

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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TRW AUTOMOTIVE US LLC,  
Petitioner,

v.

MAGNA ELECTRONICS INC.,  
Patent Owner.

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Case IPR2015-00960  
Case IPR2015-00961<sup>1</sup>  
Patent 8,116,929 B2

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Before PHILLIP J. KAUFFMAN, BARRY L. GROSSMAN, and  
ROBERT J. WEINSCHENK, *Administrative Patent Judges*.

GROSSMAN, *Administrative Patent Judge*.

DECISION  
Institution of *Inter Partes* Review  
*37 C.F.R. § 42.108*

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<sup>1</sup> We use this caption to indicate that this Decision applies to, and is entered in, both cases. The parties are not authorized to use this caption.

## I. INTRODUCTION

TRW Automotive US LLC (“Petitioner”) filed a Petition in IPR2015-00960 requesting an *inter partes* review of claims 1, 2, 4–7, and 9–15 of U.S. Patent No. 8,116,929 B2 (“the ’929 patent”). Paper 2 in IPR2015-00960 (“’960 Pet.”). Petitioner also filed a Petition in IPR2015-00961 requesting an *inter partes* review of claims 3, 8, and 16–23 of the ’929 patent. Paper 2 in IPR2015-00961 (“’961 Pet.”). Magna Electronics Inc. (“Patent Owner”) filed a Preliminary Response to the ’960 Petition and the ’961 Petition. Paper 7 in each case (“’960 Prelim. Resp.” and “’961 Prelim. Resp.,” respectively). We review the Petitions under 35 U.S.C. § 314, which provides that an *inter partes* review may not be instituted “unless . . . there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.”

The parties are the same in the ’960 and ’961 Petitions. Petitioner challenges the same patent in both Petitions. There is substantial overlap of the references relied on in the Petitions. Petitioner relies on the same Declaration by Dr. Jeffrey Miller, discussing all challenged claims of the ’929 patent, in the ’960 Petition and in the ’961 Petition. Patent Owner’s Preliminary Response to the ’961 Petition is essentially identical to its Preliminary Response to the ’960 Petition. The issues presented in each case are essentially the same. The common exhibits on which Petitioner and Patent Owner rely in the ’961 Petition have the same exhibit numbers as the corresponding exhibits in the ’960 Petition. Accordingly, to facilitate the just, speedy, and inexpensive resolution of these cases, we address both Petitions in this Decision.<sup>2</sup>

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<sup>2</sup> All citations to the record are to the ’960 Petition (generally, “Pet.”) and to the ’960 Prelim. Resp. (generally “Prelim. Resp.”), unless indicated otherwise.

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Based on the record before us, we are persuaded that the information presented in the Petition and the Preliminary Response demonstrates a reasonable likelihood that Petitioner will prevail in establishing that claims 1, 2, 4–7, 9–16, 18–20, and 23 are anticipated by Pawlicki '857.

*A. Related Proceedings*

Petitioner and Patent Owner both state that the '929 patent is involved in a pending district court case, *Magna Electronics Inc. v. TRW Automotive Holdings Corp., et al.*, No. 1:13-cv-01364 (W.D. Mich. 2013). Pet. 3; Paper 5, 1. Both parties also state that the '929 patent was involved in *In re Certain Vision-Based Driver Assistance System Cameras, Components Thereof, and Products Containing the Same*, Inv. No. 337-TA-907, before the U.S. International Trade Commission, but the '929 Patent has been dropped from that proceeding. Pet. 4; Paper 5, 1.

We also note that the '929 patent claims to be a continuation of applications that matured into U.S. Patent Nos. 7,991,522 (“the '522 patent”), 7,877,175 (“the '175 patent”), and 7,720,580 (“the '580 patent”). A Terminal Disclaimer was filed in the '929 patent to overcome obviousness-type double patenting rejections based on the '522 patent, the '175 patent, and the '580 patent. Ex. 1003, 12, 25. Several claims in the '522 patent were determined to be unpatentable in IPR2014-00221. The '522 patent also is involved in pending IPR2014-01208. Several claims of the '175 patent were determined to be unpatentable in IPR2014-00227.<sup>3</sup> The '175 patent was also the subject of a petition in IPR2014-01206, but institution was denied. *See* IPR2014-01206, paper 13, (PTAB Dec. 23, 2014).

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<sup>3</sup> IPR2014-00228 was consolidated with IPR2014-00227. IPR2014-00228, Paper 14.

*B. The '929 Patent*

The '929 patent is titled “Imaging System For Vehicle.” The Specification discloses an imaging system for vehicles that is able to determine if another vehicle, or some other “object of interest,” is adjacent to, forward of, or rearward of the vehicle equipped with the imaging system. Ex. 1002, col. 1, ll. 20–27. The objective of the imaging system is to assist the driver in changing lanes or parking. *Id.* The disclosed imaging system also can serve as a lane departure warning system. *Id.*

The disclosed imaging system uses “an edge detection algorithm” to detect edges of objects in a target zone or area of interest within the field of view of the imaging system, and determines if another vehicle is present in response to various characteristics of the detected edges, such as size, location, distance, intensity, and/or relative speed. *Id.* at col. 2, ll. 48–57. The system uses various filtering mechanisms, such as algorithms executed in software by a system microprocessor, to substantially eliminate or substantially ignore edges or pixels that are not, or cannot be, indicative of a vehicle or significant object. *Id.* at col. 2, ll. 62–66. Based on the filtering mechanism or software used as applied to the image data, the disclosed system is capable of distinguishing between vehicles or other objects and shadows of objects or vehicles so that a shadow of a vehicle two lanes over is not considered a vehicle in the adjacent lane. *Id.* at col. 3, ll. 9–12. The system switches between daytime and nighttime algorithms to detect headlamps of vehicles in the adjacent lane. *Id.* at col. 3, ll. 13–15.

The basic elements of the system are shown in Figure 1, reproduced below.

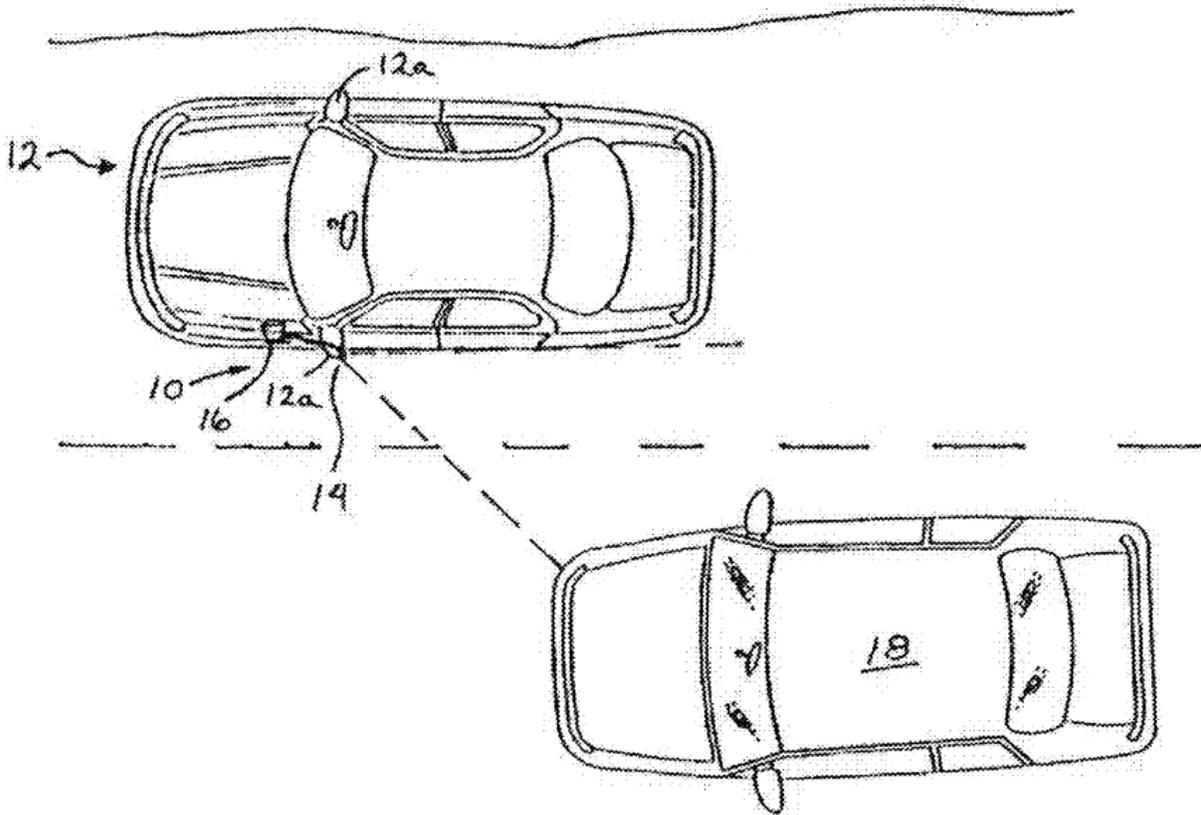


Figure 1 shows a vehicle incorporating and using the disclosed object detection system.

As shown generally in Figure 1, system 10 is positioned on vehicle 12 as part of exterior rearview mirror 12a. System 10 is designed and intended to capture an image of an object, such as vehicle 18, located in an adjacent lane. *Id.* at col. 4, ll. 47–51. System 10 comprises an image capture device, sensor, or camera 14, which captures an image, and control 16, which processes the captured image to determine whether another vehicle 18 is present. *Id.* at col. 4, ll. 51–57. Control 16 also may activate a warning indicator or signal to alert the driver of vehicle 12 that another vehicle is present. *Id.* at col. 4, ll. 57–60. Control 16 is a

processor that executes the algorithms and performs the computations necessary to detect an object. *See, e.g., id. at col. 7, l. 54–col. 8, l. 36.*

### *C. Representative Claims*

Challenged claims 1, 16, and 20 are independent claims. Claims 1 and 16 are reproduced below.

1. An imaging system for a vehicle, said imaging system comprising:

an imaging array sensor comprising a plurality of photo-sensing pixels, wherein said imaging array sensor is positioned at a vehicle equipped with said imaging system and has a field of view exteriorly of the equipped vehicle, and wherein said imaging array sensor is operable to capture image data;

a control for processing said captured image data;

wherein, responsive to said processing of said captured image data, said control distinguishes an object present in the field of view of said imaging array sensor from a shadow present in the field of view of said imaging array sensor; and

wherein, responsive at least in part to said processing of said captured image data, said control determines an object of interest present in the field of view of said imaging array sensor.

16. An imaging system for a vehicle, said imaging system comprising:

an imaging array sensor comprising a plurality of photo-sensing pixels, wherein said imaging array sensor is positioned at a vehicle equipped with said imaging system and has a field of view exteriorly of the equipped vehicle, and wherein said imaging array sensor is operable to capture image data;

a control for processing said captured image data;

wherein, responsive at least in part to said processing of said captured image data, said control determines an object of interest present in the field of view of said imaging array sensor;

wherein said control utilizes edge detection in processing said captured image data; and

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wherein, in determining said object of interest, an algorithmically executed filtering mechanism is utilized that at least substantially ignores detected edges that are not indicative of an object of interest in order to at least one of (a) reduce a processing requirement and (b) reduce false signals.

*D. References Relied Upon*

Petitioner relies upon the following references:

Reference	Asserted Date	Exhibit Number
Pawlicki '857, PCT Pub. WO 03/093857 A2	Pub. Nov. 13, 2003	Ex. 1004
Jeon, U.S. Pat. Pub. No. 2002/0080235	Pub. Jun. 27, 2002	Ex. 1005 <sup>4</sup>
Tzomakas, "Vehicle Detection in Traffic Scenes Using Shadows," Internal Report 98-06, Institut für Neuroinformatik, Ruhr-Universität Bochum, FRG	Aug. 1998	Ex. 1006
Kenue, U.S. Pat. No. 4,970,653	Iss. Nov. 13, 1990	Ex. 1007 <sup>5</sup>
Yamamura, JP App. 2003-76987	Pub. Mar. 14, 2003	Ex. 1008
Thorpe, "Vision and Navigation for the Carnegie-Mellon Navlab," IEEE Transactions on Pattern Analysis and Machine Intelligence, Vol. 10, No. 3	May 1988	Ex. 1009

<sup>4</sup> This Exhibit was filed only in the '961 case.

<sup>5</sup> This Exhibit was filed only in the '961 case.

Reference	Asserted Date	Exhibit Number
Graefe, “Visual Recognition of Obstacles on Roads,” Intelligent Robots and Systems	1994	Ex. 1010
Broggi I, “Vision-Based Road Detection in Automotive Systems: A Real-Time Expectation-Driven Approach,” Journal of Artificial Intelligence Research, 325– 348	Dec. 1995	Ex. 1011
Broggi II, “Multi-Resolution Vehicle Detection Using Artificial Vision,” IEEE Intelligent Vehicles Symposium, 310– 314	June 2004	Ex. 1014
Sun, “On-Road Vehicle Detection Using Optical Sensors: A Review”	N/A.	Ex. 1015

Petitioner also relies on the Declaration of Dr. Jeffrey Miller (Ex. 1016).

*E. The Asserted Grounds*

Petitioner asserts the following grounds of unpatentability (’960 Pet. 1–3; ’961 Pet. 1–2, 10 n. 6, 21, 56 n. 17):

Claims Challenged	Statutory Basis	References
1, 2, 4–7, 9–15, 16, 18–20, 23	§ 102(b)	Pawlicki ’857

1, 2, 4–7, 9–15, 16, 18–20, 23	§ 103(a)	Pawlicki '857
1, 2, 4–7, 9–15	§ 103(a)	Pawlicki '857 and Tzomakas
1, 2, 4–7, 9–15	§ 103(a)	Pawlicki '857 and Broggi II
1, 2, 4–7, 9–15	§ 103(a)	Pawlicki '857 and Broggi I
1, 16, 18	§ 102(b)	Yamamura
1, 16, 18	§ 103(a)	Yamamura
16, 18	§ 102(b)	Kenue
16, 18	§ 103(a)	Kenue
1	§ 102(b)	Graefe
1	§ 103(a)	Graefe
1	§ 102(b)	Thorpe
1	§ 103(a)	Thorpe
4	§ 103(a)	Yamamura and Sun
3, 8, 17, 21, 22	§ 103(a)	Pawlicki '857 and Jeon

## II. ANALYSIS

### A. *Real Parties in Interest*

In accordance with 37 C.F.R. § 42.8(b)(1), Petitioner identifies “TRW Automotive U.S. LLC of Farmington Hills, Michigan” as the sole real party in interest. Pet. 3. Petitioner also identifies “TRW Automotive Holdings Corp.” and “TRW Vehicle Safety Systems Inc.” as co-defendants in the related litigation identified by Petitioner and cited in Section I.A., above. *Id.* at 3–4. Petitioner also acknowledges that both co-defendants “are corporations related to Petitioner.” *Id.*

Patent Owner asserts that, because Petitioner has failed to identify TRW Automotive Holdings Corp., its acknowledged corporate parent, as a real party in interest, the requirements of 35 U.S.C. § 312(a)(2) have not been met. Prelim. Resp. 58–60. According to Patent Owner, TRW Automotive Holdings Corp. “undoubtedly exhibits a significant measure of control” over Petitioner. *Id.* at 59. In support of its position, Patent Owner cites the fact that the Annual Report of Petitioner’s parent corporation discusses Petitioner’s financial position and operating results, which “suggests a tight financial integration” between the two companies. *Id.* Patent Owner also cites a statement in the Annual Report that the parent company “conduct[s] *substantially all of our operations* through subsidiaries” as further evidence of control by the parent over the subsidiary. *Id.* (citing Ex. 2002).

Additionally, Patent Owner asserts that Petitioner failed to name ZF Friedrichshafen AG as a real party in interest. *Id.* at 60. Patent Owner asserts that, on May 15, 2015, ZF Friedrichshafen AG announced that “TRW will be incorporated into ZF as a new division called Active & Passive Safety Technology.” *Id.* (citing Ex. 2003). Patent Owner argues that, as a result of this acquisition, “ZF is also a real party in interest.” *Id.*

A petition for *inter partes* review may be considered only if, *inter alia*, “the petition identifies all real parties in interest.” 35 U.S.C. § 312(a)(2). The Office Patent Trial Practice Guide provides guidance regarding factors to consider in determining whether a party is a real party in interest. 77 Fed. Reg. 48,756, 48,759–60 (Aug. 14, 2012). Considerations may include whether a non-party “funds and directs and controls” an IPR petition or proceeding. *Id.* at 48,760. Additional relevant factors include: the non-party’s relationship with the

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petitioner; the non-party's relationship to the petition itself, including the nature and/or degree of involvement in the filing; and the nature of the entity filing the petition. *Id.* Generally, a party does not become a "real party in interest" merely through association with another party in an unrelated endeavor. *Id.* A party also is not considered a real party in interest in an *inter partes* review solely because it is a joint defendant with a petitioner in a patent infringement suit or is part of a joint defense group with a petitioner in the suit. *Id.*

Whether a party who is not a named participant in a given proceeding is a "real party in interest" to that proceeding "is a highly fact-dependent question." *Id.* at 48,759. There is no "bright line test." *Id.* Courts invoke the term "real party in interest" to describe relationships and considerations sufficient to justify applying conventional principles of estoppel and preclusion. *Id.*

The non-party's participation with a petitioner may be overt or covert, and the evidence may be direct or circumstantial, but the evidence as a whole must show that the non-party possessed effective control over the petitioner relating to the *inter partes* review. *Zoll Lifecor Corp. v. Philips Elecs. N. Am. Corp.*, Case IPR2013-00609, 2014 WL 1253109, at \*6 (PTAB Mar. 20, 2014). Accordingly, we look to the evidence as a whole on which Patent Owner relies to determine the fact dependent issue of whether TRW Automotive Holdings Corp. and/or ZF Friedrichshafen AG is a real party in interest in this proceeding.

Patent Owner argues about what the evidence "undoubtedly exhibits" (Prelim. Resp. 59) or "suggests" (*id.*) concerning the relationship of Petitioner to its parent corporation. These arguments are based on general evidence of a parent/subsidiary relationship in a required Annual Report (Form 10-K) submitted to the U.S. Securities and Exchange Commission ("SEC") (Ex. 2002). Neither the

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admitted existence of a parent/subsidiary relationship nor the fact that the 2014 Annual Report states generally that the parent company “conduct[s] substantially all of [its] operations through subsidiaries” (Ex. 2002, 0005) is persuasive evidence to establish sufficient opportunities “to control *all aspects* of Petitioner’s business, *including controlling this inter partes review*,” as found in *Zoll*. *Zoll*, 2014 WL 1253109, at \*6 (emphasis added). The one sentence on which Patent Owner relies from the 136-page Annual Report does not suggest that Petitioner performs no business and engages in no activity other than that dictated by its corporate parent.

On the record before us, we are not persuaded that the totality of the evidence establishes that either TRW Automotive Holdings Corp. or ZF Friedrichshafen AG is “an involved and controlling parent corporation representing the unified interests of itself and Petitioner,” as found in *Zoll*.<sup>6</sup> *Id.* at 7. Unlike the facts in *Zoll*, the evidence before us does not establish that Petitioner’s actions “have blurred sufficiently the lines of corporate separation with its parent,” such that the parent corporation “has had control, or could have controlled Petitioner, in all aspects of its business,” which would include the aspects of its business relating to the *inter partes* review. *Id.*

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<sup>6</sup>In considering jurisdiction over a corporate parent based on activities of its subsidiary, the United States Court of Appeals for the Federal Circuit has held that “a corporate subsidiary’s contacts in the forum state cannot be imputed to the parent corporation absent clear and convincing evidence that the parent controls the subsidiary’s activities.” *Avocent Huntsville Corp. v. Aten Inter’l Co.*, 552 F.3d 1324, 1337–38 (Fed. Cir. 2008) (citing *Negron-Torres v. Verizon Commc’ns, Inc.*, 478 F.3d 19, 27 (1st Cir. 2007) (declining to assert jurisdiction over Verizon based on the actions of its subsidiary without strong evidence of control by the parent corporation)). Here, there is no such strong evidence of control.

In *RPX Corp. v. Virnetx, Inc.*, Case IPR2014-00171, slip op. at 6–10 (PTAB June 23, 2014) (Paper 52),<sup>7</sup> the Board discussed a number of factors to determine whether petitioner RPX was a proxy for a non-party. Those factors included whether the petitioner is compensated by the non-party for filing the petition; whether the petitioner was authorized, explicitly or implicitly, by the non-party to file the petition or to represent the non-party in the *inter partes* review; and whether the petitioner is a “nominal plaintiff” with “no substantial interest” in the IPR challenge. *Id.* at 7–10. Unlike the facts in *RPX*, based on the record before us, there is no persuasive evidence that Petitioner is acting as a proxy for TRW Automotive Holdings Corp. or ZF Friedrichshafen AG.

In *Denso Corp. v. Beacon Navigation GmbH*, Case IPR2013-00026, 2014 WL 1252998, at \*5 (PTAB Mar. 14, 2014), the Board determined that the mere fact that parties are co-defendants or concurrent defendants in litigation does not make them real parties in interest. In *Denso*, as here, there was no persuasive evidence that the non-party engaged in strategic planning, preparation, and review of the *inter partes* review petition. *Id.* at 6. Petitioner’s identification of its co-defendants as “related to Petitioner” (Pet. 4) does not contradict Petitioner’s identification of the sole real party in interest in this proceeding.

Patent Owner cites *Copperweld Corp. v. Independence Tube Corp.*, 467 U.S. 752 (1984) in support of its position. Prelim. Resp. 59. *Copperweld* held that “the coordinated activity of a parent and its wholly owned subsidiary must be viewed as that of a single enterprise *for purposes of § 1 of the Sherman Act*. . . . Indeed, the very notion of an ‘agreement’ in Sherman Act terms between a parent and a wholly

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<sup>7</sup> In *RPX*, the parties submitted a proposed redacted version (Paper 52) of the Board’s decision. In Paper 53, the Board entered the redacted decision and ordered that the redacted decision (Paper 52) would be available to the public.

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owned subsidiary lacks meaning.” 467 U.S. at 771 (emphasis added). The Supreme Court recognized that “a rule that punished coordinated conduct simply because a corporation delegated certain responsibilities to autonomous units might well discourage corporations from creating divisions with their presumed benefits. This would serve no useful antitrust purpose but could well deprive consumers of the efficiencies that decentralized management may bring.” *Id.* The Supreme Court also recognized that “a corporation may adopt the subsidiary form of organization for valid management and related purposes. Separate incorporation may improve management, avoid special tax problems arising from multistate operations, or serve other legitimate interests.” *Id.* at 772–73. Patent Owner’s reliance on *Copperweld* is not persuasive that Petitioner failed to identify all real parties in interest for purposes of this Petition seeking *inter partes* review of the ’929 patent.

The totality of the evidence before us does not establish anything other than a traditional parent/subsidiary business relationship. This common form of conducting business, without more, does not establish a relationship sufficient to make the parent a real party in interest in this *inter partes* review. Generic references to the existence of a parent/subsidiary business relationship in an SEC Annual Report do not establish or suggest that the parent funds, directs, or controls the IPR petition or proceeding, or that the subsidiary is a proxy for the parent. There is no persuasive evidence that the parent has any control over the petition itself or over Petitioner’s role in this proceeding. Accordingly, based on the totality of the evidence before us, Patent Owner fails to establish that TRW Automotive Holdings Corp. or ZF Friedrichshafen AG should have been identified as a real party in interest in this proceeding. *See also TRW Auto. U.S. LLC v.*

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*Magna Elecs., Inc., Case IPR2015-00949, 2015 WL 5564756, at \*3–5* (PTAB Sep. 17, 2015) (determining that neither TRW Automotive Holdings Corp. nor ZF Friedrichshafen AG was a real party in interest based on the facts in that case).

### *B. Printed Publications*

A petitioner in an *inter partes* review may request to cancel as unpatentable one or more claims of a patent “only on the basis of prior art consisting of patents or printed publications.” 35 U.S.C. § 311(b). Patent Owner asserts that Sun, Broggi II, Graefe, and Tzomakas are neither patents nor printed publications, and thus cannot serve as a valid basis for granting the Petition. Prelim. Resp. 8–17.

It is clear that Sun, Broggi II, Graefe, and Tzomakas are not patents. Thus, the only basis on which each asserted reference can be considered in this proceeding is if each reference qualifies as a “printed publication.”

Whether a document qualifies as a printed publication under § 102 is a legal conclusion based on underlying factual determinations. *SRI Int’l, Inc. v. Internet Sec. Sys., Inc.*, 511 F.3d 1186, 1192 (Fed.Cir.2008). “Public accessibility” has been called the touchstone in determining whether a reference constitutes a printed publication under 35 U.S.C. § 102(b). *Id.* at 1194. A reference is publicly accessible upon a satisfactory showing that it has been disseminated or otherwise made available to the extent that persons interested and ordinarily skilled in the subject matter or art exercising reasonable diligence, can locate it. *Bruckelmyer v. Ground Heaters, Inc.*, 445 F.3d 1374, 1378 (Fed. Cir. 2006); *see also In re Cronyn*, 890 F.2d 1158, 1160 (Fed. Cir. 1989) (“The statutory phrase ‘printed publication’ has been interpreted to mean that before the critical date the reference must have been sufficiently accessible to the public interested in the art; dissemination and public accessibility are the keys to the legal determination

whether a prior art reference was ‘published.’”) quoting *Constant v. Advanced Micro-Devices, Inc.*, 848 F.2d 1560, 1568 (Fed.Cir.1988)).

In *In re Klopfenstein*, 380 F.3d 1345, 1348 (Fed. Cir. 2004), our reviewing Court rejected an argument that “distribution and/or indexing” are the key components to a “printed publication” inquiry because that argument “fails to properly reflect what our [Federal Circuit] precedent stands for,” explaining that “printed publication” means sufficiently accessible to the public interested in the technology through generally available media that serve to disseminate information. *Id.* at 1348. A printed publication need not be easily searchable after publication if it was sufficiently disseminated at the time of its publication. *Suffolk Technologies, LLC v. AOL Inc.*, 752 F.3d 1358, 1364 (Fed. Cir. 2014).<sup>8</sup>

Where professional and behavioral norms entitle a party to a reasonable expectation that the information displayed will not be copied or disclosed, courts are more reluctant to find something a “printed publication.” *Klopfenstein*, 380 F.3d at 1351. Where parties have taken steps to prevent the public from copying or disclosing information, the opportunity for others to appropriate that information and assure its widespread public accessibility is reduced. *Id.* These protective measures could include license agreements, non-disclosure agreements, anti-copying software or a simple disclaimer informing members of the viewing public that no copying or disclosure of the information will be allowed. *Id.* Protective measures are to be considered insofar as they create a reasonable expectation that the information will not be copied. *Id.*

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<sup>8</sup> As explained in *Klopfenstein*, the word “disseminate” is used in its literal sense, i.e. “make widespread” or “to foster general knowledge of” and does not require distribution of reproductions or photocopies. 380 F.3d. at 1348 n. 3.

The determination of whether a reference is a “printed publication” under 35 U.S.C. § 102(b) involves a case-by-case inquiry into the facts and circumstances surrounding the reference’s disclosure to members of the public. *Klopfenstein*, 380 F.3d at 1350.<sup>9</sup>

Against this general background, we consider the evidence and arguments on which the parties rely.

*1. Sun (Ex. 1015)*

Petitioner asserts, without citation of any supporting evidence, that Sun was “published before Dec. 23, 2004,” and is prior art “at least under § 102(a).” Pet. 10. Petitioner does not provide the source or date of the asserted public availability. Sun has no indicia that it is a “printed publication” or was publicly available, and if so, the date it became publicly available.

Patent Owner asserts that Petitioner fails to provide sufficient evidence to demonstrate that Sun was publicly accessible prior to December 23, 2004, the priority date of the ’929 patent. Prelim. Resp. 10. We agree.

We determine that Petitioner has not established sufficiently that Sun is a printed publication. Accordingly, we will not consider Sun in this proceeding.

*2. Broggi II (Ex. 1014)*

Petitioner asserts, without citation of any supporting evidence, that Broggi II was “published before Dec. 23, 2004,” and is prior art “at least under § 102(a).” Pet. 10.

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<sup>9</sup> See also *ServiceNow, Inc. v. Hewlett-Packard Co.*, Case IPR2015-00707, 2015 WL 5117886, at \*5 (PTAB Aug. 26, 2014) (discussing case law and prior *inter partes* reviews that considered whether a document was a printed publication).

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Broggi II contains the following information printed on its first page:

2004 IEEE Intelligent Vehicles Symposium  
University of Parma  
Parma, Italy • June 14-17, 2004

Multi-Resolution Vehicle Detection using  
Artificial Vision

Alberto Broggi, Pietro Cerri  
Dipartimento di Ingegneria dell'Informazione  
Università di Parma  
Parma, I-43100, Italy  
{broggi, cerri}@ce.unipr.it

Pier Claudio Antonello  
Surround Sensing - Vehicle development  
Centro Ricerche FIAT  
Orbassano (TO), I-10043, Italy  
pierclaudio.antonello@crf.it

The information in the upper left corner, partially obscured by the title,<sup>10</sup> states, “2004 IEEE Intelligent Vehicles Symposium, University of Parma, Parma, Italy • June 14-17, 2004.” Ex. 1014, 1. In the lower left corner, the following information appears, “0-7803-8310-9/04/\$20.00 © 2004 IEEE.” *Id.* The first page is numbered “310.” *Id.*

Patent Owner asserts that the 2004 copyright notice and the identifier “2004 IEEE Intelligent Vehicles Symposium, University of Parma, Parma, Italy, June 14–17, 2004” is not sufficient to establish that Broggi II is a printed publication. Prelim. Resp. 11–12. Again, we agree.

The Information about the date and location of a symposium appearing on Broggi II is not persuasive evidence that Broggi II was publicly accessible on the date indicated.

A copyright notice informs the public that copyright protection is claimed, identifies the copyright owner, and states the asserted year of first publication. 17 U.S.C. § 401. The purpose of a copyright notice is, simply, to put a reader on notice that a claim has been made that the work is copyrighted. We are not

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<sup>10</sup> The overlap of the title of the article and the identifying information in the upper left corner appears on the Ex. 1014 document filed with the Petition.

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persuaded that the copyright date “2004” for Broggi II shows sufficiently that Broggi II was publicly accessible before the critical date.

The Board has held that an IEEE *publication* requires no further evidence of publication date (*Ericsson Inc. v. Intellectual Ventures I LLC*, Case IPR2014-00527, 2015 WL 2409306, at \*6 (P.T.A.B. May 18, 2015)). Petitioner, however, has not directed us to persuasive evidence that Broggi II is an IEEE publication.

Based on the record before us, we determine that Petitioner has not established sufficiently that Broggi II is a printed publication under § 102(a). Accordingly, we will not consider Broggi II in this proceeding.

We note that Broggi II has been relied on in at least one *inter partes* review proceeding based on evidence not offered in this proceeding. *See* Prelim. Resp. 13–14. We decline to consider such extrinsic evidence, particularly where the disclosure of Broggi II is merely cumulative to other cited references.

### 3. *Graefe (Ex. 1010)*

Petitioner asserts that Graefe was “published more than one year before Dec. 23, 2004, and [is] prior art under § 102(b).” Pet. 10. Graefe contains the following information printed on it – “Intelligent Robots and Systems. Elsevier, 1994.” Ex. 1010, *passim*. This is the only indicia of the source and date of its asserted public accessibility. Petitioner provides no explanation, nor does Petitioner direct us to additional evidence, to support the asserted publication of Graefe prior to December 23, 2004.

Patent Owner argues that “neither the 1994 date nor TRW’s unsupported attorney statement is sufficient to establish that Graefe qualifies as a prior art printed publication.” Prelim. Resp. 15. We agree.

Based on the record before us, we determine that Petitioner has not established sufficiently that Graefe is a printed publication. Accordingly, we will not consider Graefe in this proceeding.

4. *Tzomakas (Ex. 1006)*

Petitioner asserts that Tzomakas was “published more than one year before Dec. 23, 2004, and [is] prior art under § 102(b).” Pet. 10. Tzomakas includes a 1998 copyright notice and the date “August 1998.” Ex. 1006, 1. As discussed above with regarding to Broggi II, this information does not establish sufficient public accessibility. Tzomakas also states it is an “Internal Report 98-06” (*id.*), which suggests the authors have taken steps to prevent public accessibility. *See Klopfenstein*, 380 F.3d at 1351. Petitioner provides no explanation nor does Petitioner direct us to additional evidence to support the asserted public accessibility of Tzomakas prior to December 23, 2004.

Patent Owner asserts that Petitioner has failed to establish that Tzomakas is a printed publication. Prelim. Resp. 15–17. We agree.

Based on the record before us, we determine that Petitioner has not established sufficiently that Tzomakas is a printed publication. Accordingly, we will not consider Tzomakas in this proceeding.

C. *Claim Construction*

In an *inter partes* review, claim terms in an unexpired patent are interpreted according to their broadest reasonable construction in light of the specification of the patent in which they appear. 37 C.F.R. § 42.100(b); *In re Cuozzo Speed Techs. LLC*, 793 F.3d 1268, 1278–79 (Fed. Cir. 2015) (“Congress implicitly approved the broadest reasonable interpretation standard in enacting the AIA,” and “the standard was properly adopted by PTO regulation”). Claim terms also are given their

ordinary and customary meaning, as would be understood by one of ordinary skill in the art in the context of the entire disclosure. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). Only terms which are in controversy need to be construed, and then only to the extent necessary to resolve the controversy. *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999).

### *1. Shadow Clause*

Independent claim 1 recites, “wherein, responsive to said processing of said captured image data, said control distinguishes an object present in the field of view of said imaging array sensor from a shadow present in the field of view of said imaging array sensor.” We will refer to this clause generally as the “shadow clause.” Claims 21 and 22 contain a substantially similar limitation. Petitioner asserts that the broadest reasonable construction of the shadow clause does not require the shadow and the object being distinguished by the control to each be present in the field of view at the same time. Pet. 6. As summarized by Petitioner, “[s]imply put, there is no temporal element in the [shadow clause].” *Id.*

Patent Owner takes a different view of the shadow clause. According to Patent Owner, the shadow clause “*clearly and unequivocally recites* that an object present in the field of view is distinguished from a shadow also present in the field of view *at the same time*. Plainly, both need to be present in the field of view for one to be distinguished from the other.” Prelim. Resp. 4 (emphases added). Patent Owner’s position is that the shadow clause “requires the *simultaneous* presence of a shadow and an object in the field of view of the imaging array sensor.” *Id.* (emphasis added).

Contrary to Patent Owner’s assertion of what the shadow clause “recites,” the phrase “at the same time,” the term “simultaneous” (or a variant thereof) or a

similar term or phrase establishing a temporal requirement, is *not* specifically recited in the shadow clause. Thus, we look to the Specification for guidance in construing the claims. We also note what is recited specifically in the shadow clause, which is that the control distinguishes an object from “a shadow,” not from the object’s shadow.

As stated in the Specification, Figures 6–9 of the ’929 patent are representations of captured images of the side area of a vehicle, showing how different shadows may be detected. Ex. 1002, col. 4, ll. 19–21. The Specification explains that

When a shadow is detected, it is either a shadow created by a vehicle entering into the blind spot, or a shadow created by something else and not the target vehicle (a vehicle entering the blind spot). Referring to FIGS. 6-9, different shadows are shown for different scenarios the system may encounter, such as, for example, the shadow cast by a truck that is one or more lanes over from the target lane (FIG. 6), shadows cast by trees alongside the road (FIG. 7), the shadow cast by the subject vehicle (FIG. 8), and/or dark structures (FIG. 9).

*Id.* at col. 9, ll. 47–55. The Specification further explains “the situations in FIGS. 6 and 7 may cause the system to indicate that it is a false positive,” which the disclosed system is intended to resolve. *Id.* at col. 10, ll. 9–11. Thus, as shown in Figure 7, there is no vehicle or object shown in the captured image, only the shadow of a tree. As explained in the Specification (*id.*), the disclosed system distinguishes the tree shadow in Figure 7 from an object to avoid a “false positive” without an object also present simultaneously.

Accordingly, for purposes of this Decision, based on the record before us, we determine that the shadow clause does *not* require that the shadow and the

object being distinguished by the control each be present in the field of view at the same time.

## 2. *Objects and Objects of Interest*

Independent claim 1 recites that the “control *distinguishes an object* present in the field of view of said imaging array sensor *from a shadow* present in the field of view.” Ex. 1002, col. 17, ll. 11–15 (emphasis added). Independent claim 1 also recites that “responsive at least in part to said processing of said captured image data, said control determines an *object of interest* present in the field of view.” *Id.* at col. 17, ll. 16–19 (emphasis added). Patent Owner asserts that “object” and “object of interest” are not synonymous. Prelim. Resp. 8. According to Patent Owner, “the system detects and identifies objects and then further processes the object to determine if that detected object has a desired characteristic.” *Id.*

The Specification uses the terms “object” and “object of interest” without distinguishing between them. The Specification states that the disclosed system determines if “*a vehicle or object of interest*” is adjacent to, forward, or rearward of the subject vehicle.” Ex. 1002, col. 1, ll. 20–25 (emphasis added). A similar statement appears at column 2, lines 44–45. The Specification, however, also states that the “system processes the detected edges within the image data subset to determine if they correspond with physical characteristics of *vehicles and other objects* to determine whether the detected edge or edges is/are part of a vehicle or a significant edge *or object* at or toward the subject vehicle.” *Id.* at col. 2, ll. 58–61 (emphases added). As explained in the Specification, the disclosed system uses various filtering mechanisms, such as algorithms executed in software by a system microprocessor, to substantially eliminate or substantially ignore edges or pixels that are not or cannot be indicative of a vehicle or *significant object* to reduce the

processing requirements and to reduce the possibility of false positive signals. *Id.* at col. 2, ll. 62–67 (emphasis added). *See also id.* at col. 3, ll. 9–12 (“The system may distinguish between vehicles or other *objects* and shadows of *objects/vehicles* . . .”) (emphasis added). In each of the cited passages, the terms “object,” “significant object,” and “object of interest” are used as an alternative to the term “vehicle.” Thus, the Specification uses the terms “object,” “significant object,” and “object of interest” as synonyms indicating something, such as a vehicle, in the image data. The system disclosed in the ’929 patent uses software, which is not recited in the challenged claims, to process the image data to determine whether the “object,” “significant object,” or “object of interest” is “part of a vehicle or a significant edge or *object* at or toward the subject vehicle.” *Id.* at col. 2, ll. 57–67 (emphasis added). If it is so determined, the determination is provided to the driver through a driver interface or display. *Id.* at col. 16, ll. 3–12.

The “wherein” clause containing the phrase “objects of interest” states the result of distinguishing a shadow from an object. That result is that the “object” is identified as an “object of interest.” Consistent with the Specification, as discussed above, the “object” and “object of interest” are the same element in the captured image data. Patent Owner has not directed us to any persuasive evidence that establishes that any substantive difference between an “object” and an “object of interest.”

On the record before us, for purposes of this Decision, we are not persuaded by Patent Owner’s evidence and arguments (Prelim. Resp. 6–8) that there is a substantive distinction between the terms “object” and “object of interest.”

*D. Asserted Grounds of Unpatentability*

*1. Anticipation by Pawlicki '857*

Petitioner asserts that claims 1, 2, 4–7, 9–15, 16, 18–20, and 23 are anticipated by Pawlicki '857. '960 Pet. 1–3; '961 Pet. 10–21.

“[U]nless a reference discloses within the four corners of the document not only all of the limitations claimed but also all of the limitations arranged or combined in the same way as recited in the claim, it cannot be said to prove prior invention of the thing claimed and, thus, cannot anticipate under 35 U.S.C. § 102.” *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1371 (Fed. Cir. 2008); *see also Verdegaal Bros. v. Union Oil Co.*, 814 F.2d 628, 631 (Fed. Cir. 1987) (“A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.”). “The identical invention must be shown in as complete detail as is contained in the . . . claim.” *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236 (Fed. Cir. 1989).

Pawlicki '857 discloses an object detection system for a vehicle (the equipped vehicle), such as a lane change assist system, that uses an edge detection algorithm to detect edges of objects in the captured images and determines if another vehicle is present in a lane adjacent to the equipped vehicle. Ex. 1004, p. 3, ll. 3–7.<sup>11</sup> The system makes this determination based on various characteristics of the detected edges, such as the size, location, distance, intensity, relative speed and/or the like. *Id.* The object detection system disclosed in Pawlicki '857, like the object detection system disclosed in the '929 patent, processes the detected edges within the image data subset to determine if the

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<sup>11</sup> We cite to the native page number in the published PCT application rather than the numbers added by Petitioner.

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detected edge or edges is/are part of a vehicle or a significant edge or object at or toward the equipped vehicle. *Id.* at p. 3, ll. 10–13. The object detection system disclosed in Pawlicki '857, like the object detection system disclosed in the '929 patent,

utilizes various filtering mechanisms, such as algorithms executed in software by a system microprocessor, to substantially eliminate or substantially ignore edges or pixels that are not or cannot be indicative of a vehicle or significant object to reduce the processing requirements and to reduce the possibility of false positive signals.

*Id.* at p. 3, ll. 13–17. The '929 Specification contains this identical disclosure. Ex. 1002, col. 2, ll. 62–67.

*a. Independent Claim 1*

Patent Owner focuses its arguments on the shadow clause in independent claim 1 (Prelim. Resp. 22–29), which also is where we focus our analysis. Concerning the “shadow clause,” Petitioner asserts “four distinct arguments” explaining how, in Petitioner’s view, Pawlicki '857 discloses “all elements” of this clause. Pet. 14. Notwithstanding these four distinct arguments, Petitioner concedes that:

[w]hile Pawlicki ('857) itself discloses that a target vehicle may be detected via its shadow, Pawlicki ('857) does not expressly outline how the target vehicle’s shadow is distinguished from other dark objects in the image (such as the shaded road) which may cause the lane change assist system 10 of Pawlicki ('857) to falsely detect a target vehicle.

*Id.* at 25–26.

First, Petitioner asserts that Pawlicki '857 “discloses all the elements” of the shadow clause because it “discloses that during the daytime, the control 16 may detect a target vehicle 18 by detecting the front horizontal shadow 18b of the

vehicle 18 on the road surface.” Pet. 14 (citing Ex. 1004, p. 15, ll. 19–22).

Pawlicki ’857 clearly discloses detecting a shadow of vehicle. Pawlicki ’857 uses this detected image to identify a vehicle. The shadow clause, however, does not require merely detecting a shadow; it requires distinguishing the shadow from an object.

Second, Petitioner asserts Pawlicki ’857 discloses the elements in the shadow clause because the reference discloses that “the edge detection algorithm 16a of control 16 may function to detect and determine if there is more than one vehicle present at the side of the subject vehicle 12.” Pet. 16 (citing Ex. 1004, p. 14, ll. 4–8). Pawlicki ’857 discloses that its system may distinguish between edges constituting the fronts of different vehicles and edges constituting the front and side of the same vehicle. Ex. 1004, p. 14, ll. 4–8. Petitioner then reasons that, because control 16 can detect the front horizontal shadow 18b of one vehicle 18, and because control 16 also can distinguish this shadow from the side or front of another vehicle, Pawlicki ’857 discloses that control 16, responsive to processing of the captured image data, distinguishes a shadow of the target vehicle 18 from another object that also may be present in the field of view, as recited in the shadow clause. Pet. 16.

Patent Owner asserts that “Pawlicki merely discusses how the system may determine if there is more than one vehicle present at the side of the subject vehicle, and thus, merely detects two objects present in the field of view, and does not distinguish a shadow from an object present in the field of view, as claimed.” Prelim. Resp. 26 (citing Ex. 1004, 14, ll. 4–5). Patent Owner’s position does not recognize, however, that Pawlicki ’857 may detect one object by its shadow 18b and the second object by a front or side panel. Thus, in recognizing and

distinguishing between the two objects, Pawlicki '857 distinguishes between a shadow and an object in the field of view. Based on this analysis of Pawlicki '857, we are persuaded for purposes of this Decision that Pawlicki '857 discloses the elements and limitations recited in the shadow clause.

Petitioner's third argument focuses on the fact that Pawlicki '857 uses different detection systems for daytime and nighttime driving. Pet. 16–17. We are not persuaded by the evidence or arguments that detecting shadows by day and detecting headlights by night meets the limitations of the shadow clause.

Petitioner's fourth argument is that Pawlicki '857 discloses use of multiple systems, wherein one system may detect a shadow and another system may detect an object. *Id.* at 17–19. We are not persuaded by the evidence or arguments that detecting shadows and objects with separate and distinct systems meets the limitations of the shadow clause.

Based on the analysis above, we are persuaded for purposes of this Decision, based on the record before us, that Pawlicki '857 discloses the shadow limitation as recited in the '929 patent.

Patent Owner also asserts that Petitioner “fails to adequately show that Pawlicki discloses both an object and an object of interest.” Prelim. Resp. 30. We have discussed above our determination that there is not a distinction between the terms “object” and “object of interest.”

Patent Owner raises no other argument against Petitioner's assertion that Pawlicki '857 anticipates claim 1 of the '929 patent.

We have considered the evidence and arguments concerning whether Pawlicki '857 discloses all the remaining elements and limitations in independent claim 1. We are persuaded, based on the record before us, for purposes of this

Decision, that there is a reasonable likelihood that each and every element as set forth in claim 1 is found, either expressly or inherently described, in Pawlicki '857 in as complete detail as is contained in claim 1. Accordingly, we determine that there is a reasonable likelihood that Petitioner will prevail in the contention that Pawlicki '857 anticipates claim 1.

*b. Dependent Claims 2, 4–7, and 9–15*

Petitioner also asserts that dependent claims 2, 4–7, and 9–15 are anticipated by Pawlicki '857. '960 Pet. 2–3, 50–58. Patent Owner does not address specifically the assertion that dependent claims 2, 4–7, and 9–15 are anticipated by Pawlicki '857.

Claim 2 recites that the control is operable to determine an object of interest present in the field of view “by determining at least a portion of a shadow of the object of interest.” The parties have not directed us to any disclosure in the '929 Specification that discusses or further explains the limitation in claim 2. Petitioner asserts that Pawlicki '857 meets the limitations in claim 2 based on the disclosure that “[d]uring daytime driving conditions, detecting *the edge of* the front horizontal shadow 18b (FIG. 4) of a vehicle 18 or the bumper 18b of a vehicle 18 may be the method for significant object or vehicle detection.” Pet. 50 (citing Ex. 1004, p. 15, ll. 19–22) (emphasis added). For purposes of this Decision, based on the record before us, we determine that detection of an edge of a shadow is also detection of a portion of a shadow.

Claim 4 recites that the control is operable in a daytime mode and a nighttime mode, and is operable to determine a shadow when operating in the daytime mode. Claim 5 recites that the control is operable to switch between daytime mode and nighttime mode in response to ambient light level. Petitioner

asserts Pawlicki '857 discloses these limitations. Pet. 51–52 (citing Ex. 1004, p. 15, ll. 17–29). For purposes of this Decision, based on the record before us, we agree with Petitioner's position.

Claim 6 recites that the control uses edge detection in processing captured image data. Petitioner asserts Pawlicki '857 “expressly teaches that the control 16 utilizes edge detection in processing the captured image data. Pet. 52–53 (citing Ex. 1004, p. 13, ll. 4–9) (“Control 16 may include a microprocessor having an edge detection algorithm or 5 function 16a (FIG. 10) which is operable to process or is applied to the image data received from the individual pixels to determine whether the image captured by the pixels defines an edge or edges of a significant object”). For purposes of this Decision, based on the record before us, we agree with Petitioner's position.

Claim 7 recites that, in determining an object of interest, an algorithmically executed filtering mechanism is used that substantially ignores detected edges that are not indicative of an object of interest in order to (a) reduce a processing requirement and/or (b) reduce false signals. Petitioner asserts Pawlicki '857 discloses that edge detection algorithm 16a, in determining an object of interest, executes filtering mechanisms that substantially ignore detected edges not indicative of an object of interest, as recited in claim 7. Pet. 53–54 (citing Ex. 1004, p. 13, ll. 8–18). For purposes of this Decision, based on the record before us, we agree with Petitioner's position.

Claim 9 recites that the field of view of the imaging array sensor encompasses (a) a rearward exterior field of view, (b) a sideward exterior field of view and/or (c) a forward exterior field of view. Petitioner asserts Pawlicki '857 discloses this limitation. Pet. 54–55 (citing, e.g., Ex. 1004, p. 4, ll. 18–20) (“The

imaging array sensor is directed generally exteriorly from the vehicle to capture an image of a scene occurring exteriorly, such as toward the side, front or rear, of the vehicle.”). For purposes of this Decision, based on the record before us, we agree with Petitioner’s position.

Claim 10 recites that the control reduces the captured image data to a reduced data set and processes the reduced data set to extract information therefrom. Petitioner asserts Pawlicki ’857 discloses this limitation. Pet. 55 (citing Ex. 1004, p. 10, ll. 26–32) (“Control 16 is operable to process image data within a reduced data set or subset of the image data set more than other image data of the image data set to reduce the processing requirements of the control.”). For purposes of this Decision, based on the record before us, we agree with Petitioner’s position.

Claim 11 recites that the reduced data set is representative of a target zone encompassed by the field of view of the imaging array sensor. Petitioner asserts Pawlicki ’857 discloses this limitation. Pet. 55 (citing Ex. 1004, p. 11, ll. 19–28) (“The reduced data set of the captured image may be representative of a targeted area or zone of interest of the exterior scene being captured by the camera.”). For purposes of this Decision, based on the record before us, we agree with Petitioner’s position.

Claim 12 recites that the control is operable to alert the driver that an object of interest is determined in the field of view. Petitioner asserts Pawlicki ’857 discloses this limitation. Pet. 56 (citing Ex. 1004, p. 10, ll. 14–18) (“Control 16 may be further operable to activate a warning indicator or display or signal device 17 (FIG. 10) to alert the driver of vehicle 12 that another vehicle is present at the

side of vehicle 12.”). For purposes of this Decision, based on the record before us, we agree with Petitioner’s position.

Claim 13 recites that the field of view of the imaging array sensor is at least partially sideward. Petitioner asserts Pawlicki ’857 discloses this limitation. Pet. 57 (citing Ex. 1004, p. 11, l. 34–p.12, l. 3) (“[C]amera 14 may be positioned elsewhere along either or both sides and/or at the rear of the vehicle and directed sidewardly and rearwardly from the vehicle to capture an image at either side of the vehicle.”). For purposes of this Decision, based on the record before us, we agree with Petitioner’s position.

Claim 14 recites that the control is operable to alert the driver that an object of interest is detected at the side in response to (a) the driver actuating a turn signal toward the side at which the object of interest is detected, and/or (b) the driver steering toward the side at which the object of interest is detected. Petitioner asserts Pawlicki ’857 discloses this limitation. Pet. 57–58 (citing Ex. 1004, p. 10, ll. 14–23) (“Control 16 may be further operable to activate a warning indicator or display or signal device . . . . The warning or alert signal . . . may only be provided when the driver of the vehicle 12 actuates a turn signal toward that side or begins turning the subject vehicle 12 towards that side to change lanes.”). For purposes of this Decision, based on the record before us, we agree with Petitioner’s position.

Claim 15 recites that the imaging array sensor comprises a CMOS imaging array sensor. Petitioner asserts Pawlicki ’857 discloses this limitation. Pet. 58 (citing Ex. 1004, p. 11, ll. 3–5) (“Camera or imaging sensor 14 may comprise an imaging array sensor, such as a CMOS or a CCD sensor or the like . . .”). For purposes of this Decision, based on the record before us, we agree with Petitioner’s position.

In summary, based on our analysis above, there is a reasonable likelihood Petitioner will prevail in establishing that claims 2, 4–7 and 9–15 are not patentable because they are anticipated by Pawlicki '857.

*c. Claims 16, 18–20, 23*

Petitioner asserts that claims 16, 18–20, and 23 are anticipated by Pawlicki '857. '961 Pet. 10–21.

Independent claim 16 does not include the shadow clause, but otherwise includes limitations substantially identical to the limitations in claim 7 (dependent from claim 6). Claim 18, dependent from claim 16, does not include the shadow clause, but otherwise includes limitations substantially identical to the limitations in claim 12. Claim 19, dependent from claim 16, does not include the shadow clause, but otherwise includes limitations substantially identical to the limitations in claim 14. Independent claim 20 does not include the shadow clause, but otherwise includes limitations substantially identical to the limitations in claim 11 (dependent from claim 10) and claim 6. Claim 23, dependent from claim 20, does not include the shadow clause, but otherwise includes limitations substantially identical to claim 5 (dependent from claim 4).

Based on our analysis above of claims 1, 2, 4–7, and 9–15, there is a reasonable likelihood Petitioner will prevail in establishing that claims 16, 18–20, and 23 are not patentable because they are anticipated by Pawlicki '857.

*2. Obviousness Based on Pawlicki '857*

Petitioner also asserts that claims 1, 2, 4–7, 9–16, 18–20, and 23 would have been obvious in view of Pawlicki. '960 Pet. 1, 12; '961 Pet. 10. The entirety of Petitioner's argument and evidence is stated in footnote 6 on page 12 of the Petition, which is reproduced below.

Further, rejections under § 103 would also be proper. After all, “[A] disclosure that anticipates under § 102 also renders the claim invalid under § 103, for ‘anticipation is the epitome of obviousness.’” *Johns Hopkins Univ. v. CellPro, Inc.*, 152 F.3d 1342, 1357 and f.n. 21 (Fed. Cir. 1998) (citations omitted). And any element not met by Pawlicki (‘857) is nevertheless obvious in view of Pawlicki (‘857). (1016 at ¶22).<sup>12</sup>

Pet. 12, n. 6. Despite the often quoted maxim that anticipation is the “epitome of obviousness,” novelty under 35 U.S.C. § 102 and nonobviousness under 35 U.S.C. § 103 are separate conditions of patentability. *Cohesive Techns, Inc. v. Waters Corp.*, 543 F.3d 1351, 1363 (Fed. Cir. 2008); *see also Jones v. Hardy*, 727 F.2d 1524, 1529 (Fed.Cir.1984) (“[T]hough anticipation is the epitome of obviousness, [they] are separate and distinct concepts.”). The tests for anticipation and obviousness are different. *Cohesive Technologies*, 543 F.3d at 1364; *see also Duro–Last, Inc. v. Custom Seal, Inc.*, 321 F.3d 1098, 1107–08 (Fed. Cir. 2003) (“Succinctly put, the various unenforceability and invalidity defenses that may be raised by a defendant—inequitable conduct, the several forms of anticipation and loss of right under § 102, and obviousness under § 103—require different elements of proof.”).

The quoted maxim does not give Petitioner an opportunity to assert unpatentability on the basis of obviousness without complying with the governing statute and rules for challenging patentability in an *inter partes* review.

Section 103(a) precludes issuance of a patent when “the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a

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<sup>12</sup> Petitioner makes the identical argument in the ’961 Petition, but cites to paragraph 149 of Ex. 1016, which is Dr. Miller’s Declaration. ’961 Pet. 10, n. 6.

person having ordinary skill in the art to which said subject matter pertains.” 35 U.S.C. § 103(a) (2006).<sup>13</sup> In *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966), the Court set out a framework for applying the statutory language of § 103:

Under § 103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background, the obviousness or nonobviousness of the subject matter is determined.

“While the sequence of these questions might be reordered in any particular case, the factors continue to define the inquiry that controls.” *KSR Int’l. Co. v. Teleflex Inc.*, 550 U.S. 398, 407 (2007).

The particularity and specificity required of supporting evidence under our governing statute and rules is set forth in 35 U.S.C. § 312(a)(3) and in 37 C.F.R. §§ 42.22(a)(2), 42.104(b)(4)–(5). Under our rules, the petition must contain a “full statement of the reasons for the relief requested, including a detailed explanation of the significance of the evidence.” 37 C.F.R. § 42.22(a)(2). The Petition also must identify how the construed claim is unpatentable under the statutory grounds asserted. *Id.* § 104(b)(4). Petitioner’s sole reliance on the maxim that “anticipation is the epitome of obviousness” fails to comply with the requirements of our rules.

Petitioner asserts that the challenged claims, if not anticipated, would have been obvious in view of Pawlicki ’857, citing to various paragraphs of Dr. Miller’s Declaration. *See, e.g.*, Pet. 52 (“Claim 4 is therefore invalid as anticipated or

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<sup>13</sup> Section 103 has since been amended. See Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, § 3(c), 125 Stat. 284, 287 (2011). However, because the application for the patent at issue in this proceeding has an effective filing date before March 16, 2013, we refer to pre-AIA § 103(a). See 125 Stat. at 293.

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obvious under the references in Grounds 1 through 4. (1016 at ¶¶106-109)).” We determine that Petitioner’s cursory analysis of the obviousness grounds fails to provide a full statement of the reasons for the relief requested, including a detailed explanation of the significance of the evidence. We also decline to consider information presented in Dr. Miller’s supporting Declaration (Ex. 1016), but not discussed sufficiently in the Petition. Among other reasons, doing so would permit the use of declarations to circumvent the page limits that apply to petitions. For the same reasons, our rules prohibit arguments made in a supporting document from being incorporated by reference into a petition. *See* 37 C.F.R. § 42.6(a)(3); *Fidelity Nat’l Info. Servs., Inc. v. DataTreasury Corp.*, Case IPR2014-00489, 2014 WL 4059220, at \*5 (PTAB Aug. 13, 2014)..

Accordingly, we determine that Petitioner has not established a reasonable likelihood of prevailing on the ground that the challenged claims would have been obvious based on Pawlicki ’857.

### *3. Obviousness Based on Pawlicki ’857 and Broggi I*

Petitioner asserts that claims 1, 2, 4–7, and 9–15 would have been obvious based on Pawlicki ’857 and Broggi I. Pet. 30–33, 50–58. Petitioner relies on Broggi I for the disclosure of the shadow clause in claim 1. *Id.* at 31. Petitioner asserts that Broggi I is cited to show vehicular vision systems that, in response to processing captured image data, distinguish shadows from objects in the image. *Id.* at 31. According to Petitioner, Broggi’s imaging system detects lane markings, and “Broggi notes that shadows hinder their detection.” *Id.* at 32 (citing Ex. 1011, 2). The cited page, however, does not mention shadows. The cited page states that a “binary image representing two different regions (road and off-road)” is generated, without any mention of shadows.

According to Petitioner, “Broggi discloses that a non-uniform sampling of the image is conducted, which counters the perspective effect in the image and causes every pixel in the image to represent information homogeneously.” *Id.* (citing Ex. 1011, 2–4). Petitioner does not explain the relevance of this purported disclosure in Broggi I. Petitioner concludes that Broggi I discloses “the road markings can easily be extracted, despite the existence of shadows.” *Id.* (citing Ex. 1011-002) (“In this way it is possible: to detect road markings through an extremely simple and fast morphological processing; [and] to overcome completely the annoying problems caused by a non uniform illumination (shadows)...”). Again, we fail to find support for Petitioner’s assertion at the cited page. We also fail to find the quoted phrase. Petitioner also cites and quotes passages from Exhibit 1011, page 1 (“Based on geometrical transform and on a fast morphological processing, the system is capable to detect road markings even in extremely severe shadow conditions on flat and structured roads.”) and Ex. 1011, page 5 (Our approach has “been demonstrated to be robust with respect to extremely critical shadow conditions and global illumination changes...”). We fail to find support for Petitioner’s assertions and quotes at the cited pages. Petitioner concludes that Broggi I discloses that, in response to the processing of captured image data, the control distinguishes an object (a lane marker) from a shadow. *Id.* (citing Ex. 1016 ¶ 91). Our review of Broggi I is that it discloses a system for “the detection of *structured* roads (with painted lane markings) and robust enough to tolerate severe illumination changes such as *shadows*.” Ex. 1011, 5. We are not persuaded that Broggi I discloses a control that distinguishes an object present in the field of view from a shadow present in the field of view, as recited in claim 1. Accordingly, based on our analysis above, we are not persuaded that Petitioner will

prevail in establishing that claims 1, 2, 4–7, and 9–15 would have been obvious based on Pawlicki '857 and Broggi I.

*4. Obviousness Based on Pawlicki '857 and Jeon*

Petitioner asserts that claims 3, 8, 17, 21, and 22 would have been obvious based on Pawlicki '857 and Jeon. '961 Pet. 30–56. This ground of unpatentability appears to be contingent on a determination that Pawlicki '857 does *not* disclose the shadow clause. As discussed above, we have determined that Pawlicki '857 *does* disclose the shadow clause. Nonetheless, we consider this asserted ground of unpatentability based on Pawlicki '857 and Jeon. We also note that Petitioner has *not* asserted in the '961 Petition that Pawlicki '857 anticipates claims 3, 8, 17, 21, and 22. The only ground asserted against these claims is obviousness based on Pawlicki '857 and Jeon.

Claim 3, dependent from claim 1, recites that the control is operable to distinguish an object of interest from a shadow “to reduce the likelihood of a false determination of an object of interest.” Thus, claim 3 merely adds a functional statement to the system recited in claim 1.

Jeon discloses an image processing method in which lane markers of a lane that a vehicle is driving in are precisely determined in order to prevent deviation from the lane by the vehicle. Ex. 1005 ¶ 11. The method generates a road image by photographing a road. It then performs a “brightness averaging process” of the road image; filters the road image; performs an “inverse perspective process” on the filtered road image; compresses the road image; determines slope in the lane markers from the compressed road image; determines a curvature in the road from the determined slope; and determines a drive direction and a lane deviation of the

vehicle. *Id.* ¶ 0012. The filtering process uses the fact that a brightness value in the lane markers is higher than that outside the lane markers. *Id.* ¶ 0038.

Petitioner asserts that Jeon discloses that an average brightness determination is performed on an image so that shadows, which are dark as compared to the overall brightness of the road, are distinguished and essentially “filtered out” of the image. ’961 Pet. 41 (citing Ex. 1005 ¶ 34) (“Image processor 20 performs an average brightness determination to remove elements from the images that may act as noise in image processing since they are too dark compared with the overall brightness of the road images. Such elements include skid marks and shadows.”).

Patent Owner asserts that shadows are “lumped with other dark elements such as skid marks.” ’961 Prelim. Resp. 32. As disclosed in Jeon, “after an average brightness value of the photographed road images is determined by the image processor 20, a brightness of portions having a value less than the average value is *exchanged with the average value* such that these portions are, in effect, removed from the image.” Ex. 1005 ¶ 35 (emphasis added). Thus, Jeon merely performs an average brightness determination and exchanges any image with a brightness that is below average with a brightness that is average. Accordingly, we determine that Jeon does not distinguish a shadow from an object, as recited in claim 3.

Claim 8, also dependent indirectly from claim 1, includes the shadow clause. Petitioner asserts “[a]ll elements of claim 8 are thus present in Pawlicki (’857) as modified in view of Jeon (’235), and the claim is invalid as obvious.” ’961 Pet. 48. Based on our analysis above, we do not agree with Petitioner’s position. Jeon does not disclose the shadow clause included in claim 8.

Claim 17, dependent from claim 16, and claim 21, dependent from claim 20, each recite that the control is operable to determine at least a portion of a shadow of the equipped vehicle and is operable to determine that the determined shadow is not an object of interest. As Petitioner notes, claims 17 and 21 “have identical language.” *Id.* at 49.

Petitioner asserts that “Jeon (’235), however, shows that its control 20 is operable to determine that the determined shadow constitutes noise, and not an object of interest.” *Id.* We disagree. Jeon merely replaces any area of the image with brightness less than the average brightness of the image with the average brightness value. The modified image, thus, has no areas with a below average brightness value. Petitioner has not directed us to persuasive evidence that Jeon is operable to determine that a shadow is not an object of interest.

Claim 22, similar to claim 3, recites that the control is operable to distinguish an object of interest from a shadow “to reduce the likelihood of a false determination of an object of interest.” Based on our analysis above, Jeon does not disclose or suggest this limitation.

Accordingly, based on the record before us, we determine that Petitioner has *not* established that there is a reasonable likelihood of prevailing on challenged claims 3, 8, 17, 21, and 22 on the basis of obviousness in view of Pawlicki ’857 and Jeon.

*5. Anticipation and/or Obviousness Based on  
Either Yamamura, Thorpe, or Kenue*

Petitioner asserts that Yamamura and Thorpe anticipate claim 1 or that claim 1 would have been obvious based on either of these references. Pet. 33, 45. Petitioner also asserts claims 16 and 18 are anticipated by Kenue or that claims 16 and 18 would have been obvious in view of Kenue. ’961 Pet. 56 & n. 17.

Under 37 C.F.R. § 42.108(a), the Board has discretion to “authorize the review to proceed on all or some of the challenged claims and on all or some of the grounds of unpatentability asserted for each claim.” The Board also “may deny some or all grounds for unpatentability for some or all of the challenged claims.” 37 C.F.R. § 42.108(b). In making such determinations, the Board considers 37 C.F.R. § 42.1(b), which requires “the just, speedy, and inexpensive resolution of every proceeding.”

Our analysis above determined that there is a reasonable likelihood that Pawlicki ’857 anticipates claims 1, 16, and 18. We have determined to institute a trial on this ground. We exercise our discretion and have determined not to institute trial of claims 1, 16, and 18 based on either Yamamura, Thorpe, or Kenue.

The additional grounds of unpatentability address the same claims on which we already are instituting an *inter partes* review. Petitioner does not articulate a meaningful distinction in terms of relative strengths of the various grounds of unpatentability. Nor does Petitioner provide argument or evidence clearly favoring any one of the asserted grounds over the others.

Regarding the obviousness challenge based on Yamamura, Petitioner’s total argument is that “[a]ny element not met by Yamamura is nevertheless obvious in view of Yamamura.” Pet. 33 (citing footnote 6 of the Petition, which asserts only that “anticipation is the epitome of obviousness.”). Petitioner’s cursory obviousness challenge is unpersuasive and noncompliant with our rules.

Regarding the obviousness challenge based on Thorpe, Petitioner’s argument is contained in footnote 15 of the Petition. Pet. 45–46. The Supreme Court has made clear that we apply “an expansive and flexible approach” to the question of obviousness. *KSR*, 550 U.S. at 415. Whether a patent claiming the

combination of prior art elements would have been obvious is determined by whether the improvement is more than the predictable use of prior art elements according to their established functions. *Id.* at 417. To reach this conclusion, however, requires more than a mere showing that the prior art includes separate references covering each separate limitation in a claim under examination.

*Unigene Labs., Inc. v. Apotex, Inc.*, 655 F.3d 1352, 1360 (Fed. Cir. 2011). Rather, obviousness requires the additional showing that a person of ordinary skill at the time of the invention would have selected and combined those prior art elements in the normal course of research and development to yield the claimed invention. *Id.*; *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) (“However, rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.”). Petitioner’s argument lacks a persuasive, fact-based analysis as to why a person of ordinary skill would have modified Thorpe as proposed by Petitioner.

Regarding the obviousness challenge based on *Kenue*, Petitioner’s entire argument is that “rejections under § 103 would also be proper.” ’961 Pet. 56 n. 17. As discussed above, this cursory analysis fails to comply with the rules governing the content of a petition for *inter partes* review.

### III. CONCLUSION

Upon consideration of the Petition and Preliminary Response, we are persuaded that the record before us demonstrates a reasonable likelihood that Petitioner will prevail on the ground that Pawlicki ’857 anticipates claims 1, 2, 4–7, 9–16, 18–20, and 23. We also have determined that, based on the record before

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us, Petitioner has not shown sufficiently that Tzomakas, Broggi II, Graefe, and Sun are prior art printed publications in this proceeding.

This is a decision to institute an *inter partes* review under 35 U.S.C. § 314. The Board has not made a final determination on the patentability of the challenged claims.

#### IV. ORDER

For the reasons given, it is:

ORDERED that *inter partes* review is authorized as to whether claims 1, 2, 4–7, 9–16, 18–20, and 23 of the '929 patent are anticipated by Pawlicki '857;

FURTHER ORDERED that pursuant to 35 U.S.C. § 314(a), *inter partes* review of the '929 patent is hereby instituted commencing on the entry date of this Order, and pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial; and

FURTHER ORDERED that no ground other than that specifically granted above is authorized for the *inter partes* review.

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