

Filed: October 25, 2024

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

BMW of North America, LLC and Robert Bosch LLC,
Petitioners,

v.

Foras Technologies Ltd.,
Patent Owner.

IPR2023-01373
U.S. Patent 7,502,958

PETITIONERS' REPLY TO PATENT OWNER'S RESPONSE

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I. Introduction

Patent Owner makes minimal effort in its attempt to overcome Petitioners' overwhelming evidence that the challenged claims are unpatentable. Patent Owner's Response (Paper 18, "POR") relies on opinions of an unqualified expert, reverses Petitioners' combination, contradicts itself and express disclosures in the prior art, and applies rigid and incorrect obviousness analysis.

II. Arguments

A. Statement of Facts

Patent Owner does not deny any fact in the Petitioners' Statement of Facts. *See generally* POR; Pet. 15-16. Petitioners' Statement of Facts are supported by the record, including Dr. Brogioli's declaration, the prior art, and the '958 patent's admitted prior art. *See, e.g.*, Ex. 1002, ¶¶42-58; Ex. 1001, 2:5-59; Safford, 1:32-55, 3:5-51, FIGS. 1B, 2; Bigbee, [0033]-[0034]; Nguyen, [0004], [0006]-[0008], [0022]-[0023], [0040], [0045]-[0046]; Kondo, [0004], [0039], [0086], [0089], [0100]-[0103], [0106], [0190]-[0191]; Safford-181, 1:67-2:3, 6:53-56, 15:60-64; Marshall, 1:11-16, 2:3-34; Tu, [0031]; Bossen, 1:35-40; Schultz, [0017]-[0018], [0030], FIGS. 1-3; Marisetty, 2:38-53, 5:21-28, 5:48-8:64, FIGS. 1-2; Klein, 1:19-66; Fox, Abstract, [0005]-[0014]; Arai, 1:39-45, 2:23-41.

All facts listed in Petitioners' Statement of Facts should be considered admitted. 37 C.F.R. § 42.23(a) ("Any material fact not specifically denied may be

considered admitted.”); *see also AVX Corp. v. Presidio Components, Inc.*, IPR2018-00292, Paper No. 16, 8-9 (P.T.A.B. May 15, 2019) (finding all of the facts listed in the Statement of Material Facts are “considered admitted” because Patent Owner did not deny any of the facts listed in Petitioner’s Statement of Material Facts).

B. The Board Should Give Mr. Jones’s Declaration No Weight.

“To offer expert testimony from the perspective of a skilled artisan in a patent case—like for claim construction, validity, or infringement—a witness *must* at least have ordinary skill in the art.” *Kyocera Senco Indus. Tools Inc. v. Int’l Trade Comm’n*, 22 F.4th 1369, 1376-77 (Fed. Cir. 2022) (emphasis added). “Without that skill, the witness’[s] opinions are neither relevant nor reliable.” *Id.* at 1377; *see also Osseo Imaging, LLC v. Planmeca USA Inc.*, No. 2023-1627, 2024 WL 4031140, at *3 (Fed. Cir. Sept. 4, 2024). The Board should give the declaration of Patent Owner’s witness Mr. Jones no weight because he does not possess the minimum qualification of the ordinary skill in the art.

The Institution Decision (“ID”) adopts Petitioners’ definition that a POSITA “would have at least a bachelor’s degree in Computer Science, Computer Engineering, or equivalent, and at least two years of prior work experience with computer architecture design, including fault tolerant computer architecture design,

as of the earliest priority date of the '958 Patent—October 25, 2004.” Petition (“Pet.”), 1. The Petition further identifies that “[a]dditional education could substitute for professional experience and vice versa.” *Id.*; Ex. 1002, ¶29; ID, 8-9 (adopting Petitioners’ definition).

Patent Owner does not oppose the Board’s adopted definition but proposes that a POSITA “would have the equivalent of a bachelor’s degree in Computer Science, Computer Engineering (or a related field) and approximately two years of work experience with computer architecture design. Additional education in the field could be substituted for industry experience, and vice versa.” POR 3; *see also* Ex. 2007, ¶25.

Mr. Jones is not a POSITA under either definition. Mr. Jones has a bachelor’s degree in Electrical and Mechanical Engineering, not Computer Science or Computer Engineering. Ex. 2008, 2. Mr. Jones does not have any further education after his bachelor’s degree. *Id.* Mr. Jones does not explain in his declaration why his degree of Electrical and Mechanical Engineering is equivalent to a degree in Computer Science or Computer Engineering, or what coursework he took that renders his degree equivalent to a bachelor’s degree in Computer Science or Computer Engineering. Ex. 2007, ¶¶6-11, 25.

Mr. Jones does not have the “two years of prior work experience with computer architecture design” included in both parties’ definitions. *See generally* Ex. 2008. His CV does not list any experience with computer architecture design, let alone fault-tolerant computer architecture design. *Id.* Indeed, Mr. Jones’s experience focuses on electronic systems and technologies, not computer systems and architectures. Ex. 2007, ¶9 (“I have forty years of experience designing complex electronic systems in a number of fields.”); *see, e.g.*, Ex. 2008, 1 (“Representative Design Work”).

The analysis of the ’958 patent, prior art, and obviousness combination requires a POSITA’s knowledge and experience with computer systems and architectures, including fault-tolerant computer systems and architectures. While Mr. Jones has “extensive experience” in telecommunications, reverse engineering, and secure systems, as well as design and implementation of firmware, he has not identified any experience in computer architecture design. *See generally* Ex. 2008; Ex. 2007, ¶¶6-11. None of his patents and publications relate to computer architecture design. *See generally* Ex. 2008. Mr. Jones’s educational experience does not meet the minimum requirement and cannot substitute for the required professional experience.

Because Mr. Jones does not meet the minimum requirement for a POSITA, the Board should give Mr. Jones’s testimony no weight. *Kyocera*, 1377-78 (holding that the administrative law judge abused their discretion by admitting the testimony of an expert that lacked experience required by the adopted definition of a POSITA); *Nespresso USA, Inc. v. K-fee Sys. GmbH*, IPR2023-00502, Paper 26, 8-14 (P.T.A.B. Sept. 10, 2024) (determining that Patent Owner’s expert is not qualified to offer expert testimony from the perspective of a person having ordinary skill in the art because the expert lacks the defined five years of professional experience).

Unlike Mr. Jones, Dr. Brogioli, Petitioner’s expert, meets either party’s definition. Dr. Brogioli has a Ph.D. and is currently an adjunct professor in Electrical and Computer Engineering, developed various computer architecture designs, developed tools for computer architecture design and modeling, and taught graduate level courses in the areas of computer architecture, hardware, and software systems, including topics related to fault-tolerant computer architecture design. Ex. 1002, ¶¶4-17; Ex. 1003, 1-3, 9-10. Thus, Dr. Brogioli’s testimony should be given more weight than that of Mr. Jones. *Nespresso*, IPR2023-00502, Paper 26, 14-16 (assigning testimony of Petitioner’s expert “more weight” when Patent Owner’s unqualified expert’s testimony conflicts with those of Petitioner’s expert who satisfy the defined experience).

C. Patent Owner Misconstrues Petitioners' Obviousness Combination.

Patent Owner's main arguments on motivation to combine the references are based on a misconstrued combination. POR 9-14, 18. Indeed, Patent Owner reverses Petitioners' combination such that it not only contradicts its acknowledged disclosures in the references but also fails to address Petitioners' combination.

1. Patent Owner addresses a reversed and unasserted Nguyen-Bigbee combination instead of Petitioners' proposed Bigbee-Nguyen combination.

First, Patent Owner reverses Petitioners' prior art combination, addressing an unasserted Nguyen-Bigbee combination instead of Petitioners' presented Bigbee-Nguyen combination. Patent Owner refers to Petitioners' combination as the "**Nguyen-Bigbee** combined system." *See, e.g.*, POR 9 ("Petitioner's proposed **Nguyen-Bigbee** 'combined system'..."); 14 ("the **Nguyen-Bigbee** 'combined system' that Petitioner says ..."), 14 ("a POSITA would readily recognize that the **Nguyen-Bigbee** 'combined system' ..."), 14 ("**Nguyen's** alleged 'determination' technique would not, **as combined with Bigbee...**"), 16 ("The **Nguyen-Bigbee** 'combined system'..."), 17 ("combine **Nguyen and Bigbee** into the 'combined system'"), 18 ("Petitioner has not shown that the **Nguyen-Bigbee** 'combined system' ..."). However, the Petition sets forth in detail how Petitioners' ground of **Bigbee in view of Nguyen** renders the challenged claims obvious. *See, e.g.*, Pet. 1 (listing Ground 1 as **Bigbee in view of Nguyen**), 19-35 (explaining the obviousness

rationale for implementing Nguyen’s determining if the lockstep is recoverable or non-recoverable in Bigbee).

2. Patent Owner misconstrues the express disclosure of Nguyen that handles recoverable and non-recoverable errors differently.

Focusing on its “Nguyen-Bigbee” combined system, Patent Owner cherry-picks snippets from the Petition and elements of the prior art to argue that “Nguyen will never determine that lockstep is non-recoverable” in such a system. POR 11-14.

Patent Owner’s flawed, reversed rationale theorizes that Bigbee discloses detecting an “error within a first processor;” “Nguyen will not determine that lockstep is non-recoverable” “whenever an individual error is detected prior to detection of a mismatch error”; thus, Patent Owner wrongly states that in the **Nguyen-Bigbee** combined system, all errors will be recoverable and handled by the recovery process. POR 11-14. Patent Owner then incorrectly concludes: “the **Nguyen-Bigbee** ‘combined system’ ... is a system without any mechanism for handling recoverable errors differently from non-recoverable errors.” *Id.*, 14.

Patent Owner’s arguments contradict the express disclosure in Nguyen that determines error recoverability and handles recoverable errors and non-recoverable errors differently (*see, e.g.*, Pet. 23-26, 40-41; Nguyen, [0007]-[0008], [0022]-[0025], [0037], [0039]-[0041], [0046], [0056]-[0058]; Ex. 1002, ¶¶66-69,

105-106), and Patent Owner acknowledges Nguyen's disclosure of the same. *See* POR 7-8. Patent Owner recognizes that Bigbee's error is akin to the recoverable error in Nguyen, but that does not negate that Nguyen's system also determines other errors, such as certain mismatch errors, as non-recoverable errors. *See* Pet. 23-26, 40-41; POR 7-8.

3. Patent Owner ignores Petitioners' combination of modifying Bigbee's FRC logic to implement Nguyen's determination of whether lockstep is recoverable.

More importantly, Patent Owner fails to address Petitioners' combination where Bigbee's FRC logic would be modified to implement Nguyen's determining if lockstep is recoverable. Pet. 30-35, 40-41; Ex. 1002, ¶¶80-98.

Patent Owner does not dispute Petitioners' proposed construction that detecting loss of lockstep includes two types of detection: (1) detecting an error in an individual processor; and (2) detecting a mismatch error. Pet. 17 (Claim Construction); POR 1-2. Patent Owner does not dispute that Bigbee's FRC logic detects both errors within the processor cores and mismatch errors. Pet. 21, 39, 62-63; Bigbee, [0019], [0033]; Ex. 1002, ¶104. As explained in the Petition, while Bigbee discloses detecting these errors, it only discloses a recovery routine for handling errors within the processor cores but provides no mechanism for handling mismatch errors under any conditions. Pet. 30-33, 38-39. The Petition, supported by

Dr. Brogioli's extensive testimony and the prior art, explains why a POSITA would have implemented Nguyen's determination of lockstep recoverability in Bigbee—to reduce the impact of errors and increase system fault tolerance and availability. Pet. 9-11, 30-35; Ex. 1002, ¶¶80-98. The Petition also explains how the Bigbee-Nguyen combination detects and determines recoverability of both types of loss of lockstep, including an error in an individual processor that would lead to a lockstep mismatch and a mismatch error, as recited in the claims, including claims 4-8. *See, e.g.*, Ex. 1001, 15:30-37; Pet. 17-18, 61-67; Ex. 1002, ¶¶147-162.

Patent Owner does not dispute that, at the time of the invention, determining whether lockstep is recoverable was known, and handling recoverable or non-recoverable errors differently was known and advantageous. Safford, 3:21-51; Nguyen, [0022]-[0023], [0040], [0046]; Pet. 5-11; *see* Section II.A (Patent Owner does not deny any of Petitioners' Statement of Facts). And Patent Owner does not identify any technical problem with Petitioners' Bigbee-Nguyen combination, such as unexpected success in implementing Nguyen's determining if lockstep is recoverable in Bigbee. *See generally* POR.

Patent Owner's focus solely on Nguyen's handling recoverable errors, despite Nguyen's disclosure of handling both recoverable and non-recoverable errors, is impermissible, and Patent Owner's rigid approach of incorporating Nguyen and

Bigbee together violates *KSR* principles. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007) (obviousness accounts for “inferences and creative steps”), 421 (A POSITA is “a person of ordinary creativity, not an automaton”); *EWP Corp. v. Reliance Universal Inc.*, 755 F.2d 898, 907 (Fed. Cir. 1985) (“A reference must be considered for everything it teaches ...”); *In re Wesslau*, 353 F.2d 238 (CCPA 1965) (“It is impermissible within the framework of section 103 to pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art.”).

D. Patent Owner Fails to Rebut the Obviousness of Using Firmware to Determine Recoverability of Loss of Lockstep.

Patent Owner does not credibly rebut that using firmware to determine recoverability of loss of lockstep was obvious, relying on incredible testimony of Mr. Jones divorced from the evidence of record.

Mr. Jones provides three flawed reasons for wrongly concluding that “implementing Nguyen’s ‘FRC checker’s compare unit’ in firmware code would be impractical.” POR 15; Ex. 2007, ¶¶32-33. Mr. Jones wrongly and baselessly argues that firmware is “impractical” or “undesirable” for comparing data from two processor cores because: (1) using firmware requires a separate processor running approximately twenty times faster than the processor cores being monitored, adding

hardware complexity and expense; (2) proving, by “formal methods,” that firmware reliably performs bit-by-bit error checking is more difficult than a hardware implementation; and (3) firmware is more vulnerable than hardware to malicious attacks. Ex. 2007, ¶¶32-33.

None of Mr. Jones’s statements is supported by objective evidence, and indeed, they contradict Petitioners’ evidence of record. None obviates Petitioners’ obviousness showing, supported by the reasoned explanation by Petitioners’ expert Dr. Brogioli and the prior art.

First, Mr. Jones’s opinion that firmware is “impractical” or “undesirable” for comparing data from two processor cores contradicts the express disclosures in the prior art that firmware and hardware are suitable alternatives for implementing the FRC logic that detects inconsistencies between the processor cores indicating FRC mismatch error. Bigbee, [0033]-[0034] (teaching implementing FRC logic 308 as executable firmware); *see also* Safford-181, 15:60-64 (teaching implementing lockstep logic in firmware). In fact, neither Patent Owner nor Mr. Jones denies that it was known to use firmware for detecting and handling lockstep errors. Pet. 11, 13; Ex. 1002, ¶¶57-58; Bigbee, [0034]; Safford-181, 15:60-64; Nguyen, [0045]; Marisetty, FIGS. 1-2, 5:48-8:64; Schultz, FIGS. 1-3, [0017]-[0018]; *see* Section II.A (Patent Owner does not deny any of Petitioners’ Statement of Facts).

Second, Mr. Jones’s statements, even if true, do not rebut Dr. Brogioli’s opinion that firmware, hardware, or a combination of firmware and hardware would have been a suitable option. *Intel Corp. v. PACT XPP Schweiz AG*, 61 F.4th 1373, 1381 (Fed. Cir. 2023) (a prior art teaching need not provide the best option if it provides a “suitable option”). Indeed, Mr. Jones suggested that in a firmware implementation, to compare data from the two processor cores, firmware would “perform bit-by-bit error checking.” Ex. 2007, ¶32; POR 15. This shows that Mr. Jones acknowledges firmware as a suitable option to “implement[] Nguyen’s FRC checker’s compare unit.” Ex. 2007, ¶32.

Furthermore, to the extent that Mr. Jones’s opinions conflict with Dr. Brogioli’s, the Board should assign Dr. Brogioli’s testimony more weight because Mr. Jones is not qualified to offer expert testimony from the perspective of a person having ordinary skill. *See above* Section II.B; *Nespresso*, IPR2023-00502, Paper 26, 14-16. Also, Mr. Jones’s opinion focuses on the unasserted Nguyen-Bigbee combined system, ignoring Petitioners’ combination of using Bigbee’s expressly disclosed firmware FRC logic to implement Nguyen’s determination. Ex. 2007, ¶33 (“I do not agree that those qualities would be viewed by a person of skill in the art as desirable **in the context of Nguyen’s error detection hardware.**” “I therefore disagree that a POSITA would have been

motivated to **combine Nguyen with Bigbee** as Dr. Brogioli suggests.”); Bigbee, [0034]. For this additional reason, the Board should assign Mr. Jones’s testimony little weight because of his misconstruction of Petitioners’ combination.

Finally, Mr. Jones testifies that he “agree[s] with Dr. Brogioli that firmware is more flexible and more easily modified.” Ex. 2007, ¶33; Ex. 1002, ¶98. Even if firmware had certain disadvantages identified by Mr. Jones, a disadvantaged prior art solution does not necessarily obviate obviousness. *Allied Erecting v. Genesis Attachments*, 825 F.3d 1373, 1381 (Fed. Cir. 2016), quoting *Medichem, S.A. v. Rolabo, S.L.*, 437 F.3d 1157, 1165 (Fed Cir. 2006) (“[A] given course of action often has simultaneous advantages and disadvantages, and this does not necessarily obviate motivation to combine.”). In fact, despite all Mr. Jones’s purported disadvantages of using firmware, such as “introduc[ing] more opportunities for error,” he developed “a highly fault tolerant” system for a rebreather that used “embedded firmware.” Ex. 2007, ¶33; Ex. 2008, 1. If firmware is suitable for such critical, life-supporting systems, firmware would also be suitable for implementing FRC logic in computer systems, as disclosed in the prior art.

E. Patent Owner's Hindsight Argument Lacks Basis Because the Combination Is Expressly Taught, Suggested, and Motivated by the Prior Art and Evidence of Record.

Patent Owner presents a hindsight argument that lacks any basis. POR 17. Patent Owner does not deny any fact in the Petitioners' Statement of Facts, including facts on what was known at the time of the invention. *See generally id.*; Section II.A. Neither does Mr. Jones dispute any discussion on the state of art by Dr. Brogioli. Ex. 1002, ¶¶42-58; *see generally* Ex. 2007. Patent Owner has not identified any technical problem with Petitioners' combination, such as unexpected success, to rebut obviousness. *See generally* POR.

Far from hindsight, the Petition, relying on the prior art and Dr. Brogioli's extensive testimony supported by objective evidence, provides reasons why a POSITA would have been motivated and found it obvious to combine Bigbee and Nguyen. Pet. 9-11, 30-35; Ex. 1002, ¶¶80-98. Petitioners' combination is straightforward application of known techniques applied according to their predictable uses to achieve predictable results, which *KSR* says is obvious as a matter of law. *KSR* at 417 ("if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.").

F. Patent Owner’s Additional Arguments Against Claim 8 Similarly Fail.

Patent Owner argued that claim 8 is not obvious because the “Nguyen-Bigbee” combined system never makes the determination that “loss of lockstep is not recoverable” under the same rationale against Petitioners’ motivation to combine. POR 18. Patent Owner’s arguments for claim 8 fail for at least the reasons in Sections II.A-E of this paper. As explained in the Petition, Bigbee-Nguyen (not Nguyen-Bigbee) render obvious the challenged claims, including claim 8, as supported by the prior art and record evidence.

III. Conclusion

For the foregoing reasons, and as explained in the Petition, the Board should find all challenged claims of the ’958 patent unpatentable.

Dated: October 25, 2024

Respectfully submitted,

/Lionel M. Lavenue/

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CERTIFICATION UNDER 37 C.F.R. § 42.24(d)

Pursuant to 37 C.F.R. § 42.24(a)(1)(i), the undersigned hereby certifies that the foregoing **Petitioners' Reply to Patent Owner's Response** contains 3,008 words, excluding the parts exempted under 37 C.F.R. § 42.24(a), as measured by the word-processing system used to prepare this paper.

/Lionel M. Lavenue/

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CERTIFICATE OF SERVICE

The undersigned hereby certifies that the foregoing **Petitioners' Reply to Patent Owner's Response** was served on October 25, 2024, via email directed to counsel of record for the Patent Owner at the following:

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