

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TESLA, INC.,
Petitioner

v.

INTELLECTUAL VENTURES II LLC.,
Patent Owner

IPR2025-00342
U.S. Patent No. 7,336,805

**PETITIONER'S REPLY TO
PATENT OWNER'S RESPONSE**

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I. INTRODUCTION

The Petition, supported by Dr. Rodriguez's testimony, establishes how the prior art renders obvious challenged claims 1-2 and 6-11 of the '805 patent. In its Patent Owner's Response ("POR"), Intellectual Ventures ("IV") attempts to avoid the prior art by improperly importing extraneous limitations into the claims, mischaracterizing the prior art, and mischaracterizing the Petition. IV's attempts to import unsupported limitations into the claims to avoid the prior art is improper. Nevertheless, the prior art renders the claims unpatentable even under IV's improper constructions.

Petitioner respectfully requests that the Board confirm the unpatentability of the challenged claims.

II. CLAIM CONSTRUCTION

IV seeks to rewrite the claims by importing unsupported limitations into the claims to avoid the prior art. The Board should reject IV's proposed constructions. Ex.1072, ¶¶21-45.

IV initially agrees with Tesla "that the Challenged Claims should have their plain and ordinary meaning." POR, 9; Pet., 7. But then IV spends fifteen pages attempting to justify why the Challenged Claims should be interpreted to require numerous limitations that are not recited in the claims, not supported by the

specification, and contrary to the intrinsic and extrinsic evidence. POR, 9-25. IV’s proposed constructions should be rejected.

A. “*performing an additional acceptance analysis*”

The Board does not need to expressly construe this claim term because it is unnecessary to resolve whether the Challenged Claims are unpatentable. *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (the Board “need only construe terms that are in controversy, and only to the extent necessary to resolve the controversy.”) (internal quotation omitted). IV does not contest that the prior art teaches “*performing an additional acceptance analysis*” under the plain and ordinary meaning as utilized in the Petition. Further, the prior art teaches “*performing an additional acceptance analysis*” even under IV’s flawed construction, as shown in §III.A.2 below. The claims are unpatentable under either construction. Ex.1072, ¶22.

Claim Language	Tesla’s Construction	IV’s Construction
<i>“performing an additional acceptance analysis”</i>	Plain and ordinary meaning	“a separate, subsequent analysis step that operates only on the set of objects previously found plausible by the matching algorithm and evaluates those objects against image-formation constraints determined by the imaging sensor’s properties relative to the scene; only objects that pass this analysis are designated ‘accepted objects’ and stored for trajectory computation” (POR, 14)

IV's proposed construction improperly imports multiple limitations that are not recited or required, including that the "*additional acceptance analysis*" "operates only on the set of objects previously found plausible by the matching algorithm" and is a "subsequent analysis step." Ex.1072, ¶23.

1. The explicit claim language contradicts IV's proposed construction.

The claim language contradicts IV's assertion that the "*additional acceptance analysis*" operates only on the set of objects previously found plausible by the matching algorithm. Claim 1 recites that the "*the additional acceptance analysis including analyzing a shape of the image formation of each object in the image data.*"¹ Ex.1001, 8:16-18. There is no reference to "*plausible objects*" in the context of the "*additional acceptance analysis*" of [1.4.3]. Ex.1072, ¶24. Accordingly, "*plausible objects*" should not be improperly imported into the claim limitation. *Superguide Corp. v. DirecTV Enterprises, Inc.*, 358 F.3d 870, 875 (Fed. Cir. 2004) ("[I]t is important not to import into a claim limitations that are not part of the claim.").

The other analysis steps of claim 1 show the inventor knew how to explicitly

¹ Unless indicated otherwise, all emphases in quoted material have been added.

Claim language is italicized.

refer to objects identified in a different analysis step when that was the intended scope of the claim. Ex.1072, ¶25; *see, e.g.,* [1.4.1]-[1.4.2] (reciting “*analyzing the plurality of edge segments ... to identify **one or more potential geometric objects**,*” and “*analyzing the **one or more potential geometric objects** for plausibility using a matching algorithm so as to identify one or more plausible objects.*”). However, for the “*additional acceptance analysis*” in [1.4.3], the claim refers to “**each object** in the image data,” not the “one or more plausible objects” or even “the one or more potential geometric objects.” Ex.1072, ¶25. Accordingly, the explicit claim language contradicts IV’s proposed construction. *Id.*

Further, the explicit claim language also shows the “*additional acceptance analysis*” is not limited to “operat[ing] **only** on the set of objects previously found plausible by the matching algorithm.” Ex.1072, ¶26. To the contrary, claim 1 of the ’805 patent uses the transitional phrase “*the method **comprising***” and then [1.4.3] recites “*the additional acceptance analysis **including***” without any further limits. *Id.*

It is well established that “comprising” and “including” are open-ended phrases that allow the inclusion of other elements without departing from the scope of the claim. MPEP § 2111.03 (“**The transitional term ‘comprising’, which is synonymous with ‘including,’ ... is inclusive or open-ended and does not exclude additional, unrecited elements or method steps.**”); *Invitrogen Corp. v. Biocrest Manufacturing, L.P.*, 327 F.3d 1364, 1368 (Fed. Cir. 2003) (“The transition

“comprising” in a method claim indicates that the claim is open-ended and allows for additional steps.’). IV fails to identify any basis for ignoring the open-ended nature of the phrases “comprising” and “including” explicitly used in the context of the “*additional acceptance analysis*” of claim 1.

For at least these reasons, the explicit claim language contradicts IV’s proposed construction of “*performing an additional acceptance analysis.*”

2. The specification and prosecution history of the ’805 patent contradict IV’s proposed construction.

IV’s proposed construction is based on improperly limiting the claims to a specific embodiment described in the specification and excluding an alternative embodiment from the specification. POR, 9-14; Ex.1072, ¶28; *Phillips v. AWH Corp.*, 415 F.3d 1303, 1323 (Fed. Cir. 2005) (en banc) (“[A]lthough the specification often describes very specific embodiments of the invention, we have repeatedly warned against confining the claims to those embodiments.”); *Medrad, Inc. v. MRI Devices Corp.*, 401 F.3d 1313, 1320 (Fed. Cir. 2005) (“A claim construction that does not encompass a disclosed embodiment is rarely, if ever, correct.”).

To support its argument, IV points to a portion of the Summary of Invention that—contrary to the claim language—explicitly describes that “[t]hese **plausible objects** undergo an additional acceptance analysis.” POR, 10; Ex.1001, 2:43-44. Even if this was the only embodiment described by the ’805 patent, which it is not,

it would be improper to limit the claims to this embodiment. The Federal Circuit has “expressly rejected the contention that if a patent describes only a single embodiment, the claims of the patent must be construed as being limited to that embodiment.” *Phillips*, 415 F.3d at 1323.

IV has failed to identify any indication of manifest exclusion or restriction in the specification or prosecution history that would limit the “*additional acceptance analysis*” to operating *only* on plausible objects. Ex.1072, ¶28; *Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 906 (Fed. Cir. 2004) (“the claims of the patent will not be read restrictively unless the patentee has demonstrated a clear intention to limit the claim scope using ‘words or expressions of manifest exclusion or restriction.’”). In fact, the specification of the ’805 patent contradicts IV’s position by describing an embodiment where the additional acceptance analysis is performed on potential geometric objects. Ex.1072, ¶28. The ’805 patent describes that “**geometric objects** pieced together by the tree traversal algorithm, in connection with the **rules derived from the geometric shape of the destination, undergo an additional acceptance analysis.**” Ex.1001, 5:19-22. Looking to claim 1, the geometric objects described in the specification as being associated with a geometrical form or shape of a destination are referred to in the claim language as “potential geometric objects,” which are different than “plausible objects.” Ex.1001, 8:7-14 (“analyzing the plurality of edge segments for the presence of **a geometric**

object associated with a geometrical form that may at least partially describe a potential destination so as to identify one or more potential geometric objects; analyzing the one or more potential geometric objects for plausibility using a matching algorithm so as to identify one or more plausible objects;”). Ex.1072, ¶28. IV has failed to identify any “words or expressions of manifest exclusion or restriction” that would limit the “*additional acceptance analysis*” of claim 1 to operating only on “plausible objects” and not on “potential geometric objects.” *Medrad*, 401 F.3d at 1320.

There is also no specific timing requirement for the “*additional acceptance analysis*.” Ex.1072, ¶29. IV asserts that the use of the adverbs “then” and “subsequently” **in the Summary of Invention** and the term “additional” require the “*additional acceptance analysis*” **in claim 1** to be performed subsequent to “analyzing the one or more potential geometric objects for plausibility using a matching algorithm so as to identify one or more plausible objects.” POR, 10-11. However, unlike the Summary of Invention, claim 1 does not include “then” or “subsequently.” Ex.1072, ¶29. Also, the claim does not recite any “acceptance analysis” besides the “additional acceptance analysis.” *Id.* Accordingly, “additional” as used in the claim modifies “acceptance analysis” without requiring it to be subsequent to any other analysis. *Id.* Again, this is an improper attempt to limit the claims to a specific embodiment described in the specification and should be

rejected. *Phillips*, 415 F.3d at 1323; *Superguide*, 358 F.3d at 875.

Further, the prosecution history does not support IV's proposed construction. IV mischaracterizes the reasons for allowance. POR, 13. Looking at the reasons for allowance, it is clear the Examiner simply recited the claim language not taught by the prosecution prior art—which did not include any of the references relied upon in the Petition.

Allowable Subject Matter

Reasons of Allowance:

1. Claims 1-19 are allowed.

The following is an examiner's statement of reasons of allowance:

Both the instant invention and the closest prior art Ninomiya et al., U.S. Patent No. 5,220,508 are directed to vehicle guidance using image analysis and image processing which further includes extracting from the acquired image data positional parameters of at least one potential destination relative to the motor vehicle. However, in the instant invention the extracting of the parameters further includes edge detection and segmentation on the image data along with performing an additional acceptance analysis so as to identify at least one accepted object, the additional acceptance analysis including analyzing a shape of the image formation of each object in the image data based on the knowledge of at least one imaging property of the imaging sensor relative to the surrounding field and storing at least one accepted object that corresponds to a most proximate destination together with corresponding relative positional data in an object list in combination with other limitations in claims 1 and 13, which is not taught by the prior art of record. Therefore claims 1 and 13 are allowed. All other claims depending on claims 1 and 13 are allowable at least by dependency on claims 1 and 13.

Ex.1002, 31 (annotated).

Contrary to IV’s assertion, there is no indication in the reasons of allowance of any presupposition of timing or that the additional acceptance analysis only operates on plausible objects. Ex.1072, ¶31. Accordingly, the Board should reject IV’s position that the prosecution history supports its proposed construction.

* * *

For all the above reasons, IV’s proposed construction of “*performing an additional acceptance analysis*” should be rejected. The Board should adopt the plain and ordinary meaning of this term.

B. “*storing interrelationships of the plurality of edge segments in a mathematical tree structure*”

In the POR, IV addresses “*storing interrelationships of the plurality of edge segments*” separately from “*a mathematical tree structure.*” POR, 14-18, 22-25. However, IV’s arguments regarding “*storing interrelationships of the plurality of edge segments*” are entirely focused on the “*mathematical tree structure*” (see POR, 14-18). Taken together as used in claim 1, IV’s construction is:

Claim Language	Tesla’s Construction	IV’s Construction
“ <i>storing interrelationships of the plurality of edge segments in a mathematical tree structure</i> ”	Plain and ordinary meaning	a single, connected mathematical tree, not a forest of disconnected trees, that stores the interrelationships of the previously identified plurality and that is then traversed as a unit in the next step (POR, 18, 25)

This unduly narrow interpretation is not supported by the claim language, the

specification, or the extrinsic evidence. Ex.1072, ¶33.

1. The Board should reject IV's unduly narrow interpretation.

The single tree, non-forest requirement IV attempts to limit the claims to is not described in the claims or the specification of the '805 patent. Ex.1072, ¶34. The '805 patent explains that “the extracted edges and segments are able to be advantageously stored in **a hierarchically organized tree structure** in the image data. **Many different proven methods for creating and organizing such a hierarchical tree structure are available** to one skilled in the art.” Ex.1001, 4:43-47; Ex.1072, ¶34. Far from limiting “*a mathematical tree structure*” to a single tree or excluding forests, this description explicitly supports a broad interpretation that encompasses “many different proven methods for creating and organizing” a mathematical tree structure, including the “scale-space segment **tree**” of Huttenlocher relied upon in the Petition where “[e]ach segment in **the tree** is indicated by its label from Figure 3, and by the type of segment: straight, curve, and open-curve.” Ex.1072, ¶34; *see also* Pet., 38-43.

To support its flawed argument, IV relies entirely on an extrinsic document—Sedgewick (Ex.2006). However, the '805 patent explicitly notes that reference² to Sedgewick “is made here **exemplarily**,” not to limit the understanding of “*a mathematical tree structure*” or provide a definition. Ex.1001, 4:47-51; Ex.1072, ¶35. Regardless, Sedgewick itself contradicts IV's position. Ex.1072, ¶¶35-37.

First, IV continues to conflate “*a mathematical tree **structure***” with “a mathematical tree.” POR, 22-25, Ex.1073, 26:21-27:4. IV alleges that Sedgewick distinguishes a “tree” from a “forest.” POR, 23. However, Sedgewick does not distinguish a “forest” from “*a mathematical tree structure*.” Ex.1072, ¶36. This is because—contrary to IV's proposed construction—Sedgewick teaches a forest is an example of “*a mathematical tree structure*.” Ex.2006, 43-44 (original page numbering); Ex.1072, ¶36.

The '805 Patent specifically references Chapter 4 of Sedgewick for “the comprehensive compilation and discussion of **widely varying tree structures**.” Ex.1001, 4:47-51. Sedgewick's Chapter 4 is titled “**Trees**” and includes an entire

² The '805 patent does not incorporate Sedgewick by reference. *See* 37 CFR 1.57(c) (incorporation by reference “must: (1) Express a clear intent to incorporate by reference by using the root words “incorporat(e)” and “reference” (e.g., “incorporate by reference”)).

section on “**Forests**,” explaining how “**any forest** can be represented as a **binary tree**” and that in some instances “**forests** [are] easier to deal with than nearly **any other kind of tree**.” Ex.2006, 35, 43-44. Contrary to IV's arguments, the very chapter of Sedgewick referenced by the '805 patent teaches that a forest is an example of “*a mathematical tree structure*.” *Id.*; Ex.1072, ¶¶36-37.

Second, the claims of the '805 patent do not include any language indicating that “*a mathematical tree structure*” is limited to a single tree. Ex.1072, ¶38. To the contrary, claim 1 of the '805 patent uses the transitional phrase “the method comprising” and then [1.4.0] recites “...*storing interrelationships of the plurality of edge segments in a mathematical tree structure*” without any specification as to the number of trees in the mathematical tree structure or the interrelationship (or lack thereof) between the number of trees in the mathematical tree structure. *Genentech*, 112 F.3d at 501. Further, none of the dependent claims of the '805 patent limit the “*mathematical tree structure*” to IV's single tree, non-forest requirement. Ex.1072, ¶38. Simply put, the claims of the '805 patent are not limited to a single tree, nor do they exclude forests made up of multiple trees. *Id.*

Third, the detailed description and prosecution history of the '805 patent do not limit “*storing interrelationships of the plurality of edge segments in a mathematical tree structure in a mathematical tree structure*” to a single tree. Ex.1072, ¶39. Even if it were appropriate to import a limitation from the

specification (it is not), IV fails to identify any embodiments in the specification of the '805 patent limiting "*a mathematical tree structure*" to a single tree or excluding a forest. POR, 9-12. Further, the extrinsic evidence IV relies on contradicts IV's position. Ex.1072, ¶39. As discussed above, Chapter 4 of Sedgewick—referenced by the '805 patent for its "discussion of *widely varying tree structures*"—includes an entire section on "forests." Ex.2006, 43-44; Ex.1072, ¶39. IV fails to provide any evidence from the specification or prosecution history for excluding Sedgewick's example of forests as a type of mathematical tree structure from the claim scope. *See GE Lighting Sols. v. AgiLight, Inc.*, 750 F.3d 1304, 1309 (Fed. Cir. 2014) ("disavowal requires that the specification or prosecution history make clear that the invention does not include a particular feature."); *Storage Tech. Corp. v. Cisco Sys., Inc.*, 329 F.3d 823, 833 (Fed. Cir. 2003). And the '805 patent itself describes a tree traversal algorithm where "the individual branches are systematically processed, beginning with the **start nodes** of the tree." Ex.1001, 4:61-65 (citing Sedgewick, Chapter 5.6); Ex.1072, ¶39. Accordingly, the plain text of the '805 patent and its file history do not support limiting *a mathematical tree structure* to a single tree. Ex.1072, ¶***.

The Board should decline IV's invitation to redraft the claims. *See Rembrandt Data Techs., LP v. AOL, LLC*, 641 F.3d 1331, 1339 (Fed. Cir. 2011) (the Federal

Circuit “repeatedly and consistently has recognized that courts may not redraft claims.”).

* * *

Accordingly, IV's proposed construction of “*storing interrelationships of the plurality of edge segments in a mathematical tree structure*” should be rejected. The Board should construe this term according to its plain and ordinary meaning.

C. “*potential destination*”

Claim Language	Tesla's Construction	IV's Construction
“<i>potential destination</i>”	Plain and ordinary meaning	a fixed, physically meaningful endpoint discoverable from geometric cues in the image, not a moving vehicle (POR, 21)

1. IV's unduly narrow interpretation is not supported by the claims, the specification, or the prosecution history and contradicts IV's infringement contentions.

Claim 1 recites “*at least one potential destination relative to the motor vehicle*” in [1.2] without any limitation as to the type of destination. Ex.1001, 7:57-8:23. There is nothing in the claims requiring the destination to be fixed or stationary. Ex.1072, ¶¶41-42; *Superguide*, 358 F.3d at 875 (“[I]t is important not to import into a claim limitations that are not part of the claim.”). The language of claim 1 also indicates that the “*potential destination*” is not limited to a stationary object because “*image data*” is “*acquired...using an imaging sensor from a surrounding field of the motor vehicle,*” and the “*potential destination*” is “*extract[ed] from the acquired*

image data.” Ex.1001, 7:59-63; Ex.1072, ¶42.

While the specification of the '805 patent provides an example of “maneuvering trucks toward docking stations,” the claims are not limited to this embodiment. Ex.1072, ¶43; *Liebel-Flarsheim*, 358 F.3d at 906 (claims are not restricted unless patentee uses “words or expressions of manifest exclusion or restriction”). Further, the '805 patent is not limited to stationary objects such as docking stations. Ex.1072, ¶43. For example, the '805 patent describes “camera-based position detection and **lane control system[s] for motor vehicles.**” Ex.1001, 1:50-54 (discussing DE 10323915.4); Ex.1072, ¶43. Consistent with the '805 patent's discussion of lane control, IV asserts in the related district court litigation that the “*potential destination*” in claim 1 covers Tesla's Autosteer and Auto Lane Change features. Ex.1016, 10. IV argues that Tesla's Autosteer “**maintains ... a set following distance (if there is a vehicle in front of you)**” and “**detects** lane markings, road edges, and **the presence of vehicles and objects to intelligently keep [the vehicle] in its driving lane**” and that “Auto Lane Change **moves [the vehicle] into the adjacent lane**” Ex.1016, 10.

IV's infringement contentions directly contradict IV's argument in this IPR. POR, 21. In the context of Tesla's Autosteer and Auto Lane Change—just like platooning—the destination of the motor vehicle is not a fixed location or endpoint and changes over time. IV's contradictory and irreconcilable positions make clear

that IV is attempting to avoid the prior art in this IPR through an overly narrow claim construction while asserting a broad construction in litigation. IV entirely failed to address its inconsistent positions in the POR. *See* POR, 18-21.

In an attempt to support the idea that a “*potential destination*” excludes moving vehicles, IV’s expert testified that the ’805 patent’s abstract provides an explicit definition of “*potential destination*” when it describes bringing a “vehicle to a stop at a specific location, for example in a parking bay or at a loading platform.”; Ex.1073, 45:1-46:3 (“Q. So you understand this statement in the abstract to be an explicit definition of a potential destination? A. Yes.”); Ex.1001, Abstract. However, the abstract’s mention of example locations for stopping a vehicle without using the phrase “*potential destination*” is very far from providing an explicit definition and should not be read as limiting because the same examples are provided in the specification along with other implementations of “vehicle guidance,” such as a “lane control system for motor vehicles.” Ex.1001, 1:10-2:10; Ex.1072, ¶44. IV has not met the exacting standards for lexicography. *Hill-Rom Servs., Inc. v. Stryker Corp.*, 755 F.3d 1367, 1371 (Fed. Cir. 2014) (“The standards for finding lexicography ... are exacting. ‘To act as its own lexicographer, a patentee must clearly set forth a definition of the disputed claim term other than its plain and ordinary meaning’ and must ‘clearly express an intent to redefine the term.’”) (quoting *Thorner v. Sony Computer Entm’t Am. LLC*, 669 F.3d 1362, 1365 (Fed.

Cir. 2012)). Accordingly, IV's attempts to limit the construction of "*potential destinations*" to a fixed location are improper. The Board should construe this term according to its plain and ordinary meaning.

III. GROUNDS 1-2 RENDER THE CHALLENGED CLAIMS OBVIOUS.

A. The prior art teaches "*performing an additional acceptance analysis*" as claimed.

1. The prior art teaches "*performing an additional acceptance analysis*" under the plain and ordinary meaning.

The Petition explains how the prior art teaches "*performing an additional acceptance analysis*" under the plain and ordinary meaning. Pet., 7, 48-54. Specifically, the Petition explains at least two ways the prior art discloses or renders obvious "*performing an additional acceptance analysis*" in [1.4.3], including based on Broggi alone (Pet., 48-52) and based on Broggi in view of Huttenlocher (Pet., 52-54).

IV does not contest that the prior art teaches "*performing an additional acceptance analysis*" under the plain and ordinary meaning as utilized in the Petition. See POR, 33-40. Instead, IV's arguments require adopting IV's erroneous construction that improperly imports multiple unrecited limitations. See *Id.* Because IV's proposed construction should be rejected (see § II.A above), it is uncontested that Petitioner has shown that the prior art teaches "*performing an additional acceptance analysis*" under the correct, plain and ordinary meaning construction.

2. The prior art teaches “*performing an additional acceptance analysis*” under IV’s flawed construction.

The Petition’s explanations of how Broggi alone and Broggi in view of Huttenlocher disclose or render obvious “*performing an additional acceptance analysis*” under the plain and ordinary meaning also show how the prior art meets the additional limitations that IV attempts to read into the claim. Pet., 7, 48-54; Ex.1072, ¶¶56-58.

IV’s arguments that the Petition fails to satisfy IV’s proposed construction of “*performing an additional acceptance analysis*” are based on a fundamental mischaracterization of the Petition. Specifically, IV incorrectly asserts that “[f]or [1.4.1], Petitioner relies on Broggi’s bottom-corner **and top-of-box searches**.” POR, 33-34. This is simply not true. The Petition’s analysis of [1.4.1] relies on only Broggi’s detection of the bottom corners—using Huttenlocher’s known pattern matching technique. Pet., 43-46. For example, the Petition explains that “Broggi analyzes the image data for the presence of a geometric object (**bottom corners of a preceding vehicle**) associated with a geometrical form (**shape associated with bottom corners of a preceding vehicle**) that may at least partially describe a potential destination (location of the preceding vehicle) so as to identify one or more potential geometric objects (**potential bottom of the bounding box**)” Pet., 44. Further, the Petition concludes the analysis of [1.4.1] by stating that

Broggi in view of Huttenlocher renders obvious analyzing the plurality of edge segments for the presence of a geometric object associated with a geometrical form that may at least partially describe a potential destination (analyzing coarse level descriptions of edge segments for **presence of a bottom corner of a preceding vehicle** associated with **a bottom corner of a model vehicle**) so as to identify one or more potential geometric objects (identifying **potential bottom corners of a preceding vehicle** by identifying potentially matching image features).

Pet., 46.

The Petition relies on Broggi's separate and subsequent step of detecting the top part of the bounding box in the analysis of [1.4.3], not [1.4.1]. Pet., 48-54. Besides the Petition's clear mapping of the prior art in this manner, footnote 7 of the Petition confirms this understanding by noting: "This alternative position for [1.4.3] is based on using Huttenlocher's pattern matching technique for detecting both **the bottom corners** (see [1.4.1]-[1.4.2]) and **the top of the preceding vehicle [1.4.3]**." Pet., 52 n.7. Contrary to IV's assertion, the Petition does not collapse distinct steps into a single step (POR, 32) but instead relies on separate steps of a multi-step process in the same manner as claimed by the '805 patent.

Based on a correct understanding of the Petition, all of IV's arguments fail because the prior art mapping set forth in the Petition satisfies the plain and ordinary meaning as well as IV's improper construction.

Indeed, the Petition explicitly maps Broggi's teachings as a multi-step, ordered pipeline analysis that considers image-formation constraints in the manner IV argues the claim should be understood to require. Specifically, the Petition explains that:

Broggi performs bounding box detection by (1) determining “two corners representing the bottom of the bounding box around the vehicle” and (2) detecting “the top part of the bounding box, which is looked for in a specific region whose location is again **determined by perspective and size constraints.**”

Pet., 43 (citing Ex.1005, 171).

Broggi describes a first analysis step (identifying “two corners representing the bottom of the bounding box” of a potential preceding vehicle). Broggi then describes a second, separate, and subsequent analysis step (detecting “the top part of the bounding box” after locating bottom corners to confirm whether a correct bounding box exists). As explained in the Petition, Broggi's second analysis step operates only on the bottom corners previously found plausible based on Huttenlocher's matching algorithm. Pet., 49-50; Ex.1072, ¶57. The Petition explicitly notes that “‘each object in the image data’ [as used in [1.4.3]] is understood to include the claimed ‘**one or more plausible objects.**’” Pet., 48 n.6. And Broggi describes the additional acceptance analysis is performed based on image-formation constraints (“perspective and size constraints” based on, e.g., the known “stereo

[camera] set-up”). Pet., 48-51 (citing Ex.1005, 171-172). Broggi also explains that only objects that pass the second analysis (e.g., by forming a completed a bounding box and associated distance refinement for a preceding vehicle) are designated as an “accepted object” and stored for trajectory computation by determining a desired path and associated steering angle. Pet., 11, 17-18, 32-37, 49-50, 54-56; Ex.1005, 173, Fig. 21. If “no correct bounding boxes exist,” then Broggi describes that “a backtracking approach is used” where a different location is checked. Pet., 49; Ex.1005, 171 (“a new search for a bounding box is performed”). Thus, the prior art mapping set forth in the Petition teaches “*performing an additional acceptance analysis*” even under IV’s flawed construction. Ex.1072, ¶58.

Notwithstanding IV’s attempts to argue that the claims require a “post-bounding-box” acceptance analysis, neither the claims nor IV’s proposed construction require the “*additional acceptance analysis*” to exclude or otherwise be performed after a bounding box analysis as taught by Broggi and the combination of Broggi and Huttenlocher. Accordingly, IV’s “post-bounding-box” arguments do not change the fact that the prior art teaches “*performing an additional acceptance analysis*” under both constructions. Ex.1072, ¶58.

B. The prior art teaches “*storing interrelationships of the plurality of edge segments in a mathematical tree structure*” as claimed.

1. Huttenlocher stores interrelationships of edge segments in a scale-space segment tree.

Huttenlocher describes the use of “a mathematical tree structure” in the context of Figs. 3 and 4, where Huttenlocher explicitly notes “Figure 4 shows this scale-space segment tree. Each segment in the tree is indicated by its label from Figure 3, and by the type of segment: straight, curve, and open-curve.” Ex.1006, 373-374, Figs. 3-4; Pet., 41-42. Despite the explicit teachings from Huttenlocher describing and showing the interrelationships of a plurality of edge segments stored in a tree structure, IV alleges that “Petitioner’s assertion that Huttenlocher discloses a hierarchical organization of edge segments is not supported by the reference itself, but rests solely on the conclusory and unsubstantiated statements of Petitioner’s expert” and “Petitioner’s assertion that Huttenlocher discloses a connected tree thus rests on conclusory expert say-so, not the reference.” POR, 50. IV’s arguments are incorrect.

The Petition shows and explains how Huttenlocher’s scale-space segment tree stores the interrelationships of the plurality of edge segments in a hierarchical manner based on granularity and relative position. Pet., 41-42 (citing Ex.1006, 373-374, Figs. 3-4; Ex.1003, ¶¶107-108). The ’805 patent itself notes that “[m]any different proven methods for creating and organizing such a hierarchical tree

structure are available to one skilled in the art[.]” Ex.1001, 4:45-51. The approach described by Huttenlocher is one example of these known methods. Pet., 41-42 (citing Ex.1006, 373-374, Figs. 3-4; Ex.1003, ¶¶107-108). Based on Huttenlocher's explicit description of storing the interrelationships of edge segments in a “**scale-space segment tree**,” Huttenlocher expressly teaches “*storing interrelationships of the plurality of edge segments in a mathematical tree structure*,” as claimed. Pet., 38-43.

IV's argument that the Petition does not show “processing that same tree structure to search for and validate a destination-describing geometric form” misses the mark. POR, 49. The Petition explains that “[i]n the combination, Broggi implements Huttenlocher's known pattern matching technique—that segments edges, stores edges segments in a **multi-scale tree**, and analyzes the edge segments—as part of detecting the location of a preceding vehicle.” Pet., 39. The Petition explains that Huttenlocher's pattern matching technique is used in [1.4.1] “to identify geometrical features in the image that ‘potentially match’ with corresponding features of an object (bottom corners of a preceding vehicle in the combination with Broggi[.]” Pet., 44-45. The Petition also explains that “Huttenlocher's pattern matching technique” may be used in [1.4.3] “to detect the top of the preceding vehicle in Broggi[.]” Pet., 52-53. Accordingly, the Petition shows that Huttenlocher teaches “*a mathematical tree structure*,” as well as how

the combination uses Huttenlocher's tree structure for each of the analysis steps claimed in [1.4.1] and [1.4.3].

Even under IV's improper construction, Huttenlocher renders obvious "*storing interrelationships of the plurality of edge segments in a mathematical tree structure.*" Ex.1072, ¶61. As explained in the Petition, Huttenlocher stores "the plurality of edge segments in a multi-scale mathematical tree structure based on granularity." Pet., 41. For instance, considering the tree identified in the red box on p. 49 of the POR the A1 segment (low granularity) is stored based on interrelationships (e.g., granularity and relative position) to the plurality of medium granularity A2, B2, C2, D2, and E2 edge segments, which are in turn stored based on interrelationships to the plurality of high granularity D3, E3, F3, G3, and H3 edge segments. Pet., 40-41; Ex.1006, Figs. 3-4; Ex.1072, ¶61. As the Board recognized, the claim "language does not require processing *all* edge segments, only a plurality, and does not require storing *all* interrelationships, just an unspecified quantity." ID, 10 (emphasis original). Accordingly, Huttenlocher discloses storing interrelationships of a plurality of edge segments in a mathematical tree structure that is not a forest, meeting the requirements of IV's improper construction. Ex.1072, ¶61. Further, as Dr. Rodriguez explains and Sedgewick confirms, Huttenlocher's visualization of a multi-rooted tree is easily

represented as a single binary tree, which also satisfies IV's improper construction.

Id.; Ex.2006, 59.

C. The prior art teaches identifying a “*potential destination*” as claimed.

The prior art teaches identifying a “*potential destination*” in the same manner as the '805 patent by automatically identifying from image data a location in the vehicle's surrounding environment. Ex.1072, ¶62. The Petition shows how the prior art teaches “the location of a preceding vehicle is a *potential destination relative to the motor vehicle*” in a manner “consistent with how the '805 patent uses the term ‘destination,’ referring to a destination as an object (e.g., cargo door of a dock).” Pet., 31 (citing Ex.1005, 174; Ex.1001, 7:25-31, 7:50; Ex.1003, ¶ 88); *see also* Ex.1001, 7:37 (“**a potential destination object**”). The Petition explains how the “location of preceding vehicle in a platoon” is “a potential destination of the [following] motor vehicle.” Pet. 28-32 The location of the preceding vehicle is a “*potential destination*” because it represents where the following motor vehicle is potentially going and is identified in the manner required by the claims of the '805 patent. Ex.1072, ¶62. Like the cargo door example, a motor vehicle in the platoon of the prior art will automatically drive toward the location of the preceding vehicle but will not run into the preceding vehicle. *Id.* The prior art identifies and operates with respect to a “*potential destination*” in the same manner as the '805 patent and

consistent with IV's infringement contentions in district court (*see* §II.C.1). *Id.*

IV's portrayal of Broggi as "reactive platooning" (POR, 40-45) ignores that the '805 patent similarly recognizes that "it is particularly advantageous for the trajectory to be constantly readapted...on the basis of a continuous image analysis[.]" Ex.1001, 6:63-67; Ex.1072, ¶63. The '805 patent also contemplates that "the position of the objects stored as potential destinations in the object list [] be continuously monitored" so that new destinations can be chosen when "the originally most proximate destination can no longer be easily reached due to circumstances[.]" Ex.1001, 7:1-12; Ex.1072, ¶63. Accordingly, like the '805 patent and IV's infringement contentions asserting claim 1 covers Tesla's Autosteer and Auto Lane Change features, the position of a leading vehicle in Broggi's platoon—updated over time based on movement of the leading vehicle—is a potential destination of the following vehicle. Ex.1072, ¶63. Also, Broggi's continuous calculation of a trajectory over time merely represents repeating the elements of claim 1, rather than teaching away from the claim. *Id.*

Finally, IV's expert, Dr. Majumder, confirmed that a stopped vehicle can be a "*potential destination*" under IV's proposed construction. Ex.1073, 50:3-51:7. Accordingly, at least in instances when the preceding vehicle in Broggi's platoon is stopped (e.g., due to a stop sign, a red light, or while waiting to make a turn), the preceding vehicle is a "*potential destination*" under IV's proposed construction and

the prior art as set forth in the Petition meets IV's unnecessarily narrow construction of "*potential destination*." Ex.1072, ¶64.

IV. CONCLUSION

The Challenged Claims are unpatentable.

Respectfully submitted,

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V. CERTIFICATE OF WORD COUNT

Under 37 C.F.R. § 42.24, the undersigned attorney for the Petitioner, declares that the argument section of this Reply (§§I-IV) has 5,588 words, according to the word count tool in Microsoft Word™.

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CERTIFICATE OF SERVICE

The undersigned certifies, under 37 C.F.R. §§ 42.105 and 42.6, that service was made on the Patent Owner as detailed below.

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