

IN THE 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 NO. 10,137,915

ISSUED: NOVEMBER 27, 2018

TITLE: SYSTEM AND METHOD FOR DETECTING ANOMALIES
IN TRAIN CONSISTS AND RAILCARS

DECLARATION OF MICHAEL I. SHAMOS, PH.D.

ON BEHALF OF PATENT OWNER

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1. I, Michael I. Shamos, declare as follows in connection with the proceedings identified above.

I. INTRODUCTION AND QUALIFICATIONS

2. I have been retained as an expert on behalf of Patent Owner to provide technical analysis and opinions relating to the Petition for *Inter Partes* Review (“Petition,” Paper 1) filed by Hum Industrial Technology, Inc. (“Hum” or “Petitioner”) challenging the validity of Claims 1, 21-30, 36, and 37 (the “Challenged Claims”) of U.S. Patent No. 10,137,915 (“the ’915 Patent” or “the Patent”). I have also been asked to provide opinions on the Declaration of Mr. Steven Ricca (“Ricca Declaration,” Ex. 1003).

3. I am aware of contemporaneous litigation involving the parties in a case styled *Amsted Rail Company, Inc. v. Hum Industrial Technology, Inc. and Brett Wilson*, 4:22-cv-00445-AGF (E.D. Mo.) (the “Litigation”).

4. I currently hold the title of Distinguished Career Professor in the School of Computer Science at Carnegie Mellon University in Pittsburgh, Pennsylvania. I am a member of two departments in that School, the Software and Societal Systems Department and the Language Technologies Institute. I was a founder and Co-Director of the Institute for eCommerce at Carnegie Mellon from 1998-2004 and from 2004-2018 was Director of the eBusiness Technology graduate program in the Carnegie Mellon University School of Computer Science. Since 2018, I have been

Director of the M.S. in Artificial Intelligence and Innovation degree program at Carnegie Mellon. My Curriculum Vitae is attached as Ex. 2002.

5. I have an A.B. degree from Princeton University in Physics, an M.A. degree from Vassar College in Physics, an M.S. degree from American University in Technology of Management, an M.S. degree from Yale University in Computer Science, an M. Phil. from Yale University in Computer Science, a Ph.D. from Yale University in Computer Science, and a J.D. degree from Duquesne University.

6. I have taught graduate courses at Carnegie Mellon in Electronic Commerce, including eCommerce Technology, Electronic Payment Systems, Electronic Voting, Internet of Things, Electronic Payment Systems and eCommerce Law and Regulation, as well as Analysis of Algorithms. Since 2007, I have taught an annual course in Law of Computer Technology. I currently also teach Artificial Intelligence and Future Markets. That course covers AI in preventive maintenance, including predicting failures based on sensor data.

7. From 2001-2021, I was a Visiting Professor at the University of Hong Kong, where I taught an annual graduate course in Electronic Payment Systems, one of the few graduate courses in the world on this subject.

8. My course on Law of Computer Technology is required for all students in the Master of Science in Artificial Intelligence and Innovation program, the

Privacy Engineering program and the Ph.D. in Societal Computing program at Carnegie Mellon.

9. I am the author and lecturer in a 24-hour video course on Internet protocols and have taught computer networking, wireless communication and Internet architecture since 1999.

10. I was engaged by Carnegie Mellon to deliver lectures to the Indian Railways on the topic “The Internet of Trains,” which specifically dealt with train sensor systems and remote communication.

11. From 1979-1987, I was the founder and president of two computer software development companies in Pittsburgh, Pennsylvania, Unilogic, Ltd. and Lexeme Corporation.

12. I am an attorney admitted to practice in Pennsylvania and have been admitted to the Bar of the U.S. Patent and Trademark Office since 1981. I have been asked to render opinions in this declaration as a technical expert. I have not been asked to offer any opinions on patent law or procedure in this proceeding.

13. I am a named co-inventor on the following six issued patents relating to electronic commerce: U.S. Patent Nos. 7,330,839, 7,421,278, 7,747,465, 8,195,197, 8,280,773, and 9,456,299.

14. I have previously served as an expert in over 350 cases concerning computer technology. In particular, I have been involved in multiple cases involving remote sensing.

15. The statements made and opinions provided in this Declaration are based on my own personal knowledge and, if called as a witness, I could and would testify in a manner consistent with the material in this Declaration.

II. MATERIALS CONSIDERED

16. I have been asked by counsel for Patent Owner to address Petitioner's assertions that the Challenged Claims would have been obvious. Petitioner does not allege that any Challenged Claim is anticipated.

17. In preparing this Declaration, I have considered all the material filed prior to the date of this Declaration in this proceeding and any other materials cited in this Declaration.

18. I have also relied on my education, skill, training, and experience in the relevant fields of technology. I have further considered the viewpoint of a person of ordinary skill in the art ("POSITA") at the time of the invention of the '915 Patent.

19. I reserve the right to supplement my opinions as expressed in this Declaration to address any new information obtained in the course of this proceeding, or based on any new positions taken by Petitioner.

20. In this Declaration, all emphasis has been added unless otherwise noted.

III. COMPENSATION

21. I am being compensated at my regular rate of \$600/hour. My compensation is in no way dependent on the testimony I give or on the outcome of this proceeding, and my compensation in no way affects the substance of my statements and opinions in this Declaration.

22. I have no financial interest in this case, the Litigation, Petitioner, Patent Owner, or the '915 Patent.

IV. SUMMARY OF MY OPINIONS

23. The following table summarizes the grounds of challenge ("Grounds") raised in the Petition:

Grd.	Sec.	References	Challenged Claims
1	§ 103	Armitage and Barone	1, 22, 24-25, 27-30, 36, 37
2	§ 103	Armitage, Barone, and LeFebvre	21
3	§ 103	Armitage, Barone, and Winfree	23, 26
4	§ 103	LeFebvre and Barone	1, 21-22, 25, 27-30, 36, 37
5	§ 103	Barone and Armitage	24, 37
6	§ 103	Barone and Winfree	23, 26

24. After a review of the '915 Patent and the alleged prior art asserted by Petitioner, it is my opinion that the Challenged Claims are not invalid under any of the Grounds. My opinions, and the bases therefor, are detailed throughout this Declaration.

V. LEGAL PRINCIPLES

25. Counsel for Patent Owner has informed me of the legal principles that apply in this proceeding.

26. A prior art reference can disclose a limitation that is not expressly disclosed in the reference if it is “inherently present” in the reference. I further understand that to be “inherently present,” the missing disclosure must necessarily and inevitably be present in the element or process described in the reference. It is my understanding that a limitation is not disclosed by inherency if the missing limitation is only probably present or if there is merely a possibility that it is present.

27. A claim is invalid as obvious under 35 U.S.C. § 103 if the differences between the subject matter sought to be patented and the prior art are such that the subject matter of the claim as a whole would have been obvious at the time of the patent’s filing date to a person having ordinary skill in the art. I have been informed that the following factors are used to determine whether or not the claimed subject matter would have been obvious: (i) the scope and content of the prior art; (ii) the differences between the prior art and the claimed invention; (iii) the level of ordinary skill in the field of the invention; and (iv) any relevant objective considerations of non-obviousness.

28. A party asserting obviousness based on a combination of prior art references must demonstrate that one of ordinary skill in the art would have been

motivated to combine the teachings of those references to achieve the claimed invention, and that the skilled artisan would have had a reasonable expectation of success in doing so. It is my understanding that it is not enough to show that one skilled in the art could combine elements of multiple references, but instead there must be some reason that would have prompted a person of ordinary skill in the art to combine the elements in the way the claimed invention does. I understand that there must be some reasoned explanation as to why one of ordinary skill in the art would combine the references.

29. A combination of references would not have been obvious if the alleged modification(s) to be made to the reference(s) would have been inconsistent with a reference's stated goals or would have rendered the combination inoperable for its intended purpose. I further understand that for something to have been obvious, the party asserting obviousness must explain why a POSITA would have selected components for combination in the manner claimed.

30. It is my further understanding that obviousness cannot be based on a hindsight combination of components selected from prior art references. I also understand that an invention would not have been obvious simply because all of the elements of the invention may have been known separately in the prior art.

31. I understand that claims must be enabled by the original disclosure of the patent. For the claims to be enabled, the information contained in the disclosure

must be sufficient to inform those skilled in the relevant art how to make and use the claimed invention without undue experimentation. I also understand the original disclosure must contain a written description of the claimed invention. I understand that the written description requirement is separate and distinct from the enablement requirement. To satisfy the written description requirement, the original disclosure must describe (in writing or drawings) the claimed invention in sufficient detail that one skilled in the art can reasonably conclude the inventor had possession of the claimed invention. In other words, the question is whether one of skill in the art can discern or visualize, from the original disclosure, that the named inventor actually invented the subject matter later claimed.

32. I understand that a reference patent, i.e. an alleged prior art patent used in a ground to prove invalidity, is only entitled to claim the benefit of the filing date of its provisional application if the disclosure of the provisional application provides support for at least one claim in the reference patent in compliance with § 112 ¶ 1. In other words, to be entitled to the provisional priority date, therefore, the provisional application's written description must provide written description support for at least one claim of the later patent. Additionally, the subject matter relied upon in the ground must be effectively filed, i.e. be present, in the provisional application. If either of these requirements are not met, the reference is not entitled to its provisional filing date as an effective filing date.

33. I have been informed and I understand that claim construction is a matter of law and the construction of a claim term will be determined by the Board. In this declaration, I have been informed and I understand that the claim terms should be interpreted under “the Phillips standard.” I have been informed and I understand that under the Phillips standard, claim terms are given their ordinary and customary meaning as understood by a person of ordinary skill in the art at the time of the invention in light of the claim language and the patent specification. I have been informed and I understand that the claim terms, as construed, encompass the embodiments disclosed in the specification. I have been informed and I understand that the patentee can serve as their own lexicographer. As such, if the specification provides a definition of a claim term, I understand that I should interpret that claim term in light of the particular definition provided in the specification. I further understand that different claim terms in a patent are presumed to have different meanings. I further understand that extrinsic evidence such as dictionaries are among the tools that can assist the Board in determining the meaning of particular claim terms to those of skill in the art.

VI. LEVEL OF ORDINARY SKILL IN THE ART

34. Petitioner defines a person of ordinary skill in the art (“POSITA”) as “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 railcar, train, vehicle, or

any other similar monitoring systems for similar industrial equipment with rotating components. Less work experience could be compensated by a higher level of education, such as a master's degree, and vice versa.” Pet., 15. Neither Petitioner not its expert, Mr. Ricca, offers any explanation why this would be a correct characterization of a POSITA. Mr. Ricca says that he applied the criteria listed in ¶ 43 of his declaration, but does not explain which factors were applicable or how they led to the characterization.

35. In fact, Mr. Ricca's characterization in his ¶ 44 differs from that of Petitioner. Mr. Ricca says that a POSITA would be “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 railcar, train, vehicle, or any other similar monitoring systems ~~for similar industrial equipment with rotating components~~. Less work experience could be compensated by a higher level of education, such as a master's degree, and vice versa. (strikethrough indicating the portion of Petitioner's characterization added to Mr. Ricca's. It is not clear which characterization was intended.

36. I note that Mr. Ricca has 24 years of experience in the field, which 12 times as much experience as he says a POSITA would have, thus classifying him as one of extraordinary skill. This is significant because that which may appear obvious to one of ordinary skill would not necessarily be obvious to one of ordinary skill.

37. The Patent defines the field of the invention at 1:13-17:

The present invention relates to the field of railcar and train safety management, and is specifically directed to a system and method for continuously collecting and analyzing operational parameters of railcars and train consists to detect anomalous operating conditions.

38. The claims are drawn to sensor devices, wireless communication systems, including wireless mesh networks, and communication management systems,. Petitioner's characterization of a POSITA does not reflect familiarity with wireless communication systems or communication management systems.

39. In my opinion, a POSITA would be a person with at least a B.S. degree in electrical engineering 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. Less work experience could be compensated for by a higher level of relevant education, and vice versa.

VII. CLAIM CONSTRUCTION

40. I have accorded all of the claim terms their plain and ordinary meaning to a POSITA.

VIII. PETITIONER HAS NOT SHOWN A REASONABLE LIKELIHOOD OF PREVAILING ON ANY GROUND

A. Ground 1: Petitioner has failed to show a reasonable likelihood that Claims 1, 22, 24-25, 27-30, 36, and 37 are obvious in view of Armitage and Barone

1. Claims 1, 22, 24-25, and 27-29

41. Claim 1 is independent. Claims 22, 24-25, and 27-29 depend directly from claim 1.

42. The combination of Armitage and Barone fails to disclose, teach, or suggest limitation 1(d)¹: “one or more filters configured to filter at least a portion of the accelerations.”

43. Petitioner argues that Armitage discloses “filtering through sampling of data, which a PHOSITA would understand requires a filter.” Petition, 20 (*citing* Armitage, [0045]). That statement is simply incorrect. Armitage [0045] reads, in pertinent part:

At high sampling rates of the accelerometer, the sampling only occurs for a portion of a wheel rotation, and radial acceleration or vibration (x-axis or y-axis) data could be ignored.

44. A POSITA would recognize that the term “sampling” as used in Armitage [0045] refers to an action that is performed during the original acquisition of vibration data and does not involve filtering. According to the Microsoft Computer Dictionary, Fifth Edition (2002), an authoritative source,

¹ I employ Petitioner’s limitation designations, which differ from those of the Patent.

“sampling” in this context means “conversion of analog signals to a digital format; samples are taken at periodic intervals to measure and record some parameter, such as a signal from a temperature sensor or a microphone.” Accelerations occur constantly. However, an information system must sample such input at discrete times, as it would be impossible to process data every nanosecond, picosecond, etc. “Sampling” refers to choosing which data items to consider. In contrast, “filter[ing] a portion of the accelerations” within the context of claim 1 occurs only after the samples have been collected. For example, the ’915 patent discloses that the signal that “originates with accelerometer hardware ... is passed to one or more sensor sections [that] select the data to be analyzed using a digital data filter ..., and passes this data on to a feature detector” Ex. 1001 at 13:15-20. Armitage does not disclose “one or more filters configured to filter at least a portion of the accelerations.”

45. A function of a “filter” is to remove unwanted content, such as noise. Another function of a “filter” is smoothing, to remove bumps or peaks. For example, the shock absorbers on an automobile are filters that perform a smoothing function.

46. The specification discloses two main types of filters: (1) “mechanical filters” (e.g., of the shock absorber type); and (2) “software filters” and “digital filters.” A “software filter” is a type of “digital filter,” as explained at 5:40-42: “The software filter used is a digital filter to decrease noise from unwanted acceleration

frequencies and increase signals from acceleration frequencies of interest.” That is not a definition of “software filter” but merely explains that a software filter is a digital filter.

47. However, not all digital filters are software filters. A digital filter can be implemented entirely in hardware, e.g., by the use of circuits with discrete logic gates. A distinguishing feature of a digital filter is that it operates on digital, rather than analog, inputs and produces a digital output. The specification also uses the term “digital data filter” at 13:18, making it clear that what a digital filter is filtering is “data.” Mechanical filters are analog filters. That is, they filter analog inputs and produce analog outputs.

48. The specification at 5:38-40 discloses “software filtering performed by software executing on a processor on main PC board 402a.”

49. The term “filter” does not appear in Armitage, nor does any term of similar import, and filtering is not inherent in Armitage. As explained above, sampling is the obtaining of data at discrete intervals. All data output by the sensor during the sampling interval is obtained and none of it is filtered. Filtering implies the processing, removal, or suppression of data that has already been obtained. Thus, a POSITA would not consider “sampling,” in the context of Armitage’s disclosure, as any sort of “filtering.”

50. To take a familiar example, a television camera “samples” a scene at 30 frames per second. It would be infeasible to take video input continuously, as no channel could possibly have enough bandwidth to transmit an infinite amount of video data or, say, even millions of frames per second. Such sampling is not filtering.

51. The Petition mistakenly takes “ignoring” data as some kind of filtering. The Petition at 25 asserts that Armitage discloses “sampling accelerations for only a portion of a wheel rotation, and filters out radial accelerations.” However, what Armitage actually says is that the radial accelerations are “ignored” as a result of the sampling process, which only captures data for a portion of a single wheel rotation. Armitage, [0045] This is not filtering, either, but is analogous to TV camera sampling.

52. Petitioner points to Armitage’s disclosure at [0056] of “amplifiers, analog-to-digital-converters, [and] microcontrollers.” Petitioner asserts that the presence of such devices necessarily “would mean the sensor is capable of filtering at least a portion of accelerations.” Petition at 26. One might program a microcontroller to perform filtering, but microcontrollers do not necessarily perform filtering. Petitioner does explain why a POSITA would arrive at the incorrect conclusion that amplifiers, analog-to-digital-converters, and microcontrollers must perform, or even suggest, filtering. Petitioner does not

identify anything in the disclosure of Armitage which a POSITA would understand to be filtering, other than its erroneous statement that “Armitage discloses filtering through sampling of data” at p. 20 of the Petition. Petitioner does not argue that any of the disclosure in Armitage filters “at least a portion of the accelerations” after the data has been detected by the sensors.

53. For filtering, the Petition at 27 relies on Barone for limitation 1(d). However, Barone is also deficient because it does not disclose filtering accelerations as claimed in limitation 1(d).

54. Barone discloses “sampling” data representing accelerations and adds a circuit, “signal conditioner 178.” Ex. 1007 at [0150], [0175]. Barone teaches that an accelerometer is mounted on a wheel of a railway truck and provides an analog signal *R* to signal conditioner 178 before the measured acceleration data is analyzed by a microprocessor. Ex. 1007, [0173], [0175]. A POSITA would see from Fig. 30 of Barone (preproduced below with colored rectangles) that raw analog signal *R* (red) is conditioned by signal conditioner 178 to yield output *S* (green). All the accelerations present in *R* are present in *S* – none have been filtered out.

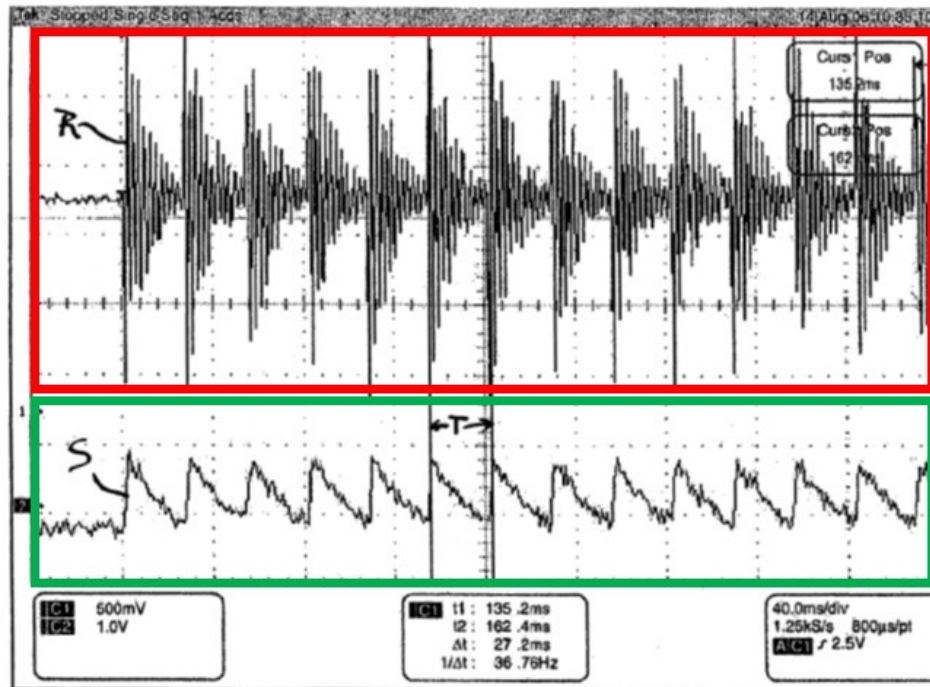


FIG. 30

55. Barone explains that the resonant frequencies of a railway truck are usually between 200 Hz and 900 Hz, and that accelerations due to bearing defects are reflected in these resonant frequencies. Ex. 1007, [0174], [0176]-[0177]. Signal conditioner 178 pre-conditions the analog signal for digital conversion. *Id.*, [0177]. Barone states the pre-conditioning is performed so that “the range of frequencies transmitted” from the signal conditioner 178 includes “the defect frequencies of interest and at least one resonant frequency of the truck, to ensure that any repeating peaks formed by acceleration resonance ... are permitted to pass.” *Id.*, [0179]. Signal conditioner 178 removes unwanted noise components from the analog signal *R* that **do not** contain the measured acceleration data for the wheel axle to produce signal *S* shown in FIG. 30. *Id.*, [0176]-[0177]. Signal *S*

comprises all of the measured acceleration data for the wheel axle. *Id.*, [0176]-[0177], [0179].

56. The output signal *S*, which includes all of the measured accelerations, is then passed to an amplifier that amplifies the voltages of the AC signal. Ex. 1007, [0176]. In turn, the output signal of the amplifier is passed to a half wave rectifier, which passes the positive voltage half of the amplified AC signal (i.e., removes the negative voltage half of the amplified AC signal but does not remove any information from the signal). The rectified waveform signal is therefore a signal that includes all of the measured accelerations of the railcar, i.e., the repeating pulses output from the accelerometer.

57. The rectified waveform signal is then passed to a second pre-conditioner, described in Barone as a low-pass or band-pass filter, to remove signal components with frequencies above a highest expected frequency for a bearing defect (e.g., 290 Hz or 300 Hz) and which includes a resonant frequency of the truck and all detected accelerations. Ex. 1007, [0176], [0179]. That is, the second pre-conditioner merely passes signal components with frequencies between 200 Hz and 300 Hz. Therefore, the output signal of the second pre-conditioner still includes all of the measured accelerations. A POSITA would readily understand this second “pre-conditioning” is performed to minimize bit errors in the digital signals, not to filter out accelerations.

58. Signal *S* is then digitized and analyzed by the microprocessor and a discrete Fourier transform is applied to the digitized signal to identify defect frequencies of interest. Ex. 1007, [0178]. Based on the discrete Fourier transform operation, the microprocessor then determines if the analog signal output from accelerometer includes any periodic peaks repeating *at any of the defect frequencies of interest*. *Id.*, [0178], [0185].

59. Independent claim 1 requires that “at least a portion of accelerations of the railcar,” which were measured by a sensor, are filtered by a filter. However, Barone’s pre-conditioners simply remove unwanted noise components from the analog signal to prepare it for the next stage of processing. and do not remove the measured acceleration data for the wheel axle from the analog signal. Bex. 1007, [0178]-[0179], [0185]. A POSITA would thus recognize that the pre-conditioners of Barone are not the same as or equivalent to the filters required by independent claim 1 because they do not filter measured accelerations data of the railcar, but merely eliminate noise. Therefore, Barone does not teach the above-recited limitation (c) of claim 1.

60. In my opinion, Petitioner has not established that independent claim 1 is obvious over Armitage and Barone. Each of claims 22, 24-25, and 27-29 depend from independent claim 1 and therefore Petitioner has not established that they are obvious.

2. Claim 30

61. Claim 30 is independent. Limitation 30(c) recites: “filtering, by one or more filters, at least a portion of the accelerations,” which is to limitation 1(d).

62. Petitioner relies for limitation 30(c) on its erroneous argument for limitation 1(d). At p. 38, for limitation 30(c), Petitioner merely cross-references Section X.A.2.c, which discusses limitation 1(d).

63. In my opinion, Petitioner has not established that independent claim 30 is obvious over Armitage and Barone.

3. Claims 36 and 37

64. Claim 36 is independent. Claim 37 depends directly from claim 36.

65. Limitation 36(d) is identical to limitation 1(d).

66. Petitioner relies for limitation 36(d) on its erroneous argument for limitation 1(d). At p. 39, for limitation 36(d), Petitioner merely cross-references Section X.A.2.c, which discusses limitation 1(d).

67. In my opinion, Petitioner has not established that independent claim 36 is obvious over Armitage and Barone. Claim 37 depends from independent claim 36, so Petitioner has not established that it is obvious.

**4. A POSITA would not have been motivated to modify
Armitage in view of Barone**

68. Petitioner asserts that a POSITA “would have been motivated to include the filtering taught by Barone,” but without providing any evidence

directed that assertion. *See* Petition at 29. As explained above, Armitage does not disclose any filtering at all and it certainly includes no suggestion or motivation that the “sampling” techniques it teaches would benefit from improvement by incorporating pre-conditioning as taught by Barone. Furthermore, Barone explicitly criticizes other data analysis techniques and a POSITA would not look to Barone to improve on the sampling techniques of Armitage. Ex. 1007, [0151] (“These processes result in improved power efficiency relative to more computation intensive algorithms used in the prior art, where power is not a significant concern.”). Therefore, a POSITA would not be motivated to combine the divergent teachings of Armitage and Barone.

B. Ground 2: Petitioner has failed to show a reasonable likelihood that Claim 21 is obvious under 35 U.S.C. § 103(a) in view of Armitage, Barone, and LeFebvre

69. Claim 21 depends from independent claim 1.

70. As shown above, Petitioner has not established that independent claim 1 is obvious over Armitage and Barone. Petitioner does not rely on LeFebvre for any limitation of claim 1. Therefore, Petitioner has not shown that the Armitage-Barone-LeFebvre combination remedies any deficiencies of the Armitage-Barone combination with respect to claim 1.

71. Consequently, Petitioner has not shown a reasonable likelihood that claim 21 is obvious over Armitage, Barone and LeFebvre.

C. Ground 3: Petitioner has failed to show a reasonable likelihood that Claims 23 and 26 are obvious in view of Armitage, Barone, and Winfree

72. Claims 23 and 26 depend from independent claim 1.

73. As shown above, Petitioner has not established that independent claim 1 is obvious over Armitage and Barone. Petitioner does not rely on Winfree for any limitation of claim 1. Therefore, Petitioner has not shown that the Armitage-Barone-Winfree combination remedies any deficiencies of the Armitage-Barone combination with respect to claim 1.

74. In my opinion, Petitioner has not established that claim 21 is obvious over Armitage, Barone and LeFebvre.

D. Ground 4: Petitioner has failed to show a reasonable likelihood that Claims 1, 21-22, 25, 27-30, 36, and 37 are obvious under in view of LeFebvre and Barone

1. Claims 1, 21-22, 25, 27-29

75. Claim 1 is independent. Claims 21-22, 35 and 27-29 depend from claim 1.

76. Limitation 1(d) recites: “one or more filters configured to filter at least a portion of the accelerations.” As with Armitage, discussed above in connection with Ground 1, LeFebvre discloses a similar “sampling,” which a POSITA would understand to be a different process from “filtering.” LeFebvre does not use the term “filtering,” or any other term of similar import. Instead, LeFebvre discusses sampling at [0034]:

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.

77. This simply teaches taking enough samples per second to ensure that the relevant frequencies will be detected. No filtering occurs.

78. Petitioner argues that LeFebvre's discussion of sending only "essential indicative information" discloses the claimed "filtering." Petition at 54 (citing LeFebvre, [0053]). However, this disclosure refers to post-processing logical decisions whether or not to send data. LeFebvre, [0053] (discussing the "burden of transmitting all the data that might be sampled" and procedures "to reduce the radio traffic to manageable proportions"). A POSITA would not consider the selective transmission of data for data reduction purposes in LeFebvre to be filtering, as opposed to downsampling.

79. Petitioner argues that the "preliminary analysis" of LeFebvre is equivalent to filtering. Petition, 54 (citing Ex. 1005, [0043]-[0046]). This disclosure in LeFebvre, however, merely discusses power management and sampling periodicities. For example, LeFebvre discloses that the instrumented pad is "normally in a passive, low power state" but periodically turns on to conduct

“preliminary analysis,” in a manner similar to sampling. Ex. 1005, [0034]. The purpose of the preliminary analysis is to “activate the [pad’s] microprocessor” and conduct additional readings if a problem is detected by the preliminary analysis. Power management is not filtering as required by limitation 1(d). Further, Petitioner tacitly acknowledges that LeFebvre does not disclose filtering by introducing Barone. Petition, 55 (“LeFebvre does not explicitly require a ‘filter’....”).

80. Barone, like LeFebvre, does not explicitly disclose any filtering of *accelerometer data* that corresponds to limitation 1(d), as explained above.

81. In my opinion, Petitioner has not established that independent claim 1 is obvious over the combination of LeFebvre and Barone. Because claims 21, 22, 25, and 27-29 depend from claim, Petitioner has not established that those claims are obvious.

2. Claim 30

82. Claim 30 is independent. Limitation 30(c) recites: “filtering, by one or more filters, at least a portion of the accelerations,” which is to limitation 1(d).

83. Petitioner relies for limitation 30(c) on its erroneous argument for limitation 1(d). At p. 66, for limitation 30(c), Petitioner merely cross-references Section X.D.2.d, which discusses limitation 1(d).

84. In my opinion, Petitioner has not established that independent claim 30 is obvious over LeFebvre and Barone.

3. Claims 36 and 37

85. Claim 36 is independent. Claim 37 depends directly from claim 36.

86. Limitation 36(d) is identical to limitation 1(d).

87. Petitioner relies for limitation 36(d) on its erroneous argument for limitation 1(d). At p. 67, for limitation 36(d), Petitioner merely cross-references Section X.D.2.d, which discusses limitation 1(d).

88. In my opinion, Petitioner has not established that independent claim 36 is obvious over Armitage and Barone. Claim 37 depends from independent claim 36, so Petitioner has not established that it is obvious.

E. Ground 5: Petitioner has failed to show a reasonable likelihood that Claims 24 and 37 are obvious under 35 U.S.C. § 103(a) over LeFebvre in view of Barone and Armitage

1. Claim 24

89. Claim 24 depends from independent claim 1. Petitioner in Ground 1 was unable to show that claim 1 is obvious over Barone and Armitage. Petitioner in Ground 4 was unable to show that claim 1 is obvious over LeFebvre and Barone. Therefore, Petitioner has not shown that claim 1 is obvious over Armitage, LeFebvre and Barone. In my opinion, Petitioner has not established that dependent claim 24 is obvious over Armitage, LeFebvre and Barone.

2. Claim 37

90. Claim 37 depends from independent claim 36.

91. Petitioner in Ground 1 was unable to show that claim 36 is obvious over Barone and Armitage. Petitioner in Ground 4 was unable to show that claim 36 is obvious over LeFebvre and Barone. Therefore, Petitioner has not shown that claim 36 is obvious over Armitage, LeFebvre and Barone. In my opinion, Petitioner has not established that dependent claim 37 is obvious over Armitage, LeFebvre and Barone.

F. Ground 6: Petitioner has failed to show a reasonable likelihood that Claims 23 and 26 are obvious under 35 U.S.C. § 103(a) over LeFebvre in view of Barone and Winfree

92. Claims 23 and 26 depend from independent claim 1.

93. Petitioner does not rely on Winfree for any limitations of claim 1. In Ground 4, Petitioner was unable to show that claim 1 is obvious over LeFebvre and Barone. In my opinion, Petitioner has not established that dependent claims 23 and 26 are obvious over Barone and Winfree.

IX. CONCLUDING STATEMENT

94. Relying on my education, experience, skill, and training in the relevant field of art, and after reviewing the materials identified above, it is my opinion that Petitioner has not established that any of the Challenged Claims is invalid.

95. In signing this declaration, I recognize that the declaration will be filed as evidence in a contested case before the Patent Trial and Appeal Board of the

United States Patent and Trademark Office. I also recognize that I may be subject to cross-examination in the case and that cross-examination will take place within the United States. If cross-examination is required of me, I will appear for cross-examination remotely within the United States during the time allotted for such cross-examination at a time and place agreed by counsel.

96. I reserve the right to supplement my opinions in the future to respond to any arguments that Petitioner raises and to take into account new information as it becomes available to me.

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

Executed May 15, 2023 at Waco, Texas.


Michael I. Shamos