

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TESLA, INC.

Petitioner,

v.

INTELLECTUAL VENTURES II LLC

Patent Owner.

Case No. IPR2025-00342

U.S. Patent No. 7,336,805

PATENT OWNER'S RESPONSE

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PATENT OWNER'S EXHIBIT LIST

EX2001	Petitioner's Answer to Complaint and Counterclaim, dated June 20, 2024, in <i>Intellectual Ventures II LLC v. Tesla, Inc.</i> , C.A. 1:24-cv-00884-ADA (W.D. Tex.)
EX2002	Docket from District Court Litigation, <i>Intellectual Ventures II LLC v. Tesla, Inc.</i> , C.A. 1:24-cv-00884-ADA (W.D. Tex.)
EX2003	Scheduling Order from District Court Litigation, <i>Intellectual Ventures II LLC v. Tesla, Inc.</i> , C.A. 1:24-cv-00884-ADA (W.D. Tex.)
EX2004	Defendant's Second Supplemental Preliminary Invalidity Contentions, dated January 9, 2025, in District Court Litigation, <i>Intellectual Ventures II LLC v. Tesla, Inc.</i> , C.A. 1:24-cv-00884-ADA (W.D. Tex.)
EX2005	Letter from Patent Owner to Associate General Counsel for Petitioner, dated August 20, 2020, enclosing copy of U.S. Pat. No. 7,181,143 and Claim Chart Presentation
EX2006	R. Sedgewick, Algorithms in C, Addison-Wesley Pub. Comp. Inc., 1990
EX2007	Declaration of Dr. Majumder In Support Of Patent Owner's Preliminary Response.
EX2008	CV of Dr. Majumder
EX2009	Ninomiya et al., U.S. Patent No. 5,220,508
EX2010	Declaration of Dr. Majumder In Support Of Patent Owner's Response.

I. INTRODUCTION

Tesla's Petition does not meet its burden. The '805 patent claims a destination-based docking assistant that processes camera imagery through an ordered pipeline: (i) detect and segment edges, store interrelationships of the resulting segments in a mathematical tree structure, and analyze those stored relations to identify geometric objects; (ii) test those candidate objects for plausibility using a matching algorithm; (iii) perform an additional acceptance analysis that evaluates the shape of the image formation using knowledge of the imaging sensor's properties relative to the surrounding field; (iv) store the accepted destination together with its positional parameters; and only then (v) calculate at least one trajectory describing an optimized travel path using those stored parameters to assist subsequent guidance. See EX1001, 6:31–7:22; 7:45–8:34; 8:30–50; 9:3–25. The Petition never proves these claim-critical steps.

First, the Petition identifies no post-detection, post-matching “additional acceptance analysis” that analyzes image formation based on camera geometry. Instead, it repackages Broggi's bounding-box search windows and stereo refinement from the detection pipeline as the supposed acceptance gate, but those are target-appearance heuristics, not the required sensor-geometry analysis performed downstream of plausibility. See Petition, 50–51; EX1005, 171–172; EX1001, 7:45–8:34. Second, the Petition never shows “at least one trajectory describing an

optimized travel path using the positional parameters of an accepted destination object,” computed after acceptance and storage. Broggi’s ARGO performs reactive platooning, issuing moment-to-moment steering to follow a moving leader rather than planning a destination-driven path that consumes stored accepted-object parameters. See EX1005, 171–172; Petition, 34–35, 46–47, 50–51; EX1001, 7:45–8:34; 8:30–50; 9:3–25. Third, the Petition does not disclose the claimed single connected “mathematical tree structure” that stores interrelationships of the plurality of edge segments and is processed using a tree traversal algorithm (claim 2). Its citations at most, point to multi-root displays, i.e., a forest, which Sedgewick treats as distinct from a tree notwithstanding the left-child/right-sibling representation device. See Petition, 37, 46–47, 50–51; EX1001, 6:31–7:22; 8:1–10; EX2006, 51–52, 57–59, 65; EX2010, ¶¶156–164, ¶167.

These deficiencies are not cured by adding Bertozzi. Bertozzi supplies interface and comfort constraints for ARGO, not a downstream sensor-geometry acceptance analysis, not object-list storage and parameter use for trajectory computation, and not a single connected tree with traversal. See Petition, 50–51; EX1001, 6:31–7:22; 7:45–8:34; 8:1–10; 8:30–50. The Petition therefore fails to prove unpatentability under either ground.

II. THE ‘805 PATENT

A. Overview

The ‘805 Patent is directed to a system and method for assisting the guidance of a motor vehicle, particularly trucks, to fixed destinations such as docking stations or loading platforms, using image data acquired from an onboard sensor. The invention aims to eliminate the need for dedicated visual markers at the destination by identifying potential destinations solely through the analysis of geometric features within the image data. EX2010, ¶27.

The core of the invention lies in a multistage image processing pipeline that first extracts positional parameters of candidate destination objects from the surrounding environment. This is achieved by performing edge detection and segmentation on the acquired image data, followed by organizing the resulting edge segments in a mathematical tree structure that encodes the interrelationships among them. This tree structure is then traversed to identify geometric objects—such as rectangles or squares—that plausibly correspond to destinations like cargo doors. EX2010, ¶28.

Once potential geometric matches are identified, they undergo a plausibility analysis using a matching algorithm (e.g., an Iterative Closest Point (ICP) algorithm) to determine alignment with stored object models. The system further refines its selection through an acceptance analysis that considers the expected distortion in the

image caused by the sensor's perspective (e.g., trapezoidal deformation of a rectangular object viewed from above). Only those objects that satisfy both geometric plausibility and sensor-based consistency are retained as candidate destinations. EX2010, ¶32.

From these, the most proximate accepted destination is selected and used to calculate an optimized travel path to guide the vehicle. This calculated trajectory may then be provided to a driver assistance system for visual display or used directly for semi-automated or automated vehicle control. The invention supports real-time recalibration of the destination and path if conditions change, and it accounts for the steering limitations of the vehicle when generating the trajectory. EX2010, ¶34. Accordingly, the claimed pipeline is: edge detection → edge segmentation with interrelationships stored in a mathematical tree structure → analysis for one or more geometric objects matching the typical form of a potential destination → plausibility matching (e.g., ICP) → additional acceptance analysis grounded in known imaging properties of the sensor relative to the scene → store the accepted object(s) corresponding to the most proximate destination with positional data → compute trajectory. (EX1001; EX2010 ¶¶27–35, 71).

In summary, as explained by Dr. Majumder, “the ‘805 Patent provides a robust, marker-free vehicle docking assistant that autonomously identifies and

localizes geometric destinations in the environment and computes optimized trajectories to guide a motor vehicle safely and accurately to its final stopping point.”

EX2010, ¶35.

B. Prosecution History

In the Notice Of Allowance the Examiner stated:

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.

EX1002, 341

Accordingly, Ninomiya (discussed in II.C) confirms the industry baseline and underscores what the claims add. Like Petitioner’s references, Ninomiya extracts

edges, clusters them into longer segments, limits/chooses candidates by score against mapped guide signs, and computes pose (FIGS. 14–17; flowcharts 21–23; FIGS. 7A–7B). But it does not perform the claimed “additional acceptance analysis ... analyzing a shape of the image formation of each object in the image data based on knowledge of at least one imaging property of the imaging sensor relative to the surrounding field.” Its use of vanishing point geometry (FIG. 20) calibrates camera tilt to reduce heading scatter; it is not an accept/reject gate on a candidate object’s image shape. This is exactly why the Examiner allowed the claims over Ninomiya. EX2010, ¶49-51.

C. Ninomiya

Ninomiya discloses a pose-from-vision pipeline centered on detecting linear “guide signs,” clustering short edge primitives into longer colinear segments, selecting among those longer segments with a scoring function keyed to predicted guide-sign locations, and then computing vehicle position and heading for travel control. At a high level, the system acquires an image, extracts short edge segments, clusters colinear segments into longer edges, limits candidates to search windows derived from forecast sign locations, selects the best longer edge(s) per sign using an evaluation function (distance to predicted sign position, total length, and multi-sign consistency), and then computes pose and integrates it with odometry. See EX2009, 3:39–58; 4:1–18; 6:10–44; 7:1–38; 9:37–67; 10:1–20; 13:41–67; 14:1–13,

46–67; 15:1–18; 16:1–13. The “guide-sign searching means” deletes segments outside predicted window regions, clusters the remaining segments into longer edges, and uses total length as an extraction measure before selection by the evaluation function; the highest-scoring segment(s) are taken as the extracted guide sign(s). EX2009, 9:37–67; 10:1–20; 13:41–67; 14:1–13.

Once guide-sign edges are selected, Ninomiya computes vehicle pose (x , y , θ) and may adjust global camera tilt to reduce heading scatter across parallel guide signs; reliability is assessed using selection scores and pose-scatter metrics, and pose is fused with wheel odometry for control. EX2009, 14:1–13, 60–67; 15:1–18; 16:1–13. As Dr. Majumder explains,

this architecture proceeds from matching/selection directly to pose computation and optional, global calibration; it does not disclose a distinct, downstream additional acceptance analysis that analyzes “the shape of the image formation” of each already-plausible object using knowledge of the imaging sensor relative to the surrounding field (e.g., camera height/tilt, horizon/vanishing-line geometry, perspective distortion). EX2010, ¶59

These points align with the examiner’s allowance rationale distinguishing the ’805 patent’s pipeline from prior art approaches like Ninomiya: Ninomiya performs image analysis to support guidance, but it does not teach the claimed additional acceptance analysis based on imaging-sensor properties nor a subsequent computation of an optimized trajectory to an accepted destination object.

III. CLAIMS OF ‘805 PATENT

Claim 1 of the ‘805 Patent is the only independent claim among the challenged claims. Claim 1 recites:

[1.0] A method for assisting guidance of a motor vehicle on the basis of image data, the method comprising:

[1.1] acquired¹ image data using an imaging sensor from a surrounding field of the motor vehicle;

[1.2] extracting from the acquired image data positional parameters of at least one potential destination relative to the motor vehicle; and

[1.3] calculating at least one trajectory describing an optimized travel path using the positional parameters so as to assist a subsequent vehicle guidance for at least one of the potential destinations,

[1.4] wherein the extracting includes:

[1.4.0] performing an edge detection and edge segmentation on the image data so as to break down the image data into a plurality of edge segments and storing interrelationships of the plurality of edge segments in a mathematical tree structure;

[1.4.1] 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;

[1.4.2] analyzing the one or more potential geometric objects for plausibility using a matching algorithm so as to identify one or more plausible objects;

[1.4.3] 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 knowledge of at least one imaging property of the imaging sensor relative to the surrounding field; and

¹ The parties agree that “acquired” is a typographical error and should be “acquiring” see Petition, 24

[1.4.4] storing at least one accepted object that corresponds to a most proximate destination together with corresponding relative positional data in an object list.

EX1001,7:57-8:23.

IV. CLAIM CONSTRUCTION

The Patent Owner maintains that the Challenged Claims should have their plain and ordinary meaning. However, a determination that a claim term “needs no construction” or has the “plain and ordinary meaning” may be inadequate when a term has more than one “ordinary” meaning or when reliance on a term’s “ordinary” meaning does not resolve the parties’ dispute.” *O2 Micro Int’l Ltd. v. Beyond Innovation Tech. Co.*, 521 F.3d 1351, 1361 (Fed. Cir. 2008). Instead, “[t]he terms used in the claims bear a presumption that they mean what they say and have the ordinary meaning that would be attributed to those words by persons skilled in the relevant art.” *Honeywell Int’l, Inc. v. ITC*, 341 F.3d 1332, 1338 (Fed. Cir. 2003). Accordingly, “Properly viewed, the ‘ordinary meaning’ of a claim term is its meaning to the ordinary artisan after reading the entire Patent.” *Aylus Networks, Inc. v. Apple Inc.*, 856 F.3d 1353, 1358 (Fed. Cir. 2017).

A. “performing an additional acceptance analysis”

The intrinsic record compels a sequential reading of the method in which the “additional acceptance analysis” occurs only after the system has first (i) analyzed edge-segment data to identify one or more potential geometric objects and then (ii)

analyzed those potential geometric objects for plausibility using a matching algorithm. The claim language itself is drafted as an ordered pipeline, and the patentee chose the signaler “additional” to describe the acceptance analysis—text that presupposes earlier, different analyses have already yielded a set of plausible objects to which the acceptance filter can be applied (EX1001, 9:3–10:20). That grammar is not accidental; it mirrors the specification’s narrative and the disclosed block-diagram architecture, which present the acceptance analysis as a downstream stage that consumes the plausible objects output from the comparator/matching stage and promotes only those that also satisfy a camera-geometry gate to the “accepted” set (EX1001, 6:31–50; 7:1–22; 7:45–67).

The Summary of the Invention reinforces this order expressly. After explaining that edges are detected and segmented, the text states that the edge segments “are then analyzed” for the presence of a geometric object describing a potential destination; plausibility is assessed “using a matching algorithm”; and “these plausible objects undergo an additional acceptance analysis” that analyzes the “shape of the image formation” using “knowledge of at least one imaging property of the imaging sensor relative to the surrounding field” (EX1001, 6:31–50; 7:1–22). The adverbs “then,” “subsequently,” and the phrase “additional acceptance analysis” show the patentee teaching a temporal and logical progression: identify candidates from the edge-segment representation → test those candidates for plausibility via

matching → apply a further gate tied to imaging-sensor geometry (EX1001, 6:31–50; 7:1–22).

The device embodiment anchors that same order in the disclosed dataflow. The image-processing unit first performs edge detection and segmentation and stores interrelationships; a locating unit identifies geometric-form candidates; a comparator employing a matching algorithm produces “plausible objects”; and only after that comparator does the specification place the acceptance-analysis unit, which evaluates the “shape of the image formation” in light of camera pose/optics relative to the scene—e.g., the elevated camera’s expectation that a rectangular door will project as a trapezoid, and horizon-based constraints derived from visible platform features (EX1001, 7:45–67; 8:1–34). The text even illustrates how a candidate that survives matching can still be rejected by the downstream acceptance analysis because it lacks the trapezoidal distortion predicted by the imaging geometry (EX1001, 8:1–34). Those disclosures make no sense unless acceptance analysis temporally follows the matching step, because the acceptance analysis is defined by its application to already plausible candidates.

Reading the claim against this specification, “performing an additional acceptance analysis” cannot be collapsed into or run in parallel with the earlier “analyzing ... for plausibility using a matching algorithm” limitation; the two steps ask different questions of different inputs at different points in the pipeline. The

matching step asks whether a candidate geometric object plausibly corresponds to a stored pattern under scaling/rotation (e.g., via ICP), while the acceptance analysis asks whether the image formation of that already determined plausible object comports with the sensor’s imaging properties relative to the surrounding field—camera height/tilt, vanishing-point/horizon geometry, and perspective distortion (EX1001, 6:31–50; 7:1–22; 8:1–34). Placing the acceptance analysis anywhere but after plausibility would sever it from its intended role as a final gate that promotes only geometry- and camera-consistent objects to the object list and trajectory computation (EX1001, 8:30–50; 9:3–25).

Therefore, the acceptance analysis “is additional” because it operates after plausibility, on a different input set (already-plausible objects), and applies different criteria (pose-aware image-formation constraints tied to the sensor’s geometry). Reading it as detection-time windowing would nullify “additional,” sever the step from the claimed order, and rewrite the pipeline the specification describes. (EX1001, 6:31–7:22; 7:45–8:34; 8:30–50).

Ninomiya’s system (cited by the Examiner as the closest art) underscores the difference and the necessity of the claimed order. Ninomiya performs edge extraction and clustering, imposes windows based on predicted positions of stored “guide signs,” and then executes a matching/selection process that scores candidate line segments by distance to mapped signs, segment-length totals, and multi-sign

consistency (EX2009, 6:10–44; 7:1–38; 8:5–35). What follows in Ninomiya is not a subsequent acceptance analysis keyed to the imaging property of the sensor relative to the surrounding field, but rather pose computation and optional tilt calibration that reduces heading scatter when multiple guide signs are visible (EX2009, 8:36–67; 9:1–20). That global camera-parameter correction is qualitatively different from the '805 Patents' acceptance analysis: it does not analyze the shape of each candidate object's image formation to accept or reject it; it adjusts the camera model to improve pose after the line-matching step has already occurred (EX2009, 8:36–67; 9:1–20). Precisely because Ninomiya lacks a later sensor-geometry acceptance gate, the Examiner credited the '805 Patent's additional acceptance analysis as a point of patentable distinction, which presupposes that the claimed acceptance analysis operates after candidate identification and after plausibility matching, not as a substitute for or part of those earlier steps (EX2009, 6:10–44; 7:1–38; 8:36–67).

Put simply, the claims, the specification's sequential narrative, and the disclosed architecture collectively require that the acceptance analysis be temporally and logically subsequent to the geometric-object analysis and the matching-based plausibility analysis. The acceptance analysis is “additional” because it applies different criteria—drawn from knowledge of the imaging sensor's properties relative to the surrounding field—to a different input set, namely the “plausible objects” already identified, and it delivers a different outcome: promotion to “accepted object”

status for storage and trajectory computation (EX1001, 6:31–50; 7:1–22; 8:1–34; 9:3–25). Ninomiya’s omission of any such subsequent sensor-geometry acceptance analysis, despite performing earlier matching/selection, reinforces why the step order in the ’805 Patent is not just stylistic but integral to what the inventors claimed (EX2009, 6:10–44; 7:1–38; 8:36–67; 9:1–20).

Accordingly, as Dr. Majumder explains “a POSITA would understand : “performing an additional acceptance analysis” to mean 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.” EX2010, ¶71.

B. “Storing interrelationships of the plurality of edge segments”

The Institution Decision states:

... we recognize Patent Owner’s argument that the claimed single mathematical tree structure must store all interrelationships of all identified edge segments. Prelim Surreply 3–4. That argument, however, stretches the claim language to require more than it recites. The claim recites identifying “a plurality of edge segments and storing interrelationships of the plurality of edge segments in a mathematical tree structure.” That language does not require processing all edge segments, only a plurality, and does not require storing all interrelationships, just an unspecified quantity. Thus, it is possible that a method using multiple trees in a multi-rooted tree structure (i.e., a forest) could satisfy the

claim language even under Patent Owner's construction, if one of the trees alone meets the other claim limitations." Institution Decision, Pg 10.

However, the Board's reading overlooks how the claim language and specification tie the "mathematical tree structure" to a single, connected data structure that stores the interrelationships of the same plurality of edge segments earlier identified and then feeds that unified representation to the downstream stages. In the Summary, the patentees describe one pipeline in which the image data "undergo an edge detection and edge segmentation, in order to break down the image data into individual edge segments, whose interrelationships are stored in a mathematical tree structure. Subsequently, these edge segments are then analyzed to check for the presence of a geometric object..." followed by plausibility matching and the additional acceptance analysis. The antecedent phrase "these edge segments" refers back to the set just "broken down" and "whose interrelationships are stored," which is the same "plurality" introduced a sentence earlier. That grammatical linkage makes sense only if the relationships of that plurality as a group are stored in one tree that can then be traversed "subsequently" as a unit. EX1001, 6:31–7:22.

The specification also explains why the inventors chose a hierarchically organized tree structure and points the reader to Sedgewick "exemplarily" for tree data structures and tree traversal techniques. The discussion is not about scattering segments across multiple independent trees, but about creating one hierarchical tree

that supports searching for higher-order geometric configurations by tree traversal. That is how the system finds forms like rectangles from edge relations such as parallelism and orthogonality. EX1001, 4:42–51; 4:51–64; 5:8–18.

The Board reasons that because the claim says “a plurality” and “interrelationships of the plurality,” it does not require “all” segments or “all” interrelationships, and therefore a forest could suffice “if one of the trees alone” meets other limitations. Institution Decision, 10. That view divorces the storing step from the very next limitation. The patent does not say “store interrelationships of some edge segments in any one of several trees and then analyze a subset.” It says the image is broken into edge segments, their interrelationships are stored in a tree, and these edge segments are then analyzed. The definite article and repeated pronouns bind the steps together; the analyzing step operates on the same set whose interrelationships were stored. EX1001, 6:31–7:22. As Majumder makes clear, “If the plurality is split across disconnected trees, the representation cannot encode interrelationships among segments that reside in different trees, and the very next stage loses the ability to traverse those links.” EX2010, ¶75.

Even if “plurality” does not mean “all segments in the image,” the claim still requires storing the interrelationships of the plurality as a set, not merely some relationships within an arbitrary subset. A forest cannot satisfy that requirement because disconnected trees cannot encode interrelationships among segments that

reside in different trees. If the segments that actually constitute a candidate rectangle are split across subtrees, there is no single path or connected hierarchy capturing the mutual relations of the full set to support the subsequent geometric-object analysis the specification describes. As Majumder identifies “The very purpose of using a tree in this invention is to allow principled, hierarchical search for geometric configurations by traversing a single structure that encodes the relations among the plurality of segments.” EX2010, ¶76.

The Board’s suggestion that “one of the trees alone” in a forest could meet the limitation also fails on its own terms. If only one tree is used downstream, then the storing step has not stored the interrelationships of the plurality in that one tree unless the entire plurality is in that tree. Otherwise, the structure lacks interrelationships between segments that were placed in other trees. That shortcoming is not merely semantic. The next steps depend on traversing the stored interrelationships to assemble and test candidate shapes. The specification’s example illustrates how the pipeline uses the stored relations to propose candidate rectangles and then subjects them to plausibility and acceptance analysis; that process presumes a connected representation that links the relevant edges together. EX1001, 6:31–7:22; 7:45–8:34.

Finally, the Board’s reliance on Sedgewick’s observation that a forest can be represented as a binary tree does not change the result. The claim is not about abstract representability; it is about what is stored: “interrelationships of the plurality

of edge segments.” Grafting separate trees together with pointer tricks creates parent–child links that reflect the encoding, not the interrelationships among the edge segments that the claims require the structure to capture and that the specification then traverses to find geometric forms. EX1001, 4:42–51; 4:51–64; 5:8–18.

Accordingly, the intrinsic record teaches a single, connected tree that stores the interrelationships of the previously identified plurality and that is then traversed as a unit in the next step. A forest reading breaks that linkage and leaves no structure that stores interrelationships of the plurality as a group, which is what the claim and specification require. Therefore, as Majumder states “a person of ordinary skill would therefore understand the intrinsic record to require a single, connected mathematical tree that stores the interrelationships of the previously identified plurality and that is then traversed as a unit in the next step.” EX2010, ¶80.

C. The ‘805 Patent Limits the Invention to Guiding a Vehicle to Fixed, Physical Destinations Identified by Geometric Analysis, as Expressly Described in the Summary of the Invention

When a patentee describes the features of the “present invention,” it is well-settled that “this description limits the scope of the invention.” *Pacing Techs., LLC v. Garmin Int’l, Inc.*, 778 F.3d 1021 (Fed. Cir. 2015). In this regard, the “Summary of the Invention” of the ‘805 Patent describes as the “present invention” a system

and method for identifying fixed, physically meaningful destinations—such as docking stations or parking bays—based on the geometric properties of image data.

An object of the present invention is to provide a method for assisting vehicle guidance on the basis of image data, **particularly when maneuvering trucks toward docking stations, as well as to provide a device suited for implementing the method, which functions without the need for affixing specific visual signatures at the destination.**

EX1001, 2:15-20. (emphasis added).

In the system according to the present invention for assisting a motor vehicle guidance on the basis of image data, in particular for maneuvering trucks toward docking stations, including a method and a device suited for implementing this method, image data are acquired by an imaging sensor from the surrounding field of a vehicle and, from these data, the positional parameters of at least one potential destination relative to the motor vehicle are extracted. This results in the calculation of a trajectory describing an optimized travel path in order to assist a subsequent vehicle guidance for at least one of the potential destinations. In this connection, along the lines of the present invention, to extract the relative positional parameters of the at least one potential destination, the image data undergo an edge detection and edge segmentation. To that end, the image data are broken down into individual edge segments, and their interrelationships are stored in a mathematical tree structure. In a subsequent step, these edge segments are then analyzed to check for the presence of a geometric object that is similar to a geometric form which, typically, at least partially describes a potential destination. **If the typical destination is a docking station for trucks at a warehouse, for example, then the typical geometric form substantially corresponds to a rectangle having roughly identical side lengths of approximately 2.5 m.** Within the framework of the inventive method, the detected geometric objects that correspond to the typical geometric form are then analyzed for plausibility using

a matching algorithm, these objects, which are classified as plausible, undergoing an additional acceptance analysis to the effect that, based on the knowledge of the imaging properties of the imaging sensor in relation to its surrounding field, the shape of the image formation of the objects in the image data is analyzed (thus, an image of a typical rectangular geometric form viewed from an elevated location is formed in the image data as a trapezoid that tapers toward the top). In a final method step, at least that object which is determined within the scope of the acceptance analysis and which corresponds to the most proximate destination is stored, along with the corresponding relative positional data, in an object list, and, to this end, at least one trajectory describing an optimized travel path is computed EX1001, 3:23-63. (emphasis added).

In this manner, a driver assistance is able to be devised by using the device according to the present invention and on the basis of the method according to the present invention, which computes **a trajectory describing an optimized travel path to at least the most proximate destination, based solely on the knowledge of the geometric appearance of the destination, without having to affix specific symbols or markings.**

EX1001, 3:64-4:4(emphasis added).

Thus, the claim language reciting “Potential destination,” refers to a physically fixed and contextually relevant location in the vehicle’s surrounding environment—such as a docking station, cargo bay, or parking spot—that is automatically identified from image data based on geometric features and spatial parameters. As Dr. Majumder explains, the system described in the ‘805 Patent “is able to locate a specific physical location in the vehicle’s environment that the system identifies as a suitable endpoint for the vehicle to approach and stop at, such as a docking station, loading platform, or parking bay.” EX2010, ¶33.

Therefore, when read in light of the intrinsic evidence, “potential destination” cannot encompass arbitrary or transient objects like moving vehicles, but must instead be understood as referring to stationary, geometrically identifiable endpoints in the vehicle’s environment that the system is configured to recognize and guide the vehicle toward. Accordingly, as Majumder explains:

.... a person of ordinary skill would therefore construe “potential destination” in the ’805 patent to mean a fixed, physically meaningful endpoint—such as a docking station, cargo bay, or parking spot—automatically identified from image geometry and used to compute an approach trajectory. Constructions that expand the term to cover arbitrary or transient objects (e.g., a moving vehicle) are inconsistent with the patent’s present-invention framing, the geometric-analysis pipeline, and the expressly stated objective of computing an optimized path based on the destination’s geometric appearance. EX2010, ¶86

As a result, “potential destination” means a fixed, physically meaningful endpoint discoverable from geometric cues in the image, not a moving vehicle. The Summary repeatedly ties destination identification to rectilinear structures (e.g., doors/docks) and then uses those stored positional parameters to compute an optimized path. EX1001, 3:23–63; 3:64–4:4; 6:31–7:22; 8:30–50. Petitioner’s attempt to recast a platooning follower as a destination planner ignores this intrinsic framing and the claim’s sequencing.

D. “A Mathematical Tree Structure” is a Single Connected Hierarchical Structure, Not a Forest

The Institution Decision treats Sedgewick’s “forest represented as a binary tree” passage as if it erased the substantive distinction between a tree and a forest, then uses the word “structure” in the claim to expand “a mathematical tree structure” to include multiple disconnected trees. Both steps are incorrect when read in the context of the intrinsic record and Sedgewick itself.

The patent expressly states the image data are broken into edge segments, “storing interrelationships of the plurality of edge segments in a mathematical tree structure,” and subsequently “these edge segments are then analyzed” to find a geometric object, proceed through a matching stage, and only then perform the additional acceptance analysis, followed by storing the accepted object (EX1001, 3:57–4:22; 4:23–67). The method claims repeat that sequence and even adds claim 2’s directive to process “the mathematical tree structure using a tree traversal algorithm,” which presumes a single connected tree amenable to traversal from a root (EX1001, 8:1–67). The specification’s repeated reference to “a hierarchically organized tree structure” and its pointer to Sedgewick are not casual; they teach the kind of single, connected representation a person of skill would build so that the interrelationships of the plurality can be traversed and tested as a unit in the very next step (EX1001, 3:57–4:22; 4:23–67).

Sedgewick does not say that a forest is the same thing as a tree; the textbook says a forest can be represented using a particular binary-tree encoding, most commonly the left-child/right-sibling technique (EX2006, p. 57–59). In that very section Sedgewick labels the discussion “Representing Forests,” which underscores that the underlying object remains a forest, i.e., a set of disconnected trees (EX2006, p. 57–59). Elsewhere Sedgewick defines a tree by the unique-path property from the root to every node and explains that “a set of trees is called a forest,” giving the standard example that removing the root from a tree yields a forest of disconnected trees (EX2006, p. 51–52). If the “representation” equivalence really collapsed the concepts, Sedgewick would not continue to treat forest traversal as a different problem, yet he assigns an exercise to “implement level-order traversal of a forest represented as a binary tree,” which confirms that the data-structure encoding does not convert a forest into a single tree for algorithmic purposes (EX2006, p. 65). In other words, Sedgewick’s representational note is about how to encode multiple trees in code, not about redefining a forest to be “a tree.” The claim here is not about the programmer’s pointer choices; it is about what is stored: “interrelationships of the plurality of edge segments in a mathematical tree structure” that the next steps then analyze and traverse (EX1001, 3:57–4:22; 8:1–67).

That is why reading “structure” to permit a forest conflicts with the claim’s function and grammar. The storing step must capture the interrelationships of the

plurality as a set; a forest, by definition, contains components among which there are no paths, so it cannot store interrelationships among edge segments that sit in different trees. If those segments are in different trees, the “subsequent” analyzing step cannot traverse a single structure to assemble and evaluate the claimed geometric forms, which is precisely the problem the patent solves by using a tree and then processing it by a tree traversal algorithm (EX1001, 3:57–4:22; 8:1–67). The Board’s suggestion that “one of the trees alone” could suffice only by redefining the “plurality” post hoc to mean “those segments that happened to be placed in that one tree.” That approach breaks the textual link between the “plurality” whose interrelationships are stored and “these edge segments” that are then analyzed in the very next limitation (EX1001, 3:57–4:22).

Finally, Sedgewick’s own organization of the material shows why Petitioner’s “interchangeability” theory is a category error. He first defines “tree” and “forest,” then presents the left-child/right-sibling representation to handle forests, then continues to speak in terms of tree versus forest notwithstanding the representational trick (EX2006, p. 51–52; p. 57–59; p. 65). That is consistent with the ’805 specification, which teaches storing the interrelationships of the plurality in a tree and then immediately analyzing these edge segments and traversing the tree. Nothing in the intrinsic record uses “structure” to expand “tree” into “set of trees,” and importing Sedgewick’s representational technique cannot rewrite the claim’s

requirement to store the interrelationships of the plurality in a single connected hierarchy that the next steps traverse (EX1001, 3:57–4:22; 8:1–67). The better reading, and the one a person of skill would adopt after reading the patent’s Sedgewick cross-reference as explained by Dr. Majumder is that “a mathematical tree structure” means a single connected tree storing the interrelationships of the previously identified plurality, not a forest of disconnected trees. EX2010 ¶¶75–80, 156–167.

V. REFERENCES RELIED ON IN THE PETITION

A. Broggi - “Visual Perception of Obstacles and Vehicles for Platooning” (EX1005)

Broggi (EX1005), titled Visual Perception of Obstacles and Vehicles for Platooning, discloses a vision-based perception and control system implemented in the ARGO autonomous vehicle, developed at the University of Parma. The focus of Broggi is on enabling two principal driving functions using onboard cameras: road following and platooning, with particular emphasis on the latter. EX2010, ¶96.

Platooning, as defined in Broggi, is the autonomous trailing of a lead vehicle by a follower vehicle—here, the ARGO car—using only visual input. The goal of platooning is to allow a vehicle to maintain a fixed time headway and proper lateral alignment with a vehicle directly ahead, forming a convoy-like chain. Unlike destination-based navigation, platooning does not involve the follower vehicle planning its own route or identifying an endpoint. Instead, the lead vehicle

determines the path and speed, and the trailing vehicle mirrors that behavior in real time. EX2010, ¶¶99-100. As Broggi states explicitly, platooning is “the automatic following of the preceding vehicle, that requires the localization and tracking of a target vehicle.” EX1005, 166.

Broggi implements platooning by using monocular image processing to detect and track the preceding vehicle. The system searches for rectangular shapes in the image plane that exhibit symmetry and contrast patterns characteristic of a vehicle’s rear. Once a candidate region is identified, the system uses template matching and frame-to-frame correlation to track the preceding vehicle as the scene evolves. The system estimates the relative distance to the preceding vehicle using a simplified stereo triangulation method, relying on a known baseline and disparity estimation.

Once the preceding vehicle’s position is established, ARGO calculates a steering correction based on the lateral offset between ARGO’s current heading and the projected centerline of the detected vehicle. This offset, or steering error, is passed through a gain-scheduled proportional controller to compute a steering angle that realigns the vehicle with the path of the leader. At the same time, ARGO’s speed is controlled to maintain a target headway, allowing the vehicle to safely trail the preceding vehicle.

Importantly, as explained by Dr. Majumder, “the platooning system described in Broggi does not involve the detection or recognition of a fixed or predefined

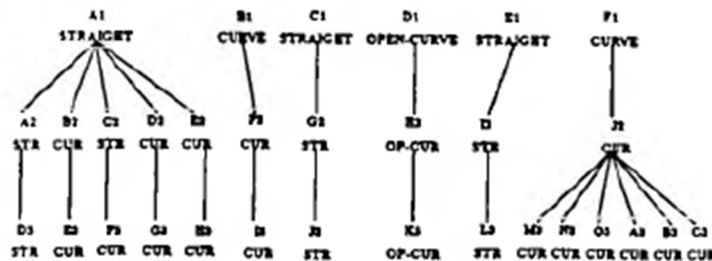
destination.” EX2010, ¶132. There is no analysis of geometric forms in the environment, no extraction of spatial features to identify plausible destinations, and no calculation of optimized trajectories toward contextually meaningful endpoints. Instead, the system operates purely reactively: the ARGO vehicle responds to the current position and movement of the preceding vehicle without any knowledge of where that vehicle is going.

B. Huttenlocher - “Object Recognition Using Alignment” (EX1006)

Huttenlocher describes a method for object recognition in which a model is first geometrically aligned with an image based on a small number of corresponding features, and then the transformed model is compared directly with the image to determine a match. The system is designed to identify rigid, potentially occluded objects in arbitrary three-dimensional orientations and scales using a two-stage approach: an initial alignment phase followed by a matching phase. EX2010, ¶101.

The alignment process is driven by scale-space segmentation of image edge contours. Edge segments are classified by curvature and shape (e.g., straight, curved, closed, or open), and organized hierarchically into a multiscale representation. This segmentation hierarchy is visualized in Figure 4 of Huttenlocher (reproduced below) as a so-called “segment tree,” which groups edge segments detected at coarse scales with their finer-scale counterparts. The hierarchy is used to identify candidate feature

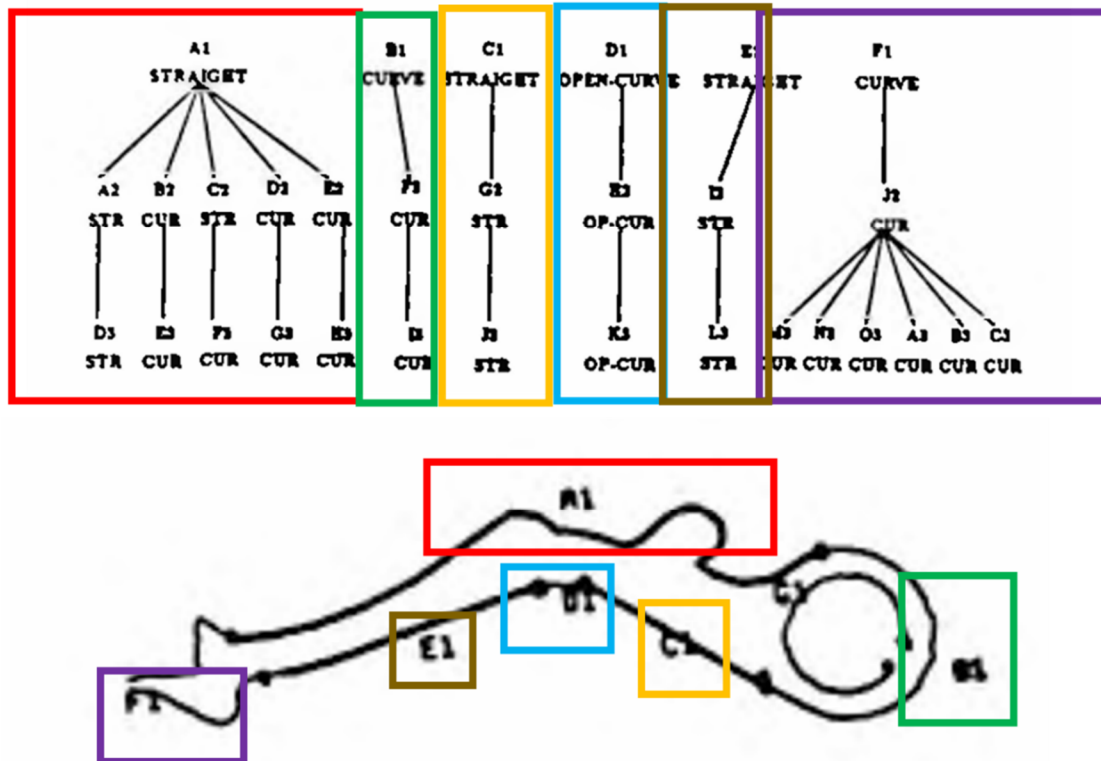
points for model alignment and ultimately to match model objects against observed image data.



Although Huttenlocher describes this structure as a “(multi-rooted) tree,” it is, in fact, a forest—i.e., a collection of disconnected trees—lacking a single root and not providing a unified set of interrelationships among all edge segments. Each subtree corresponds to an independent segment group rather than forming a single, connected structure. As Dr. Majumder explains, “Figure 4 does not identify any relationship between ‘A1 Straight,’ ‘B1 Curve,’ ‘C1 Straight,’ ‘D1 Open Curve,’ ‘E1 Straight,’ and ‘F1 Curve.’” EX2010, ¶163.

Specifically, from Figure 4 it is impossible to extract any information about the relationship between any two nodes. As shown “in Patent Owner’s annotated combined version of Huttenlocher’s Figure 3 (bottom) and Figure 4 (top), Figure 4 does not show the inter-relationships between the edge segments ‘A1 Straight,’ ‘B1

Curve,’ ‘C1 Straight,’ ‘D1 Open Curve,’ ‘E1 Straight,’ and ‘F1 Curve’.” EX2010, ¶167.



Consequently, the representation shown in Huttenlocher does not satisfy the structural constraints of a “mathematical tree structure” in the sense of a connected, hierarchical data structure in which each node (except the root) has exactly one parent and a unique path exists between the root and each other node.

C. Brady - US5434927 (EX1007)

Brady discloses a machine vision system for classifying and tracking objects, such as vehicles, in real-time roadway scenes using video imagery. The system acquires video images from cameras positioned over roadways and processes these

images to detect and classify vehicles and track their movement through traffic environments. Vehicle classification is achieved by evaluating edge element intensities (horizontal and vertical) at each pixel, converting these into directional vectors, and applying fuzzy logic to characterize the region. EX2010, ¶108.

D. Bertozzi - “Automatic Vehicle Guidance: The Experience of the ARGO Autonomous Vehicle” (EX1008)

Bertozzi provides a comprehensive overview of the development and functionality of the ARGO autonomous vehicle referenced in Broggi, with specific emphasis on its capabilities for vision-based road following and platooning. The ARGO vehicle, developed by the University of Parma, integrates stereo and monocular vision systems to enable automated guidance, obstacle detection, and lane following. One of its central features is the implementation of a platooning mode, which allows the vehicle to automatically follow a preceding vehicle. EX2010, ¶108.

Importantly, Bertozzi confirms and elaborates on the limitations of this platooning approach: ARGO’s platooning functionality is fundamentally reactive and depends entirely on visual tracking of the vehicle directly ahead. The system detects and tracks the leading vehicle based on features such as symmetry, shape, and position, using monocular and stereo imagery. Once detected, the preceding vehicle is treated as a dynamic reference point, and ARGO continuously adjusts its trajectory to follow it. However, ARGO does not possess any knowledge of the

destination of the vehicle it is following. It does not plan or compute a trajectory toward a known or predefined destination. Instead, it adapts its movements in real-time to mirror the path taken by the preceding vehicle. EX2010, ¶109.

This lack of foresight or destination-awareness is a defining characteristic of ARGO's platooning mode. As such, Bertozzi's disclosure underscores a critical distinction between reactive following behavior—where the vehicle simply mimics the leader's path—and proactive guidance systems that calculate an optimized trajectory to a known potential destination based on environmental data. Accordingly, Bertozzi confirms that ARGO, in platooning mode, merely follows the car in front and does not compute an optimized path to a destination, as required by the challenged claims. EX2010, ¶110.

VI. GROUNDS 1–2: THE PETITION FAILS TO PROVE THE CLAIMED PIPELINE—NO POST-DETECTION “ADDITIONAL ACCEPTANCE ANALYSIS,” NO DESTINATION-BASED OPTIMIZED TRAJECTORY, AND NO SINGLE CONNECTED MATHEMATICAL TREE

Petitioner's case fails on three independent, claim-critical fronts, and adding references does not cure any of them. First, the Petition never identifies a post-detection “additional acceptance analysis” that analyzes the shape of the image formation “based on knowledge of at least one imaging property of the imaging sensor relative to the surrounding field,” performed after plausibility matching, as the claims and specification require. See EX1001, 6:31–7:22; 7:45–8:34. Instead, it

repeatedly repackages Broggi's bounding-box heuristics and stereo refinement as the supposed acceptance gate. Petition, 43–44; 50–51; EX1005, 171–172. Second, the Petition never shows “at least one trajectory describing an optimized travel path using the positional parameters of an accepted destination object,” computed only after the acceptance stage and storage in an object list. EX1001, 7:45–8:34; 8:30–50; 9:3–25. Broggi's ARGO performs reactive platooning—moment-to-moment steering to follow a moving leader—not destination-driven planning that consumes stored accepted-object parameters. EX1005, 171–172; Petition, 37; 43–44; 50–51. Third, the Petition does not disclose the claimed single connected “mathematical tree structure” that stores interrelationships of the plurality of edge segments and is later processed using a tree traversal algorithm (claim 2). EX1001, 6:31–7:22; 8:1–10. Its citations at most point to multi-root displays—a forest—not a traversable tree as understood under Sedgewick. Petition, 37; 43–44; EX2006, 51–52, 57–59, 65; see also EX2010, ¶¶156–164, ¶167.

Ground 1 recycles Broggi, Huttenlocher, and Brady to map these limitations but collapses distinct steps into the same bounding-box routine, skips the required sensor-geometry acceptance gate, treats a steering signal as an “optimized trajectory” without using stored accepted-object parameters, and relies on a forest rather than the required tree. Petition, 37; 43–44; 50–51; EX1005, 171–172. Ground 2's addition of Bertozzi does not fix any of these defects: it offers interface and

control constraints, not a post-matching, sensor-geometry acceptance analysis, not object-list storage and parameter use for trajectory computation, and not a single connected tree with traversal. Petition, 50–51. Each of these failures is independently dispositive; together, they emphatically show that the Petition does not prove unpatentability under either ground.

A. Petitioner Fails to Show the Ordered Pipeline, a Post-Detection “Additional Acceptance Analysis,” a Destination-Based Optimized Trajectory, or a Single Connected Mathematical Tree Structure

Ground 1 fails because Petitioner does not show the ordered pipeline the claims require, does not identify any post-detection “additional acceptance analysis” based on imaging-sensor properties, does not compute an optimized trajectory using the stored positional parameters of an accepted destination object, and does not disclose the claimed mathematical tree structure that is later traversed. The ’805 patent specifies an ordered sequence: identify candidate geometric objects from edge segments, evaluate those candidates for plausibility using a matching algorithm, then perform an additional acceptance analysis grounded in the imaging sensor’s geometry relative to the surrounding field, store the accepted destination with positional data, and then compute an optimized trajectory for guidance. See EX1001, 6:31–7:22; 7:45–8:34; 8:30–50; 9:3–25.

Petitioner’s mapping collapses distinct steps into Broggi’s single bounding-box routine and never reaches the required sensor-geometry acceptance gate. For

[1.4.1], Petitioner relies on Broggi’s bottom-corner and top-of-box searches; for [1.4.3], it points to the same top-of-box search framed by perspective/size windows and stereo refinement, relabeling that detection as “acceptance analysis.” Petition, 43–44; 50–51; EX1005, 171–172. The claims, however, require the acceptance analysis after plausibility matching and require that it analyze image formation using knowledge of imaging-sensor properties (elevated-camera trapezoid, artificial horizon), not target-appearance heuristics. EX1001, 6:31–7:22; 7:45–8:34.

Petitioner likewise fails on [1.3]. The claims require “at least one trajectory describing an optimized travel path using the positional parameters of an accepted destination object,” computed after acceptance and storage. EX1001, 7:45–8:34; 8:30–50; 9:3–25. Broggi discloses reactive platooning: continuous steering to follow a moving leader, not destination-driven path planning that consumes stored accepted-object parameters. EX1005, 171–172; Petition, 37; 43–44; 50–51.

Finally, Ground 1 does not identify the claimed mathematical tree structure that “stores interrelationships of the plurality of edge segments” and is later processed using a tree traversal algorithm (claim 2). EX1001, 6:31–7:22; 8:1–10. Petitioner points to multi-rooted hierarchies at most; as Dr. Majumder explains, a disconnected collection cannot encode interrelationships of the plurality or be traversed as a unit to assemble destination-describing shapes. EX2010, ¶168. Each

of these deficiencies is independently dispositive; together they confirm that Ground 1 does not establish unpatentability.

1. The Petition Impermissibly Collapses Distinct Steps [1.4.1] and [1.4.3] into the Same Broggi Bounding-Box Routine

The Petition’s own citations show it mapping limitation [1.4.1] and [1.4.3] to the same bounding-box detection routine in Broggi, rather than to distinct, sequential stages as the claim and specification require. For [1.4.1] (“analyzing the plurality of edge segments for the presence of a geometric object ... so as to identify one or more potential geometric objects”), the Petition relies on Broggi’s two-step box routine—first “determining ‘two corners representing the bottom of the bounding box around the vehicle’” and then “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’”—as the analysis that identifies the candidate object (Petition, 43–44).

It then uses the very same top-of-box search, in the same detection sequence and in the same cited pages of Broggi, to satisfy [1.4.3] (“performing an additional acceptance analysis ... including analyzing a shape of the image formation ... based on knowledge of at least one imaging property ...”), asserting that “detecting the top part of the bounding box” includes the claimed acceptance analysis because that top is “looked for in a specific region whose location is ... determined by perspective and size constraints,” and tying it to Broggi’s subsequent “distance refinement” step (Petition, 50–51).

By doing so, the Petition collapses the claim’s multi-stage pipeline—candidate identification then matching plausibility then “additional acceptance analysis” based on imaging-sensor properties—into a single vehicle-box routine in which the same top-of-box heuristic allegedly does double duty as both the [1.4.1] identification step and the [1.4.3] acceptance step (Petition, 43–44, 50–51).

That conflation is at odds with the explicit claim language and the specification. The claim orders distinct sub-steps and labels the camera-geometry gate “additional acceptance analysis,” signaling a later, different analysis that consumes the already “plausible” objects output by the matching stage; the specification underscores this with “then,” “subsequently,” and “downstream” language and by describing acceptance analysis as using imaging-sensor properties (e.g., elevated-camera trapezoid, artificial horizon) to accept/reject candidates after matching (EX1001, 6:31–7:22; 7:45–8:34). The Petition’s mapping never identifies such a subsequent, sensor-geometry acceptance gate; instead, it repackages Broggi’s top-of-box search window—a target-appearance heuristic framed by perspective/size and typical aspect ratio—as the asserted acceptance analysis and relies on box-based distance refinement to finish the job (Petition, 50–51).

The result is that the Petition uses one bounding-box detection process to satisfy two different limitations that the claim and specification treat as separate in time, function, and criteria. See also the Petition’s own cross-reference tying [1.4.1]

back to the same bounding-box passages cited for [1.2]/[1.4.0], confirming it is all the same detection flow rather than a later acceptance analysis based on sensor-scene imaging properties (Petition, 43–44, 37).

As a result, as Majumder explains:

... the Petition’s mapping is therefore inconsistent with the claim’s ordered pipeline and the ’805 specification. Using one bounding-box detector to satisfy both [1.4.1] and [1.4.3] erases the very distinction the patent draws between finding/scoring candidates and subsequently accepting them based on sensor-scene imaging properties EX2010, ¶117

Instead, Broggi’s top-of-box search is a detection-time windowing heuristic that constrains where to look for a box edge; it is not the downstream, post-matching “additional acceptance analysis” the claims require. The acceptance stage in the ’805 pipeline evaluates projective image formation under the known camera pose (e.g., trapezoidality with an elevated sensor; horizon/vanishing-line constraints) after plausibility matching—i.e., it is a different question, asked at a different time, of a different input set. (EX1001; EX2010 ¶¶71, 75–80).

2. The Petition Identifies No Post-Bounding-Box, Sensor-Geometry “Additional Acceptance Analysis” as the Claims Require

The Petition never identifies any additional acceptance analysis—i.e., a stage performed after Broggi’s bounding-box routine—that analyzes “a shape of the image formation of each object ... based on knowledge of at least one imaging property of the imaging sensor relative to the surrounding field,” as the challenged claims

require. The claim language and specification make clear that this acceptance analysis is a distinct, downstream gate that follows candidate identification and plausibility matching, and that it leverages camera-scene imaging geometry (e.g., the elevated camera’s expectation that a real-world rectangle will appear as a trapezoid, or horizon/vanishing-line constraints) to accept or reject objects before storage and trajectory computation. See EX1001, 6:31–7:22 (edges → potential geometric objects → plausibility via matching → “additional acceptance analysis” based on sensor imaging properties), 7:45–8:34 (acceptance analysis “connected downstream” of the comparator; trapezoid and artificial-horizon examples), 8:30–50 (accepted objects then stored and used for trajectory).

By contrast, the Petition’s treatment of Broggi identifies only the bounding-box detection heuristics—finding the two lower corners, searching for the top of the box within a region constrained by perspective/size and typical aspect ratio, then proceeding to stereo distance refinement—and repackages that same detection sequence as if it satisfied both the upstream identification step and the separate acceptance analysis that happens later. See Petition, 43–44 (mapping bottom-corner/top-of-box routine to identification), 50–51 (asserting the same top-of-box search “includes” the recited acceptance analysis and tying it to distance refinement). None of that is an additional, later analysis based on knowledge of the imaging sensor relative to the surrounding field; it is all part of target appearance heuristics

and post-detection range estimation within the same bounding-box pipeline. The Petition points to no step performed after that routine that analyzes whether the image formation of each object conforms to camera-pose-predicted distortion (such as the trapezoid constraint the patent discloses) or to horizon/vanishing-point geometry derived from the sensor's mounting configuration. See EX1001, 7:45–8:34 (acceptance analysis uses elevated-camera geometry to reject rectangles that are not trapezoids and employs an artificial horizon); cf. Petition, 50–51 (relying only on perspective/size search windows and stereo refinement).

Nor does the Petition cure this gap with the other references. Huttenlocher supplies edge-based alignment and hierarchical feature organization, not a sensor-geometry acceptance gate that operates after plausibility matching. Brady addresses tracking/history logs, and Bertozzi provides user-interface and speed-dependent steering constraints—again, not an accept/reject analysis keyed to “knowledge of at least one imaging property of the imaging sensor relative to the surrounding field.” The Petition nowhere identifies any stage in the combined system that, subsequent to Broggi's box completion, evaluates the shape of the image formation of candidate objects using camera-scene geometry (camera height/tilt, vanishing lines/horizon, perspective distortion) to decide whether those candidates should be accepted. That is precisely what the '805 Patent teaches as the additional acceptance analysis (EX1001, 6:31–7:22; 7:45–8:34), and precisely what the Petition fails to show in the

proposed combination—particularly after the bounding-box detection routine it relies upon (Petition, 43–44, 50–51).

The acceptance gate is downstream of the comparator/matching unit and evaluates whether an already plausible object’s image formation comports with the camera’s pose-dependent geometry. EX1001, 7:45–8:34. Petitioner never identifies any later step doing that work; it points back to perspective/size search windows and stereo distance refinement within the same bounding-box pipeline. Petition, 50–51; EX1005, 171–172. That is not the claimed additional analysis. Further, even if the Board were to view Broggi’s perspective/size search windows as “acceptance,” they are not additional (they occur before plausibility), are not sensor-pose acceptance (no trapezoid/horizon gate tied to mounting geometry), and are not downstream of a matching comparator as the claims and specification require. (EX1001, 7:45–8:34.)

3. Broggi’s Reactive Platooning Is Not the Claimed Destination-Based Optimized Trajectory Using Accepted-Object Parameters Under [1.3]

The claims require computing “at least one trajectory describing an optimized travel path using the positional parameters” of an accepted destination object, after the three-gate pipeline produces that object. EX1001, 6:31–7:22; 7:45–8:34; 8:30–50; 9:3–25. Broggi’s ARGO instead performs reactive platooning: detect the lead vehicle, complete a bounding box, optionally refine distance with stereo, and feed a gain-scheduled proportional controller that outputs a steering angle to keep

formation with the leader—no destination, no optimization to a goal, and no use of stored accepted-object parameters. EX1005, 171–172. The Petition’s mapping equates that steering signal to a claimed “optimized trajectory,” but it never identifies the prerequisite accepted destination or the claimed use of its stored positional parameters. Petition, 37; 43–44; 50–51.

Specifically, the Petition states:

“Broggi discloses or renders obvious calculating at least one trajectory describing an optimized travel path using the positional parameters (calculating a steering angle describing a desired path using the relative location and associated distance of the preceding vehicle) so as to assist a subsequent vehicle guidance for one of the potential destinations (the steering angle is used for controlling steering of a motor vehicle during platooning to the location of the preceding vehicle).”
Petition, 37

However, in Broggi, no path, let alone an “optimized path,” is calculated “to assist a subsequent vehicle guidance for at least one of the potential destinations,” as required in the Challenged Claims.

Broggi’s platooning control does not satisfy limitation [1.3] because the claims require computing “at least one trajectory describing an optimized travel path using the positional parameters of an accepted destination object,” and doing so only after the three-gate pipeline has produced that accepted object. The ’805 patent sets out that order expressly: identify candidate geometric objects from edge segments, test those candidates for plausibility using a matching algorithm, then perform an

additional acceptance analysis based on camera–scene imaging properties, store the accepted destination with corresponding positional data in an object list, and then compute the optimized trajectory for guidance. See EX1001, 6:31–7:22; 7:45–8:34; 8:30–50; 9:3–25. The device description likewise makes clear that the accepted object’s positional data are provided to a processing unit “to calculate a trajectory describing an optimized travel path,” i.e., a planner that consumes the stored parameters of the accepted destination, not a mere reactive steering adjustment. See EX1001, 7:45–8:34; 8:30–50.

By contrast, Broggi discloses a reactive follower: detect the preceding vehicle, complete a bounding box, optionally refine distance with stereo, and feed a gain-scheduled controller whose error input is the current relative position of the leader; the controller outputs a steering angle to keep formation with the moving car. See EX1005, 171–172. That is platooning based on continuous tracking of a moving target, not a computation of an optimized path to a destination object that has been accepted on camera-geometry grounds and stored with positional parameters. The Petition’s mapping confirms the point: it equates Broggi’s controller “desired path” during platooning to the claimed optimized trajectory, relying on the same detection/box-completion pages and tying in stereo refinement. See Petition, 43–44; Petition, 50–51. But that mapping skips the claim’s prerequisite inputs: an accepted destination object produced by the downstream acceptance analysis and stored with

its positional data, which the trajectory computation must then use. See EX1001, 7:45–8:34; 8:30–50; 9:3–25.

Once the claim’s pipeline dependency is respected, Broggi cannot meet [1.3]. There is no stage in Broggi that performs the ’805 patent’s imaging-property-based acceptance analysis to accept or reject destination objects and then stores the accepted destination with corresponding positional data in an object list; there is likewise no subsequent computation of an optimized travel path using those stored positional parameters. See EX1001, 6:31–7:22; 7:45–8:34; 8:30–50. Broggi’s loop “maintains lateral alignment by continuously tracking the position of the lead vehicle” and updating steering; it has no accepted destination object, no object-list semantics, and no optimization step keyed to stored destination parameters. See EX1005, 171–172.

Dr. Majumder provides the following analogy to demonstrate the distinction between the “platooning” taught in Broggi and the Challenged Claims.

“Consider the difference between a person using GPS navigation to drive to a known restaurant versus a person blindly following another car without knowing where it’s going.

In the first scenario, the GPS system calculates a destination-driven, optimized path based on road conditions, distance, and travel time. The driver knows exactly where they’re going, and the system computes a trajectory that actively assists the driver in reaching that specific location in the most efficient way possible. This reflects what is required in the challenged claims: the system must calculate at least one trajectory describing an

optimized travel path using positional parameters specifically to assist vehicle guidance to a destination.

In the second scenario—the one described in Broggi—the driver simply follows the taillights of the car in front, regardless of where that car is headed. There is no understanding of the endpoint, no route optimization, and no calculated guidance to an actual destination. The leader car could be heading to the store, to the mountains, or even circling a parking lot—the follower has no idea. It adapts its path in real-time solely to maintain alignment and distance with the vehicle ahead, not to reach a defined endpoint. This is akin to ARGO’s platooning: it calculates steering corrections based on the preceding car’s movements, but it never plans a path to a known or optimized destination.” EX2010, ¶¶139-141.

Thus, Broggi’s ARGO is like the second driver—blindly following a lead vehicle without ever knowing or planning where it’s ultimately going. That is fundamentally different from what the challenged claims require: a calculated and optimized trajectory to reach a specific, identified destination.

Even under the Board’s broader “destination” construction, the Petitioner’s theory still fails because [1.3] requires the optimized trajectory to be derived from the positional parameters of the accepted object and computed after that acceptance. Broggi never even produces that input. Treating the follower controller’s instantaneous steering command as a “trajectory” would read the sequencing and “use-of-parameters” language out of [1.3]: the claim demands trajectory computation using the stored positional data of an accepted destination object, but Broggi never generates or uses such data. See Petition, 50–51; EX1001, 8:30–50;

9:3–25. In short, Broggi’s moment-to-moment steering toward a moving car is not “calculating at least one trajectory describing an optimized travel path using the positional parameters” of an accepted destination object as [1.3] requires; it is a different class of behavior that the intrinsic record distinguishes from the claimed destination-based planning. See EX1001, 6:31–7:22; 7:45–8:34; EX1005, 171–172; Petition, 43–44; Petition, 50–51.

As a result, the Petition’s reliance on Broggi fails to satisfy the requirement that the system calculate “at least one trajectory describing an optimized travel path...to assist a subsequent vehicle guidance for at least one of the potential destinations,” as recited in the challenged claims. Broggi’s ARGO system does not calculate a trajectory to any destination, nor does it have any awareness of one. Instead, it blindly follows a moving vehicle using reactive steering corrections based solely on visual tracking—without knowledge, planning, or optimization toward a defined endpoint. This reactive, follower-based control is fundamentally distinct from the proactive, destination-driven trajectory planning claimed in the ‘805 Patent. The Petition’s attempt to equate Broggi’s platooning behavior with the claimed destination-guidance functionality is not supported by the record and should therefore be rejected.

4. The Petition Fails to Establish That Huttenlocher—or Any Cited Reference—Discloses the Claimed “Mathematical Tree Structure” Required by the ‘805 Patent

The “mathematical tree structure” issue is dispositive for Ground 1 and frames Ground 2: the claims require storing interrelationships of the plurality of edge segments in a mathematical tree structure and then processing the mathematical tree structure using a tree traversal algorithm, which, in context, means a single connected hierarchy that can be traversed as a unit. EX1001, 6:31–7:22; 8:1–10. Sedgewick confirms that a tree is a connected acyclic graph with a unique path from the root to each node, and that a forest is a set of disconnected trees; his remark that a forest can be “represented” as a binary tree is a coding device, not a redefinition that collapses a forest into one traversable tree. EX2006, 51–52, 57–59, 65. Against that intrinsic and textbook backdrop, Petitioner points to Huttenlocher’s multi-root displays but never identifies a single connected hierarchy storing interrelationships of the plurality for any destination geometry, and it never shows the claimed traversal step; at most, it relies on a forest. Petition, 37; 43–44; 50–51. As Dr. Majumder explains, such disconnected collections cannot encode interrelationships of the plurality or be traversed as a unit to evaluate higher-order geometric constraints, a point visible from the figures themselves. EX2010, ¶¶156–164, ¶167. Nor do Brady or Broggi supply the missing tree or traversal; they address other problems and cannot cure Huttenlocher’s shortfall.

**a) “Mathematical Tree Structure” Means One
Connected Tree—Not a Forest—and the Petition
Identifies None**

Petitioner’s “tree/forest” theory fails on the claim language, the specification’s functional role for the tree, Sedgewick’s definitions, and the record evidence. The claims require “identifying a plurality of edge segments and storing interrelationships of the plurality of edge segments in a mathematical tree structure,” after which “these edge segments are then analyzed” for destination-describing geometric forms, subjected to a plausibility matching stage, and only then sent through an additional acceptance analysis before storage and trajectory computation. EX1001, 6:31–7:22; 8:30–50; 9:3–25. The grammar ties “the plurality” whose interrelationships are stored to “these edge segments” that are later analyzed, indicating a single structure that encodes the interrelationships of that plurality as a set and can be traversed “subsequently” as a unit. EX1001, 6:31–7:22. The specification explains why: the inventors chose a “hierarchically organized tree structure” so that the system can traverse the one hierarchy and evaluate relations such as parallelism and orthogonality to assemble higher-order shapes (e.g., rectangles) that may represent destinations. EX1001, 4:42–64; 5:8–18. Splitting the plurality across disconnected trees would defeat that purpose, because there is no path structure connecting segments in different components and thus no way to encode or traverse their interrelationships in one pass.

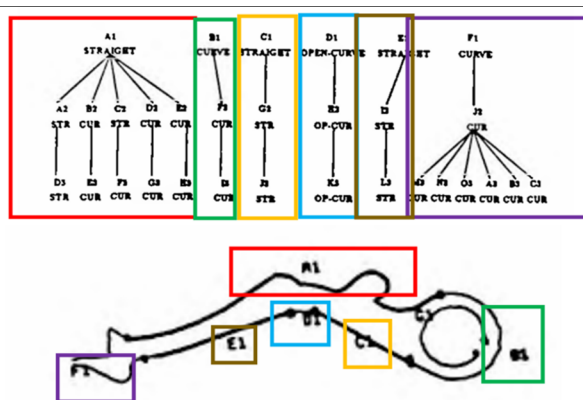
Sedgewick, explicitly invoked by the patent, confirms this understanding. A tree is a connected acyclic graph with a unique path from the root to each node, and a forest is a set of disconnected trees. EX2006, 51–52 (tree vs. forest); 57–59 (forest-as-binary-tree encoding); 65 (forest traversal remains distinct). Petitioner relies on Sedgewick’s note that “any forest can be represented as a binary tree,” but Sedgewick makes clear this is merely a representation technique (left-child/right-sibling encoding), not a redefinition that collapses a forest into a single tree for algorithmic purposes. EX2006, 57–59. Indeed, Sedgewick continues to treat “traversal of a forest” as distinct even after presenting that encoding, underscoring that the underlying object remains a forest and must be handled as such. EX2006, 65. Claim 2’s requirement to process “the mathematical tree structure using a tree traversal algorithm” therefore reinforces that claim 1’s “mathematical tree structure” is one connected tree whose interrelationships can be traversed from a root, not a collection of disconnected trees requiring multiple traversals or an unclaimed “super-root” augmentation. EX1001, 8:1–10.

Against this backdrop, the Petition does not identify a data structure that meets the claim. Where Petitioner points to Huttenlocher’s hierarchical displays to satisfy the “mathematical tree structure,” it does not show a single connected hierarchy that stores the interrelationships of the plurality of edge segments used to assemble a destination geometry; at most, it shows multi-rooted groupings—i.e., a forest—with

no unique path structure linking many pairs of segments. Petition, 37; Petition, 43–44. Petitioner also never shows the next, required step: processing that same tree structure to search for and validate a destination-describing geometric form. See Petition, 43–44 (mapping to bounding-box detection) and 50–51 (continuing the same detection sequence).

Petitioner points to Huttenlocher’s multiscale display and calls it a “(multi-rooted) tree,” but it is actually a forest: there is no single root, no unique path between many node pairs, and no encoded relationships among labeled segments such as A1/B1/C1. Petition, 37; 43–44. As Dr. Majumder explains, a person of skill would understand that such a disconnected collection cannot “store interrelationships of the plurality” because it fails to capture relations among segments that lie in different components and cannot be traversed as a unit to evaluate higher-order constraints. EX2010, ¶¶168.

“A visual inspection of the annotated version of Figures 3 and 4 (below) confirms that the labeled edge segments do not share any structural relationship. They are not part of a hierarchy. There is no single path between segments, no common ancestor, and no indication that they are organized in a tree structure.”



EX2010, ¶167

The point is visible from the face of the figure: “The labeled edge segments do not share any structural relationship. They are not part of a hierarchy. There is no single path between segments, no common ancestor, and no indication that they are organized in a tree structure.” EX2010, ¶167. Petitioner’s assertion that Huttenlocher discloses a connected tree thus rests on conclusory expert say-so, not the reference.

Accordingly, the 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. The edge segments lack a common ancestor, are not connected by any path, and are not arranged in a hierarchy that would constitute a tree structure. Without any evidence of interrelationships among the segments, Petitioner fails to show that Huttenlocher teaches the claimed pipeline that depends on a single encoded set of interrelationships precisely so that the downstream stages can operate on “these edge segments” collectively.

Petitioner’s appeal to the word “structure” in “mathematical tree structure” does not change the analysis. In context, the phrase denotes the one data structure that both (i) stores the interrelationships of the previously identified plurality and (ii) is then analyzed and traversed in the very next stages. EX1001, 6:31–7:22; 8:1–10. Reading “structure” to include a forest would unmoor the storing step from the immediately following “these edge segments are then analyzed” limitation and

would render claim 2's single-traversal requirement nonsensical or incomplete. EX1001, 8:1–10. And even if one entertained a broader “forest” notion, the Petition still fails on the merits because it never identifies any one of its cited hierarchies that actually stores interrelationships of edge segments for a destination geometry and is traversed to assemble and validate that geometry in the manner the claims require. Petition, 37; Petition, 43–44; Petition, 50–51; EX2010, ¶¶156–164; EX1001, 4:42–64; 5:8–18; 6:31–7:22; 8:1–10.

b) Brady and Broggi Do Not Disclose or Suggest the Claimed Mathematical Tree Structure and Cannot Remedy Huttenlocher's Deficiencies

Even if Huttenlocher's failure to disclose a valid “mathematical tree structure” were somehow excused, neither Brady nor Broggi provides any disclosure or suggestion that cures this fundamental shortcoming. The challenged claims of the ‘805 Patent require not only edge detection and segmentation, but also that the interrelationships of a plurality of edge segments be stored in a mathematical tree structure—a specific and technical data organization that is both connected and acyclic, with exactly one path between the root and each node, as defined by Sedgewick and expressly incorporated into the specification.

Brady does not address this requirement. While Brady generally relates to image segmentation and shape analysis, it makes no mention of constructing, storing, or traversing a hierarchical tree of edge segments. There is no indication in Brady of

a data structure that captures edge interrelationships in a manner that conforms to the definition of a tree under Sedgewick. Nor does Brady disclose any tree traversal algorithms or describe a method for organizing edge segments into a connected structure with a single root and unique paths.

Likewise, Broggi is wholly silent on the use of tree structures for representing edge relationships. As explained elsewhere in this Response, Broggi discloses a reactive platooning system that uses real-time visual tracking to follow a preceding vehicle. While it performs certain feature detection tasks, Broggi does not segment edge data into a plurality of labeled components, nor does it construct or store any interrelationship between such components in a tree-like data structure. In fact, Broggi is concerned primarily with low-level control feedback and does not engage in the type of structured object recognition and geometric abstraction required by the claims.

Further, respecting the pipeline is dispositive. The optimized path in [1.3] must be derived from the accepted object's stored positional parameters, which do not exist until after plausibility and then an additional acceptance analysis. EX1001, 7:45–8:34; 8:30–50; 9:3–25. Broggi never produces that input; it maintains alignment to a moving car by moment-to-moment control. EX1005, 171–172. Treating that controller output as a “trajectory” ignores both the required sequencing

and “use-of-parameters” language in [1.3] and is inconsistent with the intrinsic record.

Because neither Brady nor Broggi discloses or suggests a data structure that meets the definition of a “mathematical tree structure,” and because neither reference addresses the need to store interrelationships of edge segments in a connected, hierarchical format, they cannot cure the deficiencies in Huttenlocher. The Petition offers no explanation as to how these references could collectively supply the missing limitation, and no rationale is provided for combining their teachings in a way that would result in the claimed tree structure. Accordingly, the Petition’s attempt to satisfy this limitation through a combination of references is legally deficient and must be rejected.

5. Claim 2’s Traversal Requirement Confirms “Mathematical Tree Structure” Means a Single Connected Tree, Not a Forest

Claim 2 confirms that “a mathematical tree structure” in claim 1 is a single, connected hierarchy and not a set of disconnected trees. The claim requires “processing the mathematical tree structure using a tree traversal algorithm.” “A tree-traversal algorithm—depth-first or breadth-first—presupposes one connected tree with a root and a unique path from the root to every node. See EX2006, 51–52 (tree vs. forest; unique-path property), 57–59 (Representing Forests—left-child/right-sibling is a representation of a forest, not a single tree), 65 (forest

traversal remains distinct). Thus, claim 2's 'processing the mathematical tree structure using a tree traversal algorithm' confirms claim 1's tree is a single connected hierarchy, not a forest.

A forest is not a single object with one root; it is a collection of roots and components. Processing a forest therefore requires either (i) multiple traversals—one per component tree—or (ii) the artifice of creating a dummy “super-root” and extra edges that are not part of the underlying interrelationships being modeled. Neither alternative is what claim 2 recites, which speaks in the singular about “the mathematical tree structure” previously built in claim 1 and then processed as a unit “using a tree traversal algorithm,” not “using multiple traversals,” not “using a forest traversal,” and not “using a traversal of an augmented representation.” EX1001, 8:1–23, 9:3–25.

The specification's flow makes the same point. After edge detection and segmentation, the image is “broken down” into edge segments “whose interrelationships are stored in a mathematical tree structure. Subsequently, these edge segments are then analyzed” for candidate geometric forms, followed by plausibility matching and a further acceptance analysis grounded in the camera's imaging geometry, and then the accepted object is stored and used for trajectory computation. EX1001, 6:31–7:22, 7:45–8:34, 8:30–50. The demonstrative language—“these edge segments,” “subsequently,” and the later use of a traversal

algorithm in claim 2—ties the analyzing operations to the same, single structure that stores the interrelationships of the plurality. Traversal is how those stored interrelationships are exploited to search for higher-order configurations such as rectangles (parallelism, orthogonality, adjacency) across the plurality. Splitting the plurality across multiple disconnected trees would defeat the very reason a tree is used: there would be no unique path structure connecting all nodes of interest, and relations among segments placed in different trees could not be captured or explored by a single traversal. See EX1001, 4:42–64, 5:8–18 (hierarchically organized tree; traversal to evaluate geometric relations).

Petitioner’s invocation of Sedgewick’s remark that “any forest can be represented as a binary tree” does not change this analysis. Sedgewick is explicit that this is a representation technique—the left-child/right-sibling encoding—not a redefinition that collapses a forest into a single tree for algorithmic purposes. EX2006, 57–59. When one “represents a forest as a binary tree,” the programmer adds pointer structure so that each component tree’s root points to a sibling root; the underlying object is still a forest, and processing it still requires either iterating over each component or introducing a dummy root that is not part of the modeled interrelationships. That is exactly why Sedgewick continues to treat “traversal of a forest” as distinct and assigns exercises for it even after presenting the encoding. EX2006, 65. Claim 2 does not recite processing an encoding trick; it requires

processing the mathematical tree structure—the same structure that stores “interrelationships of the plurality of edge segments”—with a traversal algorithm. EX1001, 6:31–7:22, 8:1–10.

The Board’s suggestion that a “forest” could satisfy claim 1 because only “a plurality” of segments and some unspecified subset of “interrelationships” must be stored becomes untenable once claim 2’s traversal is considered. If “the mathematical tree structure” were a forest, a single traversal would either skip segments and interrelationships located in other component trees or silently import an unclaimed augmentation step to bind disconnected components under a dummy root. Either path rewrites claim 2. The better, intrinsic reading gives effect to both claims: claim 1 builds a single tree that stores the interrelationships of the recited plurality; claim 2 then processes that same tree with a traversal algorithm to discover and evaluate geometric configurations before the later plausibility and acceptance gates. EX1001, 6:31–7:22, 8:1–23.

Petitioner’s references do not teach this limitation in any event. Huttenlocher describes hierarchical feature organization to facilitate edge alignment, but it does not disclose storing the interrelationships of a plurality of edge segments in a single tree and then processing that tree using a tree traversal algorithm as claim 2 requires. Broggi’s bounding-box detector and Brady’s tracking likewise lack a tree of edge-segment interrelationships and any traversal of such a tree. Nothing in the proposed

combination identifies a data structure that matches the claim’s “mathematical tree structure” and then applies a traversal algorithm to it. Further, treating a forest as “the mathematical tree structure” would require multiple traversals or an unclaimed super-root augmentation, rewriting claim 2’s single traversal over the structure. EX1001, 8:1–10; EX2006, 57–59, 65. These absences are fatal under claim 2 and further support the proper, singular-tree reading of claim 1.

B. Ground 2 Is Deficient Because Bertozzi Does Not Cure the Shortcomings of Broggi, Huttenlocher, and Brady

Petitioner’s addition of Bertozzi (EX1008) does not cure the core deficiencies that persist in Broggi (EX1005), Huttenlocher, or Brady with respect to the limitations actually recited. Claim 1 requires an additional acceptance analysis that analyzes the shape of the image formation “based on knowledge of at least one imaging property of the imaging sensor relative to the surrounding field,” and it requires that analysis to occur after plausibility matching and before storage and trajectory computation. EX1001, 6:31–7:22; 7:45–8:34. Petitioner never identifies any such downstream, sensor-geometry acceptance gate in Broggi; the Petition instead reuses the same bounding-box top search and stereo refinement found in the detection pipeline. Petition, 50–51; EX1005, 171–172. Bertozzi adds nothing that changes that fact. Its ARGO platform discussion, driver-interface elements, and speed-dependent steering constraints do not introduce a post-matching, sensor-relative acceptance analysis that accepts or rejects already-plausible objects based

on camera pose, horizon/vanishing lines, or expected trapezoidal distortion. EX1001, 7:45–8:34.

The claims also require storing “at least one accepted object that corresponds to a most proximate destination together with corresponding relative positional data in an object list,” and then using those stored positional parameters to compute an optimized trajectory. EX1001, 8:30–50; 9:3–25. Broggi never produces an accepted destination object or an object list; it tracks a leading vehicle and issues steering commands. EX1005, 171–172; Petition, 43–44; 50–51. Bertozzi does not supply the missing object-list semantics, nor does it add any mechanism to store accepted-destination positional data for later planning. The essential pipeline remains unfulfilled.

The “mathematical tree structure” requirement is likewise unmet. The patent tethers the storing step to the very next analysis step: the image is broken into edge segments, their interrelationships are stored in a mathematical tree structure, and these edge segments are then analyzed; claim 2 further requires processing the mathematical tree structure using a tree traversal algorithm. EX1001, 6:31–7:22; 8:1–10. Petitioner’s reliance on Huttenlocher never identifies a single connected tree that stores interrelationships of the plurality of edge segments used to assemble a destination geometry; at most it points to multi-rooted groupings. Petition, 37; 43–

44. Bertozzi does not fill that gap and certainly does not disclose traversal of such a tree in the claimed pipeline.

Limitation [1.3] also remains unsatisfied. The claims demand “at least one trajectory describing an optimized travel path using the positional parameters of an accepted destination object,” computed after acceptance and storage. EX1001, 7:45–8:34; 8:30–50; 9:3–25. Broggi discloses reactive platooning—continuous steering to maintain formation with a moving leader—not destination-driven path planning that consumes stored accepted-object parameters. EX1005, 171–172; Petition, 37; 43–44; 50–51. Bertozzi’s speed-dependent steering limits or driver displays neither create an accepted destination nor convert Broggi’s controller output into a trajectory computed from stored positional parameters. The claim’s “use-of-parameters” and its sequencing remain unmet.

Nor does Petitioner articulate any principled reason or expectation to retrofit ARGO’s follower control with a sensor-geometry acceptance gate and a single traversable tree of edge-segment interrelationships so as to yield the ’805 pipeline. The cited portions of Bertozzi address interface and comfort constraints, not destination-object acceptance, object-list storage, tree traversal, or destination-based trajectory computation. Petition, 50–51. In short, Ground 2 falls with Ground 1’s deficiencies: adding Bertozzi does not supply a post-matching, sensor-geometry “additional acceptance analysis,” does not create the required object list of accepted

destination objects, does not provide the single connected mathematical tree that is traversed (claim 2), and does not transform Broggi's reactive following into the claimed destination-based optimized trajectory computed from stored accepted-object parameters.

VII. CONCLUSION

For both grounds, Petitioner has not carried its burden to prove unpatentability by a preponderance of the evidence. The record never identifies the claimed post-detection "additional acceptance analysis" based on imaging-sensor properties relative to the surrounding field, instead reusing Broggi's bounding-box heuristics and stereo refinement. It never shows "at least one trajectory describing an optimized travel path" that is computed using the stored positional parameters of an accepted destination object after the ordered pipeline of identification → plausibility matching → additional acceptance analysis → storage. And it never discloses the required single connected "mathematical tree structure" that stores interrelationships of the plurality of edge segments processed using a tree traversal algorithm (claim 2). Adding Bertozzi does not cure these defects; it supplies neither the missing acceptance gate nor the destination-based trajectory computation nor the traversable tree.

Because the Petition collapses distinct limitations, omits key claim-critical steps, and fails to provide a structure or process meeting the claims as construed in

view of the specification and Sedgewick, the Board should enter a Final Written Decision confirming the patentability of the challenged claims and deny the relief requested under Grounds 1 and 2.

Respectfully submitted,

Dated: October 14, 2025

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Pursuant to 37 C.F.R. § 42.24(d), I certify that this **PATENT OWNER'S RESPONSE** complies with the type-volume limits set forth in the Memorandum and 37 C.F.R. § 42.24 because it contains 13,651 words, excluding the parts of the Brief that are exempted by 37 C.F.R. § 42.24(a), according to the word processing system used to prepare this Brief.

Respectfully submitted,

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CERTIFICATE OF SERVICE

The undersigned certifies that pursuant to 37 C.F.R. § 42.6(e), a copy of the foregoing **PATENT OWNER'S RESPONSE** was served via email (as consented to by counsel) on October 14, 2025 to lead and backup counsel of record for Petitioner as follows:

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