

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SHENZHEN JIMUYIDA TECHNOLOGY CO., LTD.,
Petitioner,

v.

ARTEC EUROPE S.à r.l.,
Patent Owner.

Case IPR2023-01148
U.S. Patent No. 7,768,656

**PATENT OWNER'S PRELIMINARY RESPONSE
TO PETITION FOR *INTER PARTES* REVIEW OF
U.S. PATENT NO. 7,768,656**

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Exhibit No.	Description
2001	Declaration of Dave Aikens
2002	Dave Aikens CV

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I. INTRODUCTION

Pursuant to 37 C.F.R. § 42.107(a), Patent Owner hereby submits the following Preliminary Response to the Petition for *Inter Partes* Review of claims 1-4, 6-15, and 17-22 (the “Challenged Claims”) of U.S. Patent No. 7,768,656 (the “’656 patent”).

Institution should be denied due to multiple independent and fatal deficiencies.

First, Petitioner fails to provide a construction for a term—“a device for capturing an image”—a term that plainly invokes 35 U.S.C. § 112 ¶6,¹ and, as such, has failed to meet its obligations under 37 C.F.R. § 42.104(b)(3). This failure affects all Challenged Claims and Grounds and is an independent reason why institution should be denied.

Second, Petitioner fails to identify its challenge “with particularity,” as required by 35 U.S.C. § 312(a)(3), in at least three materials respects. Petitioner asserts that that ***all of its three references***—Tomasi, Vinther, and Vuylsteke—individually disclose each and every element of both independent claims. This conclusory (and incorrect) assertion fails to provide Patent Owner or the Board

¹ Unless otherwise noted, and because the ’656 patent was filed on August 28, 2007, citations are to the pre-AIA statute throughout.

with the required specificity as to **(i)** what is missing from any particular reference, and **(ii)** what the proposed combinations are. Petitioner's failure leaves Patent Owner and the Board guessing which of the 64 (for Ground 1) and 512 (for Ground 2) potential combinations Petitioner relies on.

Additionally, the Petition does not explain or otherwise provide the required specificity as to **(iii)** why a POSITA would have modified Petitioner's primary reference(s) in view of its secondary reference(s). Petitioner asserts that all three references disclose all of the claim elements, and concludes that a POSITA would have found it obvious to swap the purported alternative components disclosed in the references to "improve[]...efficiency." But neither the Petitioner nor its expert's declaration—which simply parrots the Petition—explains why a POSITA would be motivated to swap components or why the alternatives would result in any purported improvements or efficiency gains.

Petitioner's failure to present its challenge with particularity by (i) not identifying what is missing from any of its three references, (ii) failing to identify the purported combinations, and (iii) not articulating how or why a POSITA would have been motivated to modify one reference in view of another reference constitute three independent deficiencies. Each of these deficiencies affect all Grounds and Challenged Claims and constitute three independent bases for denying institution.

Third, the Petition does not explain how or where the references disclose key elements of the '656 patent's challenged claims. For example, Petitioner fails to show that any of the three references disclose several elements of the independent claims—e.g., “a device for capturing an image,” “a spatial or temporal distribution of an amplitude or a wavelength of said structured light,” and/or a first virtual line with a first group of coded elements and a second virtual line with a second group of coded elements—and further fails to show how these elements would be rendered obvious by any of the proposed combinations.

Because these deficiencies impact all claims across all grounds, the Petition must be denied.²

II. OVERVIEW OF THE '656 PATENT & PROSECUTION HISTORY

U.S. Patent No. 7,768,656 is directed to a novel and non-obvious system for three dimensional (3D) measurement of shapes of material objects using non-contact structured light triangulation. For ease of reference, Figures 1 and 13 of the '656 patent are reproduced below:

² Patent Owner reserves the right to address additional deficiencies that are not identified in this Patent Owner Preliminary Response (“POPR”), including deficiencies in Petitioner's interpretation of the cited references. Nothing in this POPR should be construed as an agreement or waiver of any argument.

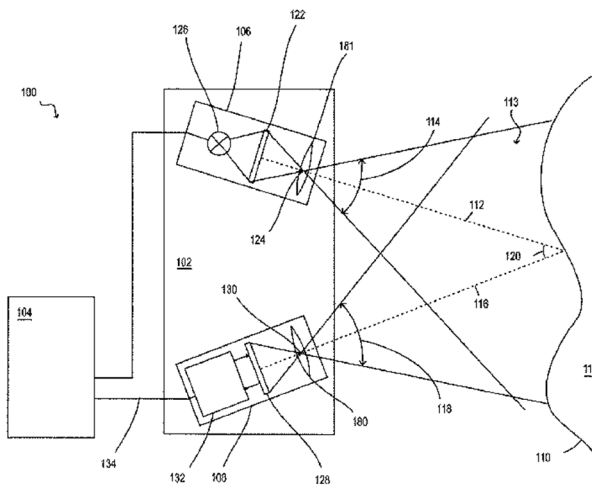


Fig. 1

Ex. 1001 ('656 patent), Fig. 1

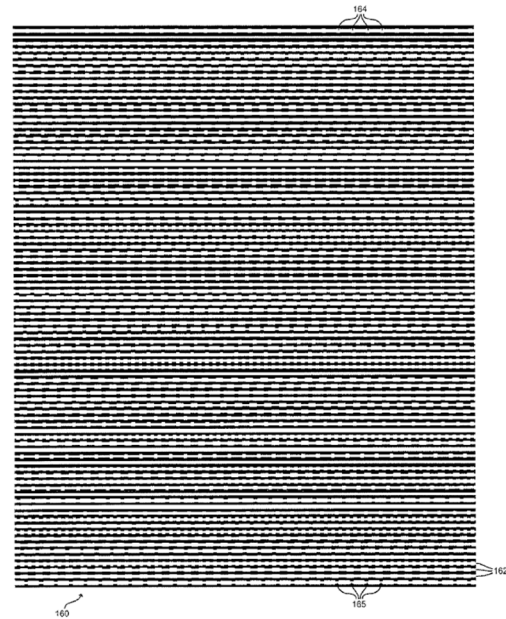


Fig. 13

Ex. 1001, Fig. 13

As shown above, an example system includes a light projector for projecting a structured light pattern onto the surface of an object, a camera (with certain components) for capturing an image of the structured light pattern acting on the surface of the object, and a computing device for determining the 3D measurement of the surface shape of the illuminated object through a triangulation algorithm that calculates a correspondence between the projected structured light and the captured image. Ex. 1001 at 1:40-62. The structured light includes coded elements that lie within planes passing through vertices of the central projection areas of both the projector and the camera, where such planes also that pass through the space of the object being measured. *Id.* This arrangement allows a correspondence between the coded elements in the structured light and the captured image to be easily

identified by restricting the number of directions in which the structured light can be deformed to one known direction, thereby providing a system and method of quickly and accurately obtaining the 3D measurement of the surface shape of objects using a non-contact structured-light triangulation methodology. *Id.*; Ex. 2001 ¶¶ 37-38.

U.S. Patent Application No. 11/846,494 was filed in the United States on August 28, 2007, and titled “System and Method for Three-Dimensional Measurement of The Shape of Material Objects.” During prosecution, U.S. Patent Application No. 11/846,494 was rejected in a Non-Final Office Action dated July 1, 2009. In the Office Action, claims 1-3, 6-13, and 16-20 were rejected under 35 U.S.C. 102(b), and claims 4, 5, 14, and 15 were rejected under 35 U.S.C. 103.

In a Response to the Office Action filed January 4, 2010, the Patentee amended all pending claims (claims 1-20) for different reasons. Particularly, claim 1 was amended to include “a light projector,” “a device for capturing an image,” as well as other changes. In the January 2010 Response, the applicant stated that:

Applicants disclose a system and method where **groups of coded elements of the structured light are located along virtual lines that are defined on the surface of the projector slide by a plurality of virtual planes**. Each of such virtual planes must pass through both the vertex of

the projector lens and the vertex of the camera lens. Furthermore, when the structured light is reflected on the object and the image is captured by the camera, the coded elements are found in the image only along virtual lines that are defined by the same exact virtual planes on the surface of the object and in the camera regardless of the shape of the surface.

Ex. 1002 at 138.³

Examiner interviews were conducted on March 3 and 11, 2010. According to the March 11, 2010 Interview Summary, “Applicant proposed amendments to overcome clarity issues of claims 1 and 11, and further provided additional claims 21-22.” Ex. 1002 at 153. An Examiner’s Amendment was entered with the March 11, 2010 Interview Summary amending claim 1 to, among other things, recite “one parameter and, where said at least one parameter defines a spatial or temporal distribution of an amplitude or a wavelength of said structured light.” *Id.* at 155-158; Ex. 2001 ¶¶ 39-40.

A Notice of Allowance issued March 23, 2010, and the application issued on August 3, 2010 as the ’656 patent.⁴ Ex. 1002 at 149, 180.

³ Emphasis, coloration, and annotations added throughout unless otherwise noted.

⁴ Appendix A to this Preliminary Response lists all Challenged Claims.

III. LEVEL OF ORDINARY SKILL IN THE ART

Petitioner proposed the following level of ordinary skill:

A person of ordinary skill in the art ('POSITA') as of the claimed priority date of the '656 would have had a bachelor's degree in computer systems, computer science, or the equivalent thereof, and at least two years of experience with 3D scanning or related technology. More education can supplement practical experience, and vice-versa.

Pet. at 15.

Petitioner's level of ordinary skill is incomplete. A POSITA could have alternatively held a bachelor's degree in optics, optical engineering, optical science, electrical engineering, physics, or mathematics and broader experience with optical measurement or scanning systems would similarly suffice because these degrees and experience provide similar training and background that could be utilized and employed by a person in the relevant field. Therefore, a POSITA as of the purported priority date of the '656 patent would have had a bachelor's degree in computer systems, computer science, optics, optical engineering, optical science, electrical engineering, physics, or mathematics or the equivalent thereof, and at least two years of experience with optical measurement or scanning systems, 3D scanning, or related technology. Ex. 2001 ¶¶ 2-16.

IV. THE PETITION FAILS BECAUSE IT DOES NOT IDENTIFY HOW THE CHALLENGED CLAIMS ARE TO BE CONSTRUED

A “petition **must** set forth...[h]ow the challenged claim is to be construed” and “[h]ow the construed claim is unpatentable.” 37 C.F.R. § 42.104(b)(3)-(4).

For means-plus-function limitations, § 42.104(b)(3) states that “[w]here the claim to be construed contains a means-plus-function or step-plus-function limitation as permitted under 35 U.S.C. 112[¶6], **the construction of the claim must identify** the specific portions of the specification that describe the structure, material, or acts corresponding to each claimed function.” In interpreting such a term, one must first identify the function of the limitation; and then look to the specification to identify the corresponding structure for that function. *Med. Instrumentation & Diagnostics Corp. v. Elekta AB*, 344 F.3d 1205, 1210 (Fed. Cir. 2003) (citing *Micro Chem., Inc. v. Great Plains Chem. Co.*, 194 F.3d 1250, 1258 (Fed. Cir. 1997)).

The PTAB has consistently held that a failure to address limitations that may be construed as means-plus-function limitations constitutes an independent basis to deny institution. *See, e.g., ZTE Corp. v. Maxwell, Ltd.*, IPR2018-00235, Paper 9 at 11 (PTAB June 1, 2018) (“Petitioner has not satisfied the claim construction requirement set forth in 37 C.F.R. § 42.104(b)(3) with respect to certain limitations

in independent claims 1, 6, and 10. ***Based on this deficiency in the Petition, which affects all of the challenged claims, we deny institution of inter partes review.***)

Petitioner here failed to provide a construction under § 112 ¶6 for a term that is plainly a means-plus-function term and failed to satisfy 37 C.F.R. § 42.104(b)(3). As such, institution should be denied.

A. “a device for capturing an image” Invokes § 112 ¶6

Claim 1.B recites “**a device for** capturing an image of said structured light pattern reflected on said object, wherein said device for capturing an image comprises a device lens characterized by a device lens vertex.”⁵

“Device for” invokes 112 ¶6. This term must be interpreted under § 112 ¶6 as a means-plus-function term because, like the nonce word “means,” the word “device” is a well-known nonce word, and the phrase is defined solely by its

⁵ Claim 1 also recites “a computing device for,” which does not invoke § 112 ¶6 as courts have found that this phrase does not invoke § 112 ¶6. *See, e.g., CA, Inc. v. Netflix, Inc.*, No. 2:21-CV-00080-JRG-RSP, 2021 WL 5323413, at *29 (E.D. Tex. Nov. 16, 2021) (finding “computing device” / “computing devices” to not invoke § 112 ¶6). However, if the Board finds that “a computing device for” does invoke § 112 ¶6, Petitioner has again failed to provide the necessary construction and analysis.

function—here “for capturing an image of said structured light pattern reflected on said object.”

Indeed, the term “device” is one that the Federal Circuit in *Williamson* explicitly identified as being a generic nonce word that does not connote sufficient structure. *See Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1350 (Fed. Cir. 2015) (“**Generic terms such as ‘mechanism,’ ‘element,’ ‘device,’ and other nonce words** that reflect nothing more than verbal constructs may be used in a claim in a manner that is tantamount to using the word ‘means’ because they ‘typically do not connote sufficiently definite structure’ and therefore may invoke § 112, para. 6.”); *see also* MPEP § 2181(I)(A) (“The following is a list of **non-structural generic placeholders that may invoke** 35 U.S.C. 112(f) or **pre-AIA 35 U.S.C. 112, paragraph 6**: ‘mechanism for,’ ‘module for,’ ‘device for,’ ‘unit for,’ ‘component for,’ ‘element for,’ ‘member for,’ ‘apparatus for,’ ‘machine for,’ or ‘system for.’”).

Courts routinely find that § 112 ¶6 applies where, as here, limitations use the nonce word “device” and do not connote sufficient structure for the claimed function. *See, e.g., Robert Bosch, LLC v. Snap-On Inc.*, 769 F.3d 1094, 1098 (Fed. Cir. 2014) (finding that the terms “program recognition device” and “program loading device” were properly construed as means-plus-function limitations); *Walgreen Co. v. Advanced Marketing Sys., LLC*, CBM2016-00015, Paper 6 at 14

(PTAB June 1, 2016) (construing “device for receiving the select code” as means-plus function limitation); *Advanced Marketing Systems, LLC v. CVS Pharmacy, Inc.*, No. 6:15-CV-134-JRG-KNM, 2016 WL 1741396, *18 (E.D. Tex. May 3, 2016) (finding that two terms reciting “device for” were means-plus-function phrases, because as “in Williamson, ‘[h]ere, the word [‘device’] does not provide any indication of structure because it sets forth the same black box recitation of structure for providing [a] specified function as if the term ‘means’ had been used”) (alterations in original); *Koninklijke Philips N.V. v. AsusTek Computer Inc.*, No. CV 15-1125-GMS, 2017 WL 2957927, at *5 (D. Del. July 11, 2017) (“The term ‘device for reading out a signal’ is construed pursuant to 35 U.S.C. § 112, ¶ 6.”); *Unified Patents Inc. v. Silver State Intell. Techs., Inc.*, IPR2017-01198, Paper 6 at 17-18 (PTAB Sept. 28, 2017) (construing “a device for sensing a location for the vehicle” as a means-plus-function limitation).

Turning to the structure identified in the specification for this term, the specification describes:

[A] **camera 108** [that] **includes a lens 180 having a vertex 130, a matrix radiation receiver 128 and a camera driver 132.** The lens 180 forms the image on the surface of the matrix radiation receiver 128. The camera driver 132 functions as an electronic signal management and processing unit which controls operation of the matrix

radiation receiver 128 and can convert the image captured by the receiver 128 to another format (e.g., VGA, bmp, jpeg, etc., as desired or required before the captured image is transferred to the camera output 134.

Ex. 1001 at 3:30-42. The specification does not otherwise describe the structure of the “camera 108” or another “device for capturing an image.” Ex. 2001 ¶¶ 41-44.

Therefore, the structure that is disclosed for the claimed “device” is a camera including a lens having a vertex, a matrix radiation receiver, and a camera driver.

Ex. 2001 ¶ 43-44.

The claim's later recitation of “wherein said device for capturing an image comprises a device lens characterized by a device lens vertex” does not connote sufficient structure. Ex. 2001 ¶ 42. At the outset, a “lens...[with a] lens vertex” on its own is not capable of “capturing an image.” Ex. 2001 ¶¶ 42-44. An image may pass through a lens, but a lens by itself cannot capture the image. *Id.* Indeed, the specification's disclosure of the structure associated with the “device for capturing an image,” reproduced above, explains that the “lens 180 forms the image on the surface of the matrix radiation receiver 128” and that the “camera driver 132” operates with the matrix radiation receiver to capture the image. *Id.* Therefore, the recited lens may operate to form an image, but the recitation of a “lens...[with a] lens vertex” is insufficient structure to perform the recited function. *Id.*

When a claim limitation does not recite sufficient structure—as is the case here—the claim **must** be construed as a means-plus-function limitation. For example, in *Cross Medical Products, Inc. v. Medtronic Sofamor Danek, Inc.*, 424 F.3d 1293, 1307-08 (Fed. Cir. 2005), the Federal Circuit found that the term “securing means” was a means-plus-function limitation even though the limitation also recited “securing means including second threads which cooperate with the first threads of the seat means to cause said rod to bear against said channel through the application of substantially equal compressive forces by said securing means in the direction of the vertical axis and applied on either side along said longitudinal axis of said channel.” The Federal Circuit construed the term according to § 112 ¶6 and because “there is insufficient structure recited for performing the specified function” since the threads alone did not perform the claimed “securing,” and the specification disclosed that the claimed “securing means” also required the use of an external nut. *Id.* at 1308. Courts have repeatedly found the same when presented with claim terms that recite insufficient structure to perform the claimed function. *See, e.g., Stryker Corp. v. Davol Inc.*, 234 F.3d 1252, 1258–59 (Fed. Cir. 2000) (finding claim term “an elongate, hollow, generally tubular spike having means for...” as a means-plus-function limitation because, although some structure of the spike was recited, the claim failed to recite the structure that performed the recited function); *Levitation Arts, Inc. v.*

Fascinations Toys & Gifts, Inc., No. A-07-CA-990-SS, 2009 WL 1270394, *3 (W.D. Tex. Apr. 2, 2009) (finding claims reciting “static magnetic means” as a means-plus-function limitation even though the claim recited that the “said static magnetic means include[ed] fixed magnets arranged at a particular spacing relative to one another in order to general said magnetic configuration with said magnetic means in levitated element” because the recitation of some, but insufficient, structure still invoked § 112 ¶(6)).

Therefore, the “device for” term here must be interpreted under § 112 ¶(6) as having the following function and structure:

Function: capturing an image of said structured light pattern reflected on said object;

Structure: camera including a lens having a vertex, a matrix radiation receiver, and a camera driver, and equivalents thereto.⁶

⁶ Claim 12 is a method claim and also requires “a device for capturing an image, wherein said device for capturing an image comprises a device lens characterized by a device lens vertex.” Because claim 12 recites the same limitation in the same means-plus-function claiming structure, this phrase in claim 12 (the only other independent claim) must also be construed according to § 112 ¶(6). *See Rain Computing, Inc. v. Samsung Elecs. Am., Inc.*, 989 F.3d 1002,

B. Petitioner's Failure to Identify "a device for capturing an image" as a Means-Plus-Function Term Constitutes an Independent Basis to Deny Institution

37 C.F.R. §42.104(b)(3) requires Petitioner to construe means-plus-function elements and identify the corresponding structure. *See* 37 C.F.R. §42.104(b)(3) ("Where the claim to be construed contains a means-plus-function or step-plus-function limitation as permitted under 35 U.S.C. 112 ¶6, the construction of the claim must identify the specific portions of the specification that describe the structure, material, or acts corresponding to each claimed function."). The Trial

1006-07 (Fed. Cir. 2021), cert. denied, 142 S. Ct. 579, 211 L. Ed. 2d 181 (2021) (finding the recitation of "a user identification module" in a method claim invoked § 112 ¶6, explaining that "[a]pplicants are free to invoke § 112 ¶ 6 for a claim term nested in a method claim. We have never held otherwise") (citing *Media Rights Techs., Inc. v. Capital One Financial Corp.*, 800 F.3d 1366, 1374 (Fed. Cir. 2015) (holding that "compliance mechanism" nested in a method claim was a means-plus function term); *On Demand Machine Corp. v. Ingram Indus., Inc.*, 442 F.3d 1331, 1340 (Fed. Cir. 2006) (holding that "providing means for a customer to visually review" nested in a method claim was a means-plus-function term)).

Practice Guide⁷ similarly explains that “[a] petitioner who chooses not to address construction under § 112[¶6] **risks failing to satisfy the requirement of 37 C.F.R. § 42.104(b)(3).**”

Here, Petitioner did not identify “a device for capturing an image” as a term invoking 37 C.F.R. §42.104(b)(3) and did not identify any corresponding structure. The PTAB has consistently found that a failure to comply with the rules and regulations related to claim construction constitutes an independent basis for denying institution. *See, e.g., Panel Claw Inc. v. Sunpower Corp.*, IPR2014-00388, Paper 14 at 7 (PTAB Aug. 7, 2014) (denying Petitioner’s request for rehearing because “**Petitioner failed to even address the possibility that 35 U.S.C. § 112, ¶6 applies**, let alone identify, for purposes of applying the statute, what particular structure corresponds to the recited function of each means-plus-

⁷ Patent Trial and Appeal Board Consolidated Trial Practice Guide (Nov. 2019), available at <https://www.uspto.gov/sites/default/files/documents/tpgnov.pdf> (“Trial Practice Guide”) at 45; *see id.* (“Where claim language **may be construed according to 35 U.S.C. § 112[¶6]**, a petitioner **must provide** a construction that includes both the claimed function and the specific portions of the specification that describe the structure, material, or acts corresponding to each claimed function.”) (citing 37 C.F.R. § 42.104(b)(3)).

function limitation”); *Facebook, Inc. v. Sound View Innovations, LLC*, IPR2017-01006, Paper 14 at 7 (PTAB Aug. 29, 2017) (denying institution where Petitioner failed to identify the structure corresponding to a means-plus-function claim limitation as required by 37 C.F.R. § 42.104(b)); *ZTE Corp.*, IPR2018-00235, Paper 9 at 11 (PTAB June 1, 2018) (“Petitioner has not satisfied the claim construction requirement set forth in 37 C.F.R. § 42.104(b)(3) with respect to certain limitations in independent claims 1, 6, and 10. ***Based on this deficiency in the Petition, which affects all of the challenged claims, we deny institution of inter partes review.***”).

Because this deficiency affects both of the independent claims and all grounds, the Board should deny institution as to all Challenged Claims.⁸

V. THE PETITION DOES NOT IDENTIFY WITH PARTICULARITY THE PROPOSED COMBINATIONS

A petition for *inter partes* review (“IPR”) must “identif[y], in writing and **with particularity**, each claim challenged, the grounds on which the challenge to

⁸ As shown and discussed further below in Sections VI.A and VII.A, Petitioner has failed to show that the cited references include the structure or equivalents that achieve the recited function, and institution should be denied for this additional and independent reason.

each claim is based, and the evidence that supports the grounds for the challenge to each claim.” 35 U.S.C. § 312(a)(3). As the Federal Circuit explains, “[i]t is of the utmost importance that petitioners in the IPR proceedings adhere to the requirement that the initial petition identify ‘with particularity’ the ‘evidence that supports the grounds for the challenge to each claim.’” *Intelligent BioSys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1369 (Fed. Cir. 2016) (quoting 35 U.S.C. § 312(a)(3)).

Here, Petitioner has not identified with any level of particularity what the proposed combinations are or why the identified references would have been combined. These failures constitute independent bases to deny institution.

A. Petitioner Fails to Identify the Challenge with Particularity

The question of obviousness is resolved on the basis of underlying factual determinations including: (1) the scope and content of the prior art, (2) any differences between the claimed subject matter and the prior art, (3) the level of skill in the art, and (4) where in evidence, so-called secondary considerations. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

i. The Petition Fails to Satisfy the Graham Factors By Not Identifying the Differences Between the Claimed Subject Matter and the Prior Art

Petitioner asserts that **each of its three references**—Tomasi, Vinther, and Vuylsteke—**individually discloses each and every element of the independent**

claims.⁹ *See generally* Pet. at 26-98; Ex. 2001 ¶ 46. Petitioner's assertion that each reference discloses all claim elements fails to provide Patent Owner or the Board with the required specificity as to what claim element(s) are purportedly missing from one reference and disclosed by another reference. Petitioner, therefore, fails to comply with at least the second *Graham* factor because Petitioner has not identified any differences between the '656 patent and Tomasi, Vinther, and/or Vuylsteke. The Board has denied institution in similar cases where a Petitioner "place[s] the burden on [the Board] to sift through the information presented by Petitioners...and identify any differences between the claimed subject matter and the teachings of [the prior art]." *Google Inc. v. EveryMD.com LLC*, IPR2014-00347, Paper 9 at 24-25 (PTAB May 22, 2014) (denying institution and noting that Petitioner "d[id] not address meaningfully the scope and content of the prior art, and any differences between the claimed subject matter and the prior art"); *see also, e.g., Matterport, Inc. v. Appliance Computing III, Inc.*, IPR2021-00939, Paper 15 at 16-17 (PTAB Nov. 23, 2021) (denying institution because "Petitioner does not identify differences between [two prior art references] and

⁹ Petitioner further asserts that Tomasi and Vinther alone disclose all Challenged Claims, and asserts that Vuylsteke discloses all Challenged Claims except for claims 4 and 15.

element 1.2 or how Petitioner proposes to combine or modify the asserted prior art to meet element 1.2"); *Moses Lake Indus., Inc. v. Enthone, Inc.*, IPR2014-00246, Paper 6 at 16-17 (PTAB June 18, 2014) (denying institution and explaining that "[a]t least one of the Graham factors discussed above, namely explaining any differences between the claimed subject matter and the prior art, is not discussed in MLI's Petition"); *Valeo N. Am., Inc. v. Magna Elecs., Inc.*, IPR2014-01206, Paper 13 at 15 (PTAB Dec. 23, 2014) ("Petitioner's obviousness analysis is incomplete in that it: fails to state explicitly the differences between the Hitachi and the claimed subject matter, does not explain persuasively the relevance of the evidence, and presents conclusory assertions regarding how the references are combined. Accordingly, Petitioner has not established a reasonable likelihood of prevailing") (citation omitted); *Microsoft Corp. v. Secure Web Conf. Corp.*, IPR2014-00745, Paper 12 at 12 (PTAB Sept. 29, 2014) ("Petitioner's general contention that if anything is missing from Crowley it may be found in Morris leaves us to speculate how the references are combined, and does not explain sufficiently how the claimed subject matter is unpatentable.").

The Board should deny institution for Petitioner's failure to satisfy the *Graham* factors by failing to identify what claim elements are missing from the prior art.

ii. *The Petition Presents Hundreds of Potential Combinations On Which Petitioner Could Rely*

Petitioner's failure to address the *Graham* factors and identify the actual combination(s) upon which Petitioner is purportedly relying places an unreasonable burden on the Board and Patent Owner, requiring denial of institution. *See Avant Tech., Inc. v. Anza Tech., Inc.*, IPR2018-00828, Paper 7 at 13-14 (PTAB Oct. 16, 2018) ("Petitioner's failure to explain the proposed grounds of unpatentability with particularity is procedurally unfair to Patent Owner. ... Because Petitioner does not adopt any particular theory with any particularity, it is not clear which particular theory or theories Petitioner actually is asserting. This lack of clarity means that if Patent Owner were to defend against fewer than all of these theories, Petitioner could shift its position to one of the unchallenged combinations. ... We, therefore, do not institute an IPR.").

Petitioner's failure results in a myriad of combinations that could be asserted by Petitioner as the purported challenge depending on how Patent Owner responds. As laid out in the Petition, the independent claims include eight limitations (including the preamble). For Ground 1, and for independent claim 1 alone the

Petition presents **64 potential different combinations**¹⁰ of Tomasi and Vinther upon which Petitioner might rely. *See generally* Pet. at 26-48, 66-69. For Ground 2, and again for independent claim 1 alone, there are **512 potential different combinations**¹¹ of Tomasi, Vinther, and Vuylsteke upon which Petitioner could rely. *See generally* Pet. at 77-86, 92-95. When considering the challenged dependent claims, there are 289 potential different combinations for Ground 1,¹² and 4,624 potential different combinations for Ground 2.¹³

¹⁰ Petitioner alleges that two references disclose all eight limitations of Claim 1: $8^2 = 64$ potential combinations.

¹¹ Petitioner alleges that three references disclose all eight limitations of Claim 1: $8^3 = 512$ potential combinations.

¹² Petitioner alleges that two references disclose all eight limitations of Claim 1, as well as the nine challenged dependent claims (seventeen total limitations):

$17^2 = 289$ potential combinations. Because Petitioner incorporates its arguments for independent claim 12 to the dependent claims, Patent Owner has calculated the potential combinations based only on claim 1 and its challenged dependent claims.

¹³ Petitioner alleges that two references disclose all seventeen challenged limitations, and that its third reference (Vuylsteke) discloses all limitations except for one dependent claim: $17^2 \times 16 = 4,624$ potential combinations.

See generally Pet. at 26-76 (Ground 1), 77-98 (Ground 2). Patent Owner cannot be expected to address all of these potential combinations.

As such, the Board should also deny institution because the Petition does not specify which of its hundreds (or potentially thousands) of different combinations it intends to rely on, thereby **failing to identify its challenge with particularity** as required by 35 U.S.C. § 312(a)(3). *See Adaptics Ltd. v. Perfect Co.*, IPR2018-01596, Paper 20 at 19-21 (PTAB Mar. 6, 2019) (denying institution because Petitioner's lack of specificity resulted in "hundreds of possible combinations" that result in "voluminous and excessive grounds" and because "the Petition fails to specify what Petitioner regards as the difference(s) between [the prior art] and the challenged claims").

B. Petitioner's Purported Motivations to Combine are Either Non-Existent or Nonsensical

In addition to not identifying what claim element(s) of a particular reference are missing and what the purported Grounds are, Petitioner provides unsupported and conclusory assertions concerning the purported motivations to combine references.

Ground 1: Petitioner's argument as to why it would have purportedly been obvious to combine Tomasi and Vinther is reproduced below:

POSITA would have had a motivation and a reasonable expectation of success in modifying Tomasi with

Vinther's teachings by using, **for example**, Vinther's specific structured light pattern, which is very similar to the one disclosed in the '656. ... It was well understood to a POSITA at the time of the invention to look to other 3D scanning implementations for guidance in how to implement such a system. ... Modifying Tomasi with Vinther's teachings would have been a straightforward application of those teachings in a manner that advantageously **improves the efficiency** of a 3D scanning system.

Pet. at 24-26.

Petitioner's primary basis as to why a POSITA would have modified a portion of Tomasi's system in view of Vinther is that "[i]t was well understood to a POSITA at the time of the invention to look to other 3D scanning implementations for guidance in how to implement such a system." *Id.* at 26. But Petitioner asserts that Tomasi's system already teaches all the elements, including "structured light patterns" (Pet. at 27-29) and does nothing to explain why Tomasi's patterns are insufficient or why Vinther's light patterns are preferable. Ex. 2001 ¶¶ 47-48. Courts routinely deny obviousness challenges—like the one presented in the Petition—that are based solely on the suggestion that a system could be modified to include different interchangeable or modular parts based entirely on hindsight bias. *See, e.g., Unigene Lab 'ys, Inc. v. Apotex, Inc.*, 655 F.3d 1352, 1360 (Fed.

Cir. 2011) (“Obviousness requires more than a mere showing that the prior art includes separate references covering each separate limitation in a claim under examination.”); *see also ActiveVideo Networks, Inc. v. Verizon Commc'ns, Inc.*, 694 F.3d 1312, 1327-28 (Fed. Cir. 2012):

Although Verizon's expert testified that '[t]hese are all components that are modular, and when I add one, it doesn't change the way the other one works,' he never provided any factual basis for his assertions. The expert failed to explain how specific references could be combined, which combination(s) of elements in specific references would yield a predictable result, or how any specific combination would operate or read on the asserted claims. Rather, **the expert's testimony on obviousness was essentially a conclusory statement that a person of ordinary skill in the art would have known, based on the 'modular' nature of the claimed components, how to combine any of a number of references to achieve the claimed inventions. This is not sufficient and is fraught with hindsight bias.**

Petitioner here nowhere explains **why** a POSITA would look to other 3D implementations. In fact, the only reason given for the combination or modification is that it would have purportedly “advantageously improv[ed] the efficiency of a 3D scanning system” (Pet. at 26), but Petitioner and its expert fail to

provide any explanation of how the efficiency would have been improved over what is taught in Tomasi. Ex. 2001 ¶ 49.

Petitioner's conclusory and unsupported statements fall well short of the level of detail and specificity required, and the Board should deny institution. *See Shopkick, Inc. v. Novitaz, Inc.*, IPR2015-00279, Paper 7 at 29-30 (PTAB May 29, 2015) (denying institution and explaining that “conclusory labels do not substitute for a fact-based analysis...establishing what is being modified and why, based on the differences between the prior art and the claimed invention, it would have been obvious to a person of ordinary skill to make the modification”).

Ground 2: Petitioner's argument as to why it would have purportedly been obvious to combine Tomasi, Vinther, and Vuylsteke, reproduced below, fares no better as it mirrors the purported reasoning discussed above:

In light of the above teachings, a POSITA would have had a motivation and a reasonable expectation of success in modifying Tomasi with Vinther's teachings by using, **for example**, Vuylsteke's grouping of coded light symbols within the structured light pattern. As previously discussed in section IX.A, Tomasi and Vinther teach using structured light patterns having varying coded bits that can be grouped. Vuylsteke also discloses coded elements that can be grouped. Indeed, it was also well understood for a designer of a system at the time of the invention to look to

other 3D scanning implementations for guidance. Modifying Tomasi in view of Vinther with Vuylsteke's teachings would have been a straightforward application of those teachings in a manner that advantageously **improves the efficiency** of a 3D scanning system.

Pet. at 76-77 (citations omitted).

Petitioner therefore asserts that Vuylsteke could be combined with Tomasi and Vinther because Vuylsteke discloses “grouping of coded light symbols within the structured light pattern.” But Petitioner already asserts that *both Tomasi and Vinther disclose the exact same thing*. See *id.* (“As previously discussed in section IX.A, **Tomasi and Vinther teach using structured light patterns having varying coded bits that can be grouped. Vuylsteke also discloses coded elements that can be grouped.**”) (citations omitted); see also *id.* at 39-43, 81-82; Ex. 2001 ¶¶ 50-51. Petitioner again relies on the generic and unsupported assertions that a POSITA would “look to other 3D scanning implementations” and that the combination would purportedly “advantageously improve[] the efficiency of a 3D scanning system.” *Id.* Petitioner, however, provides no explanation as to how Vuylsteke's system is different from, or an improvement over, Tomasi and/or Vinther and further fails to identify any particular application or reason justifying why a POSITA would use Vuylsteke's purported groupings over Tomasi's and/or Vinther's purported groupings. Ex. 2001 ¶¶ 50-52.

For the same reasons discussed above, Petitioner's failure to explain **why** a POSITA would have been motivated to combine the identified references or explain how the references could have purportedly been combined to arrive at the claimed inventions mandates denial under 35 U.S.C. § 312(a)(3). *See, e.g., ActiveVideo Networks, Inc. v. Verizon Communic'ns, Inc.*, 694 F.3d 1312, 1327-28 (Fed. Cir. 2012); *Shopkick*, IPR2015-00279, Paper 7 at 29-30 (PTAB May 29, 2015); *Avant Tech.*, IPR2018-00828, Paper 7 at 11-12 (denying institution for Petitioner's failure to "'identif[y]...with particularity' [] the ground supporting Petitioner's theory of invalidity as § 312(a)(3) requires" and further noting that Petitioner failed to explain how a POSITA would have modified or "***combined [] individual elements identified in the various prior art references to arrive at an embodiment of the claimed invention for any of the challenged claims***"); *Markforged Inc. v. Continuous Composites, Inc.*, IPR2022-01431, Paper 7 at 14 (PTAB Jan. 18, 2023) (denying institution because the Petition "does not constitute a reasoned explanation regarding why the skilled artisan would have combined Lipsker's precoating and non-precoating actuator embodiments to arrive at the claimed subject matter. Moreover, Dr. Rosen's declaration testimony on this point is entitled to little to no weight as it merely parrots the Petition.").

C. Dr. Gupta's Testimony Should Be Given Little, If Any, Weight

The Board should afford the testimony of Petitioner's expert, Dr. Mohit Gupta, little (if any) weight because Dr. Gupta's declaration parrots the Petition, does not identify any additional facts or information supporting the Petition's assertions, and provides only conclusory testimony. The Director recently designated as precedential the Board's *Xerox v. Bytemark* decision finding that conclusory and unsupported testimony should be afforded little or no weight. *See XEROX Corp. v. Bytemark, Inc.*, IPR2022-00624, Paper 9 at 15 (PTAB Aug. 24, 2023) (precedential) (“[T]he cited declaration testimony is conclusory and unsupported, adds little to the conclusory assertion for which it is offered to support, and is entitled to little weight.”) (collecting cases).¹⁴ Dr. Gupta's

¹⁴ *See also* <https://www.uspto.gov/subscription-center/2023/director-vidal-designates-precedential-decision-regarding-declaration> (“In this decision denying institution of *inter partes* review, the Board determined that the testimony of a declarant that merely repeats, verbatim, conclusory assertions from a petition, without citing additional supporting evidence or providing technical reasoning to support the testimony, is entitled to little weight.”).

declaration mostly recites *verbatim*¹⁵ the language in the Petition and falls squarely within this precedential *Xerox* decision.

Therefore, Dr. Gupta's testimony cannot save the Petitioner's non-existent, non-sensical, and conclusory reasons for combining the references, and, for this independent reason, the Board should deny institution. *See, e.g., Markforged*, IPR2022-01431, Paper 7 at 14.

VI. GROUND 1: THE PETITION FAILS TO SHOW THAT TOMASI IN VIEW OF VINHER RENDERS OBVIOUS MULTIPLE ELEMENTS OF THE INDEPENDENT CLAIMS

A. The Petition Fails to Show That Tomasi in View of Vinther Renders Obvious “a device for capturing an image”

As explained above in Section IV, claims 1 and 12's recitations of “**a device for capturing an image** of said structured light pattern reflected on said object” must be interpreted under 35 U.S.C. § 112 ¶6. The corresponding structure associated with the recited function is: **a camera having a lens with a vertex, a matrix radiation receiver, and a camera driver, and equivalents thereof**. Petitioner does not show how Tomasi, Vinther, or a combination thereof renders obvious this structure (or its equivalent).

¹⁵ The only notable differences are ones in exhibit labeling nomenclature and some small typographical changes.

Petitioner asserts that both Tomasi and Vinther disclose “a camera for capturing images,” that Tomasi’s camera “includ[es] a lens having an optical center (lens vertex)” and that Vinther’s camera “compris[es] a lens with a focal point (lens vertex).” Pet. at 31, 33. Petitioner does not, however, explain or otherwise assert that Tomasi and/or Vinther disclose a matrix radiation receiver, a camera driver, or their equivalents. Indeed, the Petition’s citations to Tomasi and Vinther do not reference any matrix radiation receiver or camera driver.

As Patent Owner’s expert, Mr. Aikens, explains, it would not have been inherent that a camera necessarily includes a matrix radiation receiver and camera driver. Ex. 2001 ¶ 53-55. And Petitioner fails to explain how these components are taught by a combination of Tomasi in view of Vinther. As discussed above, Petitioner’s expert declaration parrots the Petition, should be afforded little (if any) weight, and does nothing to expand on why the purported combination renders this limitation obvious.

As such, Petitioner has failed to demonstrate that there is a reasonable likelihood that Tomasi in view of Vinther discloses or otherwise renders obvious “a device for capturing an image.”

B. The Petition Fails to Show That Tomasi in View of Vinther Renders Obvious “a projector lens characterized by a projector lens vertex”

Claims 1 and 12 recite a “light projector comprises a light source, a slide with a slide pattern located on a slide surface, and *a projector lens characterized by a projector lens vertex.*” Petitioner fails to show that Tomasi, Vinther, or Tomasi in view of Vinther discloses or otherwise renders obvious “a projector lens characterized by a projector lens vertex.”

Petitioner Fails to Prove That Tomasi Discloses This Limitation. The Petition reproduces paragraphs 4, 34, 36 and 59 of Tomasi and concludes that Tomasi’s “projector optical center” discloses the claimed “projector lens vertex.” Pet. at 27-29. While Tomasi’s quoted text does reference a “projector optical center 302,” the text does not mention any “**projector lens**” as required by the claims. Indeed, none of the cited paragraphs recite a “**lens**” at all. And Petitioner does not explain why the cited text purportedly explicitly or inherently teaches or otherwise renders obvious the claimed “projector lens.” As Patent Owner’s expert, Mr. Aikens, explains, a projector may have an optical center without necessarily having an optical lens, *i.e.*, a lens is not explicitly or inherently disclosed. Ex. 2001 ¶ 74.

Petitioner Fails to Prove That Vinther Discloses This Limitation. The Petition again reproduces several block quotes from Vinther and asserts that

Vinther's "projector optical center" discloses the claimed "projector lens vertex."

See Pet. at 29-31. *First*, Vinther does not recite an "optical center" and it is unclear what aspect or portion of Vinther the Petition purportedly identifies as satisfying the claimed "projector lens characterized by a projector lens vertex." *Second*, Petitioner's only citation mentioning a projector lens (Pet. at 30 (citing Ex. 1005 (Vinther) at 2:1-2)) is from a different prior art device discussed in the "Background of Invention," not the device disclosed and relied upon in Vinther. Petitioner does not explain how this text purportedly discloses the claimed "projector lens vertex." *Finally*, Petitioner nowhere explains why Vinther's singular reference to a "projector lens" in the Background section discloses or renders obvious the claimed projector lens having "a projector lens vertex." In fact, Mr. Aikens explains that not all projector lenses include a lens vertex, for example in the case of a non-symmetric lens. Ex. 2001 ¶ 74-75.

Petitioner Fails to Prove That Tomasi in view of Vinther Discloses This Limitation. As discussed above, Petitioner does not explain how either Tomasi or Vinther discloses "a projector lens characterized by a projector lens vertex." Petitioner also does not explain why a POSITA would have been motivated to modify Tomasi in view of Vinther in such a way that would render obvious this limitation. As discussed above, Petitioner's expert declaration parrots the Petition,

should be afforded little (if any) weight, and does nothing to expand on why the purported combination renders this limitation obvious. Ex. 2001 ¶ 76.

As such, Petitioner has failed to demonstrate that there is a reasonable likelihood that Tomasi in view of Vinther discloses or otherwise renders obvious “a projector lens characterized by a projector lens vertex.”

C. The Petition Fails to Show That Tomasi in View of Vinther Renders Obvious “a spatial or temporal distribution of an amplitude or a wavelength of said structured light”

Claims 1 and 12 recite “wherein said slide pattern comprises a plurality of coded elements, where each of said coded elements is characterized by at least one parameter and, where said at least one parameter defines **a spatial or temporal distribution of an amplitude or a wavelength of said structured light.**”

Petitioner Fails to Prove That Tomasi Discloses This Limitation. The Petition reproduces Figure 6 and paragraphs 35, 89, and 90 and concludes that each of Tomasi’s “grid point[s] [are] characterized by parameters including color defining a spatial distribution of wavelength, and/or size defining a spatial distribution of amplitude.” Pet. at 36. However, none of Petitioner’s quoted or cited portions of Tomasi recite either “amplitude” or “wavelength.” In fact, **Tomasi never once mentions “amplitude” or “wavelength.”** And Petitioner does not explain how Tomasi’s disclosures or grid points teach “a spatial or

temporal distribution of an amplitude or a wavelength of said structured light.”

Ex. 2001 ¶¶ 59-60.

Petitioner Fails to Prove That Vinther Discloses This Limitation. The Petition reproduces 6:4-5, 7:18-27, and Figures 4 and 5, of Vinther and again summarily concludes that each of Vinther’s “line[s] [are] characterized by parameters including line width or intensity defining a spatial distribution of **amplitude.**” See Pet. at 37. Again, none of Petitioner’s quoted or cited portions of Vinther reference either “amplitude” or “wavelength.” In fact, **Vinther, like Tomasi, never once mentions “amplitude” or “wavelength.”** And Petitioner does not explain how Tomasi’s disclosures or lines disclose the claimed “spatial or temporal distribution of an amplitude or a wavelength of said structured light.”

Ex. 2001 ¶¶ 59-60.

Petitioner Fails to Prove That Tomasi in view of Vinther Discloses This Limitation. As discussed above, Petitioner does not explain how either Tomasi or Vinther discloses “a spatial or temporal distribution of an amplitude or a wavelength of said structured light.” Petitioner also does not explain why a POSITA would have been motivated to modify Tomasi in view of Vinther in such a way that would render obvious this limitation. As discussed above, Petitioner’s expert declaration parrots the Petition, should be afforded little (if any) weight, and

does nothing to expand on why the purported combination renders this limitation obvious. Ex. 2001 ¶¶ 59-60.

As such, Petitioner has failed to demonstrate that there is a reasonable likelihood that Tomasi in view of Vinther disclose or otherwise render obvious “a spatial or temporal distribution of an amplitude or a wavelength of said structured light.”

D. The Petition Fails to Show That Tomasi in View of Vinther Renders Obvious a “virtual line” or “coded elements” along the Virtual Line

Claims 1 and 12 recite: “a **first slide virtual line and a second slide virtual line are defined on said slide surface**” and that “said coded elements of said first group are located along said first virtual line and said coded elements of said second group are located along said second virtual line.”

Petitioner Fails to Prove That Tomasi or Vinther Discloses the Claimed “Virtual Line.” For Tomasi, Petitioner asserts that Tomasi’s purported “epipolar line pairs define virtual lines on the slide surface.” Pet. at 43 (quoting Ex. 1004 ¶ 60 (“[A]ny point on a given **epipolar line** in the projector plane 322 must map onto the corresponding epipolar line in the camera plane 324.”)). However, Petitioner fails to explain why Tomasi’s “epipolar line,” or any other line, teaches the claimed “virtual lines.” Nor does Petitioner explain how these purported epipolar lines are “defined on said slide surface,” as claimed. Ex. 2001 ¶ 64.

Moreover, the Petition lacks the requisite particularity because Petitioner does not identify which of the purported “multiple epipolar planes and epipolar line pairs” constitute the “first slide virtual line” and the “second slide virtual line.” *See* 35 U.S.C. § 312(a)(3).

For Vinther, Petitioner cites Figures 4-7, 7:15-35, and 8:21-25 and summarily concludes that:

Vinther discloses using multiple virtual lines to resolve the correspondence between points of the slide pattern and points in the captured image. **Vinther** discloses defining virtual lines on the slide pattern. These virtual lines relate to planes inherent in the epipolar geometry (called epipolar planes) that exists between the projector and the camera.

Pet. at 44-45.

Despite Petitioner's reliance on Vinther's purported disclosures of “epipolar geometry” and “epipolar” planes, Vinther never once recites “epipolar” or “polar” and Petitioner fails to explain why Vinther allegedly discloses epipolar geometry and planes. Additionally, like with Tomasi, even if Vinther did disclose epipolar geometry and planes as Petitioner suggests, Petitioner does not explain how such disclosures constitute a disclosure of the claimed “virtual lines.” Nor does

Petitioner explain how these purported epipolar lines are “defined on said slide surface,” as claimed. Ex. 2001 ¶¶ 65-66.

Moreover, the Petition lacks the requisite particularity because Petitioner does not identify which of the purported “multiple virtual lines” constitute the “first slide virtual line” and the “second slide virtual line.” See 35 U.S.C. § 312(a)(3).

Petitioner Fails to Prove That Tomasi or Vinther Discloses the Claimed First and Second Coded Element Groups along the respective First and Second Virtual Lines. Claim [1.G] requires that the “first group [of coded elements] are located along said first virtual line” and the “second group [of coded elements] are located along said second virtual line.” Petitioner makes no attempt to explain or show how each of the purported first and second virtual lines in Tomasi or Vinther include the corresponding claimed first and second groups of coded elements along those lines.

For Tomasi, Petitioner concludes that “Tomasi discloses groups of coded elements located along each of the epipolar lines that are inherent in the epipolar geometry.” Pet. at 46. For Vinther, Petitioner concludes that “Vinther discloses multiple virtual lines passing through groups of coded elements.” Ex. 2001 ¶ 69.

But Petitioner's conclusory statements and blank citations to portions of Tomasi or Vinther do not explain how Tomasi or Vinther disclose a first group of

coded elements along a first virtual line and a second group of coded elements along a second virtual line. Petitioner has therefore failed to articulate with particularity how Tomasi or Vinther disclose this limitation. Ex. 2001 ¶ 70.

Petitioner Fails to Prove That Tomasi in view of Vinther Discloses This Limitation. As discussed above, Petitioner does not explain how either Tomasi or Vinther discloses the claimed “virtual line[s]” or that a “first group [of coded elements] are located along said first virtual line” and a “second group [of coded elements] are located along said second virtual line.” Petitioner also does not explain why a POSITA would have been motivated to modify Tomasi in view of Vinther in such a way that would render obvious this limitation. Ex. 2001 ¶¶ 69-70, 72. As discussed above, Petitioner’s expert declaration parrots the Petition, should be afforded little (if any) weight, and does nothing to expand on why the purported combination renders this limitation obvious.

As such, Petitioner has failed to demonstrate that there is a reasonable likelihood that Tomasi in view of Vinther disclose or otherwise render obvious this limitation.

VII. GROUND 2: THE PETITION FAILS TO SHOW THAT TOMASI IN VIEW OF VINTHER AND VUYLSKETE RENDERS OBVIOUS MULTIPLE ELEMENTS OF THE INDEPENDENT CLAIMS

A. The Petition Fails to Show That Tomasi in View of Vinther and Vuylskete Renders Obvious “a device for capturing an image”

As explained above in Section IV, claims 1 and 12's recitations of “**a device for capturing an image** of said structured light pattern reflected on said object” must be interpreted under 35 U.S.C. § 112 ¶6. The corresponding structure associated with the recited function is: **a camera having a lens with a vertex, a matrix radiation receiver, and a camera driver, and equivalents thereof**. As explained above in Section VI.A, Petitioner does not show how Tomasi, Vinther, or a combination thereof renders obvious this structure (or its equivalent). Petitioner also fails to show how Vuylskete in view of Tomasi and Vinther renders obvious the recited structure.

Petitioner cites a single page of Vuylsteke and states that: “Vuylsteke discloses a camera for capturing images. [Vuylsteke] further describes that the focal length is designed to match that of the projector optics.” Pet. at 79. Petitioner does not explain how this text constitutes a disclosure of a matrix radiation receiver, camera driver, or their equivalents. Indeed, the Petition's citations to Vuylsteke do not reference to any matrix radiation receiver or camera driver. Ex. 2001 ¶¶ 56.

Petitioner also fails to explain why it would have been obvious that the proposed combined system of Tomasi in view of Vinther and Vuylsteke would have incorporated the components from Vuylsteke's camera—to the extent Vuylsteke discloses them at all—how such a combination would have been made, and why a POSITA would have had a reasonable expectation of success.

Ex. 2001 ¶¶ 55-57. As discussed above, Petitioner's expert declaration parrots the Petition, should be afforded little (if any) weight, and does nothing to expand on why the purported combination renders this limitation obvious.

As such, both of Petitioner's Grounds fail to disclose or render obvious the structure associated with the claimed "device for capturing an image," providing another independent basis on which to deny institution.

B. The Petition Fails to Show That Tomasi in View of Vinther and Vuylskete Renders Obvious "a spatial or temporal distribution of an amplitude or a wavelength of said structured light"

As explained above in Section VI.C, Petitioner fails to show how Tomasi, Vinther, or Tomasi in view of Vinther renders obvious claim 1 and 12's recitation of "a spatial or temporal distribution of an amplitude or a wavelength of said structured light." As shown below, Petitioner also fails to demonstrate how Vuylsteke, or Tomasi in view of Vinther and Vuylsteke, renders obvious this limitation.

Petitioner asserts that “Vuylsteke discloses that it was known to use a slide pattern with varying wavelength” and quotes Vuylsteke’s discussion of a prior art system referred to as “Tajima”. While Vuylsteke describes Tajima as disclosing “gradually increasing wavelength,” Vuylsteke disparages Tajima and identifies several problems with Tajima’s system that Vuylsteke’s system attempts to solve. Ex. 1006 at 148; Ex. 2001 ¶ 61. For example, Vuylsteke explains that “acceptable range accuracy” using Tajima’s system can be difficult to achieve, and that “it is not obvious [how] to deal with the effects of mutual illumination from nearby reflecting surfaces” caused by Tajima’s system. *Id.* The Petition does not explain how Vuylsteke’s disparagement of Tajima’s system constitutes a disclosure of using varying wavelengths in Vuylsteke system. Moreover, given Vuylsteke’s disparagement of Tajima, the Petition does not explain why a POSITA would have been motivated by Vuylsteke’s disclosure to use Tajima’s “gradually increasing wavelength” technique in combination with Tomasi and Vinther. Ex. 2001 ¶ 61.

Petitioner also asserts that Vuylsteke discloses “varying amplitude” through Vuylsteke’s use of grid points. *See* Pet. at 80-81 (quoting Ex. 1006 at 150, Figs. 2-3). But Petitioner’s identified disclosure states that “every grid point is individually marked with **a bright or a dark spot.**” *Id.* Petitioner does not explain how Vuylsteke’s disclosures of making a certain grid point either bright or

dark (*see* Ex. 1006 at 150, Fig. 3) constitute a variation in amplitude as claimed.

Ex. 2001 ¶ 62.

As such, both of Petitioner's Grounds fail to disclose or render obvious "a spatial or temporal distribution of an amplitude or a wavelength of said structured light," providing another independent basis on which to deny institution.

C. The Petition Fails to Show That Tomasi in View of Vinther and Vuylsteke Renders Obvious a "virtual line" Or "coded elements" along the Virtual Line

As explained above in Section VI.D, Petitioner fails to establish that the proposed combination of Tomasi and Vinther renders obvious the claimed virtual lines or first/second groups of coded elements are located along a first/second virtual line, as claimed. As shown below, Petitioner also fails to demonstrate how Vuylsteke, or Tomasi in view of Vinther and Vuylsteke, renders obvious this limitation.

For the purported virtual lines, Petitioner asserts that "Vuylsteke discloses light sheets (planes) projected through the projector lens vertex, and virtual planes passing through the projector lens vertex and the camera lens vertex. The structured light pattern is designed in a grid-like fashion such that defined rows and columns intersect with the light sheets." Pet. at 82. The Petition again fails to explain how the purported light sheets and virtual planes result in or disclose a first and second "slide virtual line" and why any such virtual line would be

“defined on said slide surface,” both of which are required by the claims. Ex. 2001 ¶ 67.

For the groups of coded elements, the Petition includes a variety of miscellaneous statements including that Vuylsteke discloses “groups of coded elements located along varying virtual lines,” “how triangulation with structured light involves the intersection of lines and planes,” “how codebits exist within the context of columns and planes,” “groups of coded elements, containing at least two coded elements,” and “how coded elements exist in the context of a grid topology.” Pet. at 84-86. But, again, none of these unsupported conclusions show or even allege that a first group of coded elements is located on a first virtual line and that a second group of coded elements is located on a second virtual line. Ex. 2001 ¶ 71. For example, Petitioner’s assertion that “groups of coded elements located along varying virtual lines”—even if accepted as true—merely states that “varying virtual lines” include “groups of coded elements.” *Id.* But this does constitute an assertion that a first virtual line includes a first grouping **and** that a second virtual lines includes a second grouping, as required by the claims. *Id.*

Moreover, Petitioner fails to explain **how** the proposed combined system of Tomasi in view of Vinther and Vuylsteke would have incorporated Vuylsteke’s coded elements and/or virtual line(s) **or why** a POSITA would have been motivated to do so. As discussed above, Petitioner’s expert declaration parrots the

Petition, should be afforded little (if any) weight, and does nothing to expand on why the purported combination renders this limitation obvious. Ex. 2001 ¶ 72.

As such, both of Petitioner's Grounds fail to disclose or render obvious the (i) claimed virtual lines or (ii) that the first and second groups of coded elements are located along the first and second virtual lines, providing additional independent bases on which to deny institution.

VIII. CONCLUSION

For the foregoing reasons, Patent Owner respectfully requests that the Board deny the Petition in full.

Dated: October 24, 2023

Respectfully Submitted,

/ Dion M. Bregman /
Dion M. Bregman, Reg. No. 45,645

APPENDIX A: CHALLENGED CLAIM CHART

1. [1. PREAMBLE]	A system for the 3D measurement of the shape of a material object, comprising:
[1.A]	a light projector for projecting a structured light pattern onto a surface of said object, wherein said light projector comprises a light source, a slide with a slide pattern located on a slide surface, and a projector lens characterized by a projector lens vertex;
[1.B]	a device for capturing an image of said structured light pattern reflected on said object, wherein said device for capturing an image comprises a device lens characterized by a device lens vertex; and
[1.C]	a computing device for determining a measurement relating to the shape of said object using a triangulation algorithm based on a correspondence between points in said slide pattern and said image, and
[1.D]	wherein said slide pattern comprises a plurality of coded elements, where each of said coded elements is characterized by at least one parameter and, where said at least one parameter defines a spatial or temporal distribution of an amplitude or a wavelength of said structured light; and
[1.E]	wherein said coded elements are assigned to one of at least first group or second group, each of which first group and second group comprising at least two of said coded elements, and
[1.F]	wherein at least a first slide virtual line and a second slide virtual line are defined on said slide surface, where said first slide virtual line is defined by an intersection between said slide surface and a first plane passing through said projector lens vertex and through said device lens vertex, and said second slide virtual line is defined by an intersection between said slide surface and a second plane passing through said projector lens vertex and through said device lens vertex,

[1.G]	wherein said coded elements of said first group are located along said first virtual line and said coded elements of said second group are located along said second virtual line.
2	The system of claim 1, wherein each of said coded elements having at least three points that do not lie on a straight line.
3	The system of claim 1, wherein at least first object virtual line and second object virtual line are defined on the surface of said object, where said first object virtual line is defined by an intersection between said surface of said object and said first plane and where said second object virtual line is defined by an intersection between said surface of said object and said second plane.
4	The system of claim 1, wherein the light projector is further characterized by a central optical axis, further wherein the light projector and the device for capturing an image are arranged such that a line extending between the projector vertex and the device vertex is perpendicular to the central optical axis of the light projector.
6	The system of claim 1, wherein the light projector is characterized by a projector central optical axis and wherein the device for capturing an image is characterized by a device central optical axis, further wherein the light projector and the device for capturing an image are arranged such that a line extending between the projector vertex and the device vertex is not perpendicular to either the projector optical axis or the device optical axis.
7	The system of claim 1, wherein the light projector projects structured light in a wavelengths selected from optical, visible and infrared wavelengths.
8	The system of claim 1, wherein the light projector is a flashlight source.
9	The system of claim 1, wherein the structured light pattern comprises a plurality of coded elements that can be variably grouped together such that all of the coded elements in each group form a unique sequence relative to the sequences of coded elements in adjacent groups of coded elements.

10	The system of claim 1, wherein the computing device determines a three-dimensional shape of the surface of said object.
11	The system of claim 1, wherein said at least one parameter defines a shape, size, or color or a change thereof in time for at least one of said coded elements.
12. [12.PREAMBLE]	A method for the 3D measurement of the shape of a material object, comprising:
[12.A]	projecting a structured light pattern from a light projector onto a surface of an object, wherein the light projector comprises a light source, a slide with a slide pattern located on a slide surface, and a projector lens characterized by a projector lens vertex;
[12.B]	capturing an image of the structured light pattern reflected on the surface of the object with a device for capturing an image, wherein said device for capturing an image comprises a device lens characterized by a device lens vertex;
[12.C]	determining a measurement relating to the surface of the object using a triangulation algorithm based on a correspondence between points in said slide pattern and said image, and
[12.D]	wherein said slide pattern comprises a plurality of coded elements, where each of said coded elements is characterized by at least one parameter and, where said at least one parameter defines a spatial or temporal distribution of an amplitude or a wavelength of said structured light, and
[12.E]	wherein said coded elements are assigned to one of at least first group or second group, each of which first group and second group comprising at least two of said coded elements, and
[12.F]	wherein at least a first slide virtual line and a second slide virtual line are defined on said slide surface, where said first slide virtual line is defined by an intersection between said slide surface and a first plane passing through said projector lens vertex and through said device lens vertex, and said

	second slide virtual line is defined by an intersection between said slide surface and a second plane passing through said projector lens vertex and through said device lens vertex, and
[12.G]	wherein said coded elements of said first group are located along said first virtual line and said coded elements of said second group are located along said second virtual line.
13	The method of claim 12, wherein each of said coded elements having at least three points that do not lie on a straight line.
14	The method of claim 12, wherein at least first object virtual line and second object virtual line are defined on said surface of said object, where said first object virtual line is defined by an intersection between said surface of said object and said first plane and where said second object virtual line is defined by an intersection between said surface of said object and said second plane.
15	The method of claim 12, wherein the light projector is further characterized by a central optical axis, further comprising arranging the light projector and the device for capturing an image such that a line extending between the light projector vertex and the device vertex is perpendicular to the central optical axis of the light projector.
17	The method of claim 12, wherein the light projector is characterized by a projector central optical axis and wherein the device for capturing an image is characterized by a device central optical axis, further comprising arranging the light projector and the device for capturing an image such that a line extending between the projector vertex and the device vertex is not perpendicular to either the projector central optical axis or the device central optical axis.
18	The method of claim 12, further comprising projecting structured light in a wavelengths selected from optical, visible and infrared wavelengths.
19	The method of claim 12, further comprising projecting the structured light from a flashlight source.

20	The method of claim 12, wherein the structured light pattern comprises a plurality of coded elements that can be variably grouped together such that all of the coded elements in each group form a unique sequence relative to the sequences of coded elements in adjacent groups of coded elements.
21	The method of claim 12, further comprising determining a three-dimensional shape of the surface of said object.
22	The method of claim 1, wherein said at least one parameter defines a shape, size, or color or a change thereof in time for at least one of said coded elements.

CERTIFICATION OF COMPLIANCE WITH TYPE-VOLUME LIMITS

This PATENT OWNER PRELIMINARY RESPONSE TO PETITION includes 9,507 words, as counted by Microsoft Word, and is therefore in compliance with the 14,000-word limit established by 37 C.F.R. § 42.24(b)(1). Accordingly, pursuant to 37 C.F.R. § 42.24(d), lead counsel for Patent Owner hereby certifies that this paper complies with the applicable type-volume limits.

Dated: October 24, 2023

Respectfully Submitted,

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CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.6(e)(4), lead counsel for Patent Owner hereby certifies that on October 24, 2023 a copy of this PATENT OWNER PRELIMINARY RESPONSE TO PETITION and the exhibits thereto were served to the email correspondence address of record for Petitioner's counsel of record:

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