corresponding structures in the '553 patent, but does not provide any contention concerning where these structures are disclosed in [the asserted prior art]." *Id.* This is consistent with the Federal Circuit's instruction that we first construe the claims and then, second, compare the construed claims—including the corresponding structure—to the prior art.

Thus, for the foregoing reasons, we do not agree with Petitioner's argument that the Board "need not resolve claim construction issues for claims 26–34 to reach the merits of the unpatentability grounds presented in the Petition." Pet. Reply 14–15.

Second, Petitioner contends that the record has developed since the Petition was filed, and the Board is capable of applying the prior art to the algorithms identified in the Patent Owner Response, in light of additional arguments presented by Petitioner in its Reply. Pet. Reply 8–14; Tr. 14:16–18, 17:13–19. We disagree.

The Petition itself fails to demonstrate that Hoffman teaches the algorithms identified by Patent Owner. For example, Patent Owner contends that the algorithm associated with the "means for analyzing the physiological state data" is disclosed at "step 430 of Figure 4, step 535 of Figure 5, or step 640 of Figure 6 and described in the Specification at 15:13–39, 17:7–11, or 19:15–41," which "may include, for example, 'using the physiological state data to identify a likely physiological state of the user,' and may also include identifying an intensity level." PO Resp. 19. Even if we accept that this is a sufficient algorithm, Petitioner has not shown that Hoffman teaches it. Rather, in the Petition, Petitioner states only that "the functions recited by claims 26, 28, and 29 are performed by 'host computer system 140' and 'computer system 800.' Hoffman discloses these structures since a 'computer 101' performs functions analogous to the 'host computer system 140' and 'computer system 800' of the '861 Patent." Pet. 31 (internal citation omitted). This contention is purely functional; Petitioner does not demonstrate that Hoffman teaches the identified corresponding structural algorithm, including any of the content identified by Patent Owner. Petitioner's analysis of similar limitations appearing in claim 1 also fails to show that Hoffman teaches the identified corresponding structural algorithm. *Id.* at 20–21. Additionally, in its Reply, Petitioner does not even attempt to show where such algorithmic structure is taught by Hoffman. Pet.

Reply 8–9; *see also id.* at 9–13 (but contending that Hjelt teaches these algorithms).

For the foregoing reasons, we are not persuaded by Petitioner's contention that Hoffman anticipates or renders obvious the "means for analyzing the physiological state data" of claim 26.

4. Dependent Claims 3–5, 12–14, 21, 22, and 28–30

Each of dependent claims 3–5, 12–14, 21, 22, and 28–30 depends, directly or indirectly, from independent claim 1, 10, 19, or 26. The analysis of these dependent claims incorporate the deficiencies identified above. *See supra* II.D.2–3. Accordingly, for the same reasons, we are not persuaded by Petitioner's contentions that Hoffman anticipates or renders obvious these claims.

5. Summary

In view of the foregoing, we conclude that Petitioner has not established by a preponderance of the evidence that claims 1, 3–5, 10, 12–14, 19, 21, 22, 26, and 28–30 of the '861 patent are unpatentable as anticipated by or obvious over Hoffman.

E. Obviousness over Hoffman, Morris, and Lundqvist, or Hoffman and Lin

Petitioner contends that claims 6, 15, and 31 of the '861 patent are unpatentable as obvious over Hoffman, Morris, and Lundqvist, and also contends that claims 7–9, 16–18, 23–25, and 32–34 are unpatentable as obvious over Hoffman and Lin. Pet. 32–49. Patent Owner does not present arguments against these contentions separate from those made regarding the independent claims, as discussed above. PO Resp. 43.

Claims 6–9, 15–18, 23–25, and 31–34 depend directly or indirectly from independent claim 1, 10, 19, or 26. Accordingly, Petitioner's contentions with respect to these dependent claims suffer from the same infirmities discussed above regarding claims 1, 10, 19, and 26. Petitioner does not rely upon Morris, Lundqvist, or Lin in a manner that would cure these deficiencies. Pet. 32–49.

Thus, for the foregoing reasons, we conclude that Petitioner has not established by a preponderance of the evidence that claims 6–9, 15–18, 23–25, and 31–34 are unpatentable as obvious over Hoffman, Morris, and Lundqvist, or over Hoffman and Lin.

F. Anticipation by or Obviousness over Hjelt

Petitioner contends that claims 1, 3–5, 10, 12–14, 19, 21, 22, 26, and 28–30 of the '861 patent are unpatentable as anticipated by and/or obvious over Hjelt. Pet. 49–61. Patent Owner opposes. PO Resp. 43–67.

1. Overview of Hjelt (Ex. 1008)

Hjelt is a U.S. patent titled "System, Method and Computer Program Product for Managing Physiological Information Relating to a Terminal User." Ex. 1008, code (54). Hjelt's Figure 17 is reproduced below.

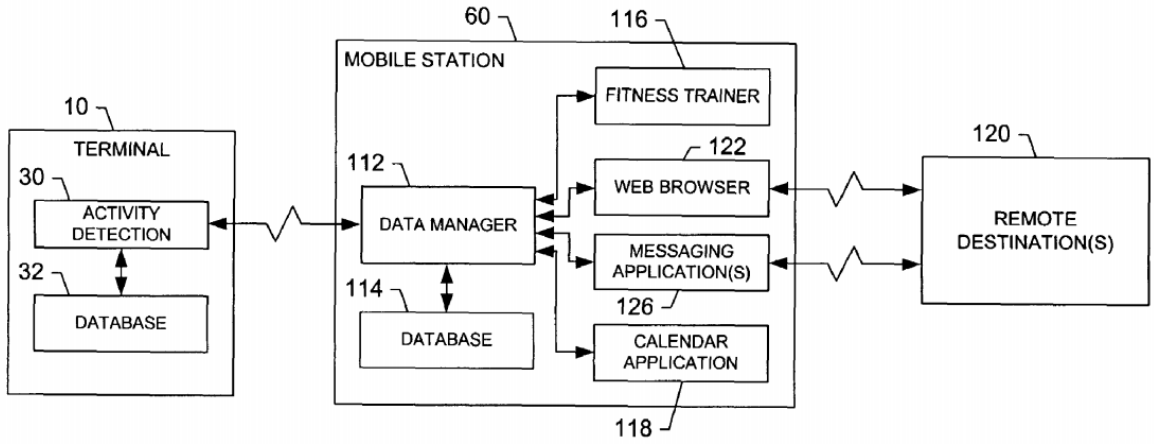

FIG. 17.

Figure 17 is a "functional block diagram of a terminal providing or otherwise transferring one or more pieces of physiological information to one or more destinations via a mobile station." *Id.* at 4:59–62.

As shown in Figure 17, Hjelt discloses terminal 10 (e.g., a mobile telephone) with activity detection application 30 for monitoring the user's fitness activities, and sensors 34 (not shown) for sensing, e.g., the ambient conditions of the terminal or user, or one or more physiological conditions of the user. *Id.* at 5:14–25, 6:9–12, 6:29–45, Figs. 1–2E (terminal 10), Fig. 3 (activity detection). Hjelt explains that activity detection application 30 communicates with mobile station 60 and/or with remote destination(s) 120, as shown in Figure 17, "to thereby permit the destination to receive physiological information from the terminal." *Id.* at 18:22–27, 22:19–25. According to Hjelt,

> The destination can thereafter manage or otherwise utilize the physiological information in any of a number of different manners. For example, the destination(s) can be capable of viewing the physiological information, as well as creating,

> modifying or otherwise customizing workout programs or routines, including setting reminders, alarms or the like (collectively referred to as "alerts") based upon a schedule of performing the activities of a workout program. In this regard, the destination(s) can be further capable of communicating with the terminal to transfer content to the terminal, such as the created, modified or otherwise customized workout programs or routines, and/or the alert(s).

Id. at 22:25–40; *see also id.* at 26:13–39 (similar), 26:65–27:14 (explaining that "destinations may select or otherwise determine content to return or otherwise transfer to the terminal 10," such as "a new exercise program, and/or modifications or adjustments to an existing exercise program . . . new or adjusted goals . . . other content related to an exercise program . . . [or] one or more alerts (e.g., reminders, alarms, etc.)"), Fig. 18 (depicting a flow chart of the transfer of content from a destination to a terminal).

2. Independent Claims 1, 10, and 19

Independent claim 1 recites "selecting, by the host computer system, content from a plurality of predefined content . . . at least partially based on the physiological state data collected from the user, . . . [but] not including the physiological state data collected from the user; and transmitting, by the host computer system, the selected content to the mobile device." Ex. 1001, 24:13–20. Independent claims 10 and 19 include similar limitations. *Id.* at 25:22–28, 26:28–34. In other words, these claims require that the content that is transmitted to the mobile device:

(1) is selected from a plurality of predefined content (i.e., from "multiple content items that exist prior to receiving the physiological state data" (*see supra* II.A.2)),

(2) is at least partially based on the user's collected physiological state data, and

(3) does not include the collected physiological state data.

See, e.g., Ex. 1001, 24:13–18; Tr. 43:22–44:2.

Petitioner contends that Hjelt discloses or renders obvious the "selecting" and "transmitting" limitations. Pet. 53–56. According to Petitioner, Hjelt's destination 120 "can 'select or otherwise determine content to return or otherwise transfer to the terminal 10,'" including a new exercise program, "modifications or adjustments to an existing exercise program," new or adjusted goals, or "other content related to an exercise program or the user's progress." *Id.* at 53–54. Thus, Petitioner contends that the content "can be selected from '*a plurality of pre-defined content*.'" *Id.* at 54.

Alternatively, Petitioner alleges that Hjelt renders obvious the selection of predefined content, because an ordinarily skilled artisan would have understood that "'destination 120' can select content from a 'pre-defined' library of content," and also would have understood that destination 120 can adjust or modify existing content. *Id.* at 54 (emphasis omitted). Moreover, Petitioner contends an ordinarily skilled artisan "would have understood that Hjelt . . . contemplates storing a library of 'predefined' content that corresponds to, for example, an exercise program of a user, or the user's goals for the exercise program," and discloses storing physiological and content information in databases. *Id.* (citing, e.g., Ex. 1003 ¶¶ 185–187) (emphasis omitted). According to Petitioner, an ordinarily skilled artisan "would have recognized that content stored by the 'destination 120' could represent a 'pre-defined' library of content from which content is selected and transmitted to the 'terminal 10' based on received 'physiological information.'" *Id.* at 54–55.

Petitioner also contends that the content selected by destination 120, e.g., "modified or customized exercise programs, alerts . . . , or calendars reflecting workout schedules," includes information other than the received physiological information. *Id.* at 55 (citing, e.g., Ex. 1003 ¶ 188) (alternatively contending this would have been obvious).

In our Institution Decision, we found these contentions to be supported sufficiently for purposes of institution. Inst. Dec. 34. We preliminarily determined that Hjelt disclosed "select[ing]" content, e.g., an exercise program or an alert, and we concluded that the content "appears to exist prior to receiving the physiological state data." *Id.* at 35 (quoting Ex. 1008, 26:65–27:14). Thus, we preliminary found that the content was "predefined." *Id.*

Patent Owner disagrees with Petitioner's contentions and our preliminary findings. PO Resp. 48–63. Patent Owner argues that even if Hjelt discloses *selecting* content, as noted in the Institution Decision, this demonstrates only that the content exists when it is selected; this does not demonstrate that the content exists *prior to* receiving the physiological state data, as required by our claim construction. *Id.* at 50–51. Thus, Patent Owner argues, "the Institution Decision's conclusion that the selection of content (an exercise program or alert) thus 'appears to fall within the scope of this limitation, because the program or alert appears to exist prior to receiving the physiological state data' conflates two separate requirements of the claims and misses the mark." *Id.* at 51; *see also* Tr. 42:11–53:5 (Patent Owner's counsel arguing that the new exercise program "exists at the time it was selected, but the assumption there that . . . you're selecting something

that existed prior to receiving the physiological state data, that's nowhere in the record").

Patent Owner also argues that each of the content items identified by Petitioner—i.e., new or modified exercise programs, new or adjusted goals, or "other content"—does not satisfy all three requirements of selected content, identified above, "because they fail to exist in mobile station 60 or remote destination 120 prior to receiving 'physiological state data,' are not based on 'physiological state data,' and/or include the 'physiological state data.'" PO Resp. 51.[11]

For example, Patent Owner contends that new or modified exercise programs "are based on Hjelt's 'selected activities,'" not "physiological state data," as properly construed. *Id.* at 55; *see also id.* at 46–47 (discussing Hjelt's "physiological information"), 51–54 (explaining that Hjelt's terminal monitors and identifies a user's activity, manages a user's fitness goals, and transmits this physiological information to the destination); Ex. 1008, 26:18–29.[12] Patent Owner also argues that *even if* "selected activities" are "physiological state data," the new or modified exercise programs are selected or generated *after* receiving that data and, therefore, do not exist prior to receipt of the data. *Id.* at 56.

[11] We do not agree that "predefined content" must "exist in Hjelt's mobile station 60 or remote destination 120." PO Resp. 51. This is not required by the plain language of the claims, or by our construction. *See supra* II.A.3; *see also* Pet. Reply 6.

[12] Patent Owner also argues that Hjelt does not generate new or modified exercise programs "based on" heart rate data, which Patent Owner concedes may be "physiological state data," as construed. *Id.* at 47–48, 55–56; Ex. 2002, 98:6–101:3.

Next, Patent Owner argues that new and adjusted fitness goals "are based on a user's goals," not "physiological state data," as properly construed. *Id.* at 57. Additionally, Patent Owner argues that *even if* a user's goals are "physiological state data," the new or adjusted goals do not exist prior to receipt of the data. *Id.* at 57–58.

Finally, Patent Owner argues that Hjelt's other content, like calendars and alerts, are based on a "user's 'selected activities,'" not "physiological state data," as properly construed. *Id.* at 58–59. Additionally, Patent Owner argues that *even if* "selected activities" are "physiological state data," the calendars and alerts do not exist prior to receipt of the data. *Id.* at 59–60.

Upon review of the parties' arguments and cited evidence, we agree with Patent Owner. For sake of argument, we accept Petitioner's contention that the "physiological information" received by Hjelt's destination 120 is "physiological state data," as properly construed. Pet. 50–52; *but see* PO Resp. 47–48, 55–56, 57, 58–59 (disputing).

New Exercise Program

Hjelt discloses that a "new" exercise program may be selected or generated based on received physiological state data. Hjelt explains, for example, that "after performing one or more operations based upon the [received] piece(s) of physiological information," the destination may "select or otherwise determine content" to transmit to the terminal, such as "a new exercise program." Ex. 1008, 26:65–27:5.[13] Hjelt does not specify

[13] Similar consistent disclosures appear elsewhere in Hjelt, including in the portions cited by Petitioner. *See* Pet. 52–56; *see, e.g.*, Ex. 1008, 2:54–3:6 (destination provides content to terminal based upon physiological information, e.g., adjusted exercise program and/or alerts), 22:19–40

when this information was created, e.g., when it "exist[ed]." *See supra* II.A.3. Thus, we agree with Patent Owner that the evidence shows that Hjelt's new exercise program exists *when it is selected* for transmission to the terminal—i.e., "after performing one or more operations based upon the piece(s) of physiological information"—but says nothing about whether that new exercise program "exist[ed] prior to receiving the physiological state data," i.e., Hjelt's physiological information, as required by our construction of "a plurality of predefined content." Tr. 42:11–53:5; *see supra* II.A.3.

Petitioner does not direct us to any persuasive evidence demonstrating that Hjelt's new exercise program exists at that critical point in time, i.e., before receiving the physiological information, or that this would have been obvious. Pet. 53–56 (citing Ex. 1008, 2:54–3:6 (disclosing that the destination "can provide content to the terminal based upon the physiological information"), 22:63–23:9 (disclosing that a destination is capable of storing a database or operating an application)) (no obviousness arguments regarding new exercise programs); Pet. Reply 1–6. Likewise, the cited testimony of Dr. Anthony fails to show that any new exercise program exists *before* receipt of physiological state data. Ex. 1003 ¶¶ 184–187.

(destination views physiological information; creates, modifies, customizes exercise programs; sets reminders and alarms; transfers content to the terminal), 22:63–23:9 (destination can store information or operate a fitness trainer or calendar application), 23:43–49 (destination receives content from, and transfers content to, terminal, including modified exercise schedules and/or alerts), 26:13–64 (explaining that the destination is capable of, "based upon the piece(s) of physiological information, generat[ing] an exercise program . . . guid[ing] the user through the exercise program, and/or modify[ing], customiz[ing] or otherwise adjust[ing] the program and/or the user's goals . . . based upon the user's progress"; also disclosing scheduling calendars and alerts).

Instead, we credit Dr. Villasenor's testimony that such content did not exist prior to receiving physiological information, but rather is created upon receiving such information, because this testimony is consistent with Hjelt's disclosure. Ex. 2003 ¶ 131; *see generally id.* ¶¶ 120–145.

Accordingly, we determine that Hjelt's "new" exercise program does not qualify as selected content.

Modified Exercise Program

As discussed above, among other things, the selected content must have "exist[ed] prior to receiving the physiological state data" *and* must be transmitted to the terminal. Hjelt's "modified" exercise programs are not shown to be "selected content" for two reasons. First, Petitioner has not shown that a modified program "exist[ed] prior to receiving the physiological state data" and, second, Petitioner has not shown that the original, base exercise program—upon which the modifications were made—is transmitted to the terminal along with the modification.

Hjelt explains that after operations are performed on the received physiological information, the destination may select content to transmit to the terminal, such as "modifications or adjustments to an existing exercise program (including one or more activities of an existing program)." Ex. 1008, 26:65–27:7. Thus, Hjelt explains that in order to create "modifications or adjustments," an original, base exercise program already exists. *Id.* However, even if this original, base program exists prior to receipt of the physiological state data, Petitioner does not (and presumably could not) establish that the modifications or adjustments themselves, i.e., the content that is "transfer[red] to the terminal" (*id.* at 27:3–7), exists at that same point in time. Pet. 53–55 (citing Ex. 1008, 2:54–3:6, 22:63–23:9).

The cited testimony of Dr. Anthony also fails to show that any modified exercise program exists *before* receipt of physiological state data Ex. 1003 ¶¶ 184–187. We recognize that Dr. Anthony opines that because destination 120 may transmit "modified versions of existing content," Hjelt's system "selects content from 'a plurality of pre-defined content.'" *Id.* ¶¶ 185, 186 (similar) (emphasis omitted). These opinions, however, are offered without any supporting evidence or persuasive explanation. For example, Dr. Anthony fails to articulate how an exercise program that is modified *based on received physiological information* could exist prior to receipt of that information. As such, we afford it minimal weight. Instead, we find Dr. Villasenor's testimony to be more probative because it is consistent with Hjelt's disclosure. Ex. 2003 ¶ 131; *see generally id.* ¶¶ 120–145.

Moreover, during the oral hearing, Petitioner's counsel argued that at least some portion of the original, base exercise program is transmitted to the terminal, along with the modifications. Tr. 56:4–57:14; Pet. Reply 6. We are not persuaded. Petitioner does not identify any support—whether in Hjelt or through its declarant—for this proposition. *See generally* Tr. 56:4–57:14; Pet. 55–56; Pet. Reply 6; Ex. 1003 ¶¶ 184–187; *but see* PO Sur-reply 17–18. Nor does Petitioner support its contention that a *portion* of the original, base program is transmitted with the modified program. Tr. 56:4–57:14; Pet. Reply 6 (arguing that "some aspect of the exercise programs or user goals necessarily existed when the 'physiological information' was received," but not arguing that this "aspect" is transmitted to the destination). To the contrary, we discern that if an original, base program is modified based on received physiological data, transmission of the original,

base program, or a portion thereof, is likely unnecessary; it is the *modified* program or portion that needs transmission. Nonetheless, it is Petitioner's burden to support its contentions, and Petitioner fails to identify any supporting evidence on this point.

We are also unpersuaded by Petitioner's contention that it would have been obvious to select predefined content. Pet. 54–55 (citing Ex. 1003 ¶¶ 185–187; Ex. 1008, 6:1–28, 22:41–62, 22:63–23:9). Petitioner does not identify any *reason why* an ordinarily skilled artisan would have found it obvious to select predefined content, as claimed. Instead, Petitioner merely contends that Hjelt's destination modifies content and that Hjelt "contemplates" storing libraries of content, including, e.g., exercise programs, because Hjelt discloses databases. *Id.* at 54. Even accepting this as true, this does not explain *why* an ordinarily skilled artisan would have found it obvious to select predefined content, as construed, for transmission to the terminal. *Id.* at 54–55; *see, e.g.*, *Belden*, 805 F.3d at 1073; *In re Giannelli*, 739 F.3d at 1380; PO Resp. 61–63.

The cited portions of Dr. Anthony's declaration also fail to explain why this would have been obvious. Ex. 1003 ¶¶ 185–187. Instead, Dr. Anthony opines that an ordinarily skilled artisan would have understood that Hjelt contemplates storing a library of predefined content, which, as we stated in out Institution Decision, is not relevant to the claims as construed. *Id.* ¶ 187; Inst. Dec. 35–36; *see also* Inst. Dec. 36 n.3 (inviting the parties to address whether storing a library of content is pertinent to the claim language); *see generally* Pet. Reply (failing to make such an argument); Pet. Reply 7 (arguing the claims do *not* specify where predefined content is stored); PO Resp. 60–61. Additionally, Dr. Anthony opines that, because

Hjelt discloses modifying content, Hjelt would have been understood to store a library of predefined content, presumably including the original, base content to be modified. Ex. 1003 ¶ 187. Even if this is true, Petitioner and Dr. Anthony fail, as discussed above, to demonstrate that such content exists before receiving the physiological information and/or fail to demonstrate that the original base program is transmitted to the terminal. Neither Petitioner's obviousness contentions nor Dr. Anthony's testimony resolves these deficiencies.

Accordingly, we determine that Hjelt's "modified" exercise program does not qualify as "selected content."

Other Content

Petitioner's contentions regarding Hjelt's disclosure of other content, such as new and adjusted goals, calendar reminders, and alerts fail for substantially the same reasons as discussed above regarding new and modified exercise programs.

As above, Hjelt explains that after operations are performed on the received physiological information, the destination may select content to transmit to the terminal, such as "new or adjusted goals" or "alerts." Ex. 1008, 26:65–27:14. However, Hjelt does not identify when these items came into existence and, as above, Petitioner does not direct us to any persuasive evidence demonstrating that these content items exist at the critical point in time—before receipt of physiological state data—or that this would have been obvious. Pet. 53–56 (citing Ex. 1008, 2:54–3:6, 22:63–23:9); Pet. Reply 1–6; Ex. 1003 ¶¶ 184–187; *but see* Ex. 2003 ¶¶ 135, 139; *see generally id.* ¶¶120–145.

Summary

For the foregoing reasons, Petitioner has not demonstrated by a preponderance of the evidence that Hjelt discloses or renders obvious the "selecting" and "transmitting" limitations of independent claims 1, 10, and 19.

3. Independent Claim 26

Claim 26 recites "means for selecting content" and "means for transmitting the selected content." Ex. 1001, 27:19–25. Even temporarily ignoring that these limitations presumptively invoke 35 U.S.C. § 112 ¶ 6, Petitioner's contentions regarding claim 26 fail for the same reasons discussed above regarding claims 1, 10, and 19. *But see Medichem*, 353 F.3d at 933. Namely, Petitioner relies upon the same teachings of Hjelt, and the same reasoning discussed above, which we find insufficient to demonstrate that a skilled artisan would have found it obvious to transmit selected content, as construed. *See* Pet. 60 (arguing claim 26 is "taught and/or rendered obvious over *Hjelt* for the same reasons discussed above" and contending Hjelt's "'destination 120' performs functions analogous to the 'host computer system 140' and 'computer system 800' of the '861 Patent"). For the foregoing reasons, we are not persuaded by Petitioner's contention that Hjelt anticipates or renders obvious the "means for selecting content" and "means for transmitting the selected content" of claim 26.

Moreover, as discussed in II.A.3, claim 26 presumptively invokes 35 U.S.C. § 112 ¶ 6, and the Petition does not identify structural algorithms corresponding to the functions of, e.g., the "means for analyzing the physiological state data" and the "means for selecting content," which

precludes our comparison of the claims against the prior art. *See supra* II.D.3. As noted above, the Petition is deficient for failing to identify corresponding algorithms and, instead, making only functional comparisons to Hjelt. *Id.*; Pet. 60.

As discussed above, *see supra* II.A.3 and II.D.3, Petitioner was obliged to identify corresponding algorithms in its Petition, and failed to do so. Like the panel in *Syrinix*, we determine that Petitioner's failure violates 37 C.F.R. § 42.104(b)(3). *Syrinix*, Paper 33 at 43. Moreover, *even if* we consider the arguments made in Petitioner's Reply, whereby Petitioner attempts to show that the "specialized algorithms" identified in the Patent Owner Response "are also disclosed by the prior art cited in the Petition," (Pet. Reply 8–9), we are unpersuaded by those contentions. For example, Petitioner does not demonstrate that Hjelt teaches the algorithm identified by Patent Owner for the "means for analyzing the physiological state data."

Specifically, Patent Owner contends that the algorithm associated with the "means for analyzing the physiological state data" is disclosed at "step 430 of Figure 4, step 535 of Figure 5, or step 640 of Figure 6 and described in the Specification at 15:13–39, 17:7–11, or 19:15–41," which "may include, for example, 'using the physiological state data to identify a likely physiological state of the user,' and may also include identifying an intensity level." PO Resp. 19. Upon review of the'861 patent, we discern that the cited figures provide only functional, not algorithmic, detail. *See, e.g.*, Ex. 1001, Fig. 4, 430 ("Analyze physiological state data"). However, the cited portions of the Specification arguably provide three examples of algorithmic detail:

> (1) "using the physiological state data to identify a likely physiological state . . . [and] associat[ing that state] with an intensity level" (*id.* at 15:13–24 (nervous, low/medium/high intensity), 19:15–25 (same));
>
> (2) "determining a physiological state of the user" (*id.* at 17:7–11 (e.g., tired, happy, thirsty, or cold)); or
>
> (3) analyzing an image for characteristics like objects or location (*id.* at 15:25–39, 19:26–41).

If we accept Patent Owner's contention that these disclosures provide sufficient algorithmic structure, we discern that Petitioner has not shown that Hjelt teaches a corresponding algorithm. In its Reply, Petitioner contends "Hjelt teaches the specialized algorithm where 'physiological information' collected by the 'terminal 10' is computed by the 'activity detection application 30' and can represent different types of information based on a type of activity performed by the user, e.g., 'intensity activity, duration activity or step activity,' among others." Pet. Reply 9–10. Petitioner however, fails to explain how collecting information and computing it to represent different types of activity information relates to the purported algorithmic examples identified by Patent Owner. For example, Petitioner does not show that Hjelt's system identifies a likely physiological state, as required by the first and second examples in the '861 Specification. Nor does Petitioner show that Hjelt's system analyzes an image, as required by the third example. At best, Petitioner contends that Hjelt's system computes and represents "intensity activity," but this is not described by the '861 patent as the complete corresponding algorithmic structure for the "means for analyzing." *See* Ex. 1001, 15:13–24, 19:15–25 (identifying a likely physiological state and *associating that state* with an intensity level).

Thus, for the foregoing reasons, we also are not persuaded by Petitioner's contention that Hjelt anticipates or renders obvious the "means for analyzing the physiological state data" of claim 26.

4. Dependent Claims 3–5, 12–14, 21, 22, and 28–30

Each of dependent claims 3–5, 12–14, 21, 22, and 28–30 depends, directly or indirectly, from independent claim 1, 10, 19, or 26. The analysis of these dependent claims incorporate the deficiencies identified above. *See supra* II.F.2–3. Accordingly, for the same reasons, we are not persuaded by Petitioner's contentions that Hjelt anticipates or renders obvious these claims.

5. Summary

In view of the foregoing, we conclude that Petitioner has not established by a preponderance of the evidence that claims 1, 3–5, 10, 12–14, 19, 21, 22, 26, and 28–30 of the '861 patent are unpatentable as anticipated by or obvious over Hjelt.

G. Obviousness over Hjelt and Kurtz

Petitioner contends that claims 2, 11, 20, and 27 are unpatentable as obvious over Hjelt and Kurtz. Pet. 61–65. Patent Owner does not present arguments against these contentions separate from those made regarding the independent claims, as discussed above. PO Resp. 44, 67.

Claims 2, 11, 20, and 27 depend directly from independent claim 1, 10, 19, or 26. Accordingly, Petitioner's contentions with respect to these dependent claims suffer from the same infirmities discussed above regarding claims 1, 10, 19, and 26. Petitioner does not rely upon Kurtz in a manner that would cure these deficiencies. Pet. 61–65.

Thus, for the foregoing reasons, we conclude that Petitioner has not established by a preponderance of the evidence that claims 2, 11, 20, and 27 are unpatentable as obvious over Hjelt and Kurtz.

III. CONCLUSION

In summary:[14]

Claims	35 U.S.C. §	Reference(s)	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1, 3–5, 10, 12–14, 19, 21, 22, 26, 28–30	102/103	Hoffman		1, 3–5, 10, 12–14, 19, 21, 22, 26, 28–30
6, 15, 31	103	Hoffman, Morris, Lundqvist		6, 15, 31
7–9, 16–18, 23–25, 32–34	103	Hoffman, Lin		7–9, 16–18, 23–25, 32–34
1, 3–5, 10, 12–14, 19, 21, 22, 26, 28–30	102/103	Hjelt		1, 3–5, 10, 12–14, 19, 21, 22, 26, 28–30
2, 11, 20, 27	103	Hjelt, Kurtz		2, 11, 20, 27
Overall Outcome				**1–34**

[14] Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*, 84 Fed. Reg. 16654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. *See* 37 C.F.R. § 42.8(a)(3), (b)(2) (2019).

IV. ORDER

Upon consideration of the record before us, it is:

ORDERED that Petitioner has not shown by a preponderance of the evidence that claims 1–34 of the '861 patent are unpatentable; and

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

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US008971861B2

(12) **United States Patent**
Gupta et al.

(10) **Patent No.: US 8,971,861 B2**
(45) **Date of Patent: Mar. 3, 2015**

(54) **RELEVANT CONTENT DELIVERY**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **13/863,714**

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(60) Provisional application No. 61/499,596, filed on Jun. 21, 2011.

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CPC ***G06Q 30/0267*** (2013.01); ***G06Q 30/02*** (2013.01)
USPC **455/414.1**

(58) **Field of Classification Search**
CPC G06Q 30/02; H04L 51/063
USPC 455/3.04, 414.3, 456.3, 456.1, 414.1; 705/14.35, 14.55, 14.64, 15, 3, 2; 340/539.12; 370/466
See application file for complete search history.

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(Continued)

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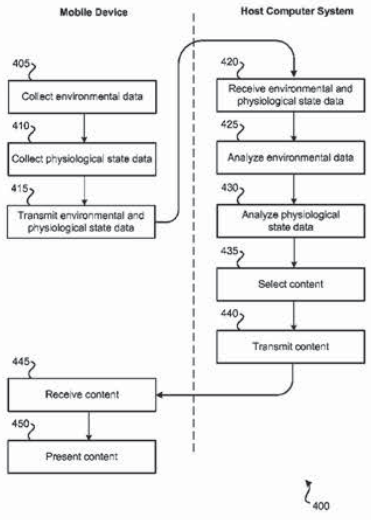
(57) **ABSTRACT**

Various arrangements for delivery of relevant content to a mobile device of a user are presented. Physiological state data and image data related to the user of the mobile device may be received by a host computer system from a mobile device. The image data may be analyzed to identify a characteristic of the image. The physiological state data may also be analyzed. Content to deliver to the mobile device of the user may be selected at least partially based on the physiological state data of the user and the characteristic of the image. The content may be transmitted to the mobile device.

34 Claims, 10 Drawing Sheets



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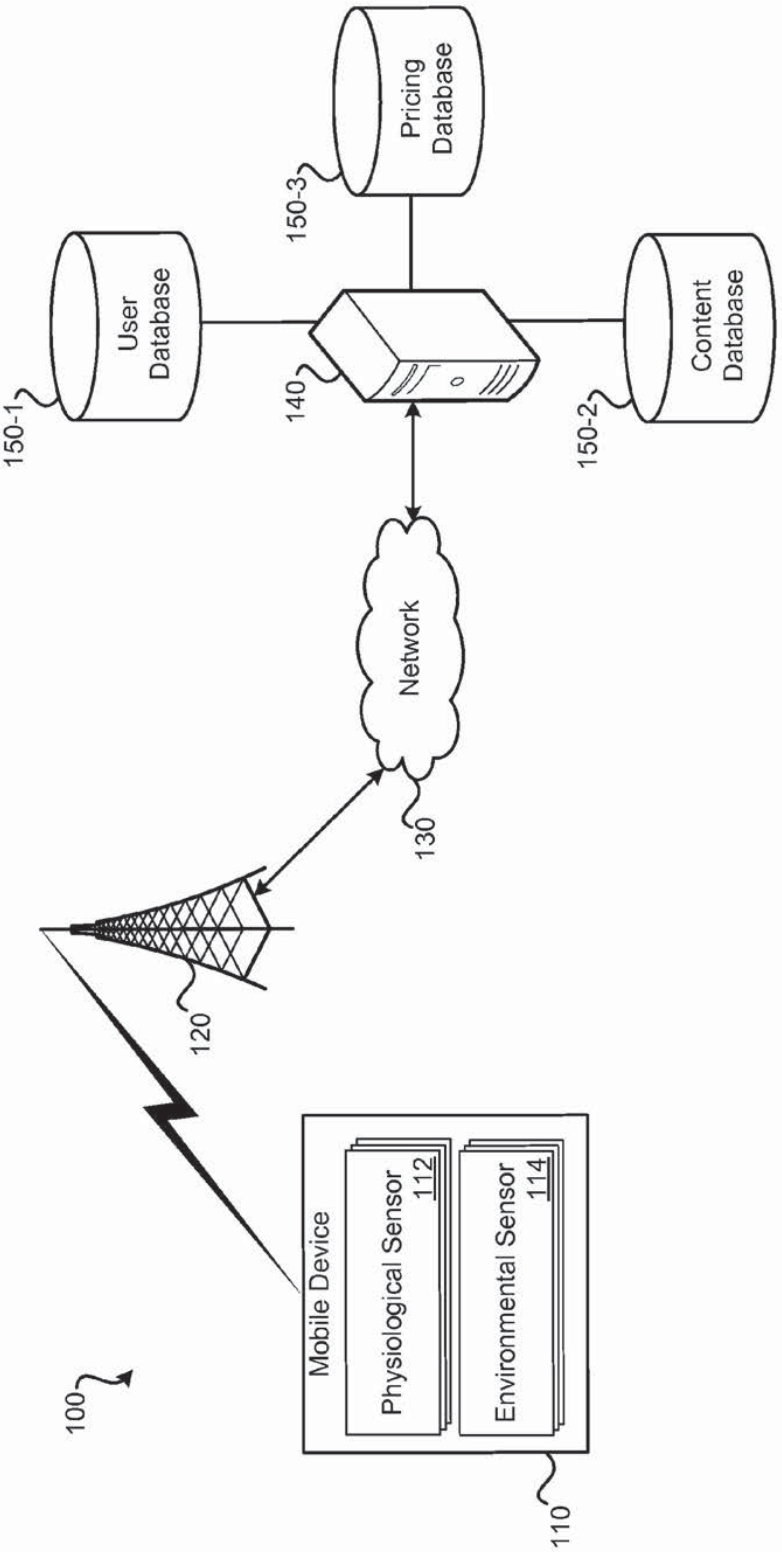

Pricing Database
150-3
User Database
150-1
140
Content Database
150-2
Network
130
120
Mobile Device
Physiological Sensor 112
Environmental Sensor 114
110
100

FIG. 1

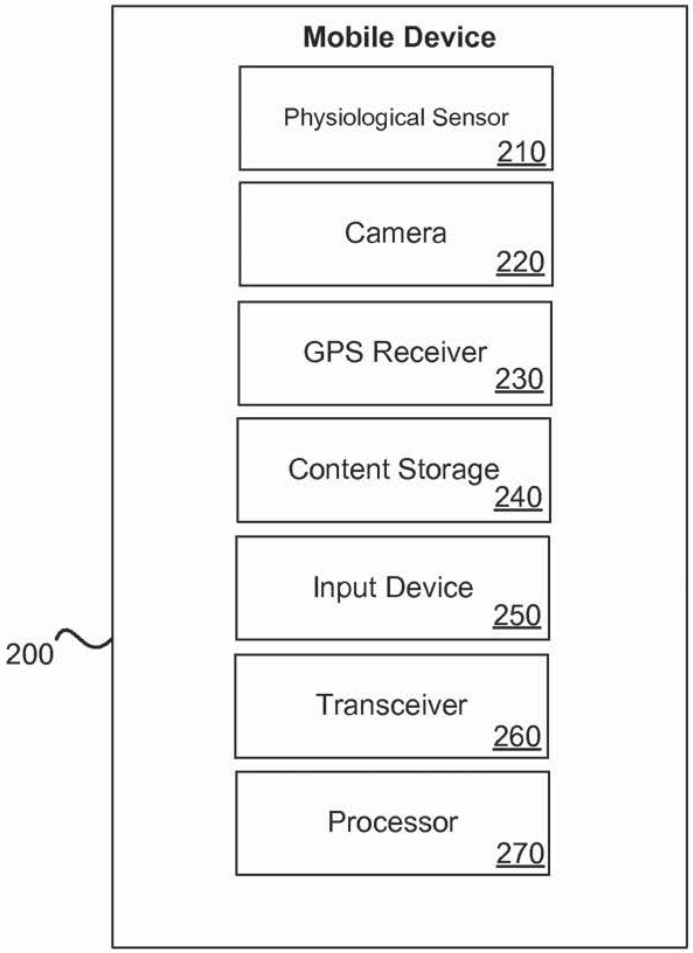
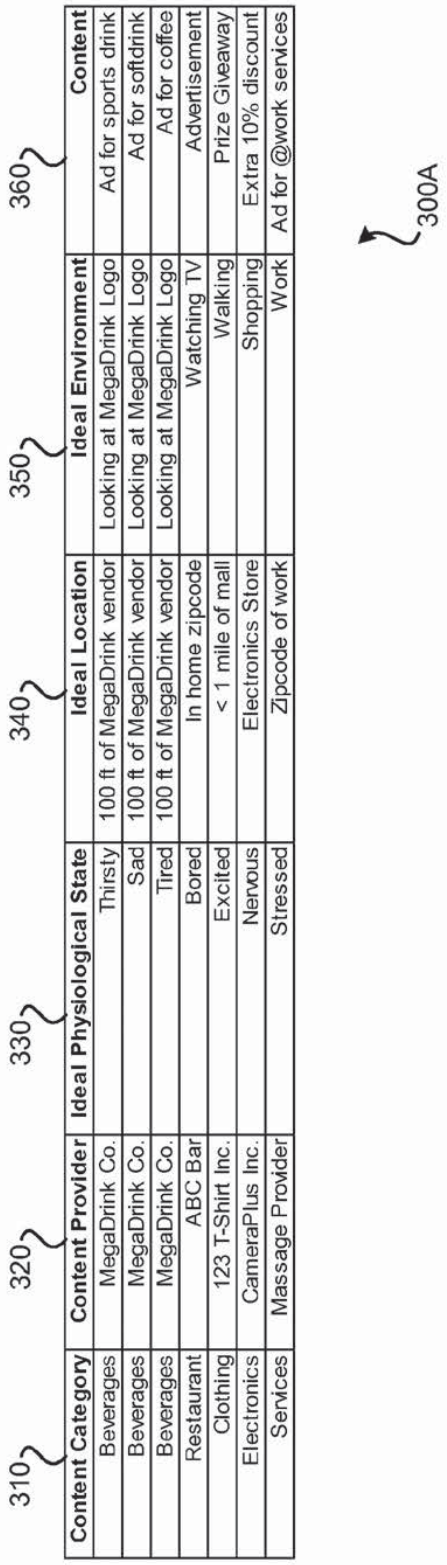

Mobile Device
Physiological Sensor
210
Camera
220
GPS Receiver
230
Content Storage
240
Input Device
250
Transceiver
260
Processor
270
200

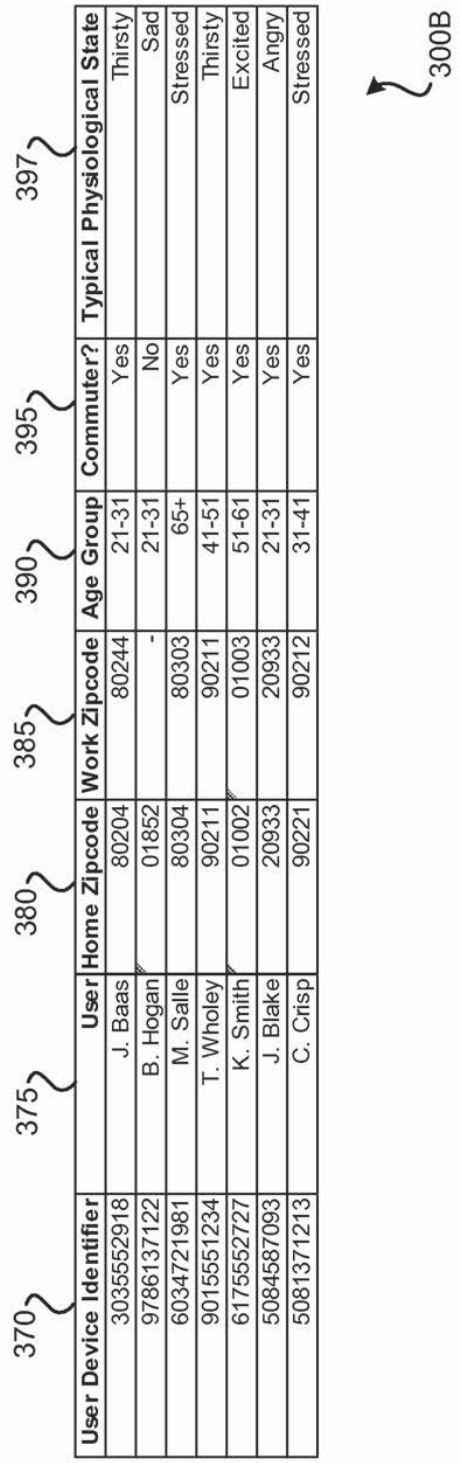
FIG. 2



310 Content Category	320 Content Provider	330 Ideal Physiological State	340 Ideal Location	350 Ideal Environment	360 Content
Beverages	MegaDrink Co.	Thirsty	100 ft of MegaDrink vendor	Looking at MegaDrink Logo	Ad for sports drink
Beverages	MegaDrink Co.	Sad	100 ft of MegaDrink vendor	Looking at MegaDrink Logo	Ad for softdrink
Beverages	MegaDrink Co.	Tired	100 ft of MegaDrink vendor	Looking at MegaDrink Logo	Ad for coffee
Restaurant	ABC Bar	Bored	In home zipcode	Watching TV	Advertisement
Clothing	123 T-Shirt Inc.	Excited	< 1 mile of mall	Walking	Prize Giveaway
Electronics	CameraPlus Inc.	Nervous	Electronics Store	Shopping	Extra 10% discount
Services	Massage Provider	Stressed	Zipcode of work	Work	Ad for @work services

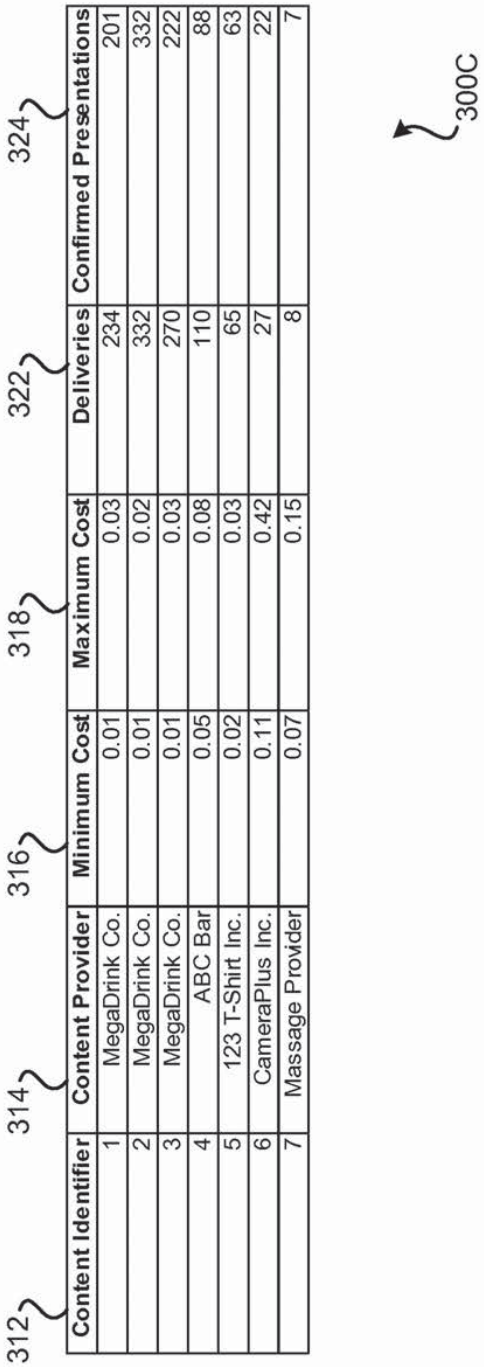
300A

FIG. 3A



User Device Identifier	User	Home Zipcode	Work Zipcode	Age Group	Commuter?	Typical Physiological State
3035552918	J. Baas	80204	80244	21-31	Yes	Thirsty
9786137122	B. Hogan	01852	-	21-31	No	Sad
6034721981	M. Salle	80304	80303	65+	Yes	Stressed
9015551234	T. Wholey	90211	90211	41-51	Yes	Thirsty
6175552727	K. Smith	01002	01003	51-61	Yes	Excited
5084587093	J. Blake	20933	20933	21-31	Yes	Angry
5081371213	C. Crisp	90221	90212	31-41	Yes	Stressed

FIG. 3B



312 Content Identifier	314 Content Provider	316 Minimum Cost	318 Maximum Cost	322 Deliveries	324 Confirmed Presentations
1	MegaDrink Co.	0.01	0.03	234	201
2	MegaDrink Co.	0.01	0.02	332	332
3	MegaDrink Co.	0.01	0.03	270	222
4	ABC Bar	0.05	0.08	110	88
5	123 T-Shirt Inc.	0.02	0.03	65	63
6	CameraPlus Inc.	0.11	0.42	27	22
7	Massage Provider	0.07	0.15	8	7

300C

FIG. 3C

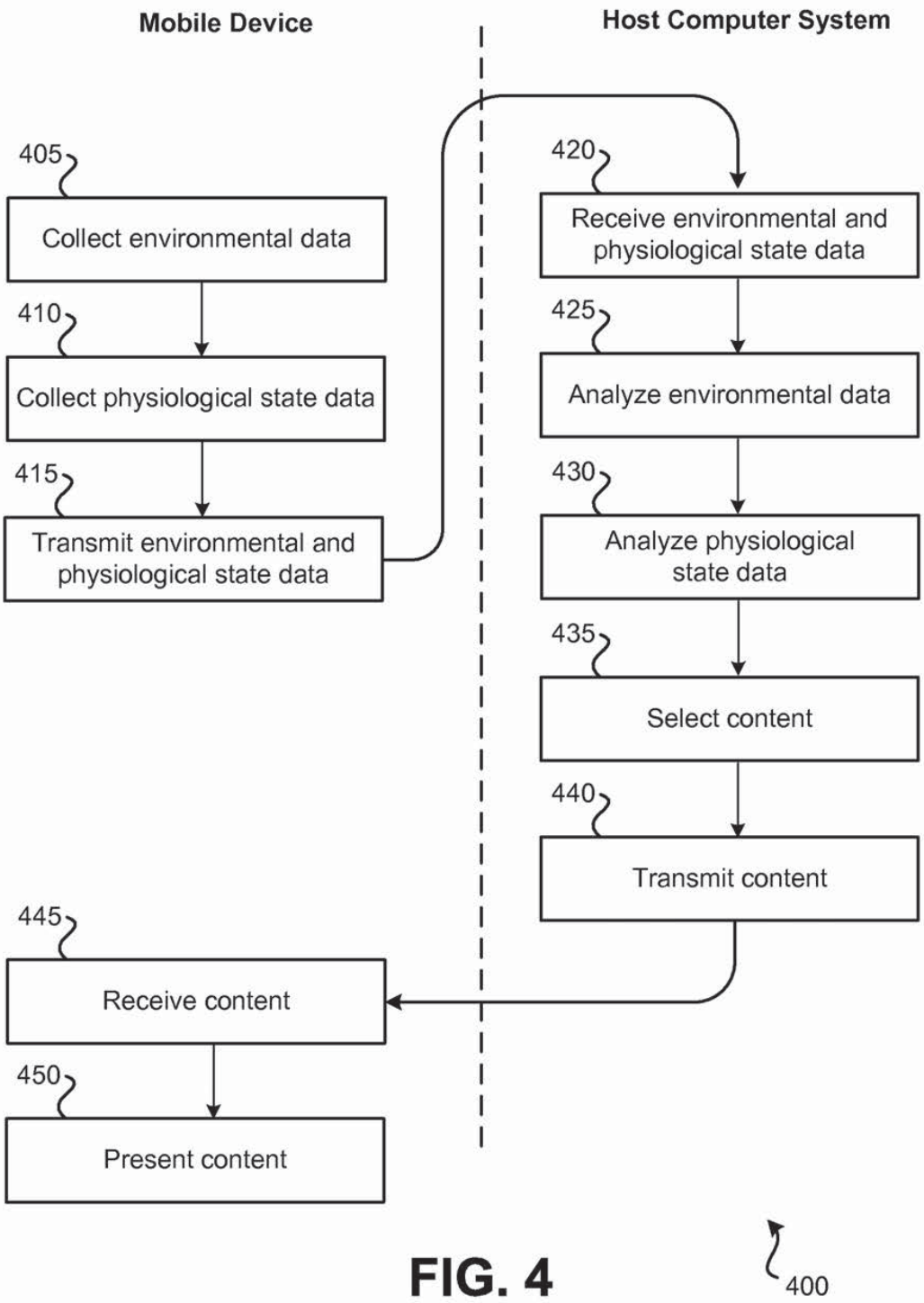

Mobile Device
Host Computer System
405
Collect environmental data
410
Collect physiological state data
415
Transmit environmental and physiological state data
420
Receive environmental and physiological state data
425
Analyze environmental data
430
Analyze physiological state data
435
Select content
440
Transmit content
445
Receive content
450
Present content
400

FIG. 4

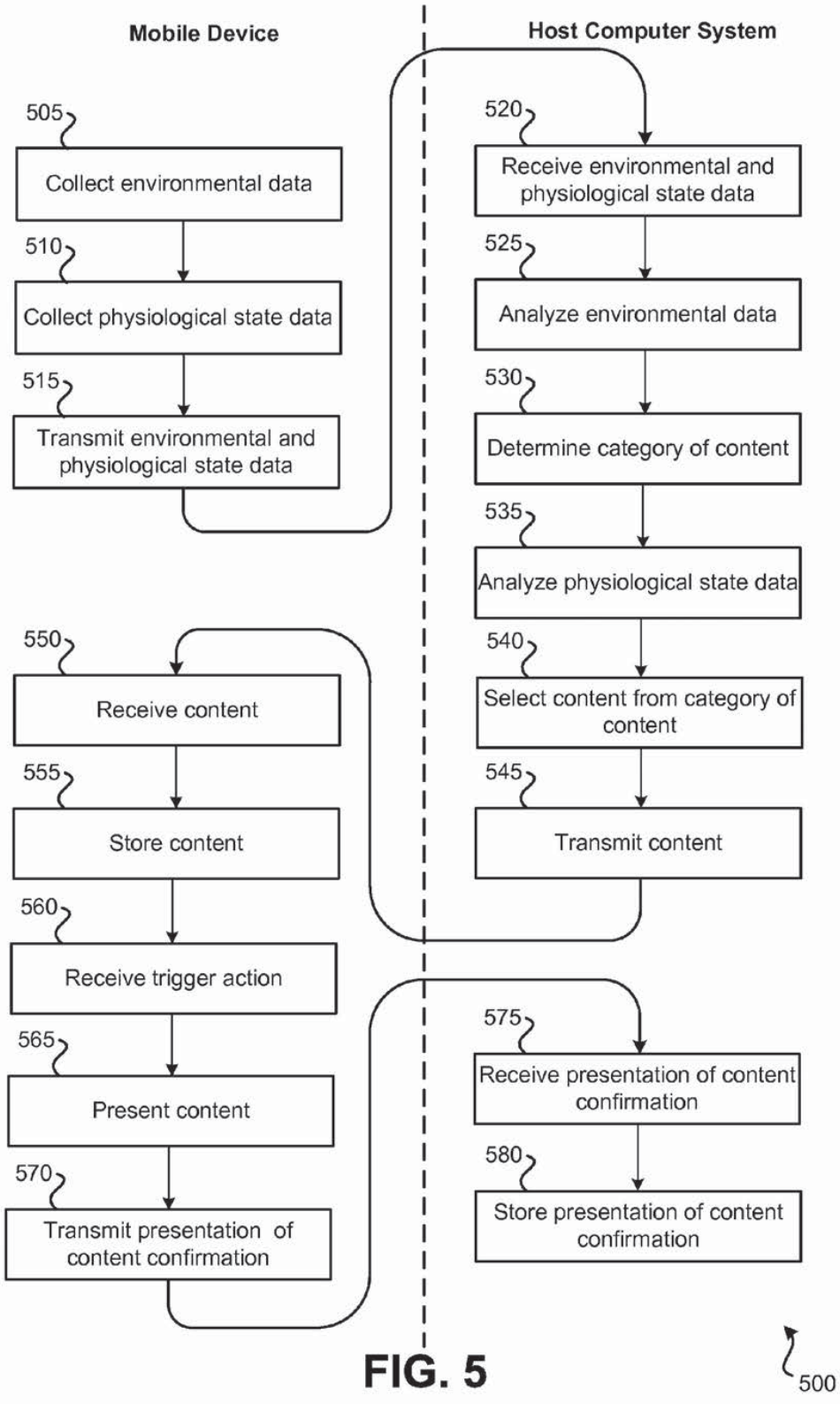

Mobile Device
Host Computer System
505
Collect environmental data
510
Collect physiological state data
515
Transmit environmental and physiological state data
520
Receive environmental and physiological state data
525
Analyze environmental data
530
Determine category of content
535
Analyze physiological state data
540
Select content from category of content
545
Transmit content
550
Receive content
555
Store content
560
Receive trigger action
565
Present content
570
Transmit presentation of content confirmation
575
Receive presentation of content confirmation
580
Store presentation of content confirmation
500

FIG. 5

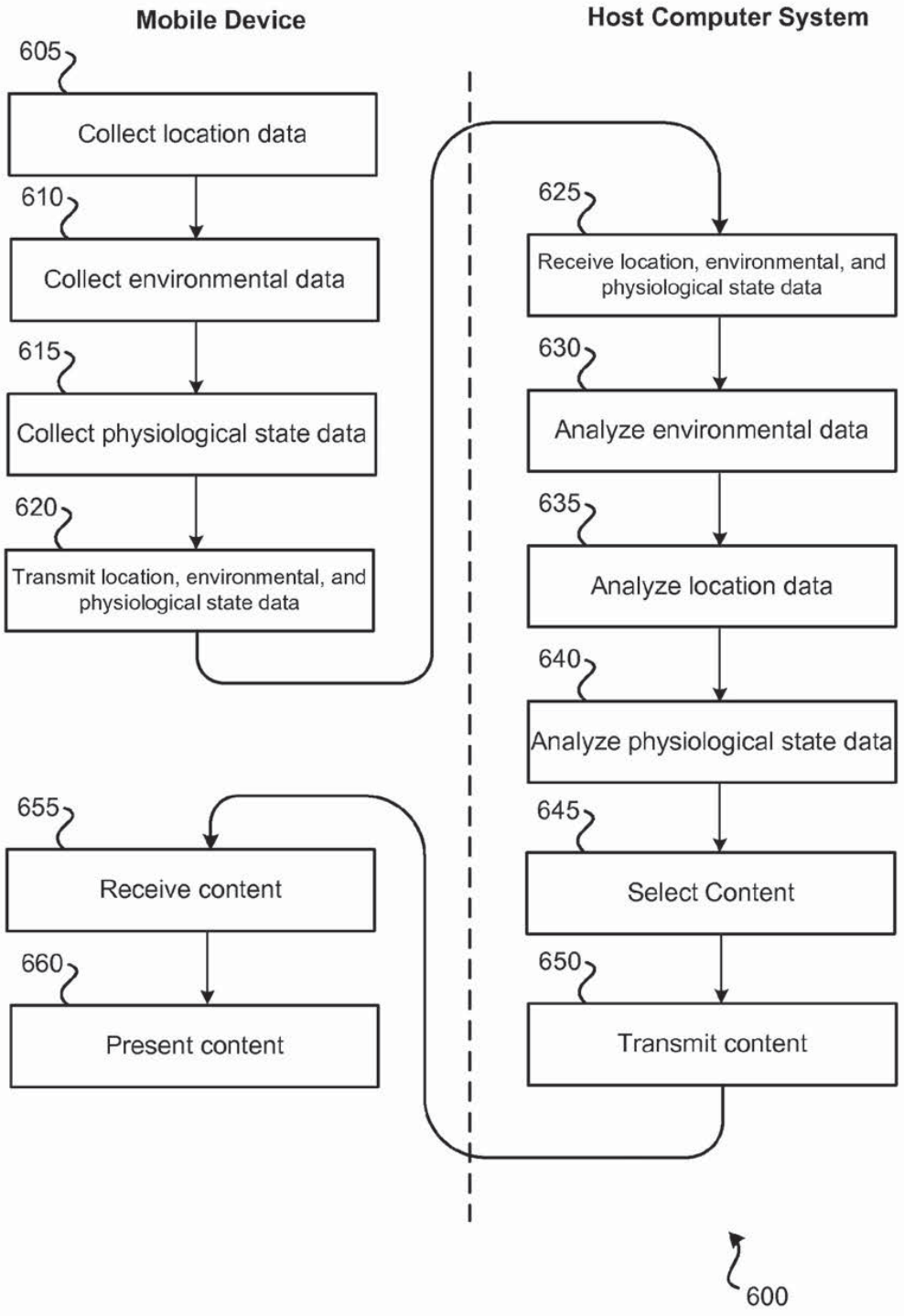

Mobile Device
Host Computer System
605
Collect location data
610
Collect environmental data
615
Collect physiological state data
620
Transmit location, environmental, and physiological state data
625
Receive location, environmental, and physiological state data
630
Analyze environmental data
635
Analyze location data
640
Analyze physiological state data
645
Select Content
650
Transmit content
655
Receive content
660
Present content
600

FIG. 6

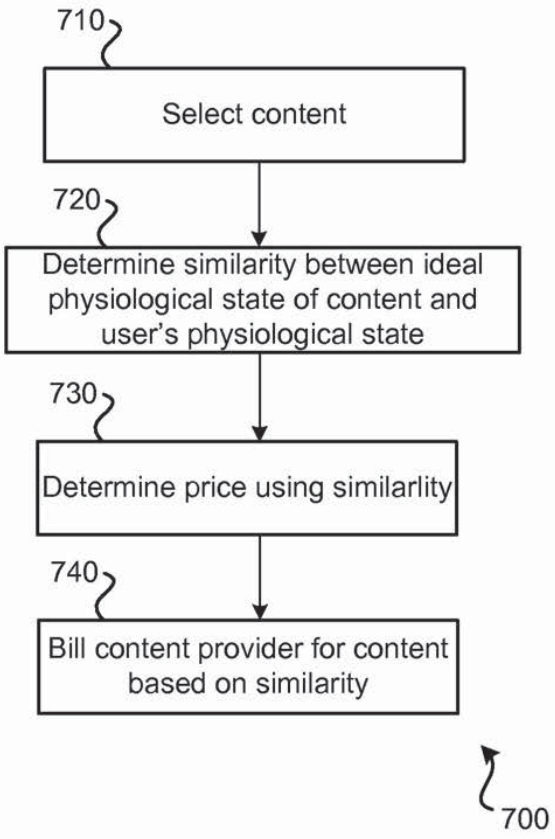

710
Select content
720
Determine similarity between ideal physiological state of content and user's physiological state
730
Determine price using similarlity
740
Bill content provider for content based on similarity
700

FIG. 7

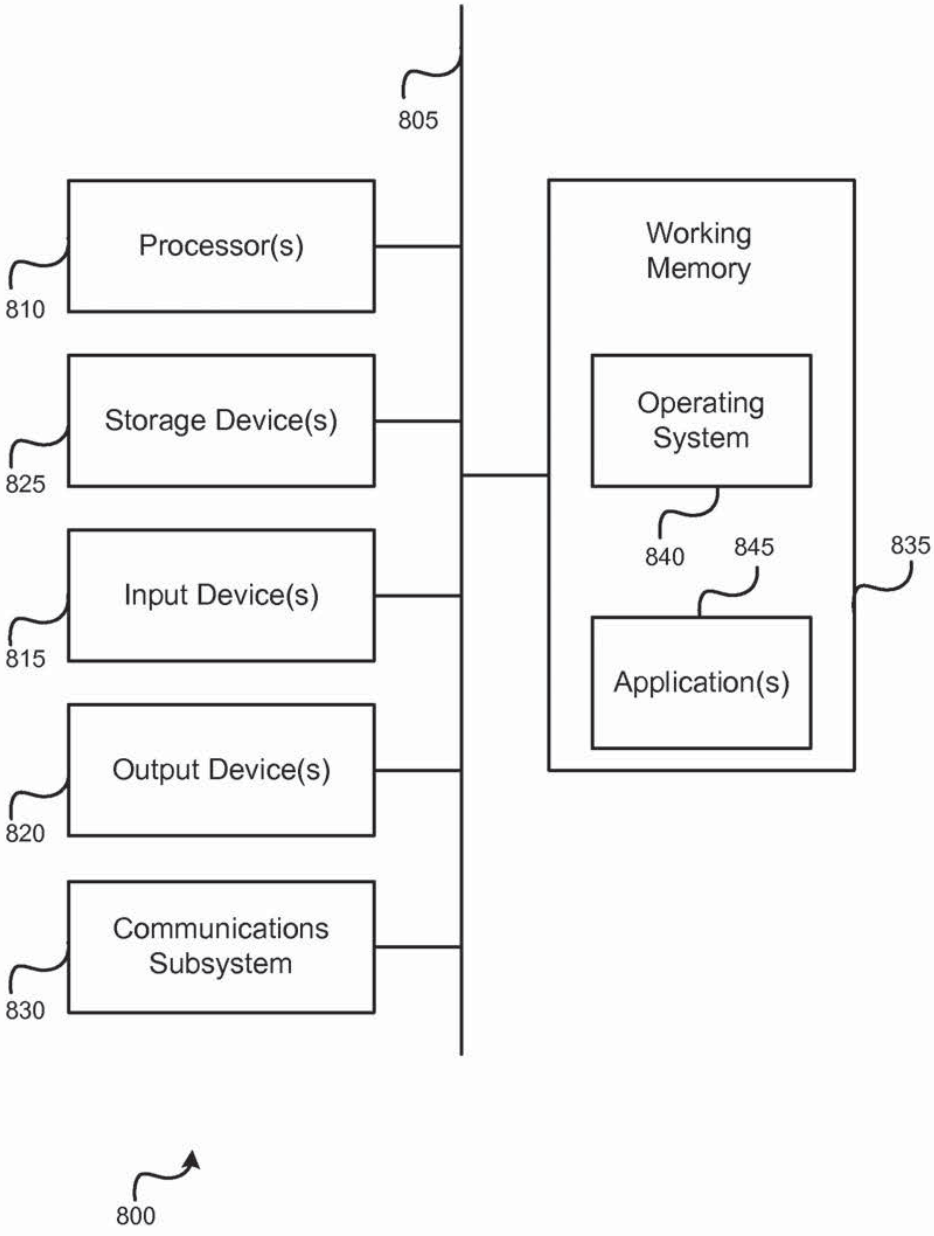

805
Processor(s)
810
Storage Device(s)
825
Input Device(s)
815
Output Device(s)
820
Communications Subsystem
830
Working Memory
Operating System
840
845
Application(s)
835
800

FIG. 8

RELEVANT CONTENT DELIVERY

CROSS REFERENCES TO RELATED APPLICATIONS

This application is a continuation of U.S. patent application Ser. No. 13/222,615, filed Aug. 31, 2011 and entitled "Relevant Content Delivery", which claims priority from U.S. Provisional Patent Application Ser. No. 61/499,596, filed Jun. 21, 2011, entitled "Relevant Content Delivery." The entire contents of the previous applications are incorporated herein by reference for all purposes.

BACKGROUND

The more closely related content, such as an advertisement, is to a person's interests, the person's activities, the person's location, and/or the person's state of mind, the more likely the person will be interested in and/or influenced by the content. Typically, content may be tailored to a user of a mobile device based on the user's interactions with a mobile device. The user may provide various forms of "active" input, such as search strings or other input via a keypad or pointing device, to an Internet browser being executed on the mobile device, upon which content may be based. For example, a user may enter a search string for "local golf courses." In response, a search engine executed on the mobile device may return search results accompanied by content, such as an advertisement for golf clubs.

SUMMARY

Systems, methods, apparatuses, and computer readable mediums are disclosed herein for delivering content to a mobile device of a user. In an example of a method, a method for delivery of relevant content to a mobile device of a user is presented. The method may include receiving, by a host computer system, from the mobile device, physiological state data collected from the user of the mobile device captured at a time. The method may include receiving, by the host computer system, image data based on an image captured by the mobile device, wherein the image was captured at least approximately at the time. The method may include analyzing, by the host computer system, the image data to identify a characteristic of the image. The method may include analyzing, by the host computer system, the physiological state data collected from the user of the mobile device. The method may include selecting, by the host computer system, content to deliver to the mobile device of the user at least partially based on the physiological state data collected from the user and the characteristic of the image, wherein the content is selected from a plurality of content. The method may include transmitting, by the host computer system, the content to the mobile device.

Embodiments of such a method may include one or more of the following: The method may include determining, by the host computer system, a price for presenting the content related to the physiological state data collected from the user and the characteristic of the image to the user, wherein the price is to be charged to a content provider associated with the content. The content may be linked with an ideal physiological state. The price for presenting the content may be higher the more likely the physiological state data collected from the user indicates the ideal physiological state. The content may comprise one or more advertisements. The method may include receiving, by the host computer system, from the mobile device, a location of the user, wherein the location was determined at least approximately at the time of a measurement of the physiological state data of the user, wherein: selecting, by the host computer system, content to deliver to the mobile device is additionally at least partially based on the location of the user. The content selected for the mobile device may be further based on one or more stored characteristics of the user accessible by the host computer system. The method may include selecting, by the host computer system, content to deliver to the mobile device of the user comprises: selecting, by the host computer system, a content category using the characteristic of the image; and selecting, by the host computer system, the content from the content category using the physiological state data collected from the user. The time may be a period of time.

In an example of a method, a method for delivering content to a user of a mobile device is presented. The method may include capturing, by the mobile device, an image at a time. The method may include storing, by the mobile device, image data based on the image. The method may include capturing, by the mobile device, physiological state data from the user of the mobile device, wherein the physiological state corresponds at least approximately to the time. The method may include transmitting, by the mobile device, the physiological state data and image data to a host computer system. The method may include receiving, by the mobile device, from the host computer system, content selected using the physiological state data and the image data. The method may include presenting, by the mobile device, the content selected using the physiological state data of the user and the image data to the user.

Embodiments of such a method may include one or more of the following: The method may include storing, by the mobile device, the content received from the host computer system. The method may include receiving, by the mobile device, a trigger action from the user, wherein the trigger action is predefined to initiate presentation of the content to the user, wherein presenting, by the mobile device, the content selected using the physiological state data and the image data to the user is triggered by the trigger action. The method may include selecting, by the host computer system, content to deliver to the mobile device of the user using the physiological state data and the image data. Selecting, by the host computer system, content to deliver to the mobile device of the user may comprise: selecting, by the host computer system, a content category using the image data; and selecting, by the host computer system, the content from the content category using the physiological state data. The content may comprise an advertisement. Presenting, by the mobile device, the content related to the physiological state data and the image data to the user may comprise using an augmented reality display. The physiological state data may comprise heart rate data, heart rate variability data, skin conductance level data, number of electrodermal responses data, or change in skin temperature data. Capturing, by the mobile device, the physiological state data of the user of the mobile device may comprise using one or more biomedical sensors selected from a group consisting of: electrocardiogram (ECG) sensors, galvanic skin response (GSR) sensors, plethysmography (PPG) sensors, skin temperature sensors (SKT), and electromyogram (EMG) sensors. The method may include determining, by the mobile device, a location of the user, at least approximately at the time of capturing the physiological state data of the user. The method may include transmitting by the mobile device, the location of the user to the host computer system. The content received by the mobile device may be additionally based on the location of the user. The time may be a period of time.

In an example of a computer program product, a computer program product residing on a non-transitory processor-readable medium and comprising processor-readable instructions is presented. The computer program product may comprise instructions configured to cause a processor to cause physiological state data of a user of a mobile device captured at a time to be received from the mobile device. The computer program product may comprise instructions configured to cause a processor to cause image data based on an image captured by the mobile device to be received from the mobile device, wherein the image was captured at least approximately at the time. The computer program product may comprise instructions configured to cause a processor to analyze the image data to identify a characteristic of the image. The computer program product may comprise instructions configured to cause a processor to analyze the physiological state data of the user of the mobile device. The computer program product may comprise instructions configured to cause a processor to select content to deliver to the mobile device of the user at least partially based on the physiological state data of the user and the characteristic of the image, wherein the content is selected from a plurality of content. The computer program product may comprise instructions configured to cause a processor to cause the content to be transmitted to the mobile device.

Embodiments of such a computer program product may include one or more of the following: The computer program product may comprise instructions configured to cause a processor to determine a price for presenting the content related to the physiological state data of the user and the characteristic of the image to the user, wherein the price is to be charged to a content provider associated with the content. The content may be linked with an ideal physiological state. The price for presenting the content may be higher the more likely the physiological state data of the user indicates the ideal physiological state. The content may comprise one or more advertisements. The computer program product may comprise instructions configured to cause a processor to cause a location of the user to be received from the mobile device, wherein the location was determined at least approximately at the time. The processor-readable instructions that cause the processor to select content to deliver to the mobile device may additionally use the location of the user. The content selected for the mobile device may be further based on one or more stored characteristics of the user. The processor-readable instructions that cause the processor to select content to deliver to the mobile device of the user may comprise additional processor-readable instructions that cause the processor to: select a content category using the characteristic of the image; and select the content from the content category using the physiological state data of the user.

In an example of a system, a system for delivering content to a user of a mobile device is presented. The system may include a processor. The system may include a memory communicatively coupled with and readable by the processor and having stored therein processor-readable instructions. The instructions, when executed by the processor, cause the processor to cause physiological state data collected from the user of the mobile device captured at a time to be received from the mobile device. The instructions may cause the processor to cause image data based on an image captured by the mobile device to be received from the mobile device, wherein the image was captured at least approximately at the time. The instructions may cause the processor to analyze the image data to identify a characteristic of the image. The instructions may cause the processor to analyze the physiological state data collected from the user of the mobile device. The instructions may cause the processor to select content to deliver to the mobile device of the user at least partially based on the physiological state data collected from the user and the characteristic of the image, wherein the content is selected from a plurality of content. The instructions may cause the processor to cause the content to be transmitted to the mobile device.

Embodiments of such a system may include one or more of the following: The processor-readable instructions may further comprise additional processor-readable instructions configured to cause the processor to determine a price for presenting the content related to the physiological state data collected from the user and the characteristic of the image to the user, wherein the price is to be charged to a content provider associated with the content. The content may be linked with an ideal physiological state. The price for presenting the content may be higher the more likely the physiological state data collected from the user indicates the ideal physiological state. The content may comprise one or more advertisements. The processor-readable instructions may further comprise additional processor-readable instructions configured to cause the processor to cause a location of the user to be received from the mobile device, wherein the location was determined at least approximately at the time, wherein: the processor-readable instructions that cause the processor to select content to deliver to the mobile device additionally use the location of the user. The content selected for the mobile device may be further based on one or more stored characteristics of the user. The processor-readable instructions configured to cause the processor to select content to deliver to the mobile device of the user may further comprise additional processor-readable instructions that cause the processor to: select a content category using the characteristic of the image; and select the content from the content category using the physiological state data collected from the user.

In an example of an apparatus, an apparatus for delivering content to a user of a mobile device is presented. The apparatus may include means for receiving, from the mobile device, physiological state data collected from the user of the mobile device captured at a time. The apparatus may include means for receiving image data based on an image captured by the mobile device, wherein the image was captured at least approximately at the time. The apparatus may include means for analyzing the image data to identify a characteristic of the image. The apparatus may include means for analyzing the physiological state data collected from the user of the mobile device. The apparatus may include means for selecting content to deliver to the mobile device of the user at least partially based on the physiological state data collected from the user and the characteristic of the image, wherein the content is selected from a plurality of content. The apparatus may include means for transmitting the content to the mobile device.

Embodiments of such an apparatus may include one or more of the following: The apparatus may include means for determining a price for presenting the content related to the physiological state data of the user and the characteristic of the image to the user, wherein the price is to be charged to a content provider associated with the content. The content may be linked with an ideal physiological state. The price for presenting the content may be higher the more likely the physiological state data collected from the user indicates the ideal physiological state. The content may comprise one or more advertisements. The apparatus may include means for receiving, from the mobile device, a location of the user, wherein the location was determined at least approximately at the time of a measurement of the physiological state data collected from the user, wherein: the means for selecting

content to deliver to the mobile device additionally uses the location of the user. The content selected for the mobile device may be further based on one or more characteristics of the user. The means for selecting content to deliver to the mobile device of the user may comprise: means for selecting a content category using the characteristic of the image; and means for selecting the content from the content category using the physiological state data collected from the user.

In an example of a system, a system for delivering content to a user of a mobile device is presented. The system may include a host computer system. The system may include a processor. The system may include a memory communicatively coupled with and readable by the processor and having stored therein processor-readable instructions. The instructions when executed by the processor, may cause the processor to cause physiological state data collected from the user of the mobile device captured at a time to be received from the mobile device. The instructions when executed by the processor, may cause the processor to cause image data based on an image captured by the mobile device to be received from the mobile device, wherein the image was captured at least approximately at the time. The instructions when executed by the processor, may cause the processor to analyze the image data to identify a characteristic of the image. The instructions when executed by the processor, may cause the processor to analyze the physiological state data collected from the user of the mobile device. The instructions when executed by the processor, may cause the processor to select content to deliver to the mobile device of the user at least partially based on the physiological state data collected from the user and the characteristic of the image, wherein the content is selected from a plurality of content. The instructions when executed by the processor, may cause the processor to cause the content to be transmitted to the mobile device. The system may include the mobile device. The mobile device may capture the image at the time. The mobile device may store image data based on the image. The mobile device may capture the physiological state data collected from the user of the mobile device, wherein the physiological state corresponds at least approximately to the time. The mobile device may transmit the physiological state data collected from the user and the image data to the host computer system. The mobile device may receive, from the host computer system, the content selected using the physiological state data collected from the user and the image data. The mobile device may present the content selected using the physiological state data collected from the user and the image data to the user.

BRIEF DESCRIPTION OF THE DRAWINGS

A further understanding of the nature and advantages of various embodiments may be realized by reference to the following figures. In the appended figures, similar components or features may have the same reference label. Further, various components of the same type may be distinguished by following the reference label by a dash and a second label that distinguishes among the similar components. If only the first reference label is used in the specification, the description is applicable to any one of the similar components having the same first reference label irrespective of the second reference label.

FIG. **1** illustrates an embodiment of a system configured for relevant content delivery.

FIG. **2** illustrates an embodiment of a mobile device that collects physiological state data and environmental data related to a user.

FIG. **3**A illustrates an embodiment of sample entries from a content database.

FIG. **3**B illustrates an embodiment of sample entries from a user database.

FIG. **3**C illustrates an embodiment of sample entries from a pricing database.

FIG. **4** illustrates an embodiment of a method for delivering relevant content to a mobile device.

FIG. **5** illustrates an embodiment of a method for delivering relevant content selected from a category of content to a mobile device wherein the content is presented to a user of the mobile device based on a trigger action.

FIG. **6** illustrates another embodiment of a method for delivering relevant content to a mobile device.

FIG. **7** illustrates an embodiment of a method for pricing content delivery to a mobile device.

FIG. **8** illustrates an embodiment of a computer system.

DETAILED DESCRIPTION

The more relevant content is to a user, the more likely the user may be to interact with the content. If the content is an advertisement, an advertisement relevant to a user may be more likely to lead to a purchase by the user of the advertised goods or services. Further, by targeting potential consumers more accurately, an entity delivering the content to the users may be able to charge content providers more money because users receiving the content are more likely to be interested in the content.

Active input, that is, input supplied by the user through a user input device, such as using a keypad or touch screen, can be used to identify content relevant to the user. However, besides active input, additional types of data can be collected from the user and the user's environment to identify content relevant to the user. In addition to active input, a mobile device, such as a cellular phone, can collect environmental data and physiological state data of the user to assist in providing relevant content, such as advertisements, recommendations, and applications to a user of the mobile device. These forms of data, when used together and/or in conjunction with other data gathered about the user, may allow for content to be targeted more precisely to the user.

Environmental data and physiological state data may be collected by a mobile device and transmitted to a host computer system. The host computer system may analyze the environmental data and the physiological state data. Based on this analysis and, possibly other characteristics of the user, content to be delivered to the mobile device may be determined. The content may be delivered and presented (e.g., displayed visually and/or played aloud) to the user via the mobile device.

Environmental data may include: the location of the mobile device, motion of the mobile device (e.g., speed and patterns), the temperature of the mobile device, objects in the vicinity of the mobile device, etc. A camera on the mobile device may be used to capture images, which may be used as environmental data. These images may be captured periodically by the mobile device without input from the user. For example, a camera may be mounted to an earpiece (or other portion) of a mobile device that faces in the direction of the user's field of vision. Images may also be captured based on user input. For example, a user may aim the camera of his mobile device at an object and provide input to the mobile device (e.g., press a button on the keypad or touch-screen) to indicate that an image is to be captured. Image data from these images, whether captured due to user input or automatically, may be analyzed (either locally by the mobile device or remotely by

a host computer system) in conjunction with physiological state data captured by the mobile device and used to provide the end user with relevant content, such as one or more advertisements.

In some embodiments, environmental data may be used to determine a type of content to deliver to a user, for example, the content may be an advertisement for a specific drink company. Physiological state data gathered about the user, collected approximately contemporaneously with the collection of the environmental data, may be used to present a specific advertisement for that drink company. For example, if an image is captured that has a logo of the drink company in the background, an advertisement for a drink produced by the company may be provided to the user. Which specific drink is advertised may be based on the physiological state of the user. For example, if the user has an elevated heart rate, elevated blood pressure, and is hot, this may indicate physical activity. As such, a sports drink advertisement may be presented to the user. However, if the user's physiological state indicates that the user is tired, an energy drink advertisement may be presented to the user. If the user's physiological state is approximately normal, a soft drink may be recommended.

In addition to input from a camera, other environmental data, such as the motion of the mobile device, may be captured by a motion sensor, such as an accelerometer or gyroscope. Such motion may reveal an activity of the user. For example, a mobile device with a bouncing up and down motion pattern for a period of time may indicate that the user is running. Such environmental data may be used to help arrive at the conclusion that the user is in need of a sports drink. Location data may also be used. A GPS receiver, or some other form of location sensor, may be used to determine the location of a mobile device, and thus, the user who is likely carrying the mobile device. Such location data may be used to target particular regions, both large and small. For example, when a user is walking within a mall, a drink company may desire to advertise smoothies available in the mall's food court when the user appears to be thirsty. Another content provider may only want advertisements provided to a user when the user is within a certain distance of a location selling the content provider's goods or services. For example, a good that a user is unlikely to travel a great distance to procure, such as a cup of coffee, may only be advertised when the user is tired and within a quarter mile of a coffee shop being advertised. Other goods, which a user may be more likely to travel a significant distance to acquire, may be advertised at a greater distance. For example, if a user is determined to be in an electronics department of a big box store, an advertisement for a competitor located 10 miles away may present the user with an advertisement that is hoped to be persuasive enough to convince the user to travel to the distance to the competitor (such as a coupon for 15% off electronics).

Physiological state data, that is, data about the user's physical condition, may be used to provide relevant content to the user. One or more physiological sensors, such as electrocardiogram (ECG) sensors, galvanic skin response (GSR) sensors, plethysmography (PPG) sensors, skin temperature sensors (SKT), and/or electromyogram (EMG) sensors can be incorporated into the mobile device and used to collect physiological state data from the user. This information may be used to infer the end user's emotional and/or physical state, collectively referred to as the user's "physiological state." Such physiological state data may be used alone or in combination with environmental data, user stored data, and/or active user input to provide the user with relevant content at a mobile device.

Stored user data, such as data stored in a user database at a host computer system, about the user may be used to provide relevant content to the user. For example, biographical information about the user may be stored that indicates the user's: sex, age, address, ethnicity, income level, job, religious affiliation, and/or travel patterns (to name only a few examples). Travel patterns may be established over a period of time using location data and may be used to infer when the user is commuting, working out, traveling for work, and/or traveling for pleasure.

As examples only, the following arrangements use environmental data in conjunction with physiological state data to allow for relevant content delivery to a user. In a first example, a purchase transaction is conducted at a first merchant's location. When a user is viewing an item for purchase from a first merchant, the user may capture an image of the item using the user's mobile device (be it automatically because the mobile device periodically captures images in the direction the user is facing or by the user pointing a camera of the mobile device at the item). Approximately at the time when the image is captured, physiological state data of the user may be collected. Such physiological state data may provide an indication of whether the user is interested in purchasing the item. For example, an increased heart rate may equate to a desire for the item. If it appears the user is likely to make a purchase from the first merchant, an advertisement for the same item (or an equivalent item) may be sent to the mobile device of the user, possibly on behalf of a second merchant, that may be attempting to lure the user to leave the first merchant and make the purchase from the second merchant. If the user does not seem excited about the item, an even deeper discount may be offered by the first or second merchant in an attempt to convince the user to purchase the item.

As a second example, consider stress experienced by a user at the user's job. Throughout a typical day and week, stress levels of the user may go up and down. When the user's stress level is particularly high, the user may be more likely to take a break and benefit from a good or service that is relaxing or at least serves as a temporary distraction. When physiological state data of the user indicates a high amount of stress, a service, such as a massage, and/or a relaxing product, such as an iced mocha latte, may be offered to the user via content presented on the mobile device. Because a user is unlikely to take a very long break from work, and thus, is unlikely to travel far, goods or services may only be offered to the user in the vicinity of the user's location. Similarly, if during normal work hours physiological state data indicates the user is likely tired, an advertisement for a caffeinated and/or sugared product may be offered to the user. Environmental data may affect the content presented to the user. For example, if images collected from the mobile device indicate that the user is traveling past a particular coffee chain, advertisements from that coffee chain may be more likely to be presented. If environmental data indicates the user is driving, a discount may be offered to cover the user's cost to park, while if the environmental data indicates the user is walking, a different discount or offer by the coffee chain may be presented.

As a third example, a user is running with a mobile device. Environmental sensors, based on speed, motion of the mobile device (e.g., bouncing up and down) and/or location, may indicate that the user is likely running. During the run, or following the run, the user's physiological state may be determined to be tired and/or dehydrated based on physiological state data. In response, a product directed to help the user may be advertised, such as an advertisement for water, a sports drink, and/or an energy bar. In some embodiments, after a workout has been sensed, a "treat" as a reward to the user may

be offered, such as an advertisement for an ice cream sundae. As a similar example, if a user captures an image of a sporting venue (e.g., a stadium, park, or river), and the physiological state data indicates the user is interested in the sporting venue (e.g., to attend a sporting event, picnic, or perform an outdoor activity such as kayaking), advertisements for appropriate goods and/or services may be provided to the user via the mobile device. For example, advertisements for items such as sunscreen, event tickets, flying discs, blankets, kayak rentals, and helmets may be provided. More specifically, advertisements for goods and/or services available in the immediate vicinity of the sporting venue may be delivered to the user.

As a fourth example, the health of a user is monitored. If the user's physiological state data indicates the user is unwell (e.g., high blood sugar, high blood pressure), a message may be provided to the user recommending a course of action, product, or service. Based on environmental sensors, which may be used to determine what activity a person is participating in, various ranges of physiological states may be permitted before a service or product is recommended to the user based on the user's health. For example, if environmental data suggests the user is exercising, the user's heart rate and blood pressure may be higher than if the user is still (e.g., sitting at a desk at work), and thus, the user may not be in need of treatment for high blood pressure. If the user's heart rate is high while environmental data indicates the user is inactive, content regarding high blood pressure treatment and/or medication may be presented to the user via the mobile device (possibly along with a recommendation to see a doctor). Extreme physiological state data could result in an ambulance being notified with location data from an environmental sensor being used to locate the user.

The above four examples represent various possible applications of systems and methods for relevant content delivery and are to serve as non-limiting examples only. Many other possible applications of relevant content delivery using environmental and physiological state data are possible.

FIG. **1** illustrates an embodiment of a system **100** configured for relevant content delivery. System **100** may include: mobile device **110**, wireless network **120**, network **130**, host computer system **140**, and databases **150** (which may include user database **150-1**, content database **150-2** and pricing database **150-3**).

Mobile device **110** may include one or more physiological sensors, such as physiological sensor **112**. Physiological sensor **112** may be one of the previously discussed physiological sensors or may be some other form of physiological sensor. Mobile device **110** may include one or more environmental sensors. Environmental sensor **114** may be: a camera (still and/or video), an accelerometer, a magnetometer, or a location sensor (e.g., GPS sensor), to name only a few examples. Mobile device **110** may also include other components, such as a processor, non-transitory computer-readable storage device, and a transceiver. Mobile device **110** may be a cellular phone. Mobile device **110** may also be some other form of mobile device such as a tablet computer, laptop computer, PDA, or electronic book reader. Further, while the description provided herein is directed to providing relevant content to a mobile device, it should be understood that such relevant content may also be provided to a device that is not mobile, such as a desktop computer that is communicatively coupled with one or more physiological sensors and one or more environmental sensors.

Mobile device **110** may communicate with wireless network **120**. Wireless network **120**, which may be a cellular network, may permit mobile device **110** to communicate with host computer system **140**, possibly via network **130**. Mobile device **110** may be configured to communicate via multiple types of wireless networks. For example, when within range of an available WiFi network, the WiFi network may be used to communicate with host computer system **140**. When outside of WiFi coverage, a cellular network may be used for communication. If no wireless network is available, physiological state data and/or environmental data may or may not be stored by mobile device **110** for later transmission to host computer system **140** when a wireless network connection becomes available. Network **130** may represent one or more public networks (e.g., the Internet) and/or one or more private networks (e.g., a corporate local area network). In some embodiments, mobile device **110** may communicate directly with network **130**.

Host computer system **140** may represent one or more computer systems. Host computer system **140** may communicate with mobile device **110** via network **130** and/or wireless network **120**. Host computer system **140** may receive and analyze environmental and physiological state data received from mobile device **110**. Based, at least partially, on the environmental and physiological state data received from mobile device **110**, host computer system **140** may transmit content to mobile device **110**. Host computer system **140** may access one or more databases **150**.

Databases **150** may include user database **150-1**, content database **150-2**, and/or pricing database **150-3**. It should be understood that databases **150** may be combined into fewer databases or may be divided into a greater number of databases. The illustrated embodiment of system **100** shows databases **150** as local to host computer system **140**; however, in some embodiments databases **150** may be accessible remotely via one or more networks, such as network **130**, by host computer system **140**.

User database **150-1** may store characteristics of various users of mobile devices. Such characteristics may be used in selecting content to be transmitted to mobile device **110**. User database **150-1** may store information about the user of mobile device **110** (and the users of other mobile devices). For example, information regarding the user's age, sex, travel patterns, religion, ethnicity, purchase habits, income, location, job, and/or hobbies may be types of information stored about the user. Such information may have been explicitly provided by the user, may have been purchased from an advertising agency, and/or may have been determined based on previous data received from the user's mobile device. Such information may be used by host computer system **140** when identifying content to be transmitted to mobile device **110**.

Content database **150-2** may contain the content that host computer system **140** has available to deliver to mobile devices, such as mobile device **110**. Content in content database **150-2** may be textual, graphic, and/or auditory. Content database **150-2** may also contain indications of the conditions under which each piece of content should be delivered to a user. For example, an ideal physiological state of the user, various acceptable locations, environmental data, the name of the content provider, or a category of content are examples of data that may be stored in content database **150-2**.

Pricing database **150-3** may be used to store how many times each piece of content has been delivered to mobile devices and how many times the content has been interacted with by users of the mobile devices. The pricing database may also contain an indication of how much the content provider (the entity that provided the content to be delivered to users) should be charged for each instance of the content either sent to a mobile device or interacted with by a user. In some embodiments, the content provider may be charged more for content that closely matches the user's physiological state

data and/or environmental data. For example, if a user's physiological state data indicates that he is very thirsty, the content provider may be charged more for content to be delivered to that user than the same content to a user who is marginally thirsty.

While system **100** illustrates a single mobile device, it should be understood that many mobile devices, associated with many different users, may be in communication with host computer system **140**. As such, different content may be delivered by host computer system **140** to different mobile devices associated with different users. System **100** may be used to perform various methods of delivering relevant content to users. For example, system **100** may be used to perform methods **400**-**700** of FIGS. **4**-**7**, respectively.

FIG. **2** illustrates an embodiment of a mobile device **200** that collects physiological state data related to a user and environmental data. Mobile device **200** may represent mobile device **110** of FIG. **1** and/or other mobile devices that may be used as part of system **100**. Mobile device **200** may include physiological sensor **210**, camera **220**, GPS receiver **230**, content storage **240**, input device **250**, transceiver **260**, and processor **270**. Mobile device **200** may also contain other components that are not presented here for simplicity.

Physiological sensor **210** may gather physiological state data about the user. Physiological sensor **210** may periodically attempt to gather physiological state data about the user. In some embodiments, physiological sensor **210** only attempts to gather physiological state data when the user is interacting with mobile device **200** (such as via input device **250**). Physiological sensor **210** may be a sensor, such as an electrocardiogram (ECG) sensor, a galvanic skin response (GSR) sensor, a plethysmography (PPG) sensor, a skin temperature sensor (SKT), or a electromyogram (EMG) sensor. More than one physiological sensor may be present in mobile device **200**. Physiological state data gathered by physiological sensor **210** may be collected over a period of time and averaged or otherwise analyzed locally. As such, each measurement of physiological state data collected by the physiological sensor **210** may not be transmitted to a host computer system. Along with physiological state data, a time that corresponds to the date and/or time of the data may be recorded. As such, it is known at what time the physiological state data was measured for the user.

Camera **220** may represent a video and/or still camera that is part of, or in communication with, mobile device **200**. Camera **220** may periodically capture images in a direction that the user is looking. For example, such periodic capturing of images may occur if the camera is mounted to a headpiece the user is wearing (such as a microphone/speaker headset). In some embodiments, camera **220** may capture devices when indicated by the user. For example, via input device **250**, the user may provide input indicating the camera is to capture an image. Some or all of the captured raw images may be transmitted for analysis to the host computer system. In some embodiments, some amount of processing may occur at mobile device **200**. For example, image data may be derived from an image captured by camera **220**. This may reduce the amount of data necessary to be transmitted to the host computer system. In some embodiments, images are analyzed by the mobile device to identify characteristics of the image. Characteristics of images may include identifiers linked with one or more identified objects present in the image. For example, a characteristic may be a logo of a company, a product, or a location being identified within an image. Images may be captured at approximately the same time as physiological state data.

GPS receiver **230** may periodically determine the location of mobile device **200** using received GPS signals. Other forms of location determination may also be possible. This location data may be transmitted to the host computer system periodically. The location data from GPS receiver **230** may be used to determine travel patterns of the user, such as where the user lives, where the user works, and the user's commute. Location data may be gathered by GPS receiver **230** approximately at the time that images are captured by camera **220** and/or physiological state data is captured by physiological sensor **210**.

Content storage **240** may represent a separate or a portion of a non-transitory computer-readable storage medium. Content that is or potentially may be displayed to the user may be stored in content storage **240**. Content storage **240** may receive content from the host computer system. The content may be stored in content storage **240** until it is presented to the user a predefined number of times (e.g., once, twice, five times). In some embodiments, content storage **240** stores multiple pieces of content. A specific piece of content from content storage **240** may be presented when a message-triggering presentation is received from the host computer system. As such, when the content is to be presented to the user, the content may already be stored locally by the mobile device, thus possibly allowing the content to be displayed sooner. Content storage **240** may store an indication of how often pieces of content have been presented to the user and/or how often the user has interacted with the content (e.g., followed a link within the content, displayed the content's coupon, etc.).

One or more input devices may be present on mobile device **200**. Input device **250** may be a touch screen, keypad, or some other component of mobile device **200** that a user may use to provide input to mobile device **200**. Transceiver **260** may communicate with one or more wireless networks. Processor **270** may be used for processing. For example, processor **270** may be used to analyze and process images captured by camera **220** to identify image data, including characteristics of the images.

FIG. **3**A illustrates an embodiment of sample entries **300**A from a content database. Sample entries **300**A may represent entries from content database **150**-**2** of FIG. **1**. Sample entries **300**A may also represent entries from some other database that is used to store content to be pushed to mobile device users. Each entry of content database may comprise: a content category **310**, a content provider **320**, an ideal physiological state **330**, an ideal location **340**, an ideal environment **350**, and content **360**.

Content category **310** data entries may indicate a general category in which a piece of content is classified. All content within a particular category may belong to a particular content provider. For example, all beverages advertised may be beverages produced by a particular company. In some embodiments, content from multiple content providers may also be present within a particular category. Content provider **320** data entries may be the entities that have paid or will be paying for the content to be provided to the user. A single content provider may be associated with multiple pieces of content in a content database.

Pieces of content may be delivered to a mobile device based on location, physiological state data, and environmental data received from a mobile device as compared to an ideal location, ideal physiological state data, and ideal environmental data associated with the content. Ideal physiological state **330** data entries may refer to the physiological state that the content provider desires the user to be in when receiving the content. Ideal location **340** data entries may be restrictions

on the locations where the content provider wants the content to be presented to the user. If outside the ideal location specified by the content provider, the content may not be considered for presentation to the user. Ideal environment **350**, which may be the same as ideal location **340**, may specify additional characteristics of the environment of the user for when the content is to be presented to the user. For example, referring to the first entry, in addition to ideal location **340** being near a MegaDrink vendor, image data captured by the mobile device may be required to indicate the user is looking at a MegaDrink logo (or, at least, that the logo is likely in the user's field of view), such as on a storefront. Content **360** data entries may indicate the content that is to be presented to the user for a specific entry. The content may be text, as indicated by content **360** data entries. In some entries, the content may be graphical and/or auditory. In some embodiments, the content may be visual, for example a projection on a display device of the mobile device configured to provide augmented reality. For example, referring again to the logo of MegaDrink, the logo may be modified to reflect an advertisement for a specific MegaDrink product.

As should be understood, a content database may contain more or fewer types of data. The specific conditions under which content for a content provider is pushed to a user may be highly customizable. For example, as long as one or two conditions are satisfied (e.g., ideal physiological state, ideal location, or ideal environment), the content may be eligible to be pushed to a user. The more conditions satisfied, the more the content provider may pay for the content to be pushed to the user. A content provider may be permitted to select which conditions are required (e.g., an ideal location that the user must be at), or are optional (an ideal environmental characteristic, if present, the content provider pays extra for the content to be delivered to the user, e.g., a content provider's logo appearing in an image captured by the mobile device).

FIG. **3**B illustrates an embodiment of sample entries **300**B of a user database. Sample entries **300**B may represent entries from user database **150-1** of FIG. **1**. Sample entries **300**B may also represent entries from some other database that is used to store data about mobile device users. Each entry of a user database may comprise data entries for: a user device identifier **370**, a user **375**, a home zip code **380**, a work zip code **385**, an age group **390**, whether the user is a commuter **395**, and the user's typical physiological state **397**.

A user device identifier **370** data entry may be an identifier specific to a mobile device, such as a telephone number. User **375** data entries may be the user's name. The home zip code **380** data entries and work zip code **385** data entries may be related to the location of the user's residence and job, respectively. This data may be explicitly provided by the user or may be determined based on the user's travel patterns (e.g., where the user is typically located Monday through Friday, 9 AM to 5 PM, and where the user is typically located in the evenings). Age group **390** data entries may specify an age range which the user is within. This data may be provided by the user, determined based on the user's physiological state data, the user's input to the mobile device, and/or data acquired from a consumer research firm. Based on the user's travel patterns, whether the user is a commuter may be determined and stored in commuter **395** data entries. Based on previous physiological state data received from a mobile device of a user, the user's typical physiological state **397** may be identified. Such data may be accessible by a host computer system and may be used to further target content to users. As should be understood, a user database may contain more or fewer types of data. The specific use data gathered and stored may be highly customizable.

FIG. **3**C illustrates an embodiment of sample entries **300**C of a pricing database. Samples entries **300**C may represent entries from pricing database **150-3** of FIG. **1**. Sample entries **300**C may also represent entries from some other database that is used to store pricing data for the delivery of content to mobile devices. Each entry of a pricing database may contain data entries for: a content identifier **312**, a content provider **314**, a minimum cost **316**, a maximum cost **318**, a number of deliveries **322**, and a number of confirmed presentations **324**.

The content identifier **312** data entries and content provider **314** data entries may be used to identify the content provider responsible for paying the cost of delivering the content associated with each entry in the pricing database. Each entry in the pricing database may have a corresponding entry in the content database. The corresponding entries in the pricing database and the content database may be linked by a content identifier that is specific to a particular piece of content.

Minimum cost **316** data entries and maximum cost **318** data entries may define the range of costs a content provider is to pay for a piece of content to be delivered to a user depending on how closely related the user's physiological state data, environmental data, and/or location data is to an ideal physiological state, ideal environmental data, and/or ideal location specified by the content provider. The closer the data matches, the higher the cost. More detail on pricing is provided in reference to method **700** of FIG. **7**.

Deliveries **322** data entries and confirmed presentations **324** data entries may be used to periodically bill the content provider. The number of deliveries **322** may indicate the number of times the content has been transmitted to mobile devices. The number of confirmed presentations **324** may indicate the number of times the host computer system has received a confirmation from mobile devices or indicate a user has been presented the content. As should be understood, a pricing database may contain more or fewer types of data. The specific data used for pricing may be highly customizable.

FIG. **4** illustrates an embodiment of a method for delivering relevant content to a mobile device. Method **400** may be performed by system **100** of FIG. **1** or by some other system for providing relevant content to a mobile device. At step **405**, environmental data may be collected by one or more environmental sensors of a mobile device, such as mobile device **110** of FIG. **1**. Environmental data may be collected via a positioning sensor (e.g., GPS), a motion sensor (e.g., accelerometer), a direction sensor (e.g., magnetometer), and/or a camera (which may be continuously capturing images or may only capture images when indicated by the user). Other types of environmental sensors may also be possible. Environmental data may be collected periodically without user interaction or when determined by the user.

At step **410**, physiological state data may be collected by one or more physiological sensors of the mobile device. Physiological state data may be gathered by electrocardiogram (ECG) sensors, galvanic skin response (GSR) sensors, plethysmography (PPG) sensors, skin temperature sensors (SKT), and/or electromyogram (EMG) sensors, to name only a handful of examples. The physiological state data may be collected at the same time, or approximately the same time, as the environmental data collected at step **405**. For example, capturing the environmental data and the physiological state data at approximately the same time may refer to capture of both within a window of 1 second, 5 seconds, 10 seconds, or 1 minute. Other time frames between step **405** and step **410** may also be used.

At step **415**, the environmental and physiological state data may be transmitted to a host computer system. Transmission

may occur via one or more networks. Referring to FIG. **1**, transmission of environmental data and physiological state data from mobile device **110** to host computer system **140** may occur via wireless network **120** and network **130**, which may include the Internet.

At step **420**, the environmental and physiological state data may be received by the host computer system. At step **425**, the environmental data may be analyzed by the host computer system. Analysis may include steps such as: identifying one or more objects appearing within an image, interpreting accelerometer data, determining a physiological state of the user, determining an activity of the user, and/or determining businesses or other entities in the vicinity of the user. At step **430**, the physiological state data may be analyzed. Analysis may include steps such as: using the physiological state data to identify a likely physiological state of the user. A physiological state identified for the user may also be associated with an intensity level. For example, if the physiological state data of the user indicates a physiological state of nervous, the user's nervous state could be associated with an intensity level of low, medium, or high based on the physiological state data. Physiological state data may be collected over a period of time and averaged (or otherwise combined) to identify the user's physiological state.

While method **400** illustrates analysis being performed by the host computer system, it should be understood that rather than transmitting raw environmental and physiological state data to the host computer system, the environmental and/or physiological state data may be partially or wholly analyzed by the mobile device, with results of the analysis transmitted to the host computer system. For example, rather than transmitting an image as environmental data to the host computer system, the image may be analyzed for various characteristics and only indications of the characteristics of the image (e.g., identifiers of objects present in the image, a location of the user) may be transmitted to the host computer system. Image data may contain a whole image captured by the camera, a partial image captured by the camera, and/or characteristics of an image as analyzed by the mobile device.

The analysis of the environmental and physiological state data may be used at step **435** to determine what content to present to the user of the mobile device. A content database (such as content database **150-2** of FIG. **1**), which may contain advertisements, and may be searched to identify content that most closely relates to the analyzed environmental and physiological state data. If no relevant content is identified, no content may be presented to the user. If relevant content is identified (e.g., containing the ideal location, ideal environmental data, and/or ideal physiological state associated with the content in the content database is similar to the analyzed data) at step **440**, the content may be transmitted to the mobile device.

At step **445**, the content may be received by the mobile device. At step **450**, the content may be presented to the user. In some embodiments, this may involve displaying text and/or graphics to the user and/or audio played via a speaker of the mobile device. In some embodiments, the content may be stored by the mobile device until an appropriate time to present the content. For example, the content may be stored until presented to the user while it is known the user is viewing the display, such as when the user is actively providing input to the mobile device. In some embodiments, the content may be presented to the user via an augmented reality display. For example, the content may be overlaid with an image captured by the mobile device's camera.

While data is transmitted to the host computer system to identify content to be presented to the user, it should be understood that various pieces of content may be stored by the mobile device. As such, the mobile device could collect environmental and physiological state data, analyze the environmental and physiological state data, determine content, and present such content to the end user without interaction with the host computer system to retrieve content. Rather, the host computer system may periodically provide various pieces of content to the mobile device, which may store the content and present the content to the user when corresponding environmental and physiological state data is collected.

FIG. **5** illustrates an embodiment of a method for delivering relevant content selected from a category of content to a mobile device presented to a user of the mobile device based on a trigger action. In method **500**, environmental data from a mobile device is used to select a category of content, while the physiological state data from the mobile device is used to select a piece of content from the selected category of content. In some embodiments, method **500** can apply to the reverse situation: the physiological state data is used to select a category of content, while the environmental data is used to select a piece of content from the selected category of content. Method **500** may be performed by system **100** of FIG. **1** or by some other system for providing relevant content to a user via a mobile device.

Similarly to step **405** of method **400**, at step **505**, environmental data may be collected by one or more environmental sensors of a mobile device, such as mobile device **110** of FIG. **1**. Environmental data may be collected via a positioning sensor (e.g., GPS), a motion sensor (e.g., accelerometer), a direction sensor (e.g., magnetometer), or a camera (which may be continuously capturing images or may only capture images when indicated by the user). Other types of environmental sensors may also be possible. Environmental data may be collected periodically or when determined by the user.

At step **510**, physiological state data may be collected by one or more physiological sensors of the mobile device. Physiological state data may be gathered by electrocardiogram (ECG) sensors, galvanic skin response (GSR) sensors, plethysmography (PPG) sensors, skin temperature sensors (SKT), and/or electromyogram (EMG) sensors, to name only a handful of examples. The physiological state data may be collected at the same, or approximately the same, time as the environmental data collected at step **505**. For example, capturing the environmental data and the physiological state data at approximately the same time may refer to capture of both within a window of 1 second, 5 seconds, 10 seconds, or 1 minute. Other time frames between step **505** and step **510** may also be used.

At step **515**, the environmental and physiological state data may be transmitted to a host computer system. Transmission may occur via one or more networks. Referring to FIG. **1**, transmission of environmental and physiological state data from mobile device **110** to host computer system **140** may occur via wireless network **120** and network **130**, which may include the Internet.

At step **520**, the environmental and physiological state data may be received by the host computer system. At step **525**, the environmental data may be analyzed. This may involve analyzing one or more images captured by the mobile device. For example, various objects or locations present within the one or more images may be identified. Analyzing the environmental data may also include analyzing information from an accelerometer and/or magnetometer. Location information from a location sensor (e.g., GPS) may also be analyzed.

Based on the environmental data, a category of content may be selected at step **530** by the host computer system. For example, if the content consists of advertisements, each cat-

egory of content may correspond to a different advertiser. As such, environmental data may be used to select a particular advertiser, using indications as to 1) what the user is looking at, what the user has looked at, and/or what is in the user's field of vision; 2) where the user is; and/or 3) what activity the user is or has been participating in.

At step **535**, the physiological state data may be analyzed by the host computer system. Analysis may include determining a physiological state of the user. For example, states that may be identified include: tired, happy, thirsty, cold, hot, scared, stressed, angry, and sad. At step **540**, using the analysis of the physiological state data at step **535**, content from the previously selected category of content may be determined. Referring to sample entries **300**A of FIG. **3**A as an example, the category of content determined at step **530** may be beverages because the environment surrounding the user contains the logo of MegaDrink. At step **540**, an advertisement for a specific drink that MegaDrink produces may be selected. Continuing with the example, if the person is determined to be tired, an energy drink (e.g., highly-caffeinated soda or coffee) made by the drink manufacturer may be advertised; if the person is determined to be thirsty, a sports drink made by MegaDrink may be advertised. If the user is sad, a soft drink by MegaDrink may be advertised. If no relevant content is identified, no content may be presented to the user. If relevant content is identified, at step **545**, the content may be transmitted to the mobile device. In some embodiments, content within the same category may belong to different content providers.

At step **550**, the content may be received by the mobile device. In some embodiments, the content may be stored for a time. The received content may be stored at step **555**. The content may be stored for a time until a trigger action is received at step **560**. The trigger action may be any action that indicates the user is interacting with the mobile device. As such, it may be assured that the user is looking at and/or listening to the mobile device. In some embodiments, the trigger action may be the user providing some input that indicates the user is interested in content, such as responding to a question: "Would you like to see offers from local merchants?" Once the trigger is received, at step **565**, the content may be presented to the user. In some embodiments, this may involve displaying text and/or graphics to the user and/or audio played via a speaker of the mobile device. In some embodiments, the content may be stored by the mobile device until an appropriate time to present the content. For example, the content may be stored until presented to the user while it is known the user is viewing the display, such as when the user is actively providing input to the mobile device.

In some embodiments, if the trigger action is not received within a threshold period of time after the content is received, the content may not be presented to the user and may be deleted from the mobile device. For example, if the content is received at step **550** and the user has placed the mobile device in her pocket for several minutes (or hours or some other period of time), the content may be unlikely to still be relevant to the user (e.g., the user may be miles away from the merchant that the content is related to), and thus may not be presented.

If the content is presented to the user at step **565**, a presentation of content confirmation may be transmitted by the mobile device to the host computer system at step **570**. As such, if the presentation of content confirmation is received at step **575**, the host computer system is assured that the content was presented to the user. An indication that the content was presented to the user may be stored at step **580** by the host computer system. This indication may be used for charging the content provider for delivering the content to the user.

While data is transmitted to the host computer system to identify content to be presented to the user, it should be understood that various pieces of content may be stored by the mobile device. As such, the mobile device could collect environmental and physiological state data, analyze the environmental and physiological state data, determine content, and present such content to the end user without interaction with the host computer system. Rather, the host computer system may periodically provide various pieces of content to the mobile device which may store the content and present the content to the user when corresponding environmental and physiological state data is collected.

FIG. **6** illustrates another embodiment of a method **600** for delivering relevant content to a mobile device. Method **600** may be performed by system **100** of FIG. **1** or by some other system for providing relevant content to a mobile device. Method **600** may use location data in addition to physiological state data and other environmental data received from the mobile device. In some embodiments, location data may be used as the only environmental data. At step **605**, the mobile device may collect location data. Such location data may be determined using a GPS receiver and/or by triangulating based on cellular towers. A general location may be determined based on the location of the nearest cellular tower. Other location-determining systems may also be used by the mobile device.

At step **610**, environmental data may be collected by one or more environmental sensors of a mobile device, such as mobile device **110** of FIG. **1**. Environmental data may be collected via a positioning sensor (e.g., GPS), a motion sensor (e.g., accelerometer), a direction sensor (e.g., magnetometer), and/or a camera (which may be continuously capturing images or may only capture images when indicated by the user). Other types of environmental sensors may also be possible. Environmental data may be collected periodically without user interaction or when determined by the user. The environmental data may be collected at the same time, or approximately the same time, as the location data collected at step **605**. For example, capturing the environmental data and the location data at approximately the same time may refer to capture of both within a window of 1 second, 5 seconds, 10 seconds, or 1 minute. Other time frames between step **605** and step **610** may also be used.

At step **615**, physiological state data may be collected by one or more physiological sensors of the mobile device. Physiological state data may be gathered by electrocardiogram (ECG) sensors, galvanic skin response (GSR) sensors, plethysmography (PPG) sensors, skin temperature sensors (SKT), and/or electromyogram (EMG) sensors, to name only a handful of examples. The physiological state data may be collected at the same time, or approximately the same time, as the environmental data collected at step **610**. For example, capturing the environmental data and the physiological state data at approximately the same time may refer to capture of both within a window of 1 second, 5 seconds, 10 seconds, or 1 minute. Other time frames between step **610** and step **615** may also be used.

At step **620**, the location data, the environmental data, and the physiological state data may be transmitted to a host computer system. Transmission may occur via one or more networks. Referring to FIG. **1**, transmission of location, environmental, and physiological state data from mobile device **110** to host computer system **140** may occur via wireless network **120** and network **130**, which may include the Internet.

At step **625**, the location, environmental, and physiological state data may be received by the host computer system. At step **630**, the environmental state data may be analyzed by the host computer system. Analysis may include steps such as: identifying one or more objects within an image, interpreting accelerometer data, determining a physiological state of the user, determining an activity of the user, and/or determining businesses or other entities in the vicinity of the user. At step **635**, the location data may be analyzed. This may involve determining content providers that are within a certain distance of the user and/or content providers in the same city, county, state, or zip code of the user. Each content provider may provide specific location limitations, such as those presented in ideal location **340** data entries of FIG. **3**A.

At step **640**, the physiological state data may be analyzed. Analysis may include steps such as using the physiological state data to identify a likely physiological state of the user. A physiological state identified for the user may also be associated with an intensity level. For example, if the physiological state data of the user indicates a physiological state of nervous, the user's nervous state could be associated with an intensity level of low, medium, or high based on the physiological state data. Physiological state data may be collected over a period of time and averaged (or otherwise combined) to identify the user's physiological state.

While method **600** illustrates analysis being performed by the host computer system, it should be understood that rather than transmitting raw location, environmental, and physiological state data to the host computer system, the location, environmental, and/or physiological state data may be partially or wholly analyzed by the mobile device, with results of the analysis transmitted to the host computer system. For example, rather than transmitting an image as environmental data to the host computer system, the image may be analyzed for various characteristics and only indications of the characteristics of the image (e.g., identifiers of objects present in the image, a location of the user) may be transmitted to the host computer system. Image data may contain a whole image captured by the camera, a partial image captured by the camera, and/or characteristics of an image as analyzed by the mobile device.

The analysis of the location, environmental, and physiological state data may be used at step **645** to determine what content to present to the user of the mobile device. A content database (such as content database **150-2** of FIG. **1**), which may contain advertisements, may be searched to identify content that matches or most closely matches the location criteria or the environmental and physiological state data. If no relevant content is identified, no content may be presented to the user. If relevant content is identified (e.g., the ideal location, ideal environmental data, and/or ideal physiological state associated with the content in the content database is similar to the analyzed data received from the mobile device) at step **650**, the content may be transmitted to the mobile device. If multiple pieces of content are identified, the most relevant piece of content may transmitted. In some embodiments, if a piece of content has been sent to the mobile device before, a different piece of content (e.g., the second closest match between the location, environmental, and physiological state data) may be presented to the user.

At step **655**, the content may be received by the mobile device. At step **660**, the content may be presented to the user. In some embodiments, this may involve displaying text and/or graphics to the user and/or audio played via a speaker of the mobile device. In some embodiments, the content may be stored by the mobile device until an appropriate time to present the content. For example, the content may be stored until presented to the user while it is known the user is viewing the display, such as when the user is actively providing input to the mobile device. In some embodiments, the content may be presented to the user via an augmented reality display. For example, the content may be overlaid with an image captured by the mobile device's camera.

FIG. **7** illustrates an embodiment of a method **700** for pricing content delivery to a mobile device. A piece of content may have a fixed price when delivered to a user. For example, the cost per impression, typically measured in thousands (CPM), may refer to a cost charged to the content provider for every thousand pieces of content delivered to users. The cost may be based on content delivered to users (e.g., step **440** of FIG. **4**) or content that has been confirmed as being presented to users (e.g., step **575** of FIG. **5**). In some embodiments, such as described in relation to method **700**, the cost per impression may vary based on how closely the location, environmental, and/or physiological state data match an ideal location, ideal environmental, and/or an ideal physiological state set by the content provider. The closer the match, the higher the cost for the content to be sent and/or presented to the user. Method **700** may be performed by system **100** of FIG. **1** or by some other system for providing relevant content to a mobile device. Method **700** may be performed as part of methods **400**, **500**, **600**, as part of some other method for providing relevant content to a mobile device, or as a stand-alone method. At step **710**, content may be selected for delivery to a mobile device of a user. Step **710** may represent step **435** of FIG. **4**, step **540** of FIG. **5**, step **645** of FIG. **6**, or some other step where content is selected for delivery.

At step **720**, the amount of similarity between the physiological state derived from the physiological state data received from the user's mobile device and the ideal physiological state linked with the content to be delivered may be determined. The more likely the physiological state data received from the mobile device indicates the ideal physiological state specified by the content provider (such as in ideal physiological state **330** data entries of FIG. **3**A), the more the content provider may be required to pay for the content to be delivered. The physiological state determined for a user may be associated with an intensity level. For example, a user's physiological state can be determined to be "slightly thirsty" or "very thirsty" based on the physiological state data. If the content provider's ideal physiological state is "thirsty," the content provider may pay more for content to be delivered to a very thirsty user than a slightly thirsty user.

Step **720** focuses on only determining the similarity between the physiological state of the user determined from the physiological state data received from the mobile device and an ideal physiological state received from the content provider. It should be understood that similar steps may also or alternatively be performed for environmental data and/or location data. Referring to location data, if the user is very close to a location specified by a content provider (e.g., 20 feet from a storefront), the cost may be higher than if the user is farther away (e.g., 200 feet from the storefront). Similarly, other environmental data may be used. For example, if the user is determined to be driving by a storefront, the cost for the content may be lower than if the user is walking by (and, thus, presumably more likely to enter the store on a whim due to content presented via the mobile device).

As such, predefined formulas may be used by the host computer system to charge content providers varying amounts based on the similarity between the content provider's desired ideal physiological state, ideal environmental data, and/or ideal location data and the physiological state data, environmental data, and location data received from the

user's mobile device. The price for the content to be delivered or presented to the user may be determined at step **730**.

At step **740**, the content provider may be billed for the presentation or delivery of the content. The content provider may be charged for individual deliveries or presentations of content, periodically (e.g., an aggregate amount for all deliveries or presentations in a particular month), or when a certain number of deliveries or presentations is reached (e.g., a thousand). Other billing schemes are also possible. For example, a dynamic billing scheme may be arranged where the number of leads and sales due to the content presented to the user is also factored into the price to the content provider.

A computer system as illustrated in FIG. **8** may represent the previously described computerized devices. For example, computer system **800** can represent components of the mobile devices and/or the host computer systems discussed in this application. FIG. **8** provides a schematic illustration of one embodiment of a computer system **800** that can perform the methods provided by various other embodiments. It should be noted that FIG. **8** is meant only to provide a generalized illustration of various components, any or all of which may be utilized as appropriate. FIG. **8**, therefore, broadly illustrates how individual system elements may be implemented in a relatively separated or relatively more integrated manner.

The computer system **800** is shown comprising hardware elements that can be electrically coupled via a bus **805** (or may otherwise be in communication, as appropriate). The hardware elements may include one or more processors **810**, including without limitation one or more general-purpose processors and/or one or more special-purpose processors (such as digital signal processing chips, graphics acceleration processors, and/or the like); one or more input devices **815**, which can include without limitation a mouse, a keyboard, and/or the like; and one or more output devices **820**, which can include without limitation a display device, a printer, and/or the like.

The computer system **800** may further include (and/or be in communication with) one or more non-transitory storage devices **825**, which can comprise without limitation local and/or network accessible storage, and/or can include without limitation a disk drive, a drive array, an optical storage device, solid-state storage device such as a random access memory ("RAM") and/or a read-only memory ("ROM"), which can be programmable, flash-updateable, and/or the like. Such storage devices may be configured to implement any appropriate data stores including without limitation various file systems, database structures, and/or the like.

The computer system **800** might also include a communications subsystem **830**, which can include without limitation a modem, a network card (wireless or wired), an infrared communication device, a wireless communication device and/or chipset (such as a Bluetooth™ device, an **802.11** device, a WiFi device, a WiMax device, cellular communication facilities, etc.), and/or the like. The communications subsystem **830** may permit data to be exchanged with a network (such as the network described below, to name one example), other computer systems, and/or any other devices described herein. In many embodiments, the computer system **800** will further comprise a working memory **835**, which can include a RAM or ROM device, as described above.

The computer system **800** also can comprise software elements, shown as being currently located within the working memory **835**, including an operating system **840**, device drivers, executable libraries, and/or other code, such as one or more application programs **845**, which may comprise computer programs provided by various embodiments, and/or may be designed to implement methods, and/or configure systems, provided by other embodiments, as described herein. Merely by way of example, one or more procedures described with respect to the method(s) discussed above might be implemented as code and/or instructions executable by a computer (and/or a processor within a computer); in an aspect, then, such code and/or instructions can be used to configure and/or adapt a general purpose computer (or other device) to perform one or more operations in accordance with the described methods.

A set of these instructions and/or code might be stored on a non-transitory computer-readable storage medium, such as the storage device(s) **825** described above. In some cases, the storage medium might be incorporated within a computer system, such as computer system **800**. In other embodiments, the storage medium might be separate from a computer system (e.g., a removable medium, such as a compact disc), and/or provided in an installation package, such that the storage medium can be used to program, configure, and/or adapt a general purpose computer with the instructions/code stored thereon. These instructions might take the form of executable code, which is executable by the computer system **800** and/or might take the form of source and/or installable code, which, upon compilation and/or installation on the computer system **800** (e.g., using any of a variety of generally available compilers, installation programs, compression/decompression utilities, etc.), then takes the form of executable code.

It will be apparent to those skilled in the art that substantial variations may be made in accordance with specific requirements. For example, customized hardware might also be used, and/or particular elements might be implemented in hardware, software (including portable software, such as applets, etc.), or both. Further, connection to other computing devices, such as network input/output devices, may be employed.

As mentioned above, in one aspect, some embodiments may employ a computer system (such as the computer system **800**) to perform methods in accordance with various embodiments of the invention. According to a set of embodiments, some or all of the procedures of such methods are performed by the computer system **800** in response to processor **810** executing one or more sequences of one or more instructions (which might be incorporated into the operating system **840** and/or other code, such as an application program **845**) contained in the working memory **835**. Such instructions may be read into the working memory **835** from another computer-readable medium, such as one or more of the storage device(s) **825**. Merely by way of example, execution of the sequences of instructions contained in the working memory **835** might cause the processor(s) **810** to perform one or more procedures of the methods described herein.

The terms "machine-readable medium" and "computer-readable medium," as used herein, refer to any medium that participates in providing data that causes a machine to operate in a specific fashion. In an embodiment implemented using the computer system **800**, various computer-readable media might be involved in providing instructions/code to processor(s) **810** for execution and/or might be used to store and/or carry such instructions/code. In many implementations, a computer-readable medium is a physical and/or tangible storage medium. Such a medium may take the form of a non-volatile media or volatile media. Non-volatile media include, for example, optical and/or magnetic disks, such as the storage device(s) **825**. Volatile media include, without limitation, dynamic memory, such as the working memory **835**.

Common forms of physical and/or tangible computer-readable media include, for example, a floppy disk, a flexible disk, hard disk, magnetic tape, or any other magnetic

medium, a CD-ROM, any other optical medium, punchcards, papertape, any other physical medium with patterns of holes, a RAM, a PROM, EPROM, a FLASH-EPROM, any other memory chip or cartridge, or any other medium from which a computer can read instructions and/or code.

Various forms of computer-readable media may be involved in carrying one or more sequences of one or more instructions to the processor(s) **810** for execution. Merely by way of example, the instructions may initially be carried on a magnetic disk and/or optical disc of a remote computer. A remote computer might load the instructions into its dynamic memory and send the instructions as signals over a transmission medium to be received and/or executed by the computer system **800**.

The communications subsystem **830** (and/or components thereof) generally will receive signals, and the bus **805** then might carry the signals (and/or the data, instructions, etc. carried by the signals) to the working memory **835**, from which the processor(s) **810** retrieves and executes the instructions. The instructions received by the working memory **835** may optionally be stored on a storage device **825** either before or after execution by the processor(s) **810**.

The methods, systems, and devices discussed above are examples. Various configurations may omit, substitute, or add various procedures or components as appropriate. For instance, in alternative configurations, the methods may be performed in an order different from that described, and/or various stages may be added, omitted, and/or combined. Also, features described with respect to certain configurations may be combined in various other configurations. Different aspects and elements of the configurations may be combined in a similar manner. Also, technology evolves and, thus, many of the elements are examples and do not limit the scope of the disclosure or claims.

Specific details are given in the description to provide a thorough understanding of example configurations (including implementations). However, configurations may be practiced without these specific details. For example, well-known circuits, processes, algorithms, structures, and techniques have been shown without unnecessary detail in order to avoid obscuring the configurations. This description provides example configurations only, and does not limit the scope, applicability, or configurations of the claims. Rather, the preceding description of the configurations will provide those skilled in the art with an enabling description for implementing described techniques. Various changes may be made in the function and arrangement of elements without departing from the spirit or scope of the disclosure.

Also, configurations may be described as a process which is depicted as a flow diagram or block diagram. Although each may describe the operations as a sequential process, many of the operations can be performed in parallel or concurrently. In addition, the order of the operations may be rearranged. A process may have additional steps not included in the figure. Furthermore, examples of the methods may be implemented by hardware, software, firmware, middleware, microcode, hardware description languages, or any combination thereof. When implemented in software, firmware, middleware, or microcode, the program code or code segments to perform the necessary tasks may be stored in a non-transitory computer-readable medium such as a storage medium. Processors may perform the described tasks.

Having described several example configurations, various modifications, alternative constructions, and equivalents may be used without departing from the spirit of the disclosure. For example, the above elements may be components of a larger system, wherein other rules may take precedence over or otherwise modify the application of the invention. Also, a number of steps may be undertaken before, during, or after the above elements are considered. Accordingly, the above description does not bound the scope of the claims.

What is claimed:

1. A method for selecting content for delivery, the method comprising:

receiving, by a host computer system, from a mobile device, physiological state data collected from a user of the mobile device;

analyzing, by the host computer system, the physiological state data collected from the user of the mobile device;

selecting, by the host computer system, content from a plurality of predefined content to deliver to the mobile device at least partially based on the physiological state data collected from the user, the selected content not including the physiological state data collected from the user; and

transmitting, by the host computer system, the selected content to the mobile device.

2. The method for selecting content for delivery of claim **1**, further comprising:

receiving, by the host computer system, image data from the mobile device, wherein selecting the content to deliver to the mobile device at least partially based on the physiological state data is further at least partially based on the image data.

3. The method for selecting content for delivery of claim **1**, further comprising:

receiving, by the host computer system, environmental data from the mobile device, wherein selecting the content to deliver to the mobile device at least partially based on the physiological state data is further at least partially based on the environmental data.

4. The method for selecting content for delivery of claim **3** wherein the environmental data indicates motion of the mobile device.

5. The method for selecting content for delivery of claim **1**, further comprising:

capturing, by the mobile device, the physiological state data from the user, wherein the physiological state data is captured using a physiological sensor selected from the group consisting of: an electrocardiogram sensor, a galvanic skin response sensor, a plenthysmography sensor, a skin temperature sensor, and an electromyogram sensor.

6. The method for selecting content for delivery of claim **5**, further comprising:

receiving, by the mobile device, from the host computer system, the selected content;

monitoring, by the mobile device, for an indication that a trigger action has occurred at the mobile device; and

in response to the trigger action not occurring with a threshold period of time, aborting, by the mobile device, presentation of the selected content and deleting the selected content from the mobile device.

7. The method for selecting content for delivery of claim **1**, further comprising:

determining, by the host computer system, a similarity between an ideal physiological state associated with the content and the physiological state data collected from the user of the mobile device; and

determining, by the host computer system, a price for presenting the content to the user at least partially based on the similarity between the ideal physiological state and the physiological state data collected from the user of the mobile device.

8. The method for selecting content for delivery of claim 7, wherein determining the price is restricted by a maximum price and a minimum price for presenting the content to the user.

9. The method for selecting content for delivery of claim 7, wherein determining the price is at least partially based on an intensity level of the physiological state data collected from the user of the mobile device.

10. A system for selecting content for delivery, the system comprising:

one or more processors; and

a memory communicatively coupled with and readable by the one or more processors and having stored therein processor-readable instructions which, when executed by the one or more processors, cause the one or more processors to:

receive, from a mobile device, physiological state data collected from a user of the mobile device;

analyze the physiological state data collected from the user of the mobile device;

select content from a plurality of predefined content to deliver to the mobile device at least partially based on the physiological state data collected from the user, the selected content not including the physiological state data collected from the user; and

cause the selected content to be transmitted to the mobile device.

11. The system for selecting content for delivery of claim 10, wherein the processor-readable instructions, when executed, further cause the one or more processors to:

receive image data from the mobile device, wherein selecting the content to deliver to the mobile device at least partially based on the physiological state data is further at least partially based on the image data.

12. The system for selecting content for delivery of claim 10, wherein the processor-readable instructions, when executed, further cause the one or more processors to:

receive environmental data from the mobile device, wherein selecting the content to deliver to the mobile device at least partially based on the physiological state data is further at least partially based on the environmental data.

13. The system for selecting content for delivery of claim 12 wherein the environmental data indicates motion of the mobile device.

14. The system for selecting content for delivery of claim 10, further comprising the mobile device, wherein:

the mobile device comprises a physiological sensor configured to capture the physiological state data; and

the physiological sensor is selected from the group consisting of: an electrocardiogram sensor, a galvanic skin response sensor, a plenthysmography sensor, a skin temperature sensor, and an electromyogram sensor.

15. The system for selecting content for delivery of claim 14, wherein the mobile device is configured to:

receive, from a host computer system, the selected content;

monitor for an indication that a trigger action has occurred at the mobile device; and

in response to the trigger action not occurring with a threshold period of time, abort presentation of the selected content and deleting the selected content from the mobile device.

16. The system for selecting content for delivery of claim 10, wherein the processor-readable instructions, when executed, further cause the one or more processors to:

determine a similarity between an ideal physiological state associated with the content and the physiological state data collected from the user of the mobile device; and

determine a price for presenting the content to the user at least partially based on the similarity between the ideal physiological state and the physiological state data collected from the user of the mobile device.

17. The system for selecting content for delivery of claim 16, wherein the processor-readable instructions, when executed, further cause the one or more processors to:

restrict the price for presenting the content to the user using a maximum price and a minimum price.

18. The system for selecting content for delivery of claim 16, wherein the processor-readable instructions, when executed, that cause the one or more processors to determine the price further comprise processor-readable instructions, when executed, that cause the one or more processors to use an intensity level of the physiological state data collected from the user of the mobile device to determine the price.

19. A non-transitory processor-readable medium for selecting content for delivery, comprising processor-readable instructions configured to cause one or more processors to:

receive, from a mobile device, physiological state data collected from a user of the mobile device;

analyze the physiological state data collected from the user of the mobile device;

select content from a plurality of predefined content to deliver to the mobile device at least partially based on the physiological state data collected from the user, the selected content not including the physiological state data collected from the user; and

cause the selected content to be transmitted to the mobile device.

20. The non-transitory processor-readable medium for selecting content for delivery of claim 19, wherein the processor-readable instructions are further configured to cause the one or more processors to:

receive image data from the mobile device, wherein selecting the content to deliver to the mobile device at least partially based on the physiological state data is further at least partially based on the image data.

21. The non-transitory processor-readable medium for selecting content for delivery of claim 19, wherein the processor-readable instructions are further configured to cause the one or more processors to:

receive environmental data from the mobile device, wherein selecting the content to deliver to the mobile device at least partially based on the physiological state data is further at least partially based on the environmental data.

22. The non-transitory processor-readable medium for selecting content for delivery of claim 21 wherein the environmental data indicates motion of the mobile device.

23. The non-transitory processor-readable medium for selecting content for delivery of claim 19, wherein the processor-readable instructions are further configured to cause the one or more processors to:

determine a similarity between an ideal physiological state associated with the content and the physiological state data collected from the user of the mobile device; and

determine a price for presenting the content to the user at least partially based on the similarity between the ideal physiological state and the physiological state data collected from the user of the mobile device.

24. The non-transitory processor-readable medium for selecting content for delivery of claim 23, wherein the pro-

cessor-readable instructions are further configured to cause the one or more processors to:

restrict the price for presenting the content to the user using a maximum price and a minimum price.

25. The non-transitory processor-readable medium for selecting content for delivery of claim **23**, wherein the processor-readable instructions configured to cause the one or more processors to determine the price further comprise processor-readable instructions configured to cause the one or more processors to use an intensity level of the physiological state data collected from the user of the mobile device to determine the price.

26. An apparatus for selecting content for delivery, the apparatus comprising:

means for receiving, from a mobile device, physiological state data collected from a user of the mobile device;

means for analyzing the physiological state data collected from the user of the mobile device;

means for selecting content from a plurality of predefined content to deliver to the mobile device at least partially based on the physiological state data collected from the user, the selected content not including the physiological state data collected from the user; and

means for transmitting the selected content to the mobile device.

27. The apparatus for selecting content for delivery of claim **26**, further comprising:

means for receiving image data from the mobile device, wherein selecting the content to deliver to the mobile device at least partially based on the physiological state data is further at least partially based on the image data.

28. The apparatus for selecting content for delivery of claim **26**, further comprising:

means for receiving environmental data from the mobile device, wherein selecting the content to deliver to the mobile device at least partially based on the physiological state data is further at least partially based on the environmental data.

29. The apparatus for selecting content for delivery of claim **28** wherein the environmental data indicates motion of the mobile device.

30. The apparatus for selecting content for delivery of claim **26**, further comprising a mobile device comprising:

means for capturing the physiological state data from the user.

31. The apparatus for selecting content for delivery of claim **30**, the mobile device further comprising:

means for receiving the selected content;

means for monitoring for an indication that a trigger action has occurred at the mobile device; and

means for aborting presentation of the selected content and deleting the selected content from the mobile device in response to the trigger action not occurring with a threshold period of time.

32. The apparatus for selecting content for delivery of claim **26**, further comprising:

means for determining a similarity between an ideal physiological state associated with the content and the physiological state data collected from the user of the mobile device; and

means for determining a price for presenting the content to the user at least partially based on the similarity between the ideal physiological state and the physiological state data collected from the user of the mobile device.

33. The apparatus for selecting content for delivery of claim **32**, wherein means for determining the price is restricted by a maximum price and a minimum price for presenting the content to the user.

34. The apparatus for selecting content for delivery of claim **32**, wherein the means for determining the price uses an intensity level of the physiological state data collected from the user of the mobile device in determining the price.

* * * * *

CERTIFICATE OF SERVICE AND FILING

I certify that on September 24, 2020, I electronically filed the foregoing Non-Confidential Principal Brief of appellant using the Court's CM/ECF filing system. Counsel for appellee were electronically served by and through the Court's CM/ECF filing system per Fed. R. App. P. 25(d) and Fed. Cir. R. 25(e).

/s/ Lauren A. Degnan
Lauren A. Degnan

CERTIFICATE OF COMPLIANCE

The Non-Confidential Principal Brief of appellant is submitted in accordance with the type-volume limitation of Fed. Cir. R. 32(b). The Brief contains 13,984 words, excluding the parts of the brief exempted by Fed. R. App. P. 32(f) and Fed. Cir. R. 32(b)(2). This Brief has been prepared in a proportionally spaced typeface using Microsoft Word 2016 in Times New Roman, 14 Point.

Dated: September 24, 2020

/s/ Lauren A. Degnan
Lauren A. Degnan

CERTIFICATE OF COMPLIANCE WITH CONFIDENTIALITY REQUIREMENTS

Appellant Apple Inc.'s Non-Confidential Principal Brief complies with Federal Circuit Rule 25.1(d)'s limitations on the amount of material that can be marked confidential in motions, responses, replies, or briefs. This Non-Confidential Principal Brief contains 12 words (including numbers) marked as confidential.

Dated: September 24, 2020

/s/ Lauren A. Degnan
Lauren A. Degnan