United States Court of Appeals for the Federal Circuit

ALIVECOR, INC.,
Appellant

v.

APPLE INC.,
Appellee

2023-1512, 2023-1513, 2023-1514

Appeals from the United States Patent and Trademark Office, Patent Trial and Appeal Board in Nos. IPR2021-00970, IPR2021-00971, IPR2021-00972.

Decided: March 7, 2025

SEAN S. PAK, Quinn Emanuel Urquhart & Sullivan, LLP, San Francisco, CA, argued for appellant. Also represented by WILLIAM ADAMS, New York, NY.

MARK S. DAVIES, White & Case LLP, Washington, DC, argued for appellee. Also represented by MICHAEL ARI AMON, Fish & Richardson P.C., San Diego, CA; RUFFIN B. CORDELL, WALTER KARL RENNER, Washington, DC; BENJAMIN ELACQUA, Houston, TX; MELANIE L. BOSTWICK, ABIGAIL COLELLA, ZACHARY HENNESSEE, Orrick, Herrington & Sutcliffe LLP, Washington, DC; E. JOSHUA ROSENKRANZ, New York, NY.

Before HUGHES, LINN, and STARK, *Circuit Judges*.

STARK, *Circuit Judge*.

Patent owner AliveCor, Inc. ("AliveCor") appeals from three final written decisions of the Patent Trial and Appeal Board ("Board") in related *inter partes* reviews ("IPRs") that found all claims of its three patents, U.S. Patent Nos. 9,572,499 (the "'499 patent"), 10,595,731 (the "'731 patent"), and 10,638,941 (the "'941 patent") (collectively, the "Challenged Patents") unpatentable over certain asserted prior art. AliveCor challenges the Board's obviousness findings and argues that the *inter partes* review petitioner, Apple Inc. ("Apple"), violated its discovery obligations. Because the Board's obviousness conclusion is supported by substantial evidence and AliveCor forfeited its discovery challenge, we affirm.

I

A

The Challenged Patents belong to a family of patents related to systems and methods for measuring and analyzing physiological data to detect cardiac arrhythmias.[1] The '499 patent and '731 patents share a common specification and describe "a method for monitoring a subject to determine when to record an electrocardiogram (ECG)." '499 patent 23:12-14.[2] The '941 patent has a different

[1] "Arrhythmia is a cardiac condition in which the electrical activity of the heart is irregular . . . [and] can cause cardiac arrest." '499 patent 1:31-34.

[2] For simplicity, all further references to the written description of the Challenged Patents will be to the '499 patent, unless otherwise noted.

specification and describes a wearable device designed to predict the occurrence of arrhythmias.

An embodiment of the Challenged Patents involves the use of a smart watch configured with a heart rate monitor such as "an optical sensor to detect the fluctuation of blood flow," i.e., a photoplethysmography ("PPG") sensor, which uses light to measure volume changes of circulating blood. '499 patent 25:13-16. As a user wears the smart watch, the PPG sensor continuously transmits heart rate information to a smartphone, which then "analyze[s] the heart rate information" for irregularities. *Id.* at 23:16-20. "[W]hen an irregularity is determined," the user is notified that an electrocardiogram ("ECG") "should be recorded." *Id.* at 23:20-22. The user may then use a second sensor, specifically "a hand-held [ECG] sensor," *id.* at 4:48-49, to record "electrical activity of the heart based on depolarization and repolarization of the atria and ventricles," J.A. 119 (internal quotation marks omitted), and, with this additional data, diagnose if the user has a cardiac arrythmia. The user may also use the ECG sensor "to record ECGs that can then be saved and/or transmitted for analysis." *Id.* at 23:24-26.

This process is illustrated in Figure 10, reproduced below.

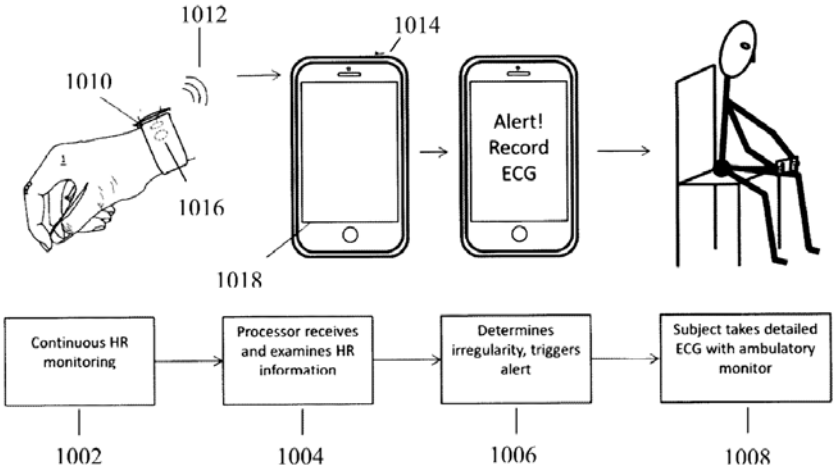

FIG. 10

The same process is the basis of representative claim 1 of the '499 patent, which recites:

> A method of determining a presence of an arrhythmia of a first user, said method comprising
>
> sensing a heart rate of said first user with a heart rate sensor coupled to said first user;
>
> transmitting said heart rate of said first user to a mobile computing device, wherein said mobile computing device is configured to sense an electrocardiogram;
>
> determining, using said mobile computing device, a heart rate variability of said first user based on said heart rate of said first user;
>
> sensing an activity level of said first user with a motion sensor;
>
> comparing, using said mobile computing device, said heart rate variability of said first user to said activity level of said first user; and

> alerting said first user to sense an electrocardiogram of said first user, using said mobile computing device, in response to an irregularity in said heart rate variability of said first user.

Id. at 26:20-39.

The appeal before us principally focuses on two features of the claims of the Challenged Patents: the use of machine learning to detect arrhythmias, and the step of confirming the presence of arrhythmias. The '499 and '731 patents broadly contemplate the use of machine learning to detect arrhythmias from ECG data. They reference multiple machine learning operations spanning a diverse range of complexity, ranging from simple operations such as "ranking," "classifying," "labelling," "predicting," and/or "clustering" data, to more complex operations like "random forest, association rule learning, artificial neural network, inductive logic programming, [and] support vector machines." *Id.* at 9:52-64. The use of machine learning is recited in dependent claims 7-9 and 17-19 of the '499 patent and dependent claims 3, 5, 6, 19, and 21-22 of the '731 patent.

The dependent claims requiring machine learning all describe the use of machine learning at a high level of generality. For example, representative claim 7 of the '499 patent recites:

> The method of claim 1, further comprising determining a presence of said arrhythmia using a machine learning algorithm.

Id. at 26:54-56. Other dependent claims recite a machine learning algorithm for detecting arrhythmia using inputs of PPG data, heart rate and heart rate variability ("HRV"), or motion sensor data. No claim requires a specific type of machine learning algorithm.

The second feature pertinent to this appeal is the "confirming" step recited in claim 1 of each of the '731 and '941 patents, reproduced below, respectively:

> A smart watch to detect the presence of an arrhythmia of a user, comprising:
>
> a processing device;
>
> a photoplethysmography ("PPG") sensor operatively coupled to the processing device;
>
> an ECG sensor, comprising two or more ECG electrodes, the ECG sensor operatively coupled to the processing device;
>
> a display operatively coupled to the processing device; and
>
> a memory, operatively coupled to the processing device, the memory having instructions stored thereon that, when executed by the processing device, cause the processing device to:
>
> receive PPG data from the PPG sensor;
>
> detect, based on the PPG data, the presence of an arrhythmia;
>
> receive ECG data from the ECG sensor; and
>
> *confirm the presence of the arrhythmia based on the ECG data*.

'731 patent 26:27-46 (emphasis added).

> A method of cardiac monitoring, comprising:
>
> sensing an activity level of a user with a first sensor on a smartwatch worn by the user;
>
> when the activity level is resting, sensing a heart rate parameter of the user with a second sensor on the smartwatch;

> determining, by a processing device, that a discordance is present between the activity level value and the heart rate parameter;
>
> based on the presence of the discordance, indicating to the user, using the smartwatch, a possibility of an arrhythmia being present; and
>
> receiving electric signals of the user from an electrocardiogram sensor ("ECG") on the smartwatch *to confirm a presence of the arrhythmia*, wherein the ECG sensor comprises a first electrode and a second electrode.

'941 patent at 17:2-17 (emphasis added). Other than in the claims, the specifications of the '731 and '941 patents do not reference or describe the "confirming" step.

B

Apple presented multiple obviousness grounds in its petition, contending (as pertinent to this appeal) that the machine learning and confirmation limitations of the Challenged Patents were rendered obvious by the teachings of certain combinations of prior art references. Apple relied on two references in its challenge to the machine learning claims: Hu 1997,[3] which Apple contended disclosed the machine learning limitations of the claims of the '499 patent, and Li 2012,[4] which purportedly teach the machine learning limitations of the '731 patent's claims.

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[3] Yu Hen Hu et al., *A Patient-Adaptable ECG Beat Classifier Using a Mixture of Experts Approach*, 44(9) IEEE Transactions on Biomed. Eng'g 891 (1997).

[4] Qiao Li & Gari D. Clifford, *Signal Quality and Data Fusion for False Alarm Reduction in the Intensive Care Unit*, 45(6) J. Electrocardiology 596 (2012).

Hu 1997 describes the creation of a computerized classification algorithm for detecting and classifying ECG signals. That algorithm is "developed based on brief, patient-specific ECG data . . . combined with a global classifier, which is tuned to a large ECG database of many patients, to form a MOE [i.e., mixture-of-experts, which is a type of machine learning algorithm] classifier structure." J.A. 4801. Hu 1997 adds that use of its algorithm will "gain significant performance enhancement at low cost," and further touts that its teachings "can be easily adapted to other automated patient monitoring algorithms and eventually support decentralized remote patient-monitoring systems." J.A. 4805; J.A. 4809.

Li 2012 describes the use of machine learning to reduce the frequency of false alarms which indicate, incorrectly, the presence of arrhythmia conditions in intensive care unit patients. Li 2012 discloses "a novel framework for [false alarm] reduction using a machine learning approach to combine up to 114 signal quality and physiological features extracted from the [ECG], [PPG], and optionally the arterial blood pressure waveform." J.A. 3873.

For the "confirming" step of the '731 and '941 patents, Apple relied on PCT Patent Application No. 2012/140559 to Shmueli ("Shmueli"). Shmueli teaches "a combined oximetry and [ECG] measuring system and method in which the oximetry measurement is performed continuously and/or repeatedly, and the ECG measurement is triggered upon detection of an intermittent irregular heart-related event." J.A. 3825. Shmueli teaches a wrist-mounted heart monitoring device equipped with both an "oximetry (SpO_2) measuring unit," i.e., a PPG sensor,[5] and "an ECG measuring unit." J.A. 3826. Shmueli explains how software may be used "to detect various irregularities of the heart

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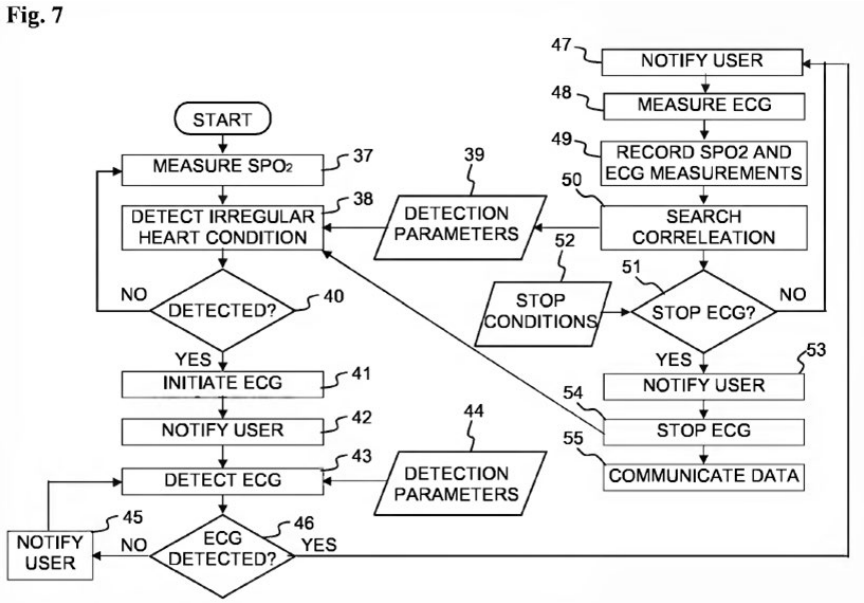
[5] It is undisputed that Shmueli uses the terms "oximetry," "SpO2," and "PPG" interchangeably. J.A. 3824.

condition" by comparing measured PPG data with stored "heart-irregularity detection parameters." J.A. 3829. Once an irregularity is detected, the software notifies the user and "initiates ECG measurement." *Id.* The software then "proceeds to element 50 to search for correlations between the [PPG] signal and the ECG signal to produce new detection parameters, or modify existing detection parameters, so as to enhance the detection algorithms of the irregular heart conditions." J.A. 3830. Modifying the detection parameters in this manner (element 50) "can be executed in real-time []together with elements" 37 (measuring PPG), 47 (notifying user to perform an ECG measurement), and 49 (recording PPG and ECG measurements). *Id.* The process continues in this manner until "the software program detects that a condition for stopping the ECG measurement is met (element 51)," such as determining that the irregular heart condition has stopped. *Id.*

The process described above is shown as a flow chart in Shmueli's Figure 7, reproduced below.

Fig. 7



J.A. 3843. Apple argued that a person of ordinary skill in the art would have understood that the software at elements 38, 39, and 50 "causes the processing device to confirm the presence of the arrhythmia based on the ECG data, by searching for correlations between the PPG and ECG data, modifying detection parameters, and confirming the presence of arrhythmia." J.A. 92.

In its Final Written Decisions, the Board agreed with Apple that Shmueli in combination with Hu 1997 rendered obvious the machine learning claims of the '499 patent, while Shmueli in combination with Li 2012 rendered obvious the machine learning claims of the '731 patent. In reaching its conclusion with respect to the '499 patent, the Board rejected AliveCor's contention that Hu 1997 "only shows machine learning in contexts *other* than arrythmia detection," J.A. 45, because "although Hu 1997 exemplifies the detection of arrhythmia using ECG data . . . the source of the heart rate parameters (e.g., ECG or SpO_2/PPG) would not have deterred a [person of ordinary skill in the art] from applying machine learning to them given the

advantages of the approach in enhancing performance and detection accuracy," J.A. 46 (internal quotation marks omitted). With respect to the machine learning claims of the '731 patent, the Board agreed with Apple that "after an ECG is measured, it would have been obvious to confirm arrhythmia detection using a machine learning algorithm based on the PPG data, motion sensor data, and/or ECG data." J.A. 111. The Board recognized that Li 2012's machine learning algorithm used multiple data inputs and found that "[n]one of the claims challenged . . . preclude ECG data (or any other data used in Li 2012) from also being input into the algorithm." J.A. 109. The Board also looked to the general state of the art, finding that at the pertinent date "those of ordinary skill in the art had . . . both interest and success in adapting machine learning to various biomedical applications." J.A. 110.

As for the "confirming" limitation, found in the claims of the '731 and '941 patents, requiring the confirmation of arrythmias using ECG measurements, the Board credited the testimony of Apple's expert, Dr. Bernard Chaitman, and found that Shmueli's teachings would have led "one of ordinary skill in the art [to] have understood that determining whether '[t]he irregular heart condition has stopped,' and notifying the user," both of which Shmueli does, "requires, as a predicate, that the software program confirm the presence of arrhythmia using the ECG data." J.A. 94-95; *see also* J.A. 3461-64. Thus, the Board held that all claims of the Challenged Patents were unpatentable as obvious.

C

During the IPR proceedings, the validity of the Challenged Patents was also being litigated in parallel proceedings before the International Trade Commission ("ITC"). AliveCor filed a complaint in the ITC on April 20, 2021, alleging that Apple was importing or selling products infringing claims of the three Challenged Patents. *See Certain*

Wearable Electronic Devices, Inv. No. 337-TA-1266, 2022 WL 2981155, at *3 (U.S.I.T.C. July 27, 2022) ("*ITC Initial Decision*"). The ITC instituted an investigation on May 26, 2021, and a few weeks later – on June 9, 2021 – Apple filed its IPR petitions at the Board.

The Board instituted the IPRs on December 8, 2021. Shortly thereafter, AliveCor's counsel contacted Apple's counsel and requested Apple's consent to introduce in the IPR proceedings evidence of secondary considerations that had been produced by Apple in the ITC investigation. The following email exchange took place between counsel:

> [AliveCor:]
>
> Apple has produced in the ITC relevant, non-public documents regarding secondary considerations of non-obviousness. . . . Please let us know if you will consent to the use of these documents in the IPR proceedings. If not, let us know your availability for a conference with the Board to request briefing to allow discovery requests related to secondary indicia.
>
> [Apple:]
>
> Your request to utilize these documents in the IPRs or utilize them as the basis for a discovery request in the IPRs is a violation of at least paragraph 4 of the ITC protective order.
>
> [AliveCor:]
>
> [W]e still have not heard back from Apple as to whether it opposes our request to use the below-identified documents in the IPR proceeding. . . . If Apple does oppose our request, we intend to seek permission from the Board to serve targeted

> discovery requests on the issue of secondary considerations.
>
> [Apple:]
>
> As mentioned below, AliveCor's use of these documents in the IPRs or use of them as the basis for a discovery request in the IPRs would be a violation of the ITC protective order. . . . AliveCor's request to the PTAB based on its knowledge of allegedly relevant information produced under the ITC protective order is improper. . . . *Apple does not grant AliveCor permission to disclose these documents to the PTAB in the IPRs*. Unless AliveCor has "an order by the Commission or the Administrative Law Judge," disclosure of these documents to the [Board], as well as their use for discovery requests in the IPRs, would be a violation of the ITC protective order.

J.A. 8814-15 (emphasis added). Neither party apprised the Board of this discovery dispute at any point during IPR proceedings. Nor did AliveCor ever ask the ITC to grant it permission to use the materials produced by Apple in the ITC investigation in the IPRs.

On June 27, 2022, an ITC administrative law judge ("ALJ") issued an Initial Decision rejecting Apple's obviousness contentions and, therefore, upholding the validity of various claims of the Challenged Patents. In reaching its conclusion, the ALJ found that AliveCor had presented secondary consideration evidence sufficient to rebut Apple's "strong" prima facie showing of obviousness. *ITC Initial Decision*, 2022 WL 2981155 at *66. Specifically, the ALJ noted that "[t]he nature and volume of industry praise is unusual, particularly the praise published in a respected medical journal, and although the evidence of copying is not especially impressive, some degree of commercial

success is evidenced from the [AliveCor product] sales data and the testimony of [AliveCor's] chief financial officer." *Id.*

By the time the consolidated IPR oral hearing was held on September 14, 2022, the ALJ's Initial Decision had been publicly available for nearly three months. Nevertheless, AliveCor made no effort to inform the Board of the ALJ's findings with respect to the evidence of copying that had been presented in the ITC, and it did not ask the Board to order Apple to produce that same evidence as discovery in the IPRs.

AliveCor timely appealed. We have jurisdiction under 28 U.S.C. § 1295(a)(4)(A).

II

A patent is invalid for obviousness "if the differences between the claimed invention and the prior art . . . would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains." 35 U.S.C. § 103. "The ultimate question of obviousness is a legal question that we review de novo with underlying factual findings that we review for substantial evidence." *Roku, Inc. v. Universal Elecs., Inc.*, 63 F.4th 1319, 1324 (Fed. Cir. 2023). Those underlying factual findings include "[w]hether a person of ordinary skill in the art would have been motivated to modify or combine teachings in the prior art, and whether he would have had a reasonable expectation of success." *OSI Pharms., LLC, v. Apotex, Inc.*, 939 F.3d 1375, 1382 (Fed. Cir. 2019) (internal citation omitted). Substantial evidence is "such relevant evidence as a reasonable mind might accept as adequate to support a conclusion." *Consol. Edison Co. of N.Y. v. N.L.R.B.*, 305 U.S. 197, 229 (1938).

We also review the Board's decision for compliance with the Administrative Procedure Act ("APA"), 5

U.S.C. § 550 *et seq*. Under the APA, we must "hold unlawful and set aside agency action, findings, and conclusions found to be . . . arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law," made "without observance of procedure required by law," or "unsupported by substantial evidence." 5 U.S.C. § 706(2). In making these determinations, "due account shall be taken of the rule of prejudicial error." *Id.*; *see also ZyXEL Commc'ns Corp. v. UNM Rainforest Innovations*, 107 F.4th 1368, 1382 (Fed. Cir. 2024) (describing § 706 as "harmless error rule").

III

AliveCor raises three main issues on appeal. First, AliveCor argues that the Board erred in finding the machine learning claims were obvious based on Hu 1997 or Li 2012 in combination with Shmueli. Second, AliveCor challenges the Board's finding that Shmueli rendered the "confirming" step obvious. Finally, AliveCor contends that Apple violated its discovery obligations by failing to produce secondary consideration evidence from the parallel ITC proceeding. We address, and reject, each of these arguments in turn.

A

AliveCor challenges the Board's findings that Hu 1997 and Li 2012, in combination with Shmueli, render obvious the machine learning steps recited in dependent claims of the '499 and '731 patents. We are not persuaded. The Board's findings are supported by substantial evidence.

The Board had substantial evidence, including the testimony of Apple's expert, Dr. Chaitman, for its finding that the teachings of Shmueli combined with Hu 1997 or Li 2012 would have motivated one of ordinary skill in the art to use a machine learning algorithm to detect arrhythmias in the manner claimed. It is undisputed that Hu 1997 and Li 2012 each teach the use of machine learning to assess

ECG data. *See* Open. Br. at 16 ("Hu 1997 does teach machine learning . . . ."); *id.* at 39 ("Li 2012 teaches using machine learning on a dataset with multiple data sources, including ECG, ABP, and PPG.") (internal emphasis omitted). To restrict each reference's teachings to the particular way it implements machine learning, as AliveCor insists we should do, would improperly fail to read these references for all that they disclose. *See In re Mouttet*, 686 F.3d 1322, 1331 (Fed. Cir. 2012) ("A reference may be read for all that it teaches, including uses beyond its primary purpose."). AliveCor's approach also conflicts with the reality that the skilled artisan is not an automaton, so we must "take account of the inferences and creative steps that a person of ordinary skill in the art would employ." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007). There was, thus, nothing improper in the Board's determination that such an artisan would have found it obvious to use machine learning in connection with PPG data, even if this precise use is not expressly disclosed in either Hu 1997 or Li 2012.

Moreover, the Challenged Patents' machine learning claims, accorded their plain and ordinary meaning in light of the specification, do not require any specific type of machine learning algorithm or a precise method for inputting and analyzing data to detect arrhythmias. Hence, Apple's burden could be, and was, satisfied by substantial evidence that a person of ordinary skill in the art would have found it obvious to use machine learning, generally, in the context of PPG and ECG data to detect cardia arrhythmia. Hu 1997's and Li 2012's descriptions of machine learning algorithms provide sufficient evidentiary support for the Board's obviousness findings, findings that were made at the same level of specificity as the claims.

AliveCor insists that the Board found, at most, that a person of ordinary skill in the art would have been motivated to use machine learning to "confirm" arrythmia, which cannot support the Board's conclusion that the

Challenged Patents' use of machine learning to "detect" arrhythmia was obvious. We disagree with this characterization of the Board's analysis. The Board acknowledged that "'confirm' and 'confirming' are discrete requirements from 'detect,'" and, with this understanding, found that Li 2012 taught "the use of machine learning to . . . 'improv[e] the accuracy of true positive *detection*.'" J.A. 85, 107 (emphasis added). Therefore, the Board did not wrongfully conflate the detection and confirmation requirements.

We also disagree with AliveCor's argument that the Board abused its discretion in crediting Dr. Chaitman's testimony. In AliveCor's view, Dr. Chaitman lacks sufficient expertise in machine learning technology. We disagree. While Dr. Chaitman is not experienced in specific, complex machine learning algorithms, he is qualified to opine on the applicability of machine learning generally. J.A. 25-27, 82-83 (describing Dr. Chaitman as having "extensive experience working with tools for detecting cardiac conditions"). Given the nature of the claims, and the fact that the Board only relied on Dr. Chaitman (in this context) for the general applicability of machine learning, the Board concluded that more advanced expertise in computer science and machine learning were "not prerequisites for qualifying a person of ordinary skill in the art." J.A. 26-27, 84. We discern no error in this holding.

Finally, AliveCor challenges the Board's reliance on a statement from Dr. Collin Stultz, Apple's expert in the ITC, to the effect that machine learning algorithms were well-known in the prior art. J.A. 110 (noting Dr. Stultz testimony that "a machine learning algorithm without specifics is nothing more than generic, functional language"). Even assuming, without deciding, that Dr. Stultz's testimony was irrelevant (because it addressed whether AliveCor's claims are directed to patentable subject matter under 35 U.S.C. § 101 and not whether they are obvious under § 103), AliveCor has not met its burden of demonstrating that the Board's reliance on this testimony prejudiced it.

See In re Watts, 354 F.3d 1362, 1369 (Fed. Cir. 2004) ("[T]he appellant must not only show the existence of error, but also show that the error was in fact harmful because it affected the decision below."). Indeed, AliveCor acknowledges that the Board "did not even rely on Dr. Stultz's testimony for obviousness" and only cited to the testimony "in passing." Open. Br. at 33-34. Even excluding its reference to Dr. Stultz's testimony, the Board's finding that machine learning was generally well-known was supported by overwhelming evidence, including the testimony of AliveCor's expert, Dr. Efimov.

Accordingly, substantial evidence supports the Board's determination that the machine learning claims of the '499 and '731 patents were obvious over the prior art.

B

Substantial evidence also supports the Board's finding that Shmueli teaches the step of confirming arrythmias using ECG measurements after a potential arrythmia is detected using PPG. Shmueli's Figure 7 depicts collection of a patient's ECG data (element 48) followed by (in element 50) "search[ing] for correlations between the [PPG] signal and the ECG signal to . . . modify existing detection parameters, so as to enhance the detection algorithms of the irregular heart conditions." J.A. 3829-30; *see also* J.A. 3843. Shmueli further explains that this step of searching for correlations can be performed in real-time together with element 37, measuring PPG. The Board reasonably read these portions of Shmueli as teaching a feedback loop in which collected ECG data is used to update the detection parameters used to identify irregularities from incoming PPG data in real time. *See* J.A. 94 (Board agreeing with Apple that "Shmueli works as follows: (1) continuously measuring SpO_2/PPG data; (2) measuring ECG data upon detecting an irregular heart condition; and (3) correlating SpO_2/PPG and ECG data to confirm presence of the irregular heart condition"). The Board also reasonably read

Shmueli as teaching that the SpO_2/PPG measurement and ECG measurement "are continued and performed in parallel" until the system determines that the irregular heart condition has stopped. J.A. 94.

The Board found further support for its determination in Dr. Chaitman's testimony. Dr. Chaitman opined that a person of ordinary skill in the art would have understood that Shmueli's feedback loop – including element 50 (searching for correlations between PPG and ECG signals), element 39 (using detection parameters to detect irregular heart conditions), and element 38 (using PPG data to detect irregular heart conditions) – "causes the processing device to confirm the presence of the arrhythmia based on the ECG data, by searching for correlations between the PPG and ECG data, modifying detection parameters, and confirming the presence of arrhythmia." J.A. 3461-63 ¶¶ 111-12. The Board also fairly credited Dr. Chaitman's testimony that one of ordinary skill reading Shmueli "would have understood that determining whether 'the irregular heart condition has stopped' also requires the software program to confirm the presence of arrythmia using the ECG data." J.A. 3464 ¶ 113.

AliveCor's contention that Shmueli confirms arrythmias using only PPG – and not, as the claims of the Challenged Patents do, using ECG – is incorrect. As the Board recognized, Shmueli states that when an irregular heart condition is detected, the PPG measurement "*preferably* continues," J.A. 3829 (emphasis added), which the Board fairly read to indicate that Shmueli teaches embodiments in which the PPG measurement has *not* continued, meaning (in such an embodiment) "ECG is the only measurement that can be used to perform the operations described by Shmueli, including determining whether the irregular heart condition has stopped," J.A. 96 (internal quotation marks omitted).

AliveCor's characterization of the Board's findings as embracing the flawed proposition that searching for correlations is equivalent to confirming arrhythmia based on ECG data lacks merit. Instead, we read the Board as finding that a skilled artisan would understand Shmueli's real-time modification of detection parameters as requiring a confirmation step. *See* J.A. 94 (determining that claims broadly encompass "confirming the presence of arrhythmia based on new parameters generated from analyzing the ECG data"); J.A. 95 (finding step of determining whether irregular heart condition has stopped "requires, as a predicate, that the software program confirm the presence of arrhythmia using the ECG data"). This is, as we have already explained, a reasonable reading of Shmueli's teachings and is supported by substantial evidence, including Dr. Chaitman's opinion.

Thus, we conclude that substantial evidence supports the Board's findings.

C

Lastly, AliveCor asks us to vacate the Board's decisions due to Apple's failure to comply with what AliveCor characterizes as the self-executing discovery obligations of an IPR petitioner. Specifically, AliveCor contends that Apple violated its discovery duties by failing to produce, in the IPRs, the secondary consideration evidence that the ALJ had found persuasive in the parallel ITC investigation. We need not delve deeply into the contours of an IPR litigant's discovery obligations because AliveCor forfeited its argument by failing to raise it with the Board.

"By regulation, the Board has provided for limited mandatory discovery." *Wi-Fi One, LLC v. Broadcom Corp.*, 887 F.3d 1329, 1338 (Fed. Cir. 2018). A petitioner's "routine discovery" obligations are set forth in 38 C.F.R. § 42.51(b)(1), which requires, among other things, that:

> Unless previously served, a party must serve relevant information that is inconsistent with a position advanced by the party during the proceeding concurrent with the filing of the documents or things that contain[] the inconsistency.

37 C.F.R. § 42.51(b)(1)(iii). AliveCor contends that Apple produced evidence of secondary considerations in the parallel ITC proceeding that supported a finding of nonobviousness, making such evidence inconsistent with the position Apple was advocating in the IPRs, which is that the claims of the Challenged Patents are obvious. This means, according to AliveCor, that Apple violated its discovery obligations when it failed to produce such evidence in the IPRs.

We will not address the merits of AliveCor's contention because it failed to preserve the issue for appellate review.[6] *See In re Google Tech. Holdings LLC*, 980 F.3d 858, 863 (Fed. Cir. 2020) ("[A] position not presented in the tribunal under review will not be considered on appeal in the absence of exceptional circumstances."). While it is not, of course, AliveCor's responsibility to ensure that Apple meets its own discovery obligations under the Board's rules, it is AliveCor's obligation to present issues to the Board, and preserve them, if it wants an opportunity to

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[6] During pendency of this appeal, Apple filed two citations of Supplemental Authority, one notifying us of two Final Written Decisions concerning related patents in which the Board found that secondary consideration evidence did not rebut the petitioner's prima facie showing of obviousness, and the other notifying us of the joint voluntary dismissal of appeals from those decisions. *See* ECF No. 53, 59. AliveCor responded to the first of these filings. *See* ECF No. 54. We have considered these filings, but they have no impact on our decision, given our conclusion that AliveCor forfeited its discovery issue.

argue them on appeal. As AliveCor concedes, it never brought the discovery issue to the Board's attention, a choice it seeks to excuse by pointing to Apple's rejection of AliveCor's request to raise the issue with the Board. *See* Oral Arg. at 11:16-12:01 (AliveCor counsel admitting to not informing Board of secondary consideration evidence);[7] Open. Br. at 59 ("[Apple] affirmatively precluded AliveCor from even seeking to have these documents introduced before the Board.") (emphasis omitted); *see also supra* I.C. (setting out email exchange between counsel). But Apple's posture did not relieve AliveCor of its obligation to present its concern to the Board and seek relief there rather than raising these matters with us, for the first time, on appeal.

Nor does this case present exceptional circumstances that might justify excusing AliveCor's forfeiture. AliveCor could have told the Board it believed Apple was violating its discovery obligations, or requested that the Board allow AliveCor to introduce evidence from the ITC in the IPR proceedings. At the very least, AliveCor could have directed the Board to the portion of the *publicly-available ITC ALJ Initial Decision* showing that the ITC was persuaded by secondary consideration evidence that Apple was not permitting the Board to consider. *See generally ITC Initial Decision*, 2022 WL 2981155 at *66, *86-87, *104-05.[8]

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[7] Available at https://oralarguments.cafc.uscourts.gov/default.aspx?fl=23-1512_07122024.mp3.

[8] At oral argument, AliveCor suggested it could not have put the ITC Initial Decision in the record because it was released after briefing was completed, and the Board requires all arguments to be made in written submissions. Oral Arg. at 11:00-12:01. The Board, however, permits parties to file a motion to submit supplemental information when it is "relevant to a claim for which the trial has been instituted." 37 C.F.R. § 42.123. Had AliveCor filed such a

Having done none of these things, or anything else to apprise the Board of the issue, we cannot find exceptional circumstances that would warrant excusing AliveCor's forfeiture.[9]

IV

We have considered AliveCor's remaining arguments and find them unpersuasive. For the foregoing reasons, we affirm.

AFFIRMED

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motion, either it would have been permitted to supplement the record (if the motion was granted) or it would have preserved the issue for appeal (if the motion was denied).

[9] AliveCor asserts it should be excused from not raising discovery issues with the Board because it was deferring to Apple's warnings that doing so would violate the ITC protective order, potentially leading to adverse consequences for AliveCor at the ITC. *See* J.A. 8815. Navigating the competing constraints of parallel proceedings may, no doubt, present challenges, and our holding today should not be read as condoning (or, for that matter, faulting) Apple's tactics.