

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

HUM INDUSTRIAL TECHNOLOGY, INC.,
Petitioner,

v.

AMSTED RAIL COMPANY, INC.,
Patent Owner.

IPR2023-00538
Patent 9,365,223 B2

Before JAMES P. CALVE, KEVIN W. CHERRY, and
MICHAEL L. WOODS, *Administrative Patent Judges*.

CHERRY, *Administrative Patent Judge*.

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

Hum Industrial Technology, Inc. (“Petitioner”) filed a petition to institute *inter partes* review of claims 1–10, 13–18, and 20–32 of U.S. Patent No. 9,365,223 B2 (Ex. 1001, “the ’223 patent”). Paper 10 (“Pet.”)¹. Amsted Rail Company, Inc. (“Patent Owner”) filed a Preliminary Response. Paper 11 (“Prelim. Resp.”). With our authorization, Petitioner filed a Reply to Patent Owner’s Preliminary Response (Paper 12) and Patent Owner filed a Sur-Reply (Paper 14, “Sur-reply”) addressing 1) whether Armitage et al. (US 2011/0282540 A1) (Ex. 1006) is prior art to certain claims and 2) whether we should exercise our discretionary authority under 35 U.S.C. § 325(d) to deny the Petition.

We have authority under 35 U.S.C. § 314 to determine whether to institute an *inter partes* review. The standard for instituting an *inter partes* review is set forth in 35 U.S.C. § 314(a), which provides that an *inter partes* review may not be instituted unless “there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” The Supreme Court has held that the Board, in a decision to institute under 35 U.S.C. § 314(b), may not institute review on less than all claims challenged in the petition. *SAS Inst. Inc. v. Iancu*, 138 S. Ct. 1348, 1355–56 (2018). Moreover, in accordance with our rules, “[w]hen instituting *inter partes* review, the Board will authorize the review to proceed on all of the challenged claims and on all grounds of unpatentability asserted for each claim.” 37 C.F.R. § 42.108(a) (2020); *see also PGS Geophysical AS v. Iancu*, 891 F.3d 1354, 1360 (Fed. Cir. 2018) (interpreting

¹ We refer to the Corrected Petition. Petitioner initially filed the Petition (Paper 1) and we granted Petitioner’s Motion to Correct Petition (Paper 9).

the statute to require “a simple yes-or-no institution choice respecting a petition, embracing all challenges included in the petition”).

Applying those standards, and upon considering the Petition, the Preliminary Response, and the evidence of record, we determine the information presented shows a reasonable likelihood that Petitioner would prevail in establishing the unpatentability of at least one of the challenged claims of the ’223 patent. Accordingly, we institute an *inter partes* review of all challenged claims (i.e., claims 1–10, 13–18, and 20–32) of the ’223 patent, based on the grounds asserted in the Petition.

II. BACKGROUND

A. Related Matters

The parties identify the following district-court proceeding as related matters involving the ’223 patent: *Amsted Rail Company, Inc. v. Hum Industrial Technology, Inc. et al*, Case No. 4:22-cv-00445-AGF (E.D. Mo.). Pet. 2; Paper 5, 1 (Patent Owner’s Mandatory Notices).

Petitioner also identifies the following pending petitions for *inter partes* review involving patents that are related to the ’223 patent: IPR2023-00539 (U.S. Patent No. 9,981,673 B2); IPR2023-00540 (U.S. Patent No. 10,137,915 B2). Pet. 2.

B. Real Parties in Interest

Petitioner identifies its real parties in interest as Hum Industrial Technology, Inc. and Dr. Brent Wilson. Pet. 1.

Patent Owner identifies Amsted Rail Company, Inc., Amsted Digital Solutions, Inc., and IONX LLC as its real party in interest. Paper 5, 1.

C. Overview of the '223 patent

The '223 patent is titled “System and Method for Monitoring Railcar Performance.” Ex. 1001, Code [54]. The '223 patent issued from Application Serial No. 13/842,427, filed Mar. 15, 2013. *Id.* at Codes [21], [22]. The '427 application is a continuation-in-part of Application Serial No. 12/861,713 (“the '713 application”), filed on Aug. 23, 2010, issued as U.S. Patent No. 9,026,281 (“the '281 patent”). *Id.* at Code [63]. The '223 patent also claims priority to provisional application No. 61/661,661, filed June 19, 2012.

The '223 patent relates to a system for monitoring operation of a railcar. *Id.* at Code [57]. The specification explains, due to automation of rail operations and increasing regulation to improve safety, the railroad industry needs to monitor the performance of trains, cars and railcar trucks because even minor mechanical failures could lead to a catastrophic failure, not only of a single railcar, but of the entire train. *Id.* at 1:35–41. Various detectors have been used, but they lack the ability to apply heuristics to act on data gathered from more than one sensor or to detect operational deviations or trends which show deviations from nominal operating parameters. *Id.* at 1:65–2:1. The present invention uses sensing units or devices, referred to as “motes” that are deployed at various locations around the railcar, and includes circuitry that allows the mote to wirelessly transmit the sensor readings to an external receiver. *Id.* at 2:45–51.

An illustrative embodiment of such a device is depicted in Figure 1, reproduced below.

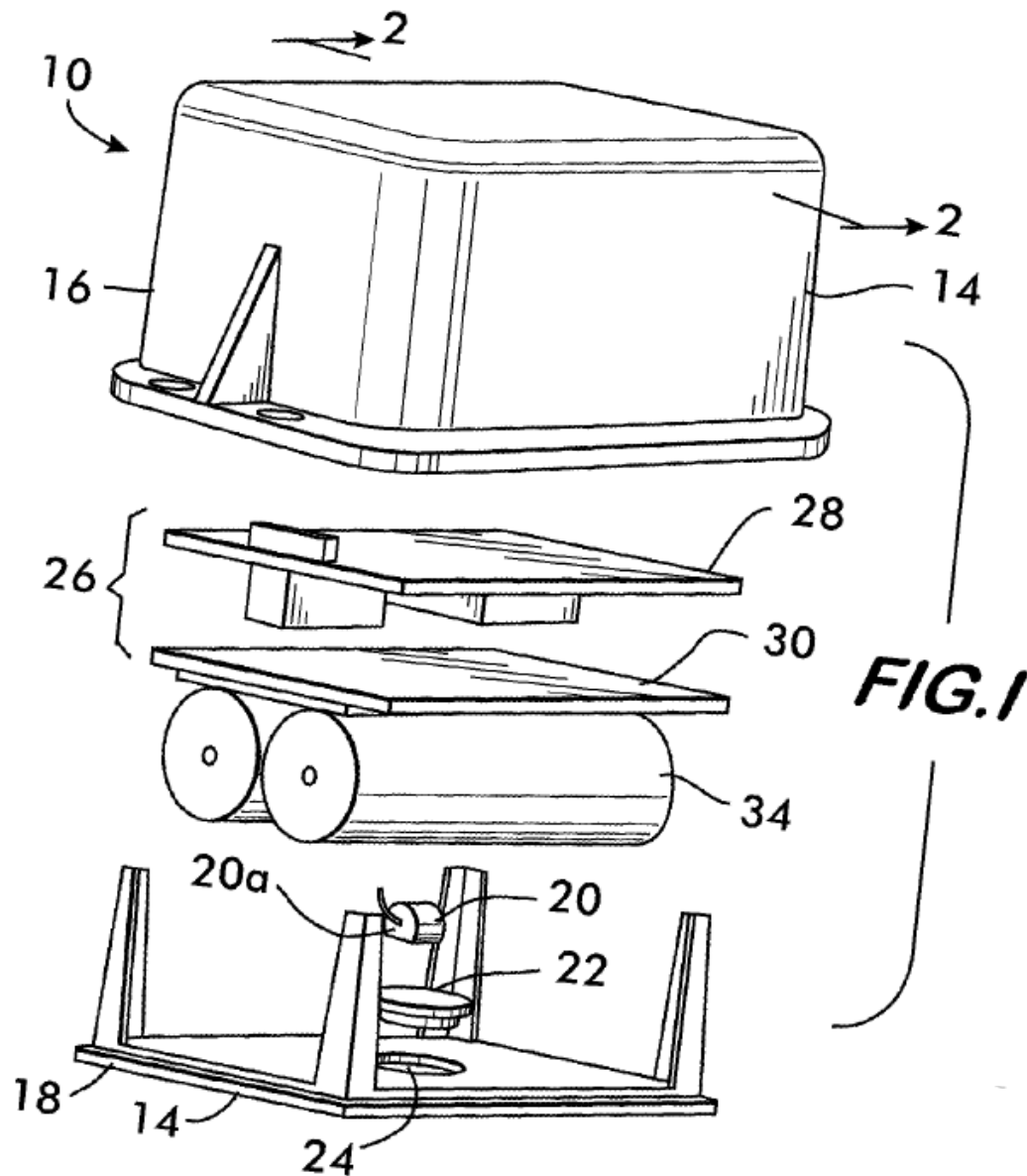


Figure 1 is an exploded perspective view of a mote. *Id.* at 3:27. Mote 10 is configured to be mountable to the surface of bearing adapter 12 of a railcar (*see* Fig. 3) to monitor the temperature of the wheel bearing, and includes housing 14 having lid section 16 and base section 18. *Id.* at 4:2–6. Sensor 20, such as temperature sensor 20a, is mounted within housing 14 and is thermally coupled to heat transfer element 22 which extends through opening 24 in housing 14. *Id.* at 4:23–28. Electrical circuitry 26 for mote

10 includes components and wiring to operate and/or receive and process the signals from sensor 20. *Id.* at 4:55–57. Circuitry 26 includes main board 28, which includes wireless communications circuitry, antennae and microprocessor and daughter board 30 including the circuitry to read the data from sensor 20. *Id.* at 4:66–5:2. Mote 10 also includes long-term power source 34. *Id.* at 5:24. Daughter board 30 includes power conditioning and management circuitry and includes a feature to conserve battery life which keeps mote 10 in a standby state and periodically wakes mote 10 to deliver readings from sensor 20. *Id.* at 5:26–29.

In embodiments where it is unsuitable to attach mote 10 to a surface to be monitored, an alternate mote can be used, as depicted in Figures 5 and 5A, reproduced below.

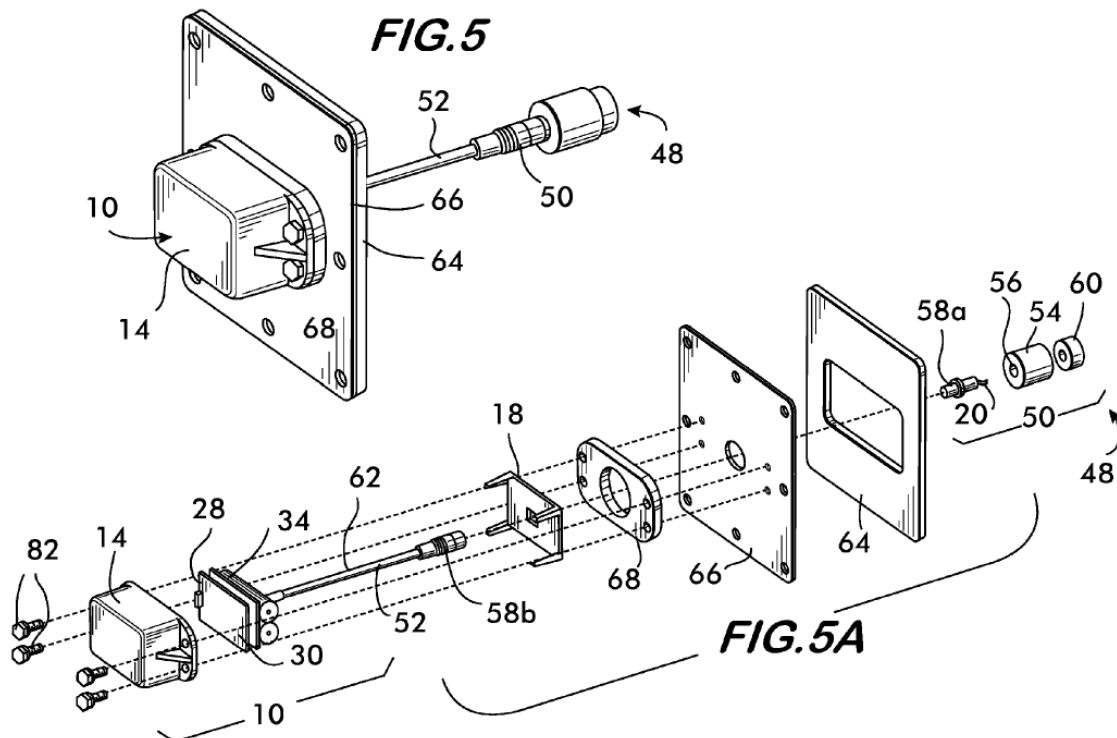


Figure 5 is a view of an alternative temperature sensor mote; and Figure. 5A is an exploded view of the sensor mote of Figure 5 shown with

components for mounting to the railcar. *Id.* at 3:36–38. In Figures 5 and 5A, mote 10 has temperature sensor 20 positioned in probe 48 that is spaced from housing 14. *Id.* at 6:16–19. In particular, temperature sensor 20 sits within sensor probe head 50 electrically attached to housing 14 via wires 52 using electrical connector 58a. *Id.* at 6:19–25. Ring shaped magnet 60 with an opening in its center fits around sensor 20 within head 50. *Id.* at 6:25–26.

The motes are arranged as part of a railcar monitoring system depicted in Figure 6, reproduced below.

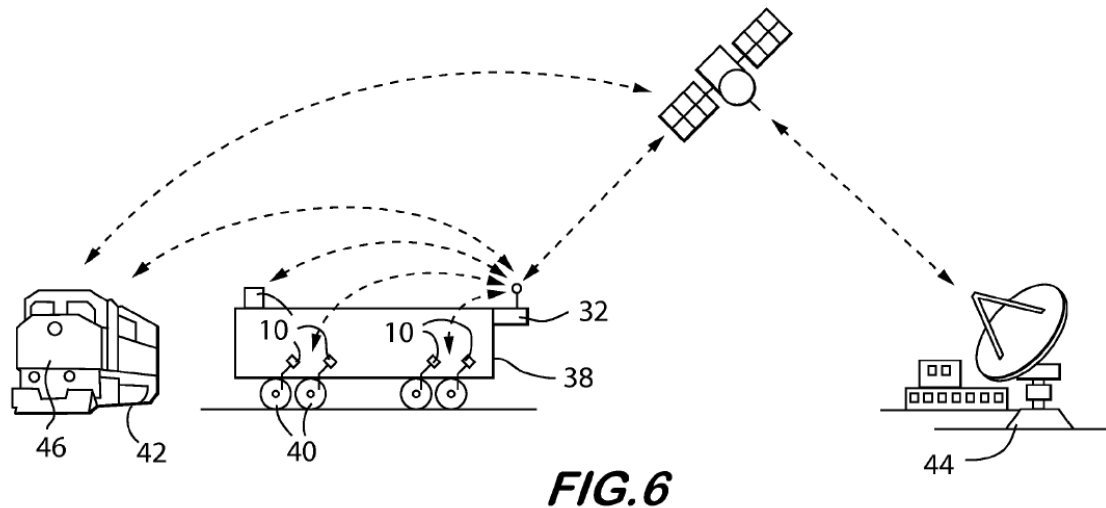


Figure 6 is a schematic diagram showing exemplary communications pathways. *Id.* at 3:41–42. Each mote 10 on railcar 38 is formed into an ad-hoc mesh network with other motes 10 on the same railcar and with a Communication Management Unit (CMU) 32 mounted on the same railcar. *Id.* at 5:12–16. Each mote 10 transfers its data to CMU 32, which transfer may occur directly or the data may be relayed by other motes in the mesh network to CMU 32. *Id.* at 5:16–20. CMU 32 collects data from each mote and can also send instructions to the motes. *Id.* at 6:66–7:1. CMU 32 is any device capable of receiving data and/or alarms from one or more motes 10

and capable of transmitting data and alarm information to a remote receiver. *Id.* at 7:4–8. CMU 32 is a single unit that serves as a communications link to other locations, such as mobile base station 42 (e.g., locomotive 46), land-based base station 44, and has its own circuitry, CPUs, processors, memory, power source, etc. to process the data received, and communicate with, control and monitor motes 10 on railcar 38. *Id.* at 7:8–8:4. CMU 32 is capable of performing advanced data analysis, using data collected from multiple motes 10, and may apply heuristics to draw conclusions based on the analysis. *Id.* at 8:5–7.

D. The Challenged Claims

Petitioner challenges claims 1–10, 13–18, and 20–32 of the '223 patent. Pet. 4–5. Of the challenged claims, claims 1, 2, 5, and 23 are independent. Claims 1, 2, and 5, reproduced below with Petitioner's identifiers for the claim limitations, are illustrative of the subject matter recited in the challenged claims.

[1 Pre] A sensor device for monitoring temperature on a railcar, comprising:

[1(a)] a housing mountable on a railcar;

[1(b)] a temperature sensor;

[1(c)] electrical circuitry in communication with said temperature sensor for obtaining information regarding the temperature being sensed, said electrical circuitry positioned within said housing;

[1(d)] a power source electrically connected to said electrical circuitry for providing power thereto, said power source positioned within said housing;

[1(e)] a probe external to said housing and which probe includes said temperature sensor and a magnet

positioned to magnetically attract the part of the railcar against which the probe will be placed; and

- [1(f)] a communication device capable of broadcasting information regarding the temperature sensed, said communication device positioned within said housing;
- [1(g)] wherein the power consumption of said sensor device is managed by placing said sensor device in a standby state and periodically awakening said sensor device to collect readings from said temperature sensor and to transmit the information regarding the temperature sensed via said communication circuitry.

Ex. 1001, 15:32–55.

[2 Pre] A system for monitoring a railcar, comprising:

- [2(a)] a plurality of sensor devices located on the railcar for monitoring parameters or conditions of the railcar, each of said sensor devices being separate from one another and including a sensor for monitoring one of said parameters or conditions of the railcar;
- [2(b)] said plurality of sensor devices including at least one temperature sensor device having:
- [2(c)] a housing;
- [2(d)] a temperature sensor in thermal communication with an item of the railcar for which the temperature is being monitored, which item is external to said housing;
- [2(e)] electrical circuitry in communication with said temperature sensor for obtaining information regarding the temperature being sensed, said electrical circuitry positioned within said housing;
- [2(f)] a power source electrically connected to said electrical circuitry for providing power thereto, said power source positioned within said housing;

[2(g)] a communication device capable of broadcasting information regarding the temperature sensed via wireless communication, said communication device positioned within said housing; and

[2(h)] a communication management unit, mounted on the railcar, capable of two way wireless communication with each of said plurality of sensor devices for receiving information therefrom, said communication management unit having a wireless communication device for broadcasting information about the parameter or condition being monitored.

Id. at 15:56–16:18.

[5 Pre] A system for monitoring the operation of a railcar comprising:

[5(a)] a. one or more sensor units mounted on said railcar, each of said sensor units monitoring an operating parameter of said railcar wherein each of said sensor units comprises

[5(b)] a sensor,

[5(c)] a power source,

[5(d)] a processor,

[5(e)] memory,

[5(f)] communication circuitry,

[5(g)] and software, stored in said memory and executed by said processor, said software performing the functions of collecting data from said sensor at periodic intervals,

[5(h)] b. a communication management unit, mounted on said railcar, said communication management unit in wireless communication with said one or more sensor units;

[5(i)] wherein said communication management unit applies heuristics to analyze data collected from said one or more sensor units

[5(j)] (a) to determine if an actual failure exists and

[5(k)] (b) to predict potential or imminent failures based
on a statistical analysis of said collected data.

Id. at 16:27–44. Independent claim 23 recites similar limitations to claim 1.

Id. at 18:9–30.

E. Evidence

Petitioner submits the following evidence:

Evidence	Exhibit No.
Declaration of Steven Ricca	1003
LeFebvre et al., US 2007/0152107 A1 (published July 5, 2007, filed Dec. 22, 2006) (“LeFebvre”)	1005
Armitage et al., US 2011/0282540 A1 (published Nov. 17, 2011, filed May 11, 2011) (“Armitage”)	1006
Barone et al., US 2007/0208841 A1 (published Sept. 6, 2007, filed Jan. 19, 2007) (“Barone”)	1007
Denny et al., US 5,633,628 (issued May 27, 1997, filed Jan. 3, 1996) (“Denny”)	1008
Provasnik, US 4,282,754 (issued Aug. 11, 1981, filed Nov. 15, 1979) (“Provasnik”)	1009

Patent Owner submits the following evidence.

Evidence	Exhibit No.
Declaration of Michael I. Shamos, Ph.D.	2001
Baker, US 8,244,411 B2 (issued Aug. 14, 2012, filed May 27, 2008) (“Baker”)	2004
Murphy et al., US 9,026,281 B2 (issued May 5, 2015, filed Aug. 23, 2010) (“Murphy”)	2005
Van Auken, US 2005/0268813 A1 (published Dec. 8, 2005, filed May 16, 2005) (“Van Auken”)	2006
LeFebvre et al., US 7,698,962 B2 (issued Apr. 20, 2010, filed Dec. 22, 2006)	2007
Declaration of William LeFebvre	2008
Searle, et al., US 2008/0195265 A1 (pub. Aug. 14, 2008, filed May 3, 2005) (“Searle”)	2009

F. Asserted Grounds of Unpatentability

Petitioner asserts the following grounds of unpatentability:

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
2–10, 18, 20, 21, 23, 25–32	103 ²	LeFebvre
13–17, 22, 24	103	LeFebvre, Barone
1, 24	103	LeFebvre, Denny, Provasnik
2, 3, 26–28	103	Armitage
4–10, 13–18, 20–23, 25, 29–32	103	Armitage, LeFebvre
1, 24	103	Armitage, LeFebvre, Denny, Provasnik

Pet. 2.

III. PATENTABILITY ANALYSIS

Petitioner contends that claims 2–10, 18, 20, 21, 23, and 25–32 of the ’223 patent are unpatentable under 35 U.S.C. § 103(a) over LeFebvre, claims 13–17, 22, and 24 are unpatentable under 35 U.S.C. § 103(a) over LeFebvre in view of Barone, claims 1 and 24 are unpatentable under 35 U.S.C. § 103(a) over LeFebvre in view of Denny and Provasnik, claims 2, 3, and 26–28 are unpatentable under 35 U.S.C. § 103(a) over Armitage, claims 4–10, 13–18, 20–23, 25, and 29–32 are unpatentable under 35 U.S.C. § 103(a) over Armitage in view of LeFebvre, and claims 1 and 24 are unpatentable under 35 U.S.C. § 103(a) over Armitage in view of LeFebvre, Denny, and Provasnik. Pet. 6.

² The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) (“AIA”), amended 35 U.S.C. § 103. The ’223 patent claims benefit of a June 19, 2012, filing date, which is before the effective date of the applicable AIA amendments. Ex. 1001, Code [60].

A patent claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) when in evidence, objective evidence of nonobviousness.³ *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

“In an [*inter partes* review], the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring *inter partes* review petitions to identify “with particularity . . . the evidence that supports the grounds for the challenge to each claim”)). This burden of persuasion never shifts to Patent Owner. *See Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015) (discussing the burden of proof in *inter partes* review).

We organize our patentability analysis into four sections. First, we address the level of ordinary skill in the art. Second, we address claim construction. Third, we provide an overview of the asserted references.

³ Patent Owner does not present arguments or evidence of secondary considerations in its Preliminary Response. Therefore, secondary considerations do not constitute part of our analysis herein.

And fourth, taking account of the information presented, we consider whether the Petition satisfies the threshold requirement for instituting an *inter partes* review under 35 U.S.C. § 314(a).

A. Level of Ordinary Skill in the Art

We consider the asserted grounds of unpatentability in view of the understanding of a person of ordinary skill in the art. In assessing the level of ordinary skill in the art, various factors may be considered, including the “type of problems encountered in the art; prior art solutions to those problems; rapidity with which innovations are made; sophistication of the technology; and educational level of active workers in the field.” *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995) (quoting *Custom Accessories, Inc. v. Jeffrey-Allan Indus., Inc.*, 807 F.2d 955, 962 (Fed. Cir. 1986)). “[O]ne or more factors may predominate.” *Id.*

Relying on the declaration testimony of Mr. Ricca, Petitioner contends that an ordinarily skilled artisan for the ’223 patent “would have been a person with at least a B.S. degree in electrical or mechanical engineering or a related field with at least two years’ experience designing monitoring systems for railcar components, or monitoring systems for similar industrial equipment with rotating components.” Pet. 14–15 (citing Ex. 1003 ¶ 45). Petitioner also contends that “[l]ess work experience could be compensated by a higher level of education, such as a master’s degree, and vice versa.” *Id.* Relying on the declaration testimony of Dr. Shamos, Patent Owner contends that an ordinarily skilled artisan for the ’223 patent would have “at least a B.S. degree in electrical or computer science or a related field, with at least two years’ experience with sensing systems for railcars or similar industrial equipment, including familiarity with wireless

networks and heuristics and statistical data analysis for failure prediction.” Prelim. Resp. 28 (citing Ex. 2001 ¶¶ 42–46). Patent Owner also contends that “[l]ess work experience could be compensated for by a higher level of relevant education, and vice versa.” *Id.*

Based on this record, it appears that the main distinction between Petitioner’s ordinary skilled artisan and Patent Owner’s is that Patent Owner further requires familiarity with wireless networks. We note, however, that the monitoring systems of the asserted prior art include wireless networks. In view of this, because Petitioner’s requirement of experience designing railcar, train, vehicle, or any other similar monitoring systems includes some familiarity with wireless networks, we adopt Petitioner’s articulation of the level of ordinary skill in the art, which is consistent with the ’223 patent and the asserted prior art, and we apply it in our obviousness evaluations below. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (the prior art, itself, can reflect appropriate level of ordinary skill in art). We note that our decision would be the same applying either party’s definition of a person of ordinary skill in the art.

B. Claim Construction

Next, we turn to claim construction. In interpreting the claims of the ’223 patent, we “us[e] the same claim construction standard that would be used to construe the claim[s] in a civil action under 35 U.S.C. [§] 282(b).” *See* 37 C.F.R. § 42.100(b) (2020). The claim construction standard includes construing claims in accordance with the ordinary and customary meaning of such claims as would have been understood by one of ordinary skill in the art and the prosecution history pertaining to the patent. *See id.*;

Phillips v. AWH Corp., 415 F.3d 1303, 1312–14 (Fed. Cir. 2005) (en banc).

Petitioner submits that no formal claim construction is necessary in this proceeding. Pet. 15. Patent Owner asserts that the term “housing” means “an enclosure.” Prelim. Resp. 29.

Having considered the record, we determine that no express claim construction is necessary for any claim terms. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (holding that only claim terms in controversy need to be construed, and only to the extent necessary to resolve the controversy (citing *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

C. Priority Date of the ’223 Patent

Patent Owner argues that claims 2–4, 23, and 27–30 the ’223 patent are entitled to the August 23, 2010, priority date of ’713 application. Prelim. Resp. 15–23; Sur-reply 1–5. Patent Owner provides a mapping of what it contends is the support in the ’713 application (Ex. 1014) for each of the claim limitations of claims 2–4, 23, and 27–30. Prelim. Resp. 17–22. With respect to independent claims 2 and 23, Patent Owner relies on the ’713 application for all of the limitations, except for the “temperature sensor” recited in the claims. *Id.* at 17–19 (claim 2), 20–21 (claim 23). For the temperature sensor, Patent Owner relies on the disclosure of LeFebvre, which is incorporated by reference into the ’713 application. *See id.* at 17–18, 20; Ex. 1014 ¶ 27. Thus, Patent Owner contends that the ’713 application provides support for all of the limitations of these claims, and therefore, claims 2–4, 23, and 27–30 are entitled to the priority date of the

'713 application. Prelim. Resp. 22–23. In its Sur-Reply, Patent Owner also points to Paragraph 44 of the '713 application, which Patent Owner contends “explains that ‘suitable components’ may be contained within the disclosed monitoring device and that ‘infinite variations are possible depending on the configuration desired.’” Sur-reply 3 (citing Ex. 1014 ¶ 44). Patent Owner also points to Paragraph 45 of the '713 application, which Patent Owner argues “explicitly notes that it describes ‘certain embodiments’ but ‘is not intended to limit [them] in any way.’” *Id.* (citing Ex. 1014 ¶ 45). Patent Owner asserts that

This disclosure is more than sufficient to inform an ordinarily skilled artisan, well aware of prior art monitoring technology, that the inventors possessed any number of monitoring devices capable of monitoring operational characteristics of a railcar, including a device with a housing and a temperature sensor, as they are disclosed in the '713 Application.

Id.

On this record, we are not persuaded that the claims 2–4, 23, and 27–30 of the '223 patent are entitled to claim priority back to the '713 application. The test for sufficiency of written description “is whether the disclosure of the application relied upon reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date.” *Ariad Pharm., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (en banc). In particular, we do not agree with Patent Owner that it can simply pluck the temperature sensor from LeFebvre and insert it into the sensor device disclosed in the '713 application. *Novozymes A/S v. DuPont Nutrition Biosciences APS*, 723 F.3d 1336, 1349 (Fed. Cir. 2013) (“Working backward from a knowledge of [the claims], that is by hindsight,” [patentee] seeks to derive written description support from an

amalgam of disclosures plucked selectively from the [prior] application.”) (first alternation in original).

As Petitioner explains and we agree, the ’713 application relates to a “railcar handbrake monitor.” *See* Ex. 1014 ¶ 1. Patent Owner points to no disclosure in the ’713 application that would lead a skilled artisan to understand the named inventors also to have possession of a sensor device, as disclosed, including a temperature sensor. *See In re Ruschig*, 379 F.2d 990, 994–995 (CCPA 1967) (“It is an old custom in the woods to mark trails by making blaze marks on the trees. It is no help in finding a trail or in finding one’s way through the woods where the trails have disappeared ... to be confronted simply by a large number of unmarked trees.”).

Patent Owner’s reliance on the incorporation by reference of the LeFebvre reference is of no assistance. Although Patent Owner is correct that it incorporated the LeFebvre reference into the body of the ’713 application, “incorporation by reference does not convert the invention of the incorporated patent into the invention of the host patent.” *Finjan LLC v. ESET, LLC*, 51 F.4th 1377, 1382 (Fed. Cir. 2022). Here, the language used for the incorporation by reference is instructive.

The CMU includes a wireless communication device 68 a for communicating with remote receivers 78. In one preferred embodiment, it can also communicate with, control and/or monitor other devices on the railcar 10. An example of such a device and system is described in U.S. Pat. No. 7,688,218 which is incorporated herein by reference.

Ex. 1014 ¶ 27. The fair reading of this passage is that LeFebvre’s devices could be controlled by the CMU disclosed in the ’713 application. This language does not suggest reconstructing the sensor devices disclosed in the ’713 application to incorporate a temperature sensor, as Patent Owner

proposes. *See Otonomy, Inc. v. Auris Med., AG*, 743 F. App'x 430, 435 (Fed. Cir. 2018) (non-precedential) (finding “the Board erred in permitting [patentee] to piece together disparate bits of disclosure and that, regardless of ‘[w]hether accorded benefit is viewed as an anticipation or written description analysis, the result is the same: unguided post hoc selection is not the proper standard.’”) (second alteration in original).

Patent Owner’s reliance on Paragraphs 44 and 45 does not persuade us differently. To begin with, Paragraph 45 simply states, “[i]t is understood that the foregoing description is intended to describe certain embodiments of the present invention, and is not intended to limit it in any way. The invention is to be read as limited by its claims only.” Ex. 1014 ¶ 45. However, this boiler plate paragraph only states that the description is not intended to limit the claims, and does not provide any written description support for incorporating a temperature sensor. *See, e.g., D Three Enterprises, LLC v. SunModo Corp.*, 890 F.3d 1042, 1051 (Fed. Cir. 2018) (“This boilerplate language at the end of the . . . specification is not sufficient to show adequate disclosure of the actual [invention].”). Patent Owner’s reliance on Paragraph 44 fares no better. Paragraph 44 states

As discussed above, the present invention provides a handbrake monitoring device, system and method. One key feature and advantage is the ability to monitor the handbrake 22 and, if it is determined that the handbrake is on and the railcar 10 is in motion, such information can be sent warning that corrective action is required. Real time data about the handbrake can be collected and forwarded to a remote receiver 78. Other embodiments provide for the determination and transmission of the actual load on the handbrake 22, or even a determination and transmission of the load as a percentage of the maximum load possible on the handbrake. Also, regular samples of the status of the handbrake can be made and transmitted. In a preferred

embodiment, the monitoring device can work with a CMU 70, but it is contemplated that the monitoring device 40 can contain the suitable components to act as an individual unit. In summary, infinite variations are possible depending on the configuration desired.

Ex. 1014 ¶ 44. This paragraph is again dealing with the handbrake sensor and measuring forces, not temperature. Moreover, the discussion of “suitable components” is not an open-ended disclosure of any sensor. As the rest of the sentence makes clear, it is dealing with the components needed for the monitoring device to operate as a stand-alone unit, without a central management unit (CMU), not as some totally different kind of sensor device. *See id.* (“[The monitoring device 40 can work with a CMU 70, but it is contemplated that the monitoring device 50 can contain the suitable components to act as an individual unit.”). Thus, as with paragraph 45, we are not persuaded that the boilerplate wishes at the end of paragraph 44—that “infinite variations are possible depending on the configuration desired”—provides written description support for the sensor device incorporating a temperature sensor, as Patent Owner contends. *See D Three*, 890 F.3d at 1051; *Novozymes*, 723 F.3d at 1344 (“A ‘mere wish or plan’ for obtaining the claimed invention does not satisfy the written description requirement.”).

Although we find that below that Petitioner has shown that there is a reasonable likelihood that the claims would have been obvious, the fact that LeFebvre, when combined with the teachings of the ’713 application, one of skill in the art, or another prior art reference, might render such a combination obvious does not satisfy the written description. *See Lockwood v. Am. Airlines, Inc.*, 107 F.3d 1565, 1572 (Fed. Cir. 1997) (“One shows that one is ‘in possession’ of the invention by describing the invention, with all

its claimed limitations, not that which makes it obvious.”). Indeed, “[i]t is not sufficient for purposes of the written description requirement of § 112 that the disclosure, when combined with the knowledge in the art, would lead one to speculate as to the modifications that the inventor might have envisioned, but failed to disclose.” *Id.* Thus, we find that, on the current record, the ’223 patent is not entitled to the 2010 priority date of the ’713 application. We note that this is only a preliminary analysis and invite the parties to develop the record on this issue further.

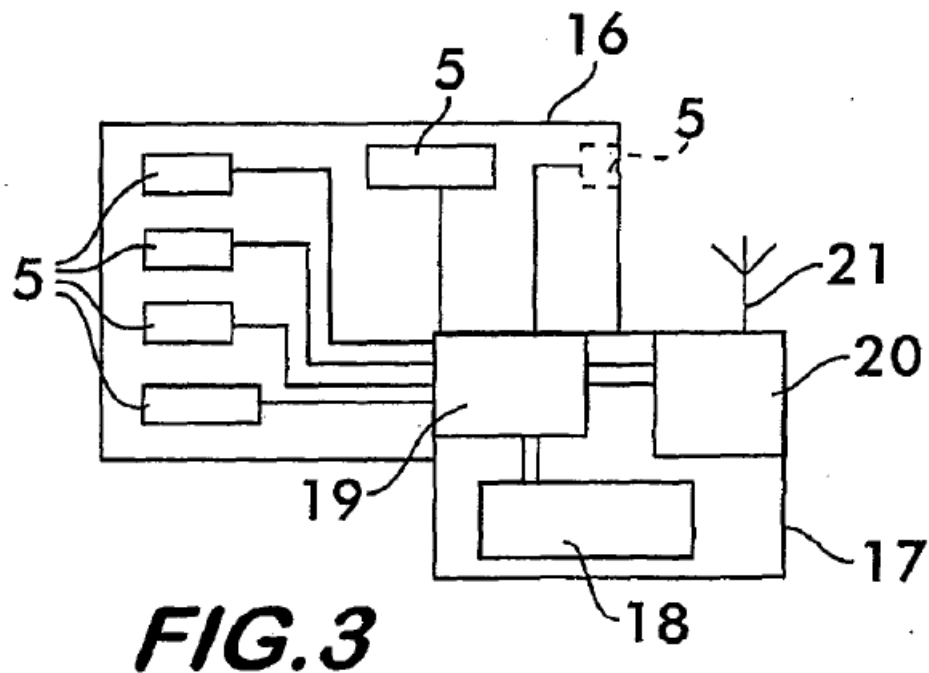
D. The Prior Art

Before turning to Petitioner’s asserted grounds of unpatentability, we provide brief summaries of the asserted references.

1. LeFebvre (Ex. 1005)

LeFebvre is entitled “Railroad Train Monitoring System.” Ex. 1005, Code [54]. LeFebvre discloses “sensors for monitoring temperature pressure, shifting loads, truck hunting and the like and have circuitry for processing information received from the sensors and for processing and reporting departures of performance variables to a remote source.” *Id.* at Code [57].

Figure 3, reproduced below, provides an illustration of an adapter pad having a plurality of sensors.



Id. at Fig. 3. Figure 3 depicts adapter pad 16 containing a plurality of sensors 5, which are embedded into its upper, side, and lower surfaces or into other locations such as its end surfaces. *Id.* ¶ 21. Figure 3 also depicts extended attachment portion 17, which is relatively isolated from the forces transmitted through adapter 16, and contains power source 18, analog/signal conditioning means and analog to digital conversion means and an associated microprocessor unit 19, as well as communications unit 20 which may be a low power radio transmitter/receiver having antenna 21. *Id.* The sensors are electrically connected to the analog to digital conversion circuit unit and the microprocessor unit which, in turn, is connected to and controls the communications unit so that messages can be sent and received. *Id.*

Figure 4, reproduced below provides an illustration of an adapter pad in situ.

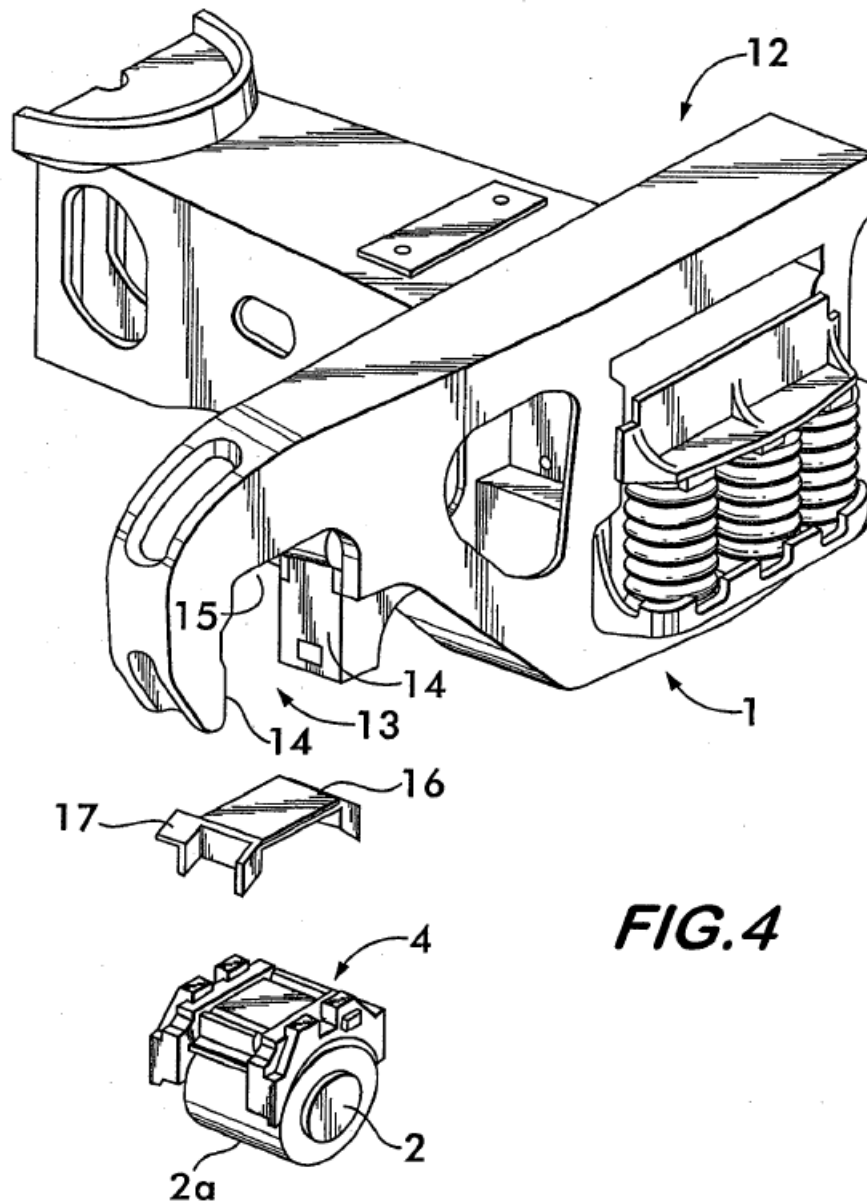


Figure 4 is an exploded perspective view of portions of a railcar truck illustrating the position of an instrumented pad with respect to the railcar truck. *Id.* ¶ 15. As depicted in Figure 4, truck 1 having axle 2 with axle bearing 2a and bearing adapter 4, is configured so that each bearing transmits the load which it carries and heat that it may generate through pads 16 and to the truck. *Id.* ¶ 17. Bearing adapters 4 have a generally

rectangular upper surface with depending legs extending from the corners of the top structure, and the legs have facing curved side surfaces which are configured so as to rest on the outer surface of bearing 2a mounted on the end of wheel bearing axle 2. *Id.* ¶ 19. Adapter pad 16 is generally rectangular in plan view and has depending legs, and is formed to seat upon the upper surface of adapter 4. *Id.* Railroad freight car 22 having trucks 1 with pads 16 also includes data control unit 23 having a radio/receiver which has the ability to communicate with the radios on the pads 4 on its own railcar. *Id.* ¶ 24, Fig. 1.

LeFebvre explains that wireless communication is available and adaptable to allow instrumented pads 16 and data control units 23 to establish a network of connections without external intervention. *Id.* ¶ 32. These elements can be set up to recognize the relationship of truck and axle location on a railcar or set up so that the digital communication unit is informed of the configuration providing thereby a multi-hop means of linking the network together. *Id.* According to LeFebvre, a purpose of the invention is to be able to monitor the behavior of all the trucks and bearings and wheels on a train so that an alarm message can get through from any railcar to the locomotive or to the remote data handling service as quickly as possible. *Id.* ¶ 52. Because a large amount of data is monitored, “the system is designed to process the raw sensor data, looking for signs of trouble and then send only essential indicative information,” using a distributed inference engine, which shares the essential functions between the microprocessors at instrumented pads 16 and at data control unit 23. *Id.* ¶ 53. Microprocessors 19 at instrumented pads 16 take a series of measurements and treat them as a time series. *Id.* ¶ 54. Then, search

algorithms, forming an inference engine, can identify, for example, periodicities and cross correlations in and between time series so that any behavior detectable at pad level will be seen. *Id.* If a particular “behavior is inferred at the instrumented pad and the magnitude is sufficient to cause alarm, relevant attributes and timing (relative to the time of transmission of report) can be passed to the car's data control unit.” *Id.* ¶ 55. LeFebvre monitors, bearing temperature, bearing condition, wheel condition, brake fore and track defects, among others. *Id.* ¶¶ 57–66.

2. *Armitage (Ex. 1006)*

Armitage is entitled “Dynamic Monitoring of Mobile Railway Car Undercarriage.” Ex. 1006, Code [54]. Armitage discloses a plurality of sensor nodes are “configured to monitor the undercarriage portion of the railway car when in motion and transmit information about the undercarriage portion to [a] control node,” which “receive[s] the information about the undercarriage portion, process[es] the information to determine a fault condition for the undercarriage portion, and wirelessly report[s] the fault condition to a collection system.” *Id.* ¶ 4.

Figure 1, reproduced below depicts an exemplary railway car system.

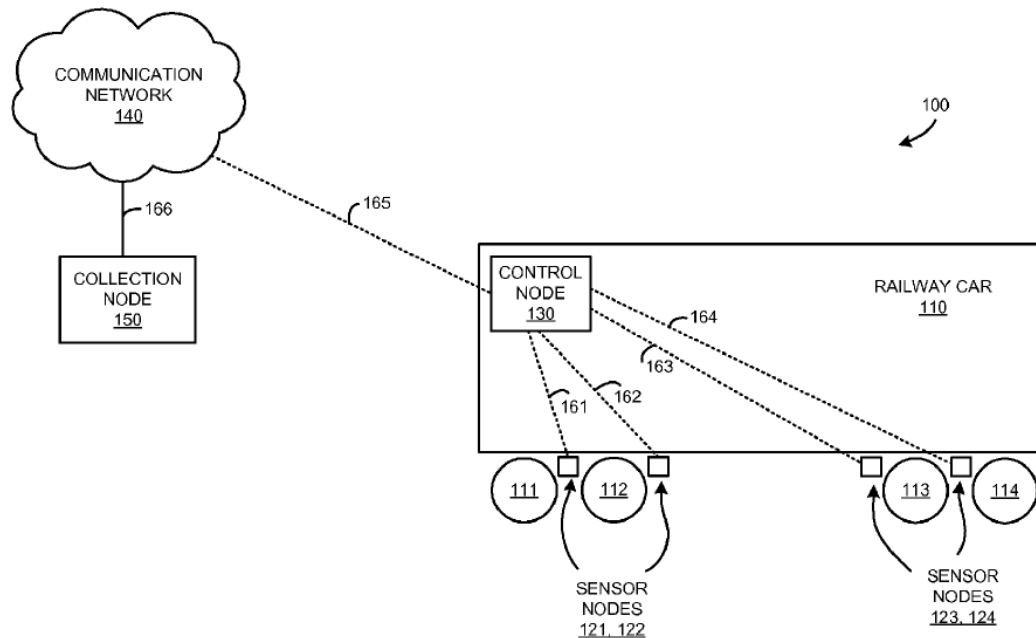


FIGURE 1

Figure 1 is a system diagram illustrating railway car monitoring system 100. System 100 includes railway car 110, undercarriage elements 111–114, sensor nodes 121–124, control node 130, communication network 140, and collection node 150. *Id.* ¶ 12. Control node 130 communicates with sensor nodes 121–124 over links 161–164 and communicates with communication network 140 over wireless link 165, and communication network 140 communicates with collection node 150 over link 166. *Id.*

Sensor nodes 121–124 each include equipment to sense and report information about undercarriage elements of a railway car. *Id.* ¶ 14. Each sensor node 121–124 also includes a transceiver portion for communication with control node 130, using either a wireline transceiver or using a wireless transceiver and antenna for wirelessly communicating with control node 130. *Id.* “Each of sensor nodes 121–124 could also include a processing portion for receiving the sensor information, amplifying, scaling, modifying, adjusting, digitizing, or converting the sensor information, as well as

controlling the transceiver portion and sensor portions.” *Id.* Each sensor node 121–124 also includes a power system, such as a battery or solar cell. *Id.*

Control node 130 receives information about the undercarriage portion from each of sensors 121–124 and processes the information to determine a fault condition for the undercarriage portion, which includes conditions such as wheel impact or sliding wheel conditions, and temperature. *Id.* ¶ 27. Control node 130 wirelessly reports any fault condition to collection node 150 through communication network 140. *Id.* ¶ 28. Control node 130 processes the information received from sensor nodes 121–124 over a period of time to determine a threshold for reporting the fault condition, or processes the sensor information to determine anomalies from an average, such as an anomaly from a running average of the temperature of all wheels on railway car 110. *Id.* ¶ 29.

3. *Barone (Ex. 1007)*

Barone is entitled “Self-Assembling Wireless Network, Vehicle Communications System, Railroad Wheel and Bearing Monitoring System and Methods Therefor.” Ex. 1007, Code [54]. Barone relates to “the field of wirelessly networking vehicles, especially where the vehicles are railroad cars, and where the communications are part of a system for monitoring the degree of wear on the wheel bearings of railroad cars.” *Id.* ¶ 2.

Figure 1 of Barone is reproduced below.

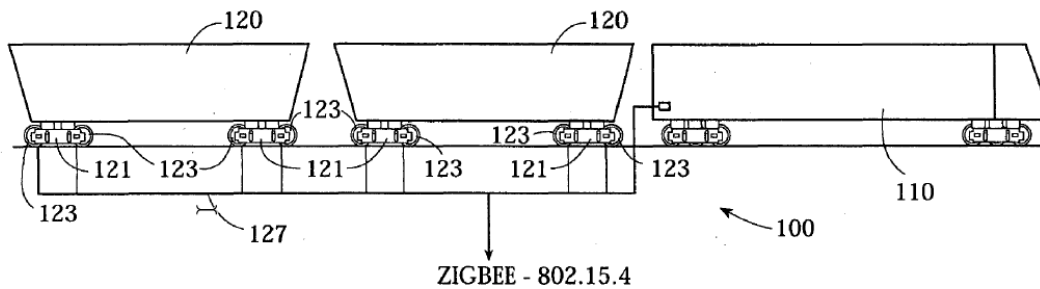


FIG. 1

Figure 1 is a schematic diagram illustrating a railroad train equipped with an exemplary network system. Network system 100 is an Autonomous Rolling Stock Monitoring System (ARMS) system used on railroad trains, where the train includes locomotive 110 and a plurality of serially connected railroad cars 120 each supported on two trucks 121 having wheels 123. *Id.*

¶ 85. The ARMS includes onboard monitoring devices that wirelessly communicate status and data to existing remote database and monitoring infrastructure. *Id.* ¶ 86. The communication system architecture includes for each wheel 123 a self-contained monitoring and diagnostic ARMS device 125 containing an IEEE 802.15.4 Zigbee wireless communication radio. *Id.* ¶ 86; Fig. 4A. Each wheel-mounted device or node 125, when powered, will autonomously form a network, and wirelessly transmit status and diagnostic data as required to locomotive 110, either by direct wireless communication with a Zigbee radio-equipped computer system supported on and powered by locomotive 110, or by a leap-frog or mesh network using other nodes 125 by Zigbee communications to act as intermediaries to receive and forward communications for the locomotive system. *Id.*

Data points that are acquired are subjected to a focused discrete Fourier transform to identify the presence of cup, cone and/or roller defect

frequencies. *Id.* ¶ 201. Barone explains that the continuous monitoring of the frequencies allows for a trending analysis at the node, which provides high reliability of the bearing monitoring. *Id.* ¶ 237. A “microprocessor stores at least partial data representative of historical peak levels in dB or other units, and changes therein that exceed a pre-selected threshold trigger special processing and alarm data generation and transmission to the locomotive system.” *Id.* In one embodiment, temperature sensor 175 connects with a comparator circuit with an adaptive trip point 181 that triggers an interrupt when the temperature detected exceeds a certain preselected threshold value, and the interrupt generated by the comparator 181 is processed as a failure alarm. *Id.* ¶ 240.

4. *Denny (Ex. 1008)*

Denny is entitled “Wheelset Monitoring System.” Ex. 1008, Code [54]. Denny relates “to [a] thermal warning device in a wheel assembly of a railway car to indicate when the temperature of the wheel assembly has reached a level indicative of potential bearing failure.” *Id.* at 1:9–12.

An exemplary thermal warning device is depicted in Figure 4 of Denny, reproduced below.

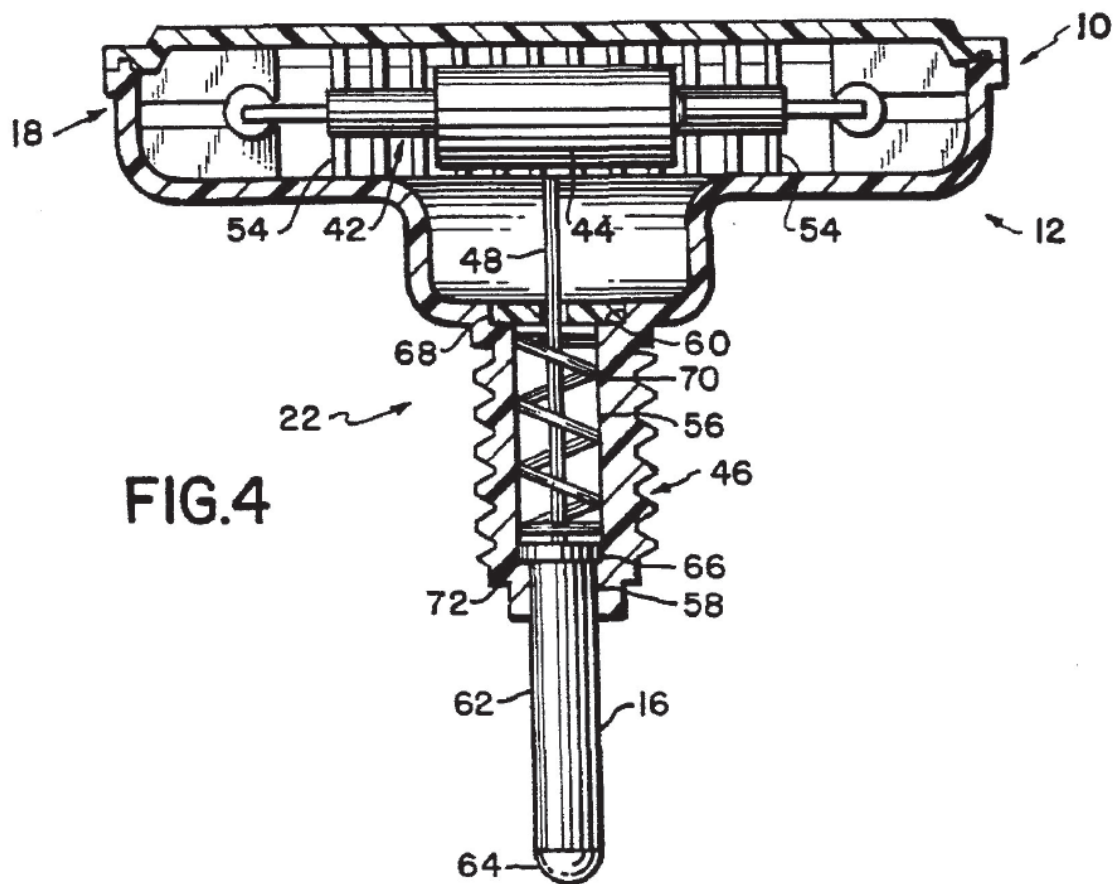


Figure 4 is a sectional view of thermal warning device 10. *Id.* at 4:23–24. Thermal warning device 10 is designed to monitor the conditions of bearing assemblies of railway car wheels. *Id.* at 4:39–41. Thermal warning device 10 is a one piece, modular unit comprising a housing 12 having a threaded lower portion 14 and a temperature sensor 16 extending from the lower portion.” *Id.* at 4:49–53. The inner compartment of the housing 12, at the upper most position, supports electronic circuit 42 including circuit board 50, power supply 44 and probe assembly 46. *Id.* at 5:35–37. Denny explains that using this arrangement, the temperature sensor adjustably extends into the wheel assembly in order to obtain accurate readings of high temperatures in wheel assembly, but the electronic circuit is situated away from the outer surface of the wheel assembly so that the

electronic circuit will not be subjected to heat from the wheel assembly and may freely dissipate heat produced by its own components. *Id.* at Code [57].

5. Provasnik (Ex. 1009)

Provasnik is entitled “Temperature Sensor for Measuring the Temperature of an Engine.” Ex. 1009, Code [54]. Provasnik relates “to a temperature sensor which is not installed permanently but which can readily be attached to and removed from the engine.” *Id.* at 1:10–13.

Figure 1 of Provasnik is reproduced below.

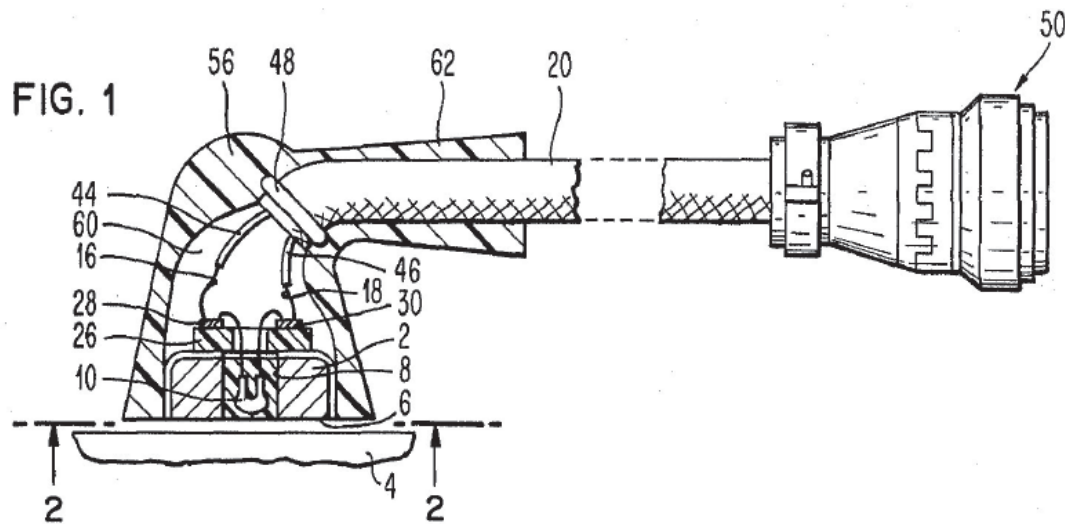


Figure 1 is a general view of a temperature sensor, partially in cross-section, for measuring the temperature of an automobile engine.” *Id.* at 2:34–36. Temperature sensor 10 is mounted within a magnet 2 for magnetic attachment to any part 4 of an engine where a temperature reading is desirable. *Id.* at 2:54–56. Provasnik explains that the sensor’s advantage is “that there is no necessity that it be inserted into the oil itself when a reading is taken.” *Id.* at 2:51–53.

E. Alleged Ground of Unpatentability Over LeFebvre

Petitioner contends that claims 2–10, 18, 20, 21, 23, and 25–32 of the ’223 patent are unpatentable under 35 U.S.C. § 103(a) as obvious over LeFebvre. Pet. 18–41. Patent Owner offers counterarguments. Prelim. Resp. 31–47. Having considered the arguments and evidence before us, we determine that the record establishes a reasonable likelihood that Petitioner would prevail on this asserted ground of unpatentability.

Petitioner maps the language of independent claim 2 to LeFebvre’s disclosures. Pet. 18–27. Petitioner asserts that although “LeFebvre discloses every element of claims 2–10, 18, 20, 21, 23, and 25–32,” because LeFebvre “does not expressly state that all disclosed limitations are part of a single embodiment,” this ground is presented under 35 U.S.C. § 103. *Id.* at 18 (emphasis omitted).

1. Claim 2

a) [2 Pre] A system for monitoring a railcar, comprising:

Petitioner contends that “[t]o the extent that the preamble is limiting, LeFebvre discloses a railcar monitoring system comprising a plurality of ‘instrumented, flexible pads,’ each of which ‘contain sensors for monitoring temperature’ and other parameters of the railcar.” Pet. 19 (citing Ex. 1005, Code [57]; Ex. 1003 ¶ 74). In particular, Petitioner notes that “LeFebvre discloses a system comprising an instrumented pad 16 that contains one or more sensors, such as temperature sensors.” *Id.* (citing Ex. 1005 ¶¶ 21, 33, 58; Ex. 1003 ¶ 74). At this time, Patent Owner does not dispute that Armitage accounts for the preamble. We have reviewed Petitioner’s citations and arguments, and agree, on this record, we find that Petitioner shown sufficiently that Armitage accounts for the preamble, if it is limiting.

- b) [2(a)] a plurality of sensor devices located on the railcar for monitoring parameters or conditions of the railcar, each of said sensor devices being separate from one another and including a sensor for monitoring one of said parameters or conditions of the railcar;*

Petitioner notes that LeFebvre discloses a system comprising a plurality of instrumented pads 16, each of which comprises one or more sensors. Pet. 19 (citing Ex. 1005 ¶¶ 19, 23, 52; Ex. 1003 ¶ 76). Petitioner contends that “[e]ach instrumented pad 16 is a separate device that is mounted on the railcar . . . upon the upper surface of a wheel bearing adapter 4.” *Id.* at 20 (citing Ex. 1005 ¶ 19; Ex. 1003 ¶ 77). At this time, Patent Owner does not dispute that Armitage accounts for this limitation. We have reviewed Petitioner’s citations and arguments, and agree, on this record, that Petitioner shown sufficiently that Armitage accounts for this limitation.

- c) [2(b)] said plurality of sensor devices including at least one temperature sensor device having:*

Petitioner asserts that “[t]he instrumented pad 16 may comprise one or more temperature sensors.” Pet. 21 (citing Ex. 1005, Code [57], ¶¶ 21, 33, 58; Ex. 1003 ¶ 79). At this time, Patent Owner does not dispute that Armitage accounts for this limitation. We have reviewed Petitioner’s citations and arguments, and agree, on this record, we find that Petitioner shown sufficiently that Armitage accounts for this limitation.

- d) [2(c)] a housing;*

Petitioner notes that “[t]he instrumented pad 16 ‘is preferably comprised of a cast or injected molded elastomeric polymer,’ . . . and ‘contains a plurality of sensors 5 which are preferably embedded into its

upper, side, and lower surfaces or into other locations.” Pet. 21 (citing (Ex. 1005 ¶¶ 19, 21). Thus, Petitioner concludes that “LeFebvre’s instrumented pad therefore includes a housing.” *Id.* (citing Ex. 1003 ¶ 81). Petitioner asserts that “[t]he housing is mounted on a railcar.” *Id.* (citing Ex. 1005 ¶ 19, Fig. 4; Ex. 1003 ¶ 82). Petitioner argues that a person of ordinary skill in the art “would also have understood that the shape, size, or material of LeFebvre’s housing could be changed (e.g., to accommodate mounting the sensor device in a different location on the railcar) without affecting the operation of the sensors or electronic circuitry contained within the housing.” *Id.* at 22 (citing Ex. 1001, 15:18–24; Ex. 1003 ¶¶ 84–86).

Patent Owner argues that Petitioner has failed to account for the claimed “housing.” Prelim. Resp. 31–37. In particular, Patent Owner asserts that “LeFebvre merely discloses an instrumented pad 16 — which a [person of ordinary skill in the art] would understand to be different from the claimed ‘housing.’” *Id.* at 33. Patent Owner contends that “the ’223 patent expressly differentiates the meaning of the terms ‘housing’ and ‘pad’ by distinguishing over the earlier pad embodiments of the LeFebvre reference.” *Id.* at 34. Patent Owner submits that “[t]he insight of LeFebvre was to place sensors into adapter pads that were already in use on many railcars.” *Id.* (citing Ex. 2001 ¶¶ 53, 65; Ex. 2008 ¶¶ 5–6, 10). Patent Owner asserts that “[c]onsistent with this history, the ’223 patent explains ‘[i]n another alternate embodiment of the invention, one or more notes may be housed in alternative housings *or built into the railcar itself*. In one such embodiment, notes can be *built into the form of an adapter pad* similar to the type shown in U.S. Pat. Nos. 7,698,962 and 7,688,218.” *Id.* at 34–35 (citing Ex. 1001, 15:18–24 (emphasis added); Ex. 2008 ¶¶ 5–6, 10). Patent Owner

concludes that “the smart pads disclosed in LeFebvre is an example of the sensor device being ‘built into the railcar itself’ which is expressly distinguished from embodiments having housings.” *Id.* at 35 (citing Ex. 1001, 15:18–24; Ex. 2008 ¶¶ 11–12).

We find that, regardless of whether we adopt Patent Owner’s claim construction and agree with Patent Owner’s arguments, set forth above, that LeFebvre fails to disclose the claimed “housing,” Petitioner has shown sufficiently that the claimed housing would have been obvious in view of LeFebvre. As Petitioner explains and we agree, a person of ordinary skill in the art “would also have understood that the shape, size, or material of LeFebvre’s housing could be changed (e.g., to accommodate mounting the sensor device in a different location on the railcar) without affecting the operation of the sensors or electronic circuitry contained within the housing.” Pet. 22 (citing Ex. 1001, 15:18–24; Ex. 1003 ¶¶ 84–86). We are not persuaded by Patent Owner’s argument that Petitioner has failed to explain why a person of ordinary skill in the art would have been motivated to modify LeFebvre because the housing would have to bear a significant vertical load, and an enclosure would not function well as a load-bearing component. Prelim. Resp. 46–47. On this record, we find persuasive that a person of ordinary skill would find using an enclosure to hold the electronics of the monitoring device of LeFebvre would be a predictable variation of having the electronics embedded in LeFebvre’s pad. *See* Ex. 1003 ¶¶ 84–86. Indeed, the ’223 patent recognizes that these solutions were known alternatives. *See* Ex. 1001, 15:18–24. As *KSR* explains, “[i]f a person of ordinary skill can implement a predictable variation, § 103 likely bars its patentability.” *KSR*, 550 U.S. at 417. Thus, we find that Petitioner has

shown a reasonable likelihood that this limitation would have been obvious. This is simply a determination on the preliminary record, and Patent Owner is free to develop the record further on this point.

- e) [2(d)] a temperature sensor in thermal communication with an item of the railcar for which the temperature is being monitored, which item is external to said housing;*

Petitioner submits that “[t]he instrumented pad 16 may comprise one or more temperature sensors configured to monitor the temperature of a wheel bearing.” Pet. 22 (citing Ex. 1005 ¶ 33; Ex. 1003 ¶ 87). Petitioner notes that “[a]s shown in Figure 4, wheel bearing 2a is external to the housing of instrumented pad 16.” *Id.* at 23 (citing Ex. 1005 ¶ 19, Fig. 4; Ex. 1003 ¶ 87). At this time, Patent Owner does not dispute that Armitage accounts for this limitation. We have reviewed Petitioner’s citations and arguments, and agree, on this record, we find that Petitioner shown sufficiently that Armitage accounts for this limitation.

- f) [2(e)] electrical circuitry in communication with said temperature sensor for obtaining information regarding the temperature being sensed, said electrical circuitry positioned within said housing;*

Petitioner argues that “[t]he instrumented pad 16 comprises electrical circuitry, specifically: ‘a power source 18, an analog/signal conditioning means and analog to digital conversion means and an associated microprocessor unit 19 and a communications unit 20.’” Pet. 23 (citing Ex. 1005 ¶ 21; Ex. 1003 ¶ 89). Petitioner contends that “[t]his electrical circuitry is located within the housing, preferably within extended attachment portion 17, and is in communication with the temperature sensor.” *Id.* at 23–24 (citing Ex. 1005 ¶ 21; Ex. 1003 ¶¶ 90–91). Petitioner asserts that “[t]he sensors are electrically connected to the analog to digital

conversion circuit unit and the microprocessor unit’ (i.e., electrical circuitry).” *Id.* at 24 (citing Ex. 1005 ¶ 21).

Patent Owner argues that Petitioner fails to show that LeFebvre accounts for the claimed “electrical circuitry positioned within said housing,” as required by independent claim 2. Prelim. Resp. 38–40. Patent Owner asserts that Petitioner is incorrect that pad 16 contains the electrical circuitry components. *Id.* at 38. Instead, Patent Owner submits that “LeFebvre discloses that ***extended portion 17*** — not the pad 16—contains these components.” *Id.*

On this record, we find that Petitioner has shown sufficiently that LeFebvre accounts for the electronics and power sources being “within said housing.” *See* Pet. 23–25. Contrary to Patent Owner’s arguments, as best we understand them, nothing in the claims, nor Patent Owner’s proposed construction, requires that the “housing” consist of a single unitary chamber. As LeFebvre makes clear, extended attachment is part of pad 16. *See* Ex. 1005 ¶ 21 (“pad 16 *has* an extended attachment portion 17”) (emphasis added). Indeed, the very name “extended attachment portion” makes clear it is an extension of pad 16, that is attached to pad 16, and that it is a portion of pad 16. *Id.* Thus, on this record, because we agree with Petitioner that extended attachment portion is part of pad 16, which Petitioner has identified as the claimed housing, and the electronics are within, at least, part of that housing, we find that Petitioner has shown sufficiently that LeFebvre accounts for this limitation.

- g) *[2(f)] a power source electrically connected to said electrical circuitry for providing power thereto, said power source positioned within said housing;*

Petitioner argues that “[t]he instrumented pad 16 comprises a power source 18, which is electrically connected to the electrical circuitry 19, as shown in Figure 3.” Pet. 24 (citing Ex. 1005 ¶¶ 21, 23, Fig. 3; Ex. 1003 ¶ 93). Petitioner submits that “the power source 18 may be contained within extended portion 17, as shown in Figure 3.” *Id.* (citing Ex. 1005 ¶ 19, Fig. 3; Ex. 1003 ¶ 93). At this time, Patent Owner raises no arguments regarding this limitation, other than the “within said housing” arguments considered above. We have reviewed Petitioner’s citations and arguments, and agree, on this record, we find that Petitioner shown sufficiently that LeFebvre accounts for this limitation

- h) *[2(g)] a communication device capable of broadcasting information regarding the temperature sensed via wireless communication, said communication device positioned within said housing; and*

Petitioner argues that “[t]he instrumented pad 16 comprises a communications unit 20.” Pet. 24 (citing Ex. 1005 ¶¶ 21, 23). Petitioner contends that LeFebvre discloses that “[t]he communications unit is preferably a radio transmitter/receiver, which is capable of wirelessly broadcasting information received from one or more sensors.” *Id.* (citing Ex. 1005 ¶¶ 21, 23, 31, 32, 43–46; Ex. 1003 ¶ 95). Petitioner argues that communications unit 20 may be contained within extended portion 17, as shown in Figure 3. *Id.* at 25 (citing Ex. 1005 ¶ 21, Fig. 3; Ex. 1003 ¶ 96). At this time, Patent Owner raises no arguments regarding this limitation, other than the “within said housing” arguments considered above. We have reviewed Petitioner’s citations and arguments, and agree, on this record, we

find that Petitioner shown sufficiently that LeFebvre accounts for this limitation

- i) *[2(h)] a communication management unit, mounted on the railcar, capable of two way wireless communication with each of said plurality of sensor devices for receiving information therefrom, said communication management unit having a wireless communication device for broadcasting information about the parameter or condition being monitored.*

Petitioner notes that “[i]n LeFebvre’s system, each of the instrumented pads 16 communicates wirelessly with a data control unit 23, which is mounted on the railcar body.” Pet. 25 (citing Ex. 1005 ¶ 24; Ex. 1003 ¶ 98). Petitioner submits that data control unit 23 is linked via cable to a communications device 24, and “[t]he data control unit 23 passes messages on to the communications device 24 for onward transmission to the locomotive or to other remote receivers.” *Id.* (citing Ex. 1005 ¶¶ 24, 38; Ex. 1003 ¶ 99) (alternation in original). Petitioner asserts that “[f]or communication with the locomotive, the communications device may use a variety of wired or wireless transmission methods, including, for example, WiFi.” *Id.* (citing Ex. 1005 ¶ 43). Petitioner notes that “[f]or communication with remote sources, the communications device may comprise, for example, ‘a cellular or satellite radio system.’” *Id.* (citing Ex. 1005 ¶ 25). At this time, Patent Owner does not dispute that LeFebvre accounts for this limitation. We have reviewed Petitioner’s citations and arguments, and agree, on this record, we find that Petitioner shown sufficiently that LeFebvre accounts for this limitation.

j) Summary

In sum, we determine that Petitioner has shown a reasonable likelihood of prevailing in showing that claim 2 is unpatentable as obvious over LeFebvre.

2. Claim 5

Claim 5 shares many similar limitations with claim 2, and for those limitations Petitioner relies on its evidence and arguments detailed with respect to claim 2. Petitioner maps together the following limitations of claims 2 and 5: [5 Pre] and [2 Pre], [5(a)] to [[2(a)], [5(b)] to [2(b)], [5(c)] to [2(f)], [5(f)] to [2(g)], [5(h)] to [2(h)]. We have reviewed those contentions and for the reasons discussed above with respect to claim 2, we find that Petitioner has shown sufficiently that LeFebvre accounts for those limitations. We now turn to the limitations that Petitioner maps separately.

a) [5(d)] “a processor,”

Petitioner contends that, in LeFebvre, “[t]he instrumented pad 16 comprises a microprocessor unit 19.” Pet. 30 (citing Ex. 1005 ¶¶ 21, 39; Ex. 1003 ¶ 120). At this time, Patent Owner does not dispute that LeFebvre accounts for this limitation. We have reviewed Petitioner’s citations and arguments, and agree, on this record, we find that Petitioner shown sufficiently that LeFebvre accounts for this limitation.

b) [5(e)] “memory,”

LeFebvre discloses that each instrumented pad contains non-volatile memory, which is used to store certain identifying information. Pet. 30 (citing Ex. 1005 ¶ 70; Ex. 1003 ¶ 122). At this time, Patent Owner does not dispute that LeFebvre accounts for this limitation. We have reviewed

Petitioner’s citations and arguments, and agree, on this record, we find that Petitioner shown sufficiently that LeFebvre accounts for this limitation.

- c) **[5(g)]** “*and software, stored in said memory and executed by said processor, said software performing the functions of collecting data from said sensor at periodic intervals,*”

Petitioner contends that “LeFebvre also discloses that each instrumented pad performs various computational functions, such as collecting data from sensors, analyzing it to determine whether an alarm condition exists, and transmitting messages upstream to the data control unit.” Pet. 33 (citing Ex. 1003 ¶ 143). Petitioner submits that “each instrumented pad comprises software that is executed by the microprocessor to carry out these functions.” *Id.* (citing Ex. 1003 ¶ 143; Ex. 1005 ¶¶ 34–35, claim 22). Petitioner asserts that “[t]his software would be stored in memory accessible by the microprocessor on the instrumented pad. *Id.* (citing Ex. 1003 ¶ 143).

Patent Owner argues that LeFebvre’s sensor, which is programmed to switch on briefly, but would normally be in a low-powered state, “is not ‘*collecting data . . . at periodic intervals*’ as recited in limitations 5(g) and 8(b).” Prelim. Resp. 44 (alteration in original). Patent Owner contends that the claims of the ’223 patent expressly distinguish between the power-saving functionality and the periodic collection of data. *Id.* (citing Ex. 1001, 5:24–29, 13:51–53).

We disagree with Patent Owner that “collecting data . . . at periodic intervals” excludes power management techniques like those described in LeFebvre. Claim 1 of the ’223 patent is instructive. Claim 1 recites, “wherein the power consumption of said sensor device is managed by placing said sensor device in a standby state and *periodically awakening*

said sensor device to collect readings from said temperature sensor and to transmit the information regarding the temperature sensed via said communication circuitry.” Ex. 1001, 15:50–55. Thus, like claim 5, claim 1 also recites, “periodically . . . collect[ing] readings.” *Id.* But claim 1 also recites requirements about how the sensor behave, e.g., placing the device in a standby state and periodically awakening. Thus, when read together, we do not agree that claims 1 and 5 cover two entirely different situations. Rather, we understand claim 1 as a subset of “collecting data . . . at periodic intervals,” and claim 5 reciting a broader limitation encompassing collection of data regardless of the power management technique used. Thus, on this record, we find that Petitioner has sufficiently shown that LeFebvre, by teaching that “the microprocessor on an instrumented pad 16 is normally in a passive, low power state, but is programmed to switch on briefly, periodically. It gathers readings from each of the sensors and performs preliminary analysis of the readings,” (Ex. 1005 ¶ 34) accounts for this limitation.

- d) **[5(i)]** “*wherein said communication management unit applies heuristics to analyze data collected from said one or more sensor units,*” **[5(j)]** “*(a) to determine if an actual failure exists and*” **[5(k)]** “*(b) to predict potential or imminent failures based on a statistical analysis of said collected data.*”

Petitioner submits that “[i]n LeFebvre’s system, the data control unit acts as an ‘aggregator of information,’ collecting data from each of the instrumented pads on the railcar.” Pet. 27 (citing Ex. 1005 ¶¶ 36, 56, 95; Ex. 1003 ¶ 108). Petitioner contends that “[t]he data control unit then uses ‘inference engine techniques’ (i.e., heuristics) to analyze the collected data.” *Id.* at 28 (citing Ex. 1005 ¶¶ 36, 56, 95; Ex. 1003 ¶ 109). LeFebvre discloses that “[a]s an aggregator of information, it is programmed to compare

information from all of the trucks on the railcar and draws inferences from them as to the status of the car, for example, the data control unit uses inference engine techniques to identify unsatisfactory behavior such as swaying, bouncing or even partial derailment.” Ex. 1005 ¶ 36. LeFebvre also states that “[g]iven that more than one instrumented pad may report misbehavior, then the components of the inference engine in the data control unit take responsibility for making assessments for the whole truck and ultimately for the freight car.” *Id.* ¶ 56. LeFebvre also discloses that “[w]hen serious trouble is inferred, then messages are sent via the communications link 23a, 24 to the locomotive, etc.” *Id.*; *see also id.* ¶ 95. Petitioner argues that “[t]he ‘inference engine’ techniques used by the data control unit include, for example, statistical analysis of the collected data.” Pet. 28 (Ex. 1005 ¶¶ 58–66; Ex. 1003 ¶ 110). Petitioner notes, as an example, “that the data control unit may detect a wheel derailment condition by looking for a high frequency, periodically repeating load and ‘a similar signal from both wheels in the wheel set.’” *Id.* (citing Ex. 1005 ¶¶ 60–61). Petitioner also notes that “the data control unit may detect track defects by ‘[m]onitoring the vertical loads in the instrumented pads and comparing these between wheel sets.’” *Id.* (citing Ex. 1005 ¶ 66). Petitioner contends that “[t]he data control unit is ultimately responsible for determining the presence of an alarm condition that relates to the railcar as a whole.” *Id.* at 29 (citing Ex. 1005 ¶ 95; Ex. 1003 ¶ 111). Petitioner asserts that “[i]f an alarm condition is present, the data control unit is responsible for sending an alarm message upstream (i.e., to the locomotive and/or a remote data handling location).” *Id.* at 29 (citing Ex. 1005 ¶ 95; Ex. 1003 ¶ 111).

Petitioner asserts that “LeFebvre discloses the use of heuristics, based upon data collected from one or more sensor units, to determine the existence of actual failure conditions.” *Id.* at 31 (citing Ex. 1005 ¶¶ 58–66; Ex. 1003 ¶ 128). Petitioner contends that “heuristics may be used to identify the existence of wheel damage such as ‘a flat spot or shelled wheel tread,’ or a wheel derailment.” *Id.* (citing Ex. 1005 ¶¶ 60, 61).

Petitioner contends that “LeFebvre discloses the use of heuristics, based upon data collected from one or more sensor units, to predict potential or imminent failures based upon a statistical analysis of the collected data.” Pet. 31 (citing Ex. 1005 ¶¶ 58–66; Ex. 1003 ¶ 130). Petitioner argues that “LeFebvre discloses that heuristics may be used to identify ‘long term trends’ in wheel bearing temperature, avoiding a potential bearing burn off and possible derailment.” *Id.* at 31–32 (citing Ex. 1005 ¶ 58). LeFebvre additionally discloses that “[s]pecific bearing defects can be inferred from frequency spectrum analysis.” Ex. 1005 ¶ 59. LeFebvre teaches that “[i]dentifying a failing bearing in its early stages is important in preventative maintenance programs.” *Id.* Petitioner asserts that “[t]hese and similar heuristics are commonly used in the industry and would have been familiar to a [person of ordinary skill in the art].” Pet. 32 (citing Ex. 1003 ¶¶ 132–133).

Patent Owner argues that Petitioner fails to account for these limitations. Prelim. Resp. 41–44. Patent Owner asserts that “[i]n order to provide for this forward-looking, predictive analysis that is ‘based on a statistical analysis,’ a statistical model with sufficient data, i.e., previously acquired data, on which to base such predictions would be needed.” *Id.* at 41. Patent Owner notes that

The '223 patent explains that ‘The CMU is capable of wirelessly collecting data from each of the motes and performing higher-level analysis of the data to detect imminent or actual failures. During such data analysis, heuristics may be applied to determine potential failures *based on statistical models* and empirical data.’”

Id. (quoting Ex. 1001, 2:57–62 (emphasis added)). Thus, Patent Owner argues that the claimed statistical analysis “necessarily involves a higher-level analysis than just the mere aggregation of collected sensor data to form an inference as to the condition of the train.” *Id.* (citing Ex. 2001 ¶¶ 73–76, 80–81). Patent Owner also argues that Petitioner cannot rely on the same disclosure for both the claimed “heuristics” and “statistical analysis” because they are separate. *Id.*

On this record, we disagree with Patent Owner that the claims require the use “statistical models.” The claim recites using “statistical analysis,” and as Petitioner notes, LeFebvre teaches analyzing the data for “long term trends” to predict whether a particular component may be about to fail. Ex. 1005 ¶ 58. On this record, we agree with Petitioner that determining trends in the data at least suggests the use of statistical techniques. *See* Ex. 1003 ¶¶ 130–132. Thus, we find that Petitioner has shown a reasonable likelihood that LeFebvre accounts for this limitation.

3. *Remaining Claims*

Patent Owner does not raise any other arguments regarding the remaining claims other than those considered above. We have reviewed Petitioner’s contentions regarding claims 2–10, 18, 20, 21, 23, and 25–32, have considered and determine that they show a reasonable likelihood Petitioner will prevail with respect to obviousness of claims 4–10, 13–18, 20–23, 25, and 29–32 over Armitage and LeFebvre.

F. Alleged Ground of Unpatentability Over LeFebvre and Barone

Petitioner contends that claims 13–17, 22, and 24 of the '223 patent are unpatentable under 35 U.S.C. § 103(a) as obvious over LeFebvre and Barone. Pet. 41–51. Patent Owner offers counterarguments. Prelim. Resp. 47–49. In particular, with respect to claims 13–17 and 22, Patent Owner relies on the arguments regarding independent claim 5 considered above. *See id.* at 47–48. With respect to claim 24, Patent Owner relies on its arguments considered above with respect to claim 23. *Id.* at 48. For the reasons provided above, we do not find those arguments persuasive. We have reviewed Petitioner's contentions regarding claims 13–17, 22, and 24 and determine that they show a reasonable likelihood Petitioner will prevail with respect to obviousness of claims 13–17, 22, and 24 over LeFebvre and Barone.

G. Alleged Ground of Unpatentability Over LeFebvre, Denny, and Provasnik

Petitioner contends that claims 1 and 24 of the '223 patent are unpatentable under 35 U.S.C. § 103(a) as obvious over LeFebvre, Denny, and Provasnik. Pet. 52–55. Patent Owner offers counterarguments. Prelim. Resp. 49–50. In particular, Patent Owner raises the arguments we considered above with respect to claim 2. *Id.* For the reasons discussed above, we did not find those arguments persuasive. We have reviewed Petitioner's contentions regarding claims 1 and 24 and determine that they show a reasonable likelihood Petitioner will prevail with respect to obviousness of claims 1 and 24 over LeFebvre, Denny, and Provasnik.

H. Whether Armitage is Prior Art to Claims 2–4, 23, and 27–30

Before addressing the grounds of unpatentability based on Armitage, we first address Patent Owner’s contention that “[t]he petition fails to establish that Armitage is entitled to the earlier filing date of its provisional application,” and thus is not prior art as to claims 2–4, 23, and 27–30. Prelim. Resp. 23–24. As we explained above, on the current record, these claims of the ’223 patent are not entitled to the earlier priority date. Thus, we find that Petitioner has shown that Armitage is prior art to these claims.⁴

I. Alleged Ground of Unpatentability Over Armitage and LeFebvre

Petitioner contends that claims 4–10, 13–18, 20–23, 25, and 29–32 of the ’223 patent are unpatentable under 35 U.S.C. § 103(a) as obvious over Armitage and LeFebvre. Pet. 68–84. Patent Owner offers various counterarguments. Prelim. Resp. 50–58. With respect to claims 4, 23, 25, 29, and 30, which depend from claim 2, Patent Owner raises the arguments we considered with respect to claim 2. *Id.* at 50, 58. Those arguments are not persuasive for the reasons set forth above. Patent Owner also raises several arguments regarding claim 5, and claims 6–10, 13–18, 20–22, which depend from claim 5. *See id.* at 51–58. We consider those arguments below.

⁴ Patent Owner contends that Petitioner cannot show an earlier priority date for Armitage during the trial. Prelim Resp. 25. Although we reserve the issue, we do not necessarily agree that Petitioner cannot reply to Patent Owner’s arguments that these claims of the ’223 patent are entitled to an earlier date by showing that Armitage also is entitled to an earlier date.

1. *Claim 5*

- a) **[5 Pre]** *“A system for monitoring the operation of a railcar comprising”*

Petitioner contends that, to the extent that the preamble is limiting, Armitage discloses, “a mobile railway car monitoring system.” Pet. 56–57 (citing Ex. 1006, Code [57]; Ex. 1003 ¶ 251). At this time, Patent Owner does not dispute that Armitage accounts for the preamble. We have reviewed Petitioner’s citations and arguments, and agree, on this record, we find that Petitioner shown sufficiently that Armitage accounts for the preamble, if it is limiting.

- b) **[5(a)]** *“a. one or more sensor units mounted on said railcar, each of said sensor units monitoring an operating parameter of said railcar wherein each of said sensor units comprises”*

Petitioner submits that “Armitage discloses a ‘mobile railway car monitoring system [including] a plurality of sensor nodes coupled to an undercarriage portion of a railway car.’” Pet. 57 (citing Ex. 1006 ¶ 4). Petitioner contends that “[t]he sensor nodes are separate from one another, and each node is attached to the railcar.” *Id.* (citing Ex. 1006 ¶ 12). Petitioner notes that “[s]ensor nodes 121-124 each include equipment to sense and report information about undercarriage elements of a railway car.” *Id.* at 58 (citing Ex. 1006 ¶ 14). Petitioner asserts that “[e]ach sensor node ‘includes a sensor portion’ that ‘could include thermometers’ or ‘other sensing equipment and circuitry.’” *Id.* (citing Ex. 1006 ¶ 14). Petitioner notes that Figure 3 of Armitage specifically shows one sensor node attached to each wheel assembly, for a total of eight sensor nodes. *Id.* (citing Ex. 1006 ¶¶ 33, 34, Fig. 3; Ex. 1003 ¶ 254). At this time, Patent Owner does not dispute that Armitage accounts for this limitation. We have reviewed

Petitioner's citations and arguments, and agree, on this record, we find that Petitioner shown sufficiently that Armitage accounts for this limitation.

c) **[5(b)]** *"a sensor,"*

Petitioner notes that "Armitage's sensor node may comprise a temperature sensor." Pet. 59 (citing Ex. 1006 ¶¶ 14, 33, 56; Ex. 1003 ¶ 257). At this time, Patent Owner does not dispute that Armitage accounts for this limitation. We have reviewed Petitioner's citations and arguments, and agree, on this record, we find that Petitioner shown sufficiently that Armitage accounts for this limitation.

d) **[5(c)]** *"a power source,"*

Petitioner submits that Armitage states that "[e]ach of sensor nodes 121–124 could also comprise a power system, such as a battery or solar cell." Pet. 62 (citing Ex. 1006 ¶¶ 14, 33). Petitioner notes that "[a] specific example is provided by the embodiment of Figure 6, where '[p]ower system 640 includes circuitry and a power source to provide power to the elements of sensor node 600.'" *Id.* (citing Ex. 1006 ¶ 57; Ex. 1003 ¶ 266) (second alteration in original). At this time, Patent Owner does not dispute that Armitage accounts for this limitation. We have reviewed Petitioner's citations and arguments, and agree, on this record, we find that Petitioner shown sufficiently that Armitage accounts for this limitation.

e) **[5(d)]** *"a processor,"*

Petitioner argues that "Armitage's sensor node comprises electrical circuitry that processes data received from the sensors." Pet. 60 (citing Ex. 1003 ¶ 263). Petitioner asserts that "[s]pecifically, each sensor node 'include[s] a processing portion for receiving the sensor information, amplifying, scaling, modifying, adjusting, digitizing, or converting the

sensor information, as well as controlling the transceiver portion and sensor portions.” *Id.* (citing Ex. 1006 ¶ 14). Petitioner points to an exemplary embodiment provided in Figure 6, which Petitioner submits “is a block diagram illustrating sensor node 600, as an example of sensor nodes 121–124 found in FIG. 1 or sensor nodes 320-327 found in FIG. 3.” *Id.* at 61 (citing Ex. 1006 ¶ 53). Petitioner notes that “Figure 6 depicts ‘processing system 620’ within the sensor node 600.” *Id.* Petitioner contends that “Processing system 620 ‘comprises specialized circuitry,’ i.e., electrical circuitry, which operates to ‘process the sensor information.’” *Id.* (citing Ex. 1006 ¶ 55). At this time, Patent Owner does not dispute that Armitage accounts for this limitation. We have reviewed Petitioner’s citations and arguments, and agree, on this record, we find that Petitioner shown sufficiently that Armitage accounts for this limitation.

f) [5(e)] “memory,”

Petitioner asserts that “[e]ach sensor node may comprise a processing system for receiving, processing, and transmitting information received from the sensors. Pet. 74 (citing Ex. 1003 ¶ 287). Petitioner contends that “[t]he processing system includes a storage system comprising at least one ‘memory device.’” *Id.* (citing Ex. 1006 ¶ 55). Petitioner notes that “the processing system must include working memory, or RAM, that stores state information for the software being executed.” *Id.* (citing Ex. 1003 ¶ 288). At this time, Patent Owner does not dispute that Armitage accounts for this limitation. We have reviewed Petitioner’s citations and arguments, and agree, on this record, we find that Petitioner has shown sufficiently that Armitage accounts for this limitation.

g) [5(f)] “communication circuitry,”

Petitioner submits that “[e]ach sensor node comprises a wireless transceiver for communicating with the control node.” Pet. 62 (citing Ex. 1006 ¶¶ 14, 33, 54; Ex. 1003 ¶ 268). Petitioner notes that “each sensor node may be configured to ‘transfer the processed sensor information to control node 130.’” *Id.* (citing Ex. 1006 ¶ 26). At this time, Patent Owner does not dispute that Armitage accounts for this limitation. We have reviewed Petitioner’s citations and arguments, and agree, on this record, we find that Petitioner has shown sufficiently that Armitage accounts for this limitation.

h) [5(g)] “and software, stored in said memory and executed by said processor, said software performing the functions of collecting data from said sensor at periodic intervals,”

Petitioner submits that Armitage discloses that each sensor node comprises software. Pet. 71 (citing Ex. 1006 ¶ 55; Ex. 1003 ¶ 347). As for the remainder of the limitation, Petitioner relies on LeFebvre. *Id.* at 71–72. In particular, Petitioner submits that “the power-saving scheme described by LeFebvre (where an electronic device enters a sleep mode to save power, and awakens periodically to collect data, perform computations, and transmit data over a network) was a well known, standard practice prior to the priority date of the ’223 Patent.” *Id.* at 71 (citing Ex. 1003 ¶ 350). Petitioner contends that a person of ordinary skill in the art “would have incorporated this well-known feature into Armitage’s sensor nodes because—as LeFebvre explains—it saves power.” *Id.* at 71–72 (citing Ex. 1005 ¶¶ 34–35; Ex. 1003 ¶ 350). Patent Owner argues that “Petitioner has not shown that LeFebvre discloses [this limitation] because a [person of ordinary skill in the art] would not confuse the collection of data at periodic intervals with a power management method.” Prelim. Resp. 51. On this

record, we do not find this argument persuasive for the reason stated above. *See supra* III.E.2.c. Patent Owner also disputes whether Petitioner has shown a motivation to combine Armitage and LeFebvre. *See* Prelim. Resp. 51–53. We consider that argument below. We have reviewed Petitioner’s citations and arguments, and agree, on this record, we find that Petitioner has shown sufficiently that Armitage accounts for this limitation.

- i) **[5(h)]** “*b. a communication management unit, mounted on said railcar, said communication management unit in wireless communication with said one or more sensor units;*”

Petitioner contends that “Armitage’s system includes a ‘control node’ (i.e., a communication management unit) on each railcar.” Pet. 63 (citing Ex. 1006 ¶¶ 4, 12, Figs. 1, 3, 5; Ex. 1003 ¶ 271). Petitioner notes that “[t]he control node communicates wirelessly with each sensor node on the same railcar.” *Id.* Petitioner submits that “[f]or example, in the embodiment of Figure 1, control node 130 communicates with each of sensor nodes 121–124 via wireless links 161–164, respectively.” *Id.* (citing Ex. 1003 ¶ 272). Petitioner asserts that “[t]he wireless links can utilize, for example, WiFi or Bluetooth, both of which provide two-way communications.” *Id.* (citing Ex. 1006 ¶ 21; Ex. 1003 ¶ 272). Petitioner notes that Armitage discloses that “[c]ontrol node 130 is also capable of broadcasting information upstream to communication network 140 over wireless link 165.” *Id.* (citing Ex. 1006 ¶ 22). Petitioner contends that “Armitage identifies WiFi, cellular networks (e.g., LTE, GSM, or CDMA), and satellite networks (e.g., Iridium) as examples of the wireless communications technologies that may be employed in wireless link 165, all of which provide two-way communications.” *Id.* at 63–64 (citing Ex. 1006 ¶ 22; Ex. 1003 ¶ 273). At this time, Patent Owner does not dispute that Armitage accounts for this

limitation. We have reviewed Petitioner’s citations and arguments, and agree, on this record, we find that Petitioner shown sufficiently that Armitage accounts for this limitation.

- j) **[5(i)]** “*wherein said communication management unit applies heuristics to analyze data collected from said one or more sensor units*” **[5(j)]** “(a) *to determine if an actual failure exists and*” **[5(k)]** “(b) *to predict potential or imminent failures based on a statistical analysis of said collected data.*”

Petitioner argues that Armitage accounts for these limitations. *See* Pet. 64–66. Petitioner notes that, as discussed above, Armitage discloses sensor nodes that contain one or more sensors that collect data about the railcar and transmit that data to the control node. *Id.* at 64. Petitioner submits that Armitage discloses, “[t]he information received could include sensor information, or modified sensor information, from each of sensors 121–124 received over wireline or wireless links. Control node 130 processes (204) the information to determine a fault condition for the undercarriage portion.” *Id.* at 64–65 (citing Ex. 1006 ¶ 27). Petitioner asserts that “[i]f a fault condition is detected, the control node wirelessly reports it (i.e., sends an alarm message) to a collection system.” *Id.* at 65 (citing Ex. 1006 ¶ 28; Ex. 1003 ¶ 277).

Petitioner argues

Armitage describes the use of heuristics to determine both the presence and nature of a fault condition. For example, Armitage discloses that “[a] single wheel sensor anomaly might . . . indicate a ‘wheel out of round’ or ‘flat spot’ condition, where a non-round geometry of a wheel can cause vibrations or shocks at a certain portion of each rotation of a wheel.” Ex. 1006 ¶ 42. Conversely, “outliers for sensor nodes on an entire side of railway car 310 could indicate a cornering failure, or an off-track condition.” *Id.* A PHOSITA would understand that these are examples of heuristics. Ex. 1003 ¶ 278.

Id. at 65. Petitioner notes that “[t]he control node can also perform statistical analysis on the collected data to detect failure conditions.” *Id.* (citing Ex. 1003 ¶ 279). Petitioner contends that “[f]or example, the control node can ‘process the sensor information to determine anomalies from an average, such as an anomaly from a running average of the temperature of all wheels on a railway car.’” *Id.* (citing Ex. 1006 ¶ 29). Petitioner asserts that “Armitage also discloses the use of a ‘moving average and trend analysis’ to detect ‘statistically significant deviations’ that are indicative of failure.” *Id.* (citing Ex. 1006 ¶¶ 30, 45). Petitioner contends that “Armitage also indicates that its system can distinguish between potential failures (which warrant maintenance) and actual failures (which require immediate service).” *Id.* at 66 (citing Ex. 1003 ¶ 280; Ex. 1006 ¶ 44).

Patent Owner argues that Petitioner failed to show that the combination accounts for these limitations. *See* Prelim. Resp. 53–58. Patent Owner asserts that the claim requires finding both actual failures and predicting “potential or imminent failures based on a statistical analysis of said collected data.” *Id.* at 53–54. Patent Owner submits that Petitioner only shows a system that is “capable of detecting whether a fault condition event currently exists and whether maintenance is immediately required or may be put off until later.” *Id.* at 54. Patent Owner argues that “Armitage merely discloses establishing an event ranking for a deviation from normal conditions based on a comparative analysis of sensor data to the population of sensor data.” *Id.* (citing Ex. 2001 ¶ 101). Patent Owner contends that “[t]his type of analysis is not predicated on performing a statistical analysis of the data collected from a specific sensor or even a pool of individual

sensor data,” but “[r]ather it is merely a comparative analysis using basic arithmetic.” *Id.* at 54–55.

We disagree with Patent Owner’s characterization of Armitage and the scope of these claim limitations. Beginning with the claimed “heuristics,” Armitage provides examples such as “[a] single wheel sensor anomaly might . . . indicate a ‘wheel out of round’ or ‘flat spot’ condition, where a non-round geometry of a wheel can cause vibrations or shocks at a certain portion of each rotation of a wheel,” conversely, “outliers for sensor nodes on an entire side of railway car 310 could indicate a cornering failure, or an off-track condition.” Ex. 1006 ¶ 42. Armitage also discusses that the control node can “process the sensor information to determine anomalies from an average, such as an anomaly from a running average of the temperature of all wheels on a railway car,” *id.* ¶ 29, and Armitage also discloses the use of a “moving average and trend analysis” to detect “statistically significant deviations” that are indicative of failure, *id.* ¶ 30. We agree with Petitioner that these are examples of statistical analysis—e.g., averages and deviations. *See* Ex. 1003 ¶ 279. Patent Owner’s contentions, as we understand them, that these are just “counting” and “comparative in nature,” are not supported by the plain disclosure of Armitage, which discusses statistical analysis of the data. *See* Ex. 1006 ¶¶ 29–30.

Patent Owner also argues that “Petitioner fails to provide any discussion regarding ‘prediction.’” Prelim. Resp. 56. Patent Owner asserts that the cited portion of Armitage (Paragraph 44) only teaches status indicators, where “[e]ach of these status indicators refers to a **currently detected failure**, i.e., an ‘event’ in the Armitage nomenclature, and does not in any way disclose **predicting** potential or imminent failures.” *Id.*

We are not persuaded by Patent Owner’s argument that Armitage does not teach or suggest predict imminent failures. The ’223 patent does not provide any definition of what it considers a “failure.” It does explain that

There is also a need to increase average train speed by improving high speed performance and reducing unplanned service interruptions through mechanical failures. Car owners increasingly seek to implement preventative maintenance programs to predict and avoid mechanical failures in the field and to efficiently schedule repairs at a facility and time of their choice. . . . Even minor mechanical failures could lead very quickly to a catastrophic failure, not only of a single railcar, but of the entire train. Thus it is desirable to detect and report deviations from operational norms or predictions of impending failure to the locomotive or to a central data handling facility as quickly as possible, allowing for timely human intervention.

Ex. 1001, 1:29–44.

This appears to be what Armitage teaches. Armitage teaches that

The degree to which any specific sensor deviates from this population is indicative of the severity of the mechanical condition of the component. When a deviation is detected, a wireless transmitter associated with the DCU could be activated and an alert generated. For example, when a sensor exhibits ‘significant’ deviation from the normal conditions, an event is generated by the DCU.

Each event could be ranked by severity and status could be provided periodically, such as twice daily, to provide railcar location and system status. The event ranking could include a ‘yellow’ condition which indicates that a railway car requires service, and a ‘red’ condition which indicates that a sensor has detected a serious deviation from normal operations that requires immediate service.

Ex. 1006 ¶¶ 43–44. In other words, Armitage teaches that the system looks at the sensor data, detects deviations, and then classifies the deviations on how far they depart from normal operating conditions, i.e., it predicts how

close they are to failure, and suggests service to prevent such failure, which appears to be what the '223 patent suggests it intends to do. Accordingly, on this record, we find that Petitioner has shown sufficiently that Armitage accounts for these limitations.

k) Motivation to Combine Armitage and LeFebvre

Patent Owner argues that “Petitioner has not and cannot show any motivation to modify Armitage in view of LeFebvre to arrive at claim 5 because doing so would change the basic operating principles of the Armitage invention.” Prelim. Resp. 51. Patent Owner asserts that “Armitage relies on a data analysis technique that requires ‘continuous monitoring’ and there is no indication in Armitage that power saving is a concern.” *Id.* (citing Ex. 1006 ¶ 44). Patent Owner contends that modifying Armitage’s system to have Armitage’s microprocessor in the sensor node to operate in a low power most of the time “would frustrate the ability of Armitage’s sensor to ‘continuous[ly] monitor[] all critical railway components.” *Id.* at 52 (citing Ex. 1006 ¶ 44; Ex. 2001 ¶ 94). Patent Owner argues that a person of ordinary skill in the art “would not be able to combine the dynamic continuous monitoring of Armitage and the power management features of LeFebvre to perform periodic collections of sensor data with any probability of success because turning sensors off and on as disclosed in LeFebvre would prevent Armitage’s system from establishing an accurate running average of the sensor data.” *Id.* (citing Ex. 2001 ¶¶ 94, 95).

On this record, we find that Petitioner has shown sufficiently that a person of ordinary skill in the art would have been motivated to combine Armitage and LeFebvre. A motivation to combine may be found “explicitly

or implicitly in market forces; design incentives; the ‘interrelated teachings of multiple patents’; ‘any need or problem known in the field of endeavor at the time of invention and addressed by the patent’; and the background knowledge, creativity, and common sense of the person of ordinary skill.” *ZUP, LLC v. Nash Mfg., Inc.*, 896 F.3d 1365, 1371 (Fed. Cir. 2018) (quoting *Plantronics, Inc. v. Aliph, Inc.*, 724 F.3d 1343, 1354 (Fed. Cir. 2013)). Thus, there is no requirement that Armitage expressly teach or suggest that power saving is a concern. “The motivation-to-combine analysis is a flexible one.” *Intel Corp. v. PACT XPP Schweiz AG*, 61 F.4th 1373, 1379 (Fed. Cir. 2023). Indeed, “‘universal’ motivations known in a particular field to improve technology provide ‘a motivation to combine prior art references *even absent any hint of suggestion* in the references themselves.’” *Id.* at 1380 (quoting *Intel Corp. v. Qualcomm Inc.*, 21 F.4th 784, 797–99 (Fed. Cir. 2021) (cleaned up) (emphasis in original)).

On this record, we are not persuaded that the proposed modification would render Armitage “inoperable” as Patent Owner contends. Although Armitage states that the system can provide “[r]ealtime, continuous monitoring,” it also explains that sensors are not continuously sending data to the Data Correlation Unit (DCU) every moment. *See* Ex. 1006 ¶ 44 (noting “each railway car sensor array reports every ‘n’ seconds to the DCU and the DCU aggregates and continuously analyzes the datastream from the sensors.”). It is a commonplace fact that design decisions entail making tradeoffs among multiple objectives. *Allied Erecting and Dismantling Co. v. Genesis Attachments, LLC*, 825 F.3d 1373, 1381 (Fed. Cir. 2016) (“A given course of action often has simultaneous advantages and disadvantages, and

this does not necessarily obviate motivation to combine.”). Indeed, LeFebvre explains

[I]n operation, the microprocessor on an instrumented pad 16 is normally in a passive, low power state, but is programmed to switch on briefly, periodically. It gathers readings from each of the sensors and performs preliminary analysis of the readings. The rationale for the choice of sampling frequencies and the selection of sensors to be read is based on the type of behavior being monitored and the particular application. Sampling should be at a frequency several times the highest frequency to be detected from the data. More frequent sampling will gain no further intelligence but increase power consumption.

Ex. 1005 ¶ 34; *see also id.* ¶ 35 (noting “should the pads detect indications of fault or impending failure, the microprocessor on the pad may be programmed to switch on the radio which it controls and send an appropriate message via the radio to the data control unit 23”). Given that Armitage already provides a reporting interval from the sensors to the DCU and LeFebvre teaches that sampling should be optimized to balance intelligence gained versus power consumption, we are not persuaded on this record, by Patent Owner’s declarant’s assertion that placing the microprocessor into a standby mode to save power would render Armitage inoperable. Rather, the prior art suggests that it was well within the level of skill in the art to adjust operation of the sensors such that power would be conserved without degrading the operation of the system. *See id.* ¶¶ 34–35. “A person of ordinary skill is also a person of ordinary creativity, not an automaton.” *KSR*, 550 U.S. at 421. On this record, we find that Petitioner has shown sufficiently that a person of ordinary skill would have been motivated to combine Armitage and LeFebvre in the manner suggested.

2. *Summary and Remaining Claims*

Patent Owner does not raise any other separate arguments regarding this ground, other than those we have considered above with respect to claim 5.⁵ *See* Prelim. Resp. 50–58. We have reviewed Petitioner’s contentions regarding claims 4–10, 13–18, 20–23, 25, and 29–32 and determine that they show a reasonable likelihood Petitioner will prevail with respect to obviousness of claims 4–10, 13–18, 20–23, 25, and 29–32 over Armitage and LeFebvre.

J. Alleged Ground of Unpatentability Over Armitage

Petitioner contends that claims 2, 3, and 26–28 of the ’223 patent are unpatentable under 35 U.S.C. § 103(a) as obvious over Armitage. Pet. 56–68. Patent Owner offers counterarguments. Prelim. Resp. 50. In particular, with respect to claims 2, 3, 27, and 28, Patent Owner argues that Armitage is not prior art. *See id.* With respect to claim 26, Patent Owner contends that certain limitations are similar to limitations [5(i)] and [5(j)] discussed above. *Id.* For the reasons discussed above, we did not find those arguments persuasive. We have reviewed Petitioner’s contentions regarding claims 2, 3, and 26–28 and determine that they show a reasonable likelihood

⁵ We note that with respect to claims 23 and 25, Patent Owner points to arguments that it is allegedly incorporating from another section, including “Armitage does not disclose, teach, or suggest (i) ‘electrical circuitry,’ (ii) a ‘power source,’ and (iii) a ‘communication device’ that are ‘positioned within said housing’ as required by independent claim 2.” *Id.* at 58. However, none of those arguments are made in the section that Patent Owner cross references, and without more explanation, we decline to consider those arguments. Patent Owner also makes arguments regarding LeFebvre, but those arguments are addressed *supra* § III.E.

Petitioner will prevail with respect to obviousness of claims 2, 3, and 26–28 over Armitage.

K. Alleged Ground of Unpatentability Over Armitage, LeFebvre, Denny, and Provasnik

Petitioner contends that claims 1 and 24 of the '223 patent are unpatentable under 35 U.S.C. § 103(a) as obvious over Armitage, LeFebvre, Denny, and Provasnik. Pet. 84–86. Patent Owner reiterates its arguments considered above with respect to claims 5 and 8. *See* Prelim. Resp. 59–61. As we explained above, we have found those arguments unpersuasive. We have reviewed Petitioner's contentions regarding claims 1 and 24 and determine that they show a reasonable likelihood Petitioner will prevail with respect to obviousness of claims 1 and 24 over Armitage, LeFebvre, Denny, and Provasnik.

L. "Correct" Constructions

Patent Owner argues that the Petition should be denied because "Petitioner fails to proffer, much less analyze the claim under, what it contends is the correct construction." Prelim. Resp. 10–11. Patent Owner asserts that Petitioner's position that "no formal construction is necessary in this proceeding" is inconsistent with positions Petitioner has taken in the ongoing district court litigation." *Id.* at 12. We disagree that Petitioner's failure to use the same claim construction in this proceeding as it offered, but has not been yet adopted, in the district court requires denying the Petition. *See, e.g., Abbott Diabetes Care Inc. v. Dexcom, Inc.*, IPR2022-00913, Paper 14 at 11–17 (PTAB Nov. 3, 2022) (explaining that there is no

requirement that a party present the same construction before the Board and the district court).

M. Impermissible Cross-Referencing

Patent Owner asserts that the Petition “fails to identify with particularity the grounds and supporting evidence for its challenge on a claim-by-claim basis,” because “Petitioner provides analysis, or at least a partial analysis, of claims 1, 5, 7, 9–10, 14, 17–18, 23, 25, 26, 29–32 that consists entirely of internal cross-references to its prior analysis of other, different claims with different claim language or limitations.” Prelim. Resp. 13 (citing Pet. 30–31, 35, 38–39, 41, 49, 53, 66–67, 71, 73, 76, 78, 82–86). We do not find the cross referencing used by Petitioner to be impermissible. Although Patent Owner identifies some differences in the claim language, e.g., limitation [5(j)], *id.* at 14, we note that in the cross-referenced sections, Petitioner does address the specific claim language, e.g., heuristics, in its detailed discussion of claim 3. Thus, we do not agree that the Petition should be denied based on the cross referencing.

IV. DISCRETION UNDER 35 U.S.C. § 325(d)

A. Legal Framework

35 U.S.C. § 325 deals with the relation of proceedings before the Board with other proceedings. 35 U.S.C. § 325(d) provides that “[i]n determining whether to institute or order a proceeding under this chapter, chapter 30, or chapter 31,⁶ the Director may take into account whether, and reject the petition or request because, the same or substantially

⁶ Chapter 31 (35 U.S.C. §§ 311–319) relates to *inter partes* review.

the same prior art or arguments previously were presented to the Office.” In evaluating arguments under § 325(d), we use

[a] two-part framework: (1) whether the same or substantially the same art previously was presented to the Office or whether the same or substantially the same arguments previously were presented to the Office; and (2) if either condition of first part of the framework is satisfied, whether the petitioner has demonstrated that the Office erred in a manner material to the patentability of challenged claims.

Advanced Bionics, LLC v. MED-EL Elektromedizinische Geräte GmbH, IPR2019-01469, Paper 6 at 8 (PTAB Feb. 13, 2020) (precedential).

Advanced Bionics states that “[p]reviously presented art . . . includes art provided to the Office by an applicant, such as on an Information Disclosure Statement (IDS), in the prosecution history of the challenged patent” and that “[t]he proceedings in which art was previously presented include . . . examination of the underlying patent application . . . and AIA post-grant proceedings involving the challenged patent.” *Advanced Bionics*, IPR2019-01469, Paper 6 at 7–8. In *Advanced Bionics*, the Board exercised its discretion to deny institution under Section 325(d), finding that the newly asserted art by the petitioner was the same or substantially the same as art previously presented to the Office and that the petitioner had not demonstrated the Office erred when considering the prior art or arguments. *Advanced Bionics*, IPR2019-01469, Paper 6 at 22.

To determine whether the Petition presents “the same or substantially the same” art or arguments previously presented to the Office, we consider

the factors set forth in *Becton, Dickinson*.⁷ *Id.* at 7 n.8. *Becton, Dickinson* provides a non-exclusive set of factors to use in applying the framework of 35 U.S.C. § 325(d).

Under *Becton, Dickinson*, we consider:

(a) the similarities and material differences between the asserted art and the prior art involved during examination; (b) the cumulative nature of the asserted art and the prior art evaluated during examination; (c) the extent to which the asserted art was evaluated during examination, including whether the prior art was the basis for rejection; (d) the extent of the overlap between the arguments made during examination and the manner in which petitioner relies on the prior art; (e) whether petitioner has pointed out sufficiently how the examiner erred in its evaluation of the asserted prior art; and (f) the extent to which additional evidence and facts presented in the petition warrant reconsideration of the prior art or arguments.

See *Becton, Dickinson*, Paper 8 at 17–18.

In assessing the similarity of the prior art and arguments presented to the Office in examination and reexamination, we consider *Becton, Dickinson* factors (a), (b), and (d). If, after our review of factors (a), (b), and (d), we determine that the same or substantially the same prior art or arguments previously were presented to the Office, we consider factors (c), (e), and (f) to determine whether Petitioner has demonstrated material error by the Office. *Advanced Bionics*, IPR2019-01469, Paper 6 at 10.

B. Prosecution History

The '223 patent was filed March 15, 2013. Ex. 1001, Code [22]. The Examiner issued a first Office Action on November 4, 2014. Ex. 1002, 108.

⁷ *Becton, Dickinson & Co. v. B. Braun Melsungen AG*, IPR2017-01586, Paper 8 (Dec. 15, 2017) (precedential as to § III.C.5, first paragraph) (“*Becton, Dickinson*”).

The Examiner rejected most of the pending claims under 35 U.S.C. § 103(a) as unpatentable as obvious over U.S. Patent No. 8,244,411 B2 (“Baker”) in view of a webpage entitled Lat-lon.⁸ *Id.* at 110. On May 1, 2015, the applicants responded by filing a declaration under 37 C.F.R. § 1.133 from named inventor Andrew H. Martin contending that the claimed invention was reduced to practice “at least as early as January 1, 2013,” which would eliminate the Lat-lon webpage as prior art. *Id.* at 161. The applicants also argued that although Baker disclosed a temperature sensor, it “provides no disclosure of anything to be done with the temperature data.” *Id.* at 161–62. The applicants also filed several Information Disclosure Sheets (IDSs) including Armitage, and 28 other U.S. patents and patent publications, as well as seven foreign references. *Id.* at 174–76, 364–69. On June 12, 2015, the applicants filed additional IDSs including a PCT search report, two foreign references, and five U.S. patents and patent publications. *Id.* at 378–79, 437–39.

On August 24, 2015, a second, final Office Action rejecting all of the pending claims was entered. *Id.* at 448–49. The Examiner withdrew the prior objections. *Id.* at 450. The Examiner issued new rejections based primarily on U.S. Patent Publication No. US 2008/0195265 A1 (Ex. 2009, “Searle”). *Id.* at 451–64. The Examiner also marked the IDSs as considered. *Id.* at 468–82, 497–99.

On January 27, 2016, the applicants filed a Request for Continuing Examination. *Id.* at 507–527. The applicants amended the claim that issued as claim 1 to include “wherein the power consumption of said sensor device

⁸ <http://web.archive.org/web/20130206222004/http://latlon.com/gpsproducts/locomotive-monitoring-unit,02/06/2013>

is managed by placing said sensor device in a standby state and periodically awakening said sensor device to collect readings from said temperature sensor and to transmit the information regarding the temperature sensed via said communication circuitry.” *Id.* at 508–09 (emphasis omitted). The application claims that issued as claims 2 and 5 of the ’223 patent did not receive any significant amendments. *Id.* at 509–11. The applicants argued that the ’223 patent “utilize[d] a different topology” than Searle. *Id.* at 518. The applicants asserted that

In the present application, each individual railcar has its own an on-board mesh network consisting of sensing units located at various points on the railcar and a communications management unit (CMU) also located on the railcar. In addition, the communication management units of each railcar are part of a mesh network consisting of communication management units from each railcar and a base unit typically located on the locomotive (when the train consist is assembled), but which also may be remote, such as land-based (see published application, [0037] and Fig. 6).

Id. at 518–19. The applicants contended that this distinguished the pending claims, including the claims that issued as claims 2 and 5, over Searle. *Id.* at 519–21. The applicants also argued that the claim that issued as claim 5 was also patentable because Searle did not disclose “the communication management unit apply heuristics to analyze the data collected from the one or more sensing devices to determine either if an actual failure exists or to predict an imminent failure.” *Id.* at 521.

On February 10, 2016, the Examiner issued a Notice of Allowability.

Id. at 536. The Examiner stated that claims were allowable because

the closest prior art of record taken either individually or in combination with other prior art of record fails to teach or suggest: monitoring temperature on a railcar wherein the power consumption of said monitoring device is managed by placing

said monitoring device in a standby state and periodically awakening said monitoring device to collect readings from said temperature sensor and to transmit the information regarding the temperature sensed via said communication circuitry and a communication management unit mounted on the railcar, capable of two way wireless communication with each of said plurality of sensor devices for receiving information therefrom, said communication management unit having a wireless communication device for broadcasting information about the parameter or condition being monitored.

Id. at 540. Thus, the Examiner identified the language that was added to claim 1 about power management and the applicants' argument about the communication management unit (CMU) as the reasons for allowance. *Id.*

C. Analysis

1. Similarity of the Prior Art and Arguments

Patent Owner asserts that the Examiner considered both references by stating "ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH./Y.S./" and initialing the IDSs. Prelim. Resp. 6. Patent Owner argues that denial of institution is warranted because the references were presented to the Office and considered by the Examiner as part of IDSs. *Id.*

The parties agree that Information Disclosure Statements (IDSs) filed during prosecution of the '223 patent cited LeFebvre and Armitage. Pet. 16; Prelim. Resp. 3–9. Under our controlling precedent, both references are considered to be "previously presented" to the Office. *Advanced Bionics*, IPR2019-01469, Paper 6 at 7–8 ("Previously presented art includes art made of record by the Examiner, and art provided to the Office by an applicant, such as on an [IDS], in the prosecution history of the challenged patent.").

2. *Whether Petitioner Demonstrates Office Material Error*

Because the same prior art previously was presented to the Office, we consider *Becton Dickinson* factors (c), (e), and (f) to determine whether Petitioner has demonstrated material error by the Office.

Although LeFebvre and Armitage were presented to the Office, and the Examiner indicated on IDSs that both references were considered, neither reference was used in a rejection of any claims of the '223 patent application as both parties recognize. Pet. 16; *cf.* Prelim. Resp. 3–9.

LeFebvre and Armitage were cited with 34 U.S. patents and published applications, 12 foreign patents, and 4 non-patent items. Ex. 1002, 468–82, 497–99. Several LeFebvre patents and a publication were cited. *Id.* at 364–366; *cf. Boragen, Inc. v. Syngenta Participations AG*, IPR2020-00124, Paper 16 at 22 (PTAB May 5, 2020) (7 references were cited).

During the prosecution history, the applicants' arguments focused on the lack of a temperature sensor in Baker, and the lack of a CMU in Searle. These features are found clearly both in Armitage and LeFebvre. The Examiner's failure to appreciate these disclosures suggests a material error occurred in the prosecution of the '223 patent. Thus, we do not consider the Examiner's initials on an IDS citing almost 50 references with the Examiner's failure to use LeFebvre or Armitage to reject claims of the '223 patent application as indicating that the Examiner sufficiently evaluated or appreciated the relevance of either reference.

As we explained above, the Petition demonstrates a reasonable likelihood that one or both references render unpatentable subject matter of all the independent claims (claims 1, 2, 5, and 23) including limitations that Patent Owner argued were not taught or suggested by Searle or Baker to

obtain allowance of those claims (i.e., claims 1, 2, 5, and 23). Pet. 18–41, 56–84; Ex. 1002, 518–526 (arguing that Searle does not teach or suggest a communication management unit as recited in all the independent claims).

As indicated by our analysis of Grounds 1 and 4 above, Petitioner has shown a reasonable likelihood that LeFebvre and Armitage by themselves disclose subject matter the Examiner found lacking in Searle for independent claims of the '223 patent application and these claims correspond to claims 2 and 23 of the '223 patent. The Petition relies on LeFebvre alone to disclose all limitations of independent claims 2–10, 18, 20, 21, 23, and 25–32, and Armitage alone to disclose all limitations of claims 2, 3, and 26–28. Pet. 18–41, 56–68.

Petitioner's showing of a reasonable likelihood of unpatentability of the '223 patent claims based on LeFebvre and Armitage, whose disclosures cited in the Petition differ substantially from disclosures of Searle and Baker relied on by the Examiner and were not applied in any rejection during examination, satisfies the second prong of *Advanced Bionics* and weighs strongly against exercising our discretion to deny institution.

V. CONCLUSION

After considering the arguments presented in the Petition, the Preliminary Response, and the evidence of record, we determine that Petitioner has demonstrated at least a reasonable likelihood of success in proving that at least one claim of the '223 patent is unpatentable. We also decline to exercise our discretion to deny the Petition under 35 U.S.C. § 325(d). Thus, we institute an *inter partes* review of all challenged claims (i.e., claims 1–10, 13–18, and 20–32) on all grounds set forth in the Petition.

Our determinations at this stage of the proceeding are based on the evidentiary record currently before us. This decision to institute trial is not a final decision as to patentability of any claim for which we have instituted an *inter partes* review. *See TriVascular, Inc. v. Samuels*, 812 F.3d 1056, 1068 (Fed. Cir. 2016) (noting that “there is a significant difference between a petitioner’s burden to establish a ‘reasonable likelihood of success’ at institution, and actually proving invalidity by a preponderance of the evidence at trial”). We will base any final decision on the full record developed during trial.

VI. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review is instituted for claims 1–10, 13–18, and 20–32 of the ’223 patent on the unpatentability grounds asserted in the Petition; and

FURTHER ORDERED that pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial, which commences on the entry date of this decision.

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