

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TESLA, INC.,
Petitioner,

v.

iQAR, INC. F/K/A INVENTLY AUTOMOTIVE, INC.,
Patent Owner

Case No. IPR2024-00545
Patent No. 8,972,161

PATENT OWNER'S RESPONSE

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TABLE OF EXHIBITS

Exhibit No.	Description
Ex. 2001	Excerpt from <u>The American Heritage College Dictionary</u> (2000)
Ex. 2002	Transcript from the October 31, 2024 Deposition of Nikolaos Papanikolopoulos, Ph.D
Ex. 2003	Expert Declaration of Craig J. Hoff

I. INTRODUCTION

Patent Owner iQar, Inc. F/K/A Invently Automotive, Inc. respectfully submits this response to Petitioner Tesla, Inc.'s ("Petitioner") Petition for *Inter Partes* Review (the "Petition") of U.S. Patent No. 8,972,161 (Ex. 1001, "the '161 patent"). The prior art does not teach what the '161 patent's claims require.

The '161 patent includes two independent claims: claims 1 and 10. Petitioner makes two arguments challenging these claims. In Ground 1, Petitioner asserts that the claims are obvious in view of U.S. Patent Publication No. 2004/0068359 to Neiss (Ex. 1005, "Neiss"). In Ground 2, Petitioner asserts that the claims are obvious in view of U.S. Patent No. 6,005,494 to Schramm (Ex. 1009, "Schramm") in combination with U.S. Patent No. 6,161,072 to Clapper (Ex. 1006, "Clapper").

Petitioner's Neiss arguments are flawed. The '116 patent claims require first "receiving a route" and then "segmenting said route into segment destinations." Neiss neither receives nor segments a route. Instead, it deliberately ignores the vehicle's route and limits its consideration to just the area around the current vehicle position (which it calls the "Prediction Horizon") to reduce the amount of memory and calculations necessary. As Neiss explains, this Prediction Horizon is simply the terrain immediately ahead of the vehicle. It has nothing to do with the vehicle's route. Moreover, Neiss purposefully keeps the Prediction Horizon small because it does not know if the vehicle will actually travel over the terrain the horizon covers.

This avoids unnecessary calculation in the event the vehicle turns and encounters different terrain. Petitioner also argues that it would have been obvious to modify Neiss such that it engages in prediction across a complete route. But this would be the opposite of what Neiss teaches: Neiss purposely limits the scope of the Prediction Horizon both to simplify and avoid unnecessary calculation in the event the vehicle encounters unforeseen events (like slow drivers). Modifying Neiss in the way Petitioner proposes would negate this and be contrary to Neiss's teachings.

Petitioner's Schramm and Clapper arguments are also flawed. Neither Schramm nor Clapper determine a plurality of efficient speeds that optimize energy usage along a route. Schramm's route assessment system simply uses speed as an input. It makes no speed determinations at all. While Clapper does use a lookup table to determine the speed the vehicle should travel at a given location, it does not do so for efficiency purposes. The lookup table includes only (1) previously driven speeds or (2) speed limits for a particular location. Neither of these is the claimed efficient speed. Indeed, both could—and often will be—highly inefficient.

II. THE '161 PATENT

The '161 patent relates to a system and method for managing and optimizing a vehicle's power consumption. (Ex. 1001, 2:15-17.) The patent explains that accurate control of fuel consumption may optimize the energy efficiency of a car. (*Id.*, 1:16-24.) Prior to the patent, however, drivers sought to manually manage fuel

consumption in imprecise ways, such as slowing down, braking lightly, and carrying lighter loads. This did not effectively improve the energy efficiency of most cars. (*Id.*)

The '161 patent proposes a solution to the limited methods to manage energy efficiency of the prior art. (Ex. 1001, 1:60-2:6.) In particular, the patent discloses a power management logic used by a motor control mechanism to efficiently control the application of power to the vehicle engine as the vehicle travels along a route to a destination. (*Id.*, 2:34-37.)

Importantly, the '161 patent explains that, in one embodiment, calculating the applied power for a route involves segmenting the route into segment (or intermediate) destinations, and then calculating a number of parameters for each segment that can be used to calculate the optimal applied power for that segment. (*Id.*, 5:8-31.) For example, a number of possible segments can be seen in Fig. 3A:

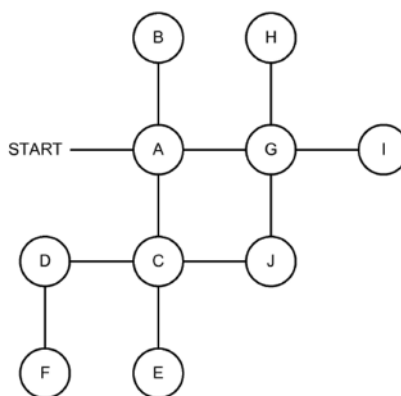


FIG. 3A

(*Id.*, Fig. 3A.) If the vehicle is currently located at START, one possible destination for the route is location C. (*Id.*, 12:44-13:38.) In that situation, one way to segment the route from START to C is to treat location A as an intermediate destination. (*Id.*) Then, route START→A→C has two segments: START→A and A→C. (*Id.*)

Once the route has been received and segmented into segment destinations, an efficient speed for the vehicle to travel between each pair of segment destinations can be determined by calculating a plurality of energy values consumed by the vehicle to travel the route, based on a plurality of variations in a target speed between pairs of segment destinations. (*Id.*, 11:10-14:14 (“Optimization of Engine Efficiency” is performed by the steps of: “1. Determine Route,” “2. Segment Route,” and then “3. Calculate Energy for the Route.”).)

In this way, the patent determines a plurality of target speeds that achieve a best summation of energy values across the route. Then, the vehicle’s operator can be notified about those efficient speeds or the corresponding power can be applied directly to the vehicle’s engine so that the vehicle travels at the appropriate speeds between each of the segment destinations. (See, *e.g.*, *id.*, 5:8-14 (“The step of calculating an applied power may include determining a route, segmenting the route into one or more segment (or intermediate) destinations, calculating an energy efficient speed for the vehicle to travel to the segment destination, determining an optimized speed for the vehicle to travel to the segment destination, and calculating

the applied power from the optimized speed for all of the segments.”); *see also* 11:10-29, 14:33-49, 18:57-19:17, Figs. 4A-B.)

III. CLAIM CONSTRUCTION

Petitioner argues that no claim constructions are necessary. Petition at 2. While Patent Owner does not believe that any specialized constructions are necessary, Petitioner has improperly applied several claim terms including “receiving a route,” “segmenting said route,” and “determining a plurality of efficient speeds.” Additional discussion of the meaning of these claim terms is provided in the sections below.

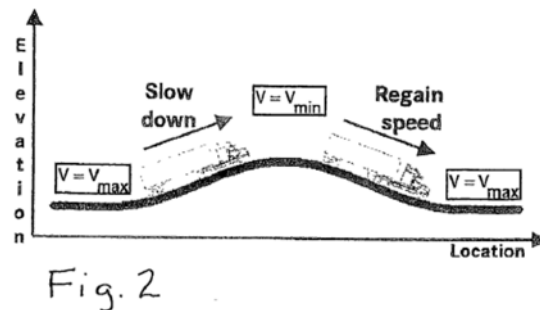
IV. REFERENCES AT ISSUE

A. Overview of Neiss

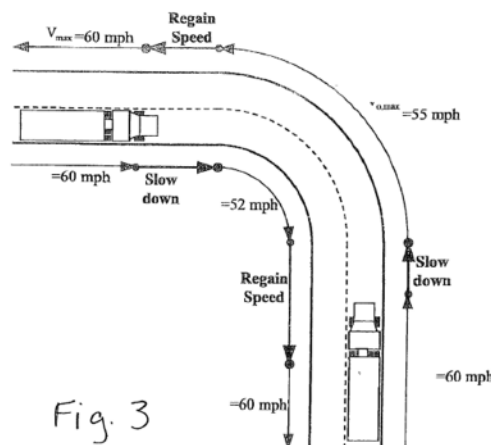
Neiss is directed toward a rudimentary vehicular cruise control system. The system employs an onboard computer, which Neiss calls a “Predictive Cruise Control (PCC),” that is intended “to replace or supplement the set speed of a conventional cruise control with a speed band.” (Ex. 1005, ¶ [0031].) Using the PCC, “[f]orward-looking terrain information is used to determine, as a function of position, a desired speed inside the speed band [] in order to maximize fuel savings.” (*Id.*)

Neiss “iteratively calculates and stores in a memory vehicle control parameters that optimize the vehicle operating cost function for a predetermined Prediction Horizon along the route ahead of the vehicle.” (*Id.*, Abstract.) Because

of this, unlike the '161 patent, Neiss's iterative system does not make any route or destination determination. Instead, Neiss simply adjusts the cruise control in response to the geography immediately in front of the vehicle. For example, when a vehicle arrives at a hill, it "slows down as it moves uphill until it reaches a minimum speed on top of the hill, and regains speed on the downhill part, thus completely converting the potential energy into kinetic energy[.]" (*Id.*, ¶0031.) This is shown in Figure 2 below:



(*Id.*, Fig. 2.) Similarly, as the vehicle "approaches a curve, the speed can automatically be reduced as shown in FIG. 3." (*Id.*, ¶0032.) This is shown in Figure 3:



(*Id.*)

Neiss explains that the “Prediction Horizon” covers only “an area around the current vehicle positioned [sic].” (*Id.*, ¶¶ [0161]-[0162].) Neiss’s PCC purposely limits its analysis to this limited area to avoid a system “in which the stored values are determined in advance,” because doing only the most minimal calculations possible means that “[l]ess memory is needed,” and “[t]here is no need for a previous ‘record drive.’” (*Id.*, ¶¶ [0163], [0164], [0166]; *see also id.*, ¶ [0169] (noting that Neiss does not use approaches that require increased calculations).)

B. Overview of Schramm

Schramm is directed to an on-board vehicle computer that determines an energy-optimum route for a vehicle to take between an origin and a destination. (Ex. 1009, Abstract.) To do so, this computer receives various inputs, including the vehicle’s start point “A,” destination point “B,” and the specific speed to the user desires to travel between the two points. This is shown in Figure 2:

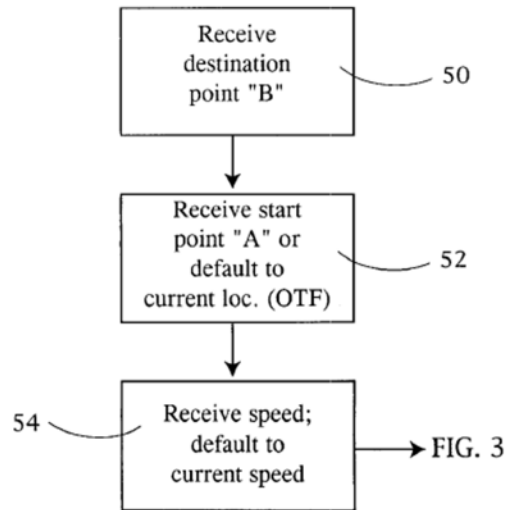


FIG. 2

(*Id.*, Fig. 2; *see also* 5:1-20.) Importantly, speed is simply an input to this process specified by the user. The speed is assumed not to vary. (*See, e.g.*, Ex. 1009, 5:14-20 (“the logic receives ***the desired average speed*** at which the operator intends to drive vehicle to the destination point ‘B’”) (emphasis added); *see also* 5:45-49 (referencing use of “the speed that was input at block 54 of FIG. 2”); 6:44-49 (noting that the vehicle computer determines if the “vehicle 12 has sufficient energy to travel from the origination point ‘A’ to the destination point ‘B’ ***at the desired speed.***”) (emphasis added); 7:40-42; 5:61-6:7; 7:18-25; 7:47-50 (all similar); Figs. 2, Fig. 6). Schramm’s system then uses these inputs—the start point, destination point, and specific desired speed—to determine possible routes and then evaluate these routes’ energy consumption. (*See, e.g., id.*, 3:2-12 (“Each possible route is characterized by an energy consumption, and the computer accesses the topographic information and

the vehicle energy consumption source to determine a select route having a minimum energy consumption among the possible routes.”); *see also id.*, 3:25-27, 4:24-27, 5:21-52, 6:11-18; 6:29-32. This evaluation process is shown in Fig. 3:

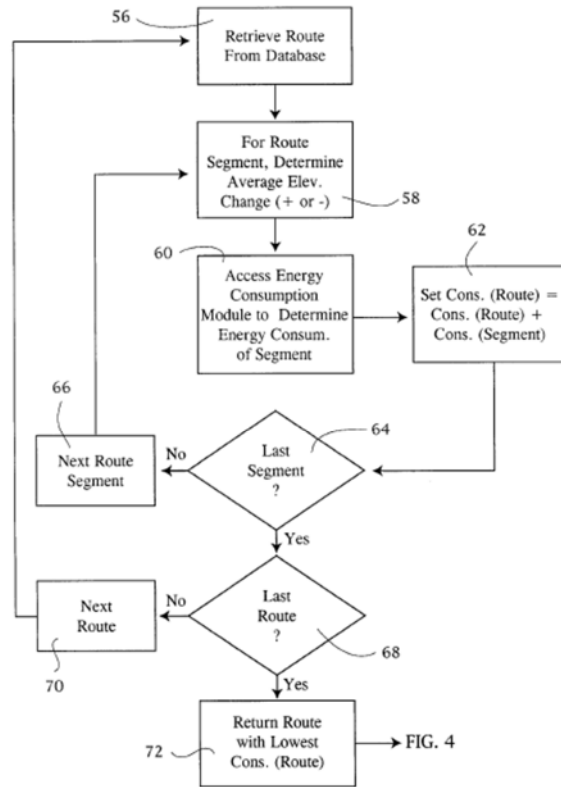


FIG. 3

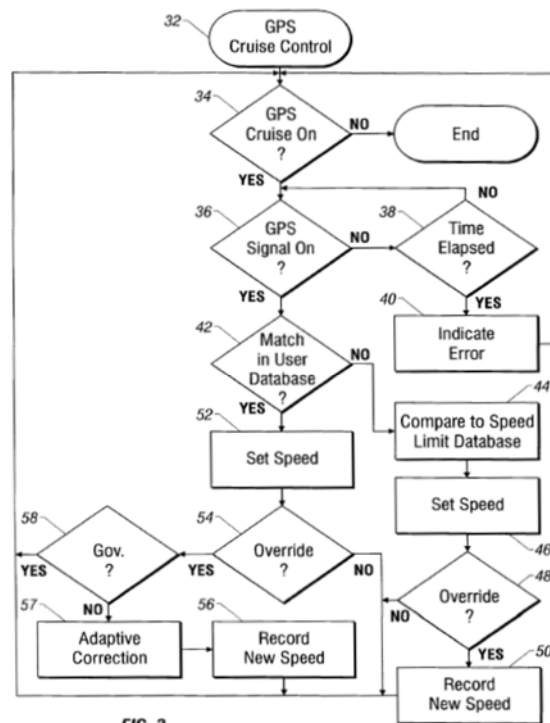
(*Id.*, Fig. 3.)

In short, Schramm’s system selects the most efficient route a vehicle could use to travel between two points ***at a specified, unchanging speed.*** If the energy consumption of that optimal route can be met by the energy reserve of the vehicle, the logic signals that the vehicle “has sufficient energy to travel from the origination point ‘A’ to the destination point ‘B’ at the desired speed.” (*Id.*, 6:44-49.)

C. Overview of Clapper

Clapper is directed to an automatic cruise control system that uses stored information about speeds the vehicle has used at its current location in the past to control the present speed of the vehicle at that same current location. (Ex. 1006, Abstract.) For locations where prior driving history is not available, the system can refer to a database of speeds for that location instead. (*Id.*)

For instance, as shown in Figure 3, “[b]ased on prior history and detected current position, the automatic cruise control 20 may set the vehicle’s speed based on the speed that the driver used previously at the same location.” (*Id.*, 1:53-56.)



(*Id.*, Fig. 3; 1:20-25; see also *id.* Fig. 4 (referencing use of “current speed,” “previous speed,” and a “database speed”); 1:50-53, 2:30-44, 2:45-60, 3:38-45.)

V. NONE OF THE CHALLENGED CLAIMS ARE OBVIOUS

All of Petitioner's Grounds of invalidity require a showing that either Neiss (Ground 1) or the combination of Schramm and Clapper (Ground 2) renders the challenged claims obvious. Neither combination teaches the claimed subject matter.

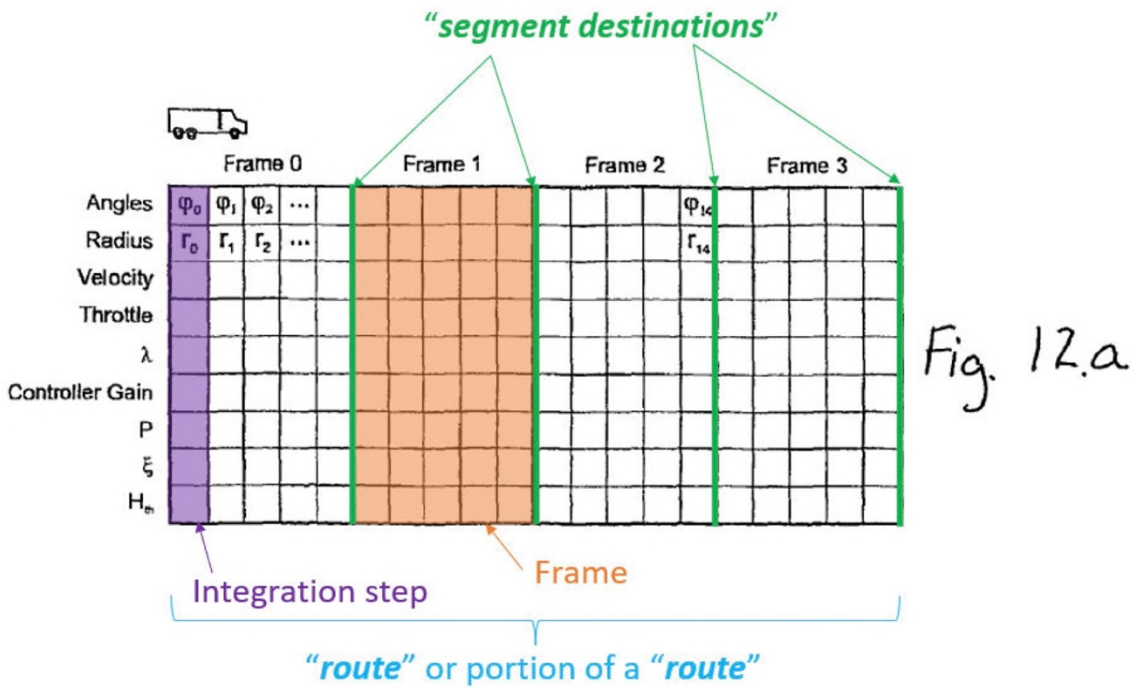
A. Ground 1: Neiss Fails to Render the Claims Obvious

Numerous required claim limitations are missing from the prior art.

1. Neiss Does Not Teach “*Receiving a Route at a Computer of Said Vehicle*” and “*Segmenting Said Route into a Plurality of Segment Destinations*”

Both claims 1 and 10 require the steps of “*receiving a route at a computer of said vehicle*” and then “*[s]egmenting said route into a plurality of segment destinations.*” In connection with these limitations, the Petition argues that Neiss's optimization algorithm “iteratively calculat[es] ... vehicle control parameters that optimize/minimize the vehicle operating cost function for a predetermined distance (referred to as a Prediction Horizon) along the route ahead of the vehicle.” Petition at 13-14. According to the Petition, this “Prediction Horizon” purportedly “corresponds to **a route** because it constitutes a path traveled by the vehicle.” Petition at 13-14. Then, the Petition notes that in Neiss, “[e]ach Prediction Horizon ... ‘is separated into Frames.’” *Id.* at 19 (quoting Ex. 1005, ¶ [0170]).) “Each frame is composed of multiple ‘integration steps’” which “correspond to a ‘small distance[]’ along its frame.” Petition at 19 (quoting Ex. 1005, ¶¶ [0162], [0170].) The Petition then goes on to correlate the “frame endpoints” to the claimed

“*segment destinations.*” *Id.* at 20-21. This is shown in the below annotated figure from the Petition:



Id. at 21. This is not what the ’161 Patent’s claims require.

a. Neiss Performs the Claimed Steps Out of Order

To begin, claims 1 and 10 require an ordered, two-step process. A “route” must first be “receiv[ed] ... at a computer of said vehicle.” Then, this already received route must be “[s]egment[ed] ... into a plurality of segment destinations.” To the extent Neiss performs these steps at all, it does so out of order.

A method claim “requires an ordering of steps when the claim language, as a matter of logic or grammar, requires that the steps be performed in the order written, or the specification directly or implicitly requires” such an ordering. *Information Techs. v. Research in Motion Ltd.*, 764 F.3d 1392, 1398-99 (Fed. Cir. 2014) (quoting

TALtech Ltd. v. Esquel Apparel, Inc., 279 F. App'x 974, 978 (Fed. Cir. 2008)); see also *Interactive Gift Exp., Inc. v. Compuserve Inc.*, 256 F.3d 1323, 1342-1353 (Fed. Cir. 2001) (noting that a step order is required “when the method steps implicitly require that they be performed in the order written”).

This is what claims 1 and 10 do here. Both require “receiving a route.” Then, “said route”—in other words, the same “route” that was previously “receiv[ed]” by the vehicle’s computer—must be “segment[ed].” A route cannot be segmented if it is not first “received” by the vehicle computer performing the segmenting. Thus, per the language of the claims and basic logic, the claimed “receiving” and “segmenting” steps must be performed in order. See *Information Techs.*, 764 F.3d at 1399 (finding that step requiring establishment of connection must occur before later step requiring transmission over that connection); *Function Media, LLC v. Google, Inc.*, 708 F.3d 1310, 1320 (Fed. Cir. 2013) (finding that claimed “processing” of created “electronic advertisement” requires that “the creation of the ad must happen before the processing begins”); *Mantech Envtl. Corp. v. Hudson Envtl. Servs., Inc.*, 152 F.3d 1368, 1376 (Fed. Cir. 1998) (finding that method claim required ordered steps: “in order for the aqueous solution to mix with the acidified groundwater, the acid must have already mixed with the groundwater to form acidified groundwater.”)

The '161 patent's specification confirms that the claimed steps must be performed in order. For instance, as shown in Figure 2, the patent's method first determines a route at step 201 and then divides this already determined route into segments at step 203:

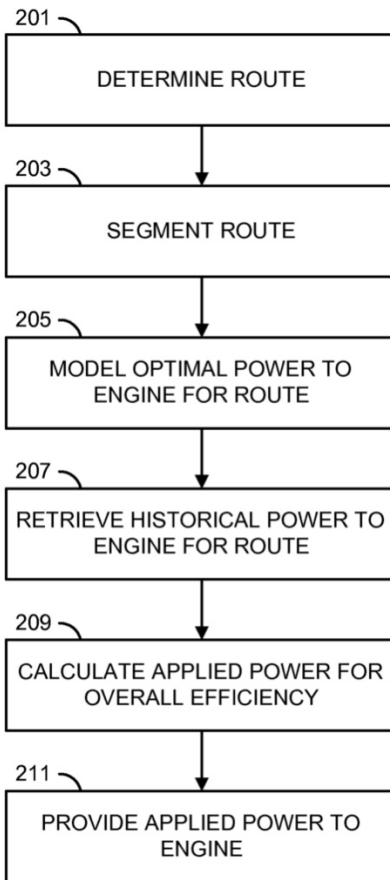


FIG. 2

(Ex. 1001, Fig. 2; *see also id.*, 11:15-17 (explaining that “a route is determined 201 from the starting position and an actual or estimated ending position” then “the route is segmented 203 into one or more segments”). Likewise, the specification explains that when a route is “segmented,” it is “broken up[,]” “divided up” or “split into”

separate “segments.” (*Id.*, 13:44-47; 13:51-58; 14:5-12; 14:65-15:7.) So, “segmenting” is a process or step performed on an existing, received route to break that route into pieces before further processing and calculation. (*See id.*; *see also* Ex. 2003, ¶¶ 98-107.) The route is not assembled from segments. Instead, it is the route that is itself segmented. (*See id.*)

This is not what Neiss teaches. Even if one incorrectly assumed that Neiss’s Prediction Horizon is a “route” as the Petition argues (it is not), rather than “segmenting” an already existing Prediction Horizon worth of road data, Neiss does the **opposite**. Its system begins by filling its integration steps with road and vehicle data. It then collects these steps into a Prediction Horizon. (*See, e.g.*, Ex. 2002, 15:9-19:20 (Petitioner’s expert explaining that it is a “Prediction Horizon” filled with angle, radius, velocity and other data—and not an empty data structure—that in his view constitutes a “route”).)

More particularly, Neiss explains that “sensors about the vehicle detect environment and vehicle operating parameters, including at least vehicle speed and position relative to the road map.” (Ex. 1005, ¶ [0015].) “As the vehicle proceeds, an onboard computer iteratively calculates and stores in a memory” both road data and “vehicle control parameters that optimize the vehicle operating cost function for a predetermined distance (referred to as a ‘Prediction Horizon’) along the route ahead of the vehicle.” (*Id.*) Neiss distinguishes this “Prediction Horizon”—which

is just the road “ahead”—from the “particular route” the vehicle is following. (See, e.g., *id.*, Abstract.) The stored road and vehicle operation data for the “Prediction Horizon” is “continuously updated and replaced by new data as the vehicle ... moves along...” (*Id.*)

Neiss’s road and vehicle data are stored in a ring buffer. (*Id.*, ¶ [0162].) The “Prediction Horizon” is nothing more than a “parameter” that specifies size—in storage cells—of this ring buffer. (*Id.*, ¶¶ [0170], [0192]; see also *id.*, ¶¶ [0027]-[0029], [0162], [0176]-[0179], [0191] (repeatedly analogizing the “Prediction Horizon” interchangeably with “ring buffer”). Next, Neiss explains that “[t]he initialization of the ring buffer ... must be completed **before** the vehicle reaches the start point on the road where the PCC system is triggered.” (*Id.*, ¶ [0178] (emphasis added).) To do so, “[f]irst the ring buffer memory is filled with angle and radius values **from cell zero up to the last cell** for the next to last frame.” (*Id.*, ¶ [0179] (emphasis added).) Calculations are then performed on this data. (*Id.*, ¶ [0180].) A new set of cell-by-cell (or integration step-by-integration step) calculations are triggered when the vehicle “reaches the end of the first frame.” (*Id.*, ¶ [0188].) These new calculations replace the old data previously stored at the beginning of Neiss’s ring buffer. (*Id.*, ¶ [0191] (“when the vehicle is driving in frame 2[,]” frame no. 0 is filled with road data and staring value estimates”).)

In sum, Neiss’s process starts with an empty ring buffer that contains no data. (See, e.g., *id.*, Fig. 11.) This empty ring buffer is then iteratively filled with road data one integration step / cell at a time as the vehicle drives until a number of ring buffer cells equal to the Prediction Horizon parameter is reached. (See *id.*, ¶ [0179].) An empty ring buffer—even one whose number of cells is dictated by the Prediction Horizon parameter—is not yet a “route.” No road-specific data is present. (See Ex. 2003, ¶¶ 108-119.) It follows that even if one did consider Neiss’s Prediction Horizon to be a “route” and its frames to be “segments” as the Petition argues, no “route” exists that can be “received” by Neiss’s vehicle computer until **after** Neiss populates a Prediction Horizon worth of integration steps / buffer cells with road-specific angle, radius, and other data. (See *id.*, ¶¶ 120-122.) In other words, Neiss determines what the Petition calls “segments” first, and then accumulates these “segments” into the Petition’s “route.” (See *id.*) Once again, the claims here require the **opposite**: the vehicle computer must first “receiv[e] a route” and then “segment[] said route.” (See *id.*) Petitioner and its expert have entirely ignored and failed to meaningfully address this operation. (See, e.g., Ex. 2002, 23:13-33:15 (Petitioner’s expert repeatedly refusing to answer questions or explain his opinions regarding the operation of Neiss’s ring buffer).)

Neiss does state that “[t]he whole Prediction Horizon is separated into Frames” and “integration steps h.” (Ex. 1005, ¶ [0170].) But, this is **not** a teaching

that a known portion of a road over which a vehicle is travelling is provided to Neiss's system and then divided up for calculation. Instead, it is simply a description of how the data that Neiss will collect (but has not yet collected) will be stored and organized. (See Ex. 2003, ¶¶ 123-125.)

b. Neiss's Prediction Horizon Is Not a "Route"

Next, Neiss's "Prediction Horizon" is not a route at all. A POSITA would have understood the ordinary meaning of the term "route" to be a road, path, or course from one place to another. (See, *e.g.*, Ex. 2001 at 1189 (defining "route" as "[a] road, course, or way for travel from one space to another").) Courts have also construed the term the same way. See, *e.g.*, *Garmin Ltd. V. TomTom, Inc.* 468 F.Supp.2d 988, 1016-1017 (W.D. Wis. 2006) (construing "optimal route" to mean "a course of travel such that the amount of time or distance from a starting point to a destination is least or requires the fewest number of turns"). In other words, a "route" is not just the terrain immediately ahead of the vehicle. It is the *path* the vehicle is following to travel ***from its present location to its destination***. (See Ex. 2003, ¶¶ 126-128.)

This is exactly how the '161 patent uses the term "route." The patent repeatedly explains that a "route" has a start, an end, and a path from that start to end. For instance, per the patent, a "route" extends "from the" vehicle's "initial position to a destination (e.g., a final destination or an intermediate destination)."

(Ex. 1001, 14:20-22; *see also id.*, 11:13-17 (a “route” is “determined ... from the starting position” to “an actual or estimated ending position”); 11:31-32 (similar).) Thus, in the example shown in Figure 1B, the vehicle’s “route” extends “from point A to point B.” (*Id.*, 6:55-56):

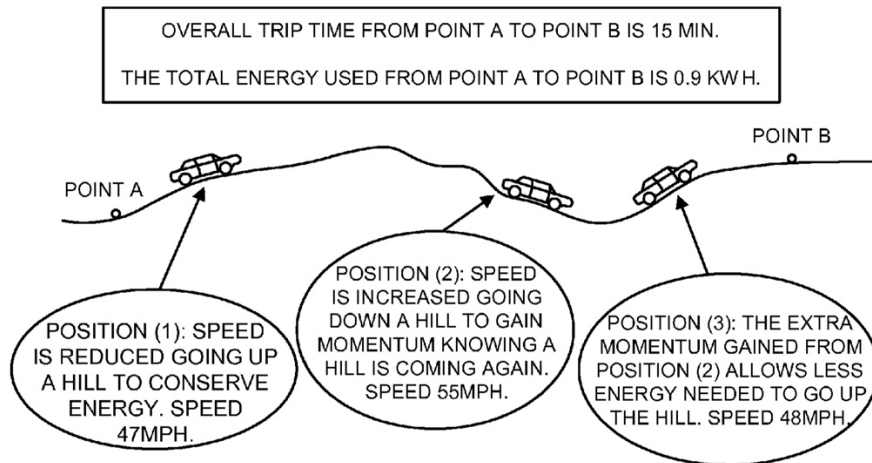


FIG. 1B

(*Id.*, Fig. 1B.) Figure 3A provides another example. This figure shows a “schematic route” with “10 junctions (A to J).” (*Id.*, 12:46-47.) Each route shown by the schematic has a start (*i.e.*, “START”), at least one intermediate junction (*i.e.*, A), and a destination. (*Id.*) One such route—the “trip” “start→A→G→J→C→E”—is highlighted below:

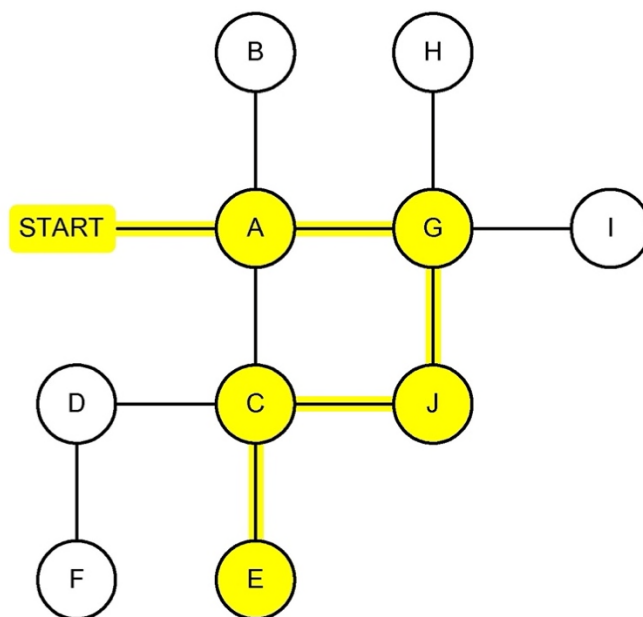


FIG. 3A

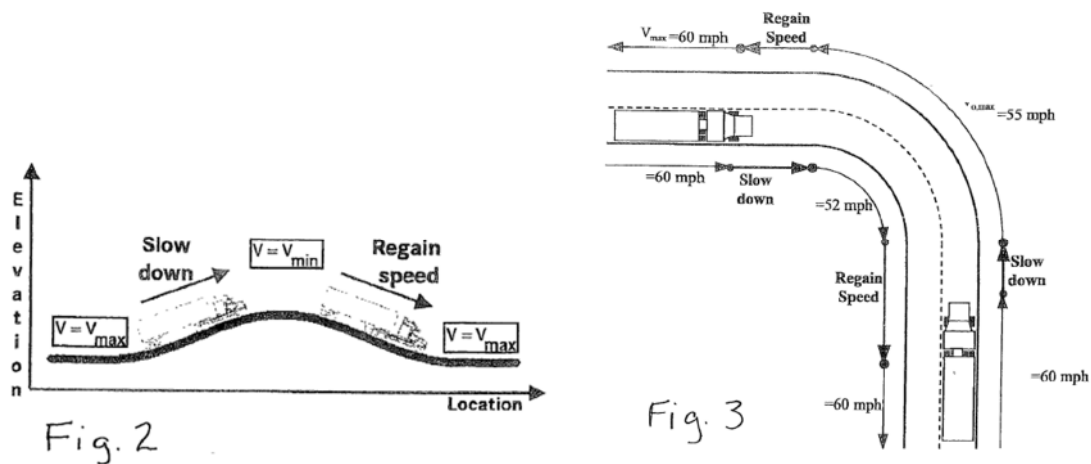
(*Id.*, Fig. 3A (annotated); *see also id.*, 12:58-13:2 (listing the various “trips” depicted in Fig. 3A).) In all cases, the ’161 patent’s routes are “for” a “destination.” (*Id.*, 5:19-21.) Each route includes a “starting location and any intermediate locations” along with a “destination.” (*Id.*, 9:10-15, 17:6-8.) The ’161 patent does not use the term “route” to refer generically to the vehicle’s direction of travel. The “route” is always the path the vehicle is traveling *to* a destination. (See Ex. 2003, ¶¶ 129-135.)

The ’161 patent’s claims themselves further support this understanding. Not only do the claims reference a “route,” but they also provide that this “route” is “segment[ed] ... into a plurality of segment destinations.” It would make little sense to construe the term “route” in a way that does not require a known destination at

the end of the route when the claim requires division of this route up into pieces—the segments—each with their own segment destination. (*See id.*, ¶¶ 136-137.)

When instituting IPR, the Board pointed to a passage in the '161 patent explaining that a route “typically includes a starting position ..., an ending position, ..., and any intermediate positions between the initial and the final position.” Institution Decision (Paper 7) at 13-14 (quoting Ex. 1001, 13:40-44). This does not affect a redefinition of the term “route.” Instead, it simply accounts for the different ways a route to a destination can be constituted in the '161 patent. For instance, a route may be “based on the current position of the vehicle and a final destination position.” (*E.g.*, Ex. 1001, 11:30-44.) The route can also include multiple “intermediate positions between the initial and the final position.” (*Id.*, 13:40-44.) This allows the operator to specify not only the “final destination,” but the “preferred route” the vehicle should follow to reach that destination. (*Id.*, 11:40-44.) Alternatively, the route may extend only to an “intermediate destination” as opposed to the final destination. (*Id.*, 9:33-35, 12:23-26, 12:40-44.) As can be seen, in all cases, the vehicle is traveling to a destination such a known, final destination, a predicted destination, or an intermediate destination. The '161 patent never characterizes general travel—without a specific identified destination—as a route. (*See* Ex. 2003, ¶¶ 138-144.)

Neiss's Prediction Horizon is not a "route" when that term is afforded its ordinary meaning. The Prediction Horizon bears no relation to the vehicle's destination. Neiss's system is not aware of and does not determine the vehicle's destination. Indeed, the word "destination" never even appears in its disclosure. The Prediction Horizon is simply the terrain/road immediately in front of, and visible from, the vehicle's current location. (See, e.g., Ex. 1005, ¶¶ [0015] (the "Prediction Horizon" is a "predetermined distance" ahead of the vehicle); [0048] (noting that the "Prediction Horizon" is the "approaching road"), [0162] (defining "Prediction Horizon" as "an area around the current vehicle position[]").) For example, as shown in Figure 2, Niess's system is able to recognize that the vehicle is approaching a hill. Or, as shown in Figure 3, the system recognizes an approaching turn:



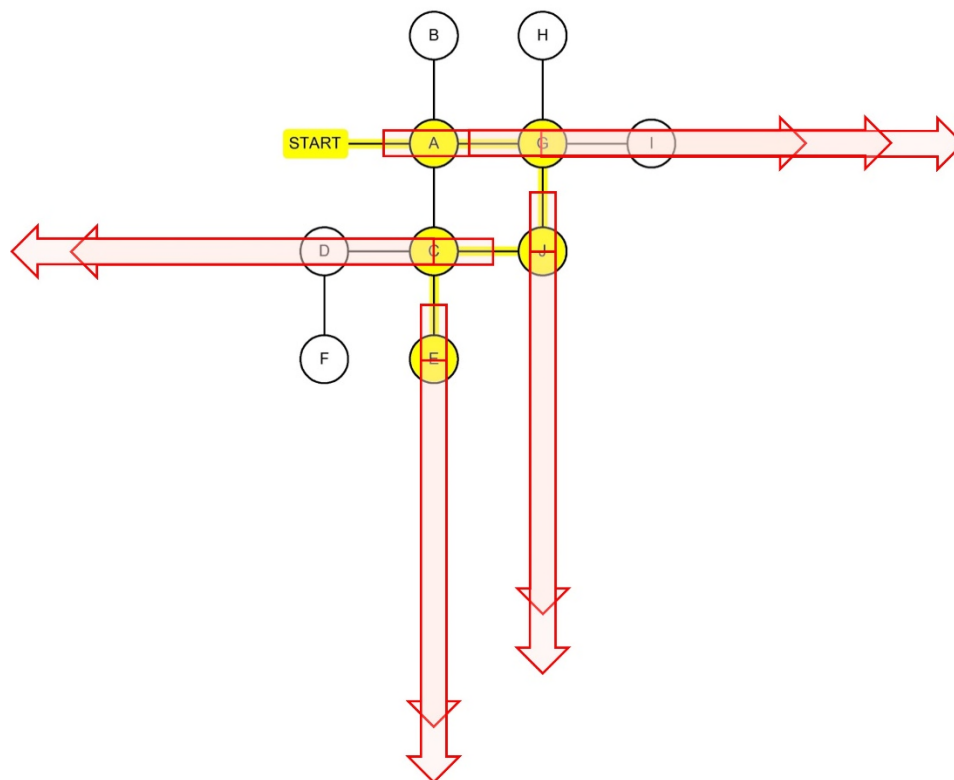
(*Id.*, Figs. 2, 3.)

Other portions of Neiss serve to further confirm that the Prediction Horizon is not a "route." For example, Neiss explains that its Prediction Horizon is calculated

“online” in “real time” and for the area ahead of a vehicle so as to allow for a “change [in] the route while driving.” (*Id.*, ¶ [0165].) In other words, Neiss has specifically designed its system to account for the fact that a vehicle may very well **not** traverse the terrain corresponding to the Prediction Horizon and may instead take another, different path requiring its system to “adapt.” (*See id.*, ¶¶ [0163]-[0169].) When it does so, Neiss will discard its prior “Prediction Horizon” (as it is not terrain over which the vehicle will ever travel) and replace it with a new “Prediction Horizon” for the new road ahead (which, once again, the vehicle may or may not ever travel over). (*See id.*) Neiss also explains that in one example, its Prediction Horizon may be 4000 m long. (*See id.*, ¶ [0192].) A vehicle can of course follow an almost innumerable number of different paths—by making a variety of different turns—over this distance. (*See* Ex. 2003, ¶¶ 145-151; *see also* Ex. 2002, 51:10-15 (Petitioner’s expert agreeing that a vehicle may turn over the course of 4km); 55:2-19 (agreeing that Neiss performs new calculations when the vehicle changes course); 58:18-23 (noting that Neiss recalculates if the vehicle changes course or speed).) Given this, a POSITA would have recognized there is no correlation between the “Prediction Horizon” and the route the vehicle is actually traveling.

The below demonstrative—generated using Figure 3A of the ’161 patent—provides an example of this. As shown, the vehicle is travelling over the yellow highlighted route from Start→A→G→J→C→E. Neiss’s system is unaware of this

route, and determines “Prediction Horizons” for the road immediately ahead of the vehicle. Thus, the first “Prediction Horizon” will miss and extend well beyond the turn from G to J, the next “Prediction Horizon” will miss and extend well beyond the turn from J to C, and so on until the vehicle ends its travels:



(See *id.*, ¶¶ 152-158.) There is no correlation between the vehicle’s route (the yellow) and the Prediction Horizons (the red). In other words, because it is simply the road ahead (regardless of whether the vehicle travels over that road or not), the “Prediction Horizon” is not a “route.” (See *id.*)

The Board also noted in its institution decision that in the event the claimed “route” requires a destination, then Neiss’s final Prediction Horizon can still be

analogized with such a “route” because “the last prediction horizon of the journey would include the final destination and, thus, qualify as a ‘route’....” See Institution Decision at 14-15. This appears to be an obviousness by inherency argument. Even though Neiss does not determine the vehicle’s final destination, the Board appears to have taken the position it inherently teaches such a determination as the Board assumes the end of the final Prediction Horizon necessarily corresponds with or includes the end of the vehicle’s route. Not so. First, the vehicle would need to actually follow the terrain corresponding to the Prediction Horizon—instead of turning or deviating from that terrain—for the final Prediction Horizon to include the vehicle’s destination. (See *id.*, ¶¶ 159-168.) As explained, this is certainly not guaranteed to occur. Neiss recognizes that the vehicle may “change ... route while driving.” (Ex. 1005, ¶ [0165].) Next, even if the vehicle did precisely follow the Prediction Horizon, the overall route would need to be an exact multiple of Neiss’s frame length for the end of the Prediction Horizon to correspond with the end of the route. As the vehicle moves along, Neiss updates the Prediction Horizon one frame at a time. (See *id.*, ¶¶ [0015]; [0188]-[0191].) If the route is not a multiple of the frame length, the final Prediction Horizon will end either before or after the vehicle’s destination. By way of example, Neiss explains that one Prediction Horizon can be 4000 m (or 4 km) long and include 200 frames. (See Ex. 1005, ¶ [0192]; see also *id.*, ¶ [0170] (noting that the “Prediction Horizon” is a “multiple of the Frame

Length”).) In such circumstances, each frame is 20 m (or 0.05 km) long. (See Ex. 2003, ¶ 165.) If a given route is 9.93 km long, the final frame will end at either 9.90 or 9.95 km rather than the route’s destination. (See *id.*, ¶ 166.) It follows that Neiss’s final Prediction Horizon does not necessarily either include the final destination or end at that destination. This will only be the case if a series of relatively unlikely events occur (*i.e.*, the vehicle exactly follows the Prediction Horizon and the route distance is multiple of the frame length). This does not show obviousness. See *PAR Pharm., Inv. V. TWI Pharm., Inc.*, 773 F.3d 1186, 1195 (Fed. Cir. 2014) (“Inherency ... may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.”); see also *Endo Pharm. Solutions v. CustoPharm*, 893 F.3d 1374, 1381 (Fed. Cir. 2018) (similar).

Petitioner concludes by arguing that “[i]f it is determined that the present limitation requires receiving an *entire* route (*e.g.*, an end-to-end route between a starting point and a final destination) *at once*, it would have been obvious to modify Neiss so that its onboard computer receives the entire route at once, instead of receiving it iteratively.” Petition at 16. According to Petitioner, it was “well-known” that an “entire end-to-end route” could be received by a vehicle and performing calculations in advance for an entire route would somehow be more “computationally efficient.” *Id.* at 17. Petitioner’s expert simply repeats this

without further explanation. (See Ex. 1003, ¶¶ 70-71.) This is directly at odds with what Neiss actually teaches.

First, Neiss ***purposefully*** does not perform calculations for an entire route in advance. While Neiss recognizes that some prior art systems do store data for entire routes, it explains that this presents a problem. (See Ex. 1005, ¶¶ [0007]-[0008].) In particular, a vehicle can encounter a variety of “unforeseeable driving situations” such as a “slower vehicle ahead.” (*Id.*, ¶ [0008].) A POSITA would have recognized that a variety of other unforeseeable events could occur along a route, including poor weather conditions that result in reduced speeds, construction detours, congestion, pauses to give right of way to emergency vehicles, yielding to bikers or pedestrians, and the like. (See Ex. 2003, ¶¶ 169-175.) Neiss goes on to explain that when these types of situations are encountered, “it is necessary to adjust the subsequent driving parameters” from those previously calculated “to achieve optimum vehicle operation.” (Ex. 1005, ¶ [0008].) This is why Neiss limits its calculations to just a Prediction Horizon. By performing calculations in “real time” and for only for a limited area ahead of the vehicle, Neiss ensures that its system can quickly “adapt” to the circumstances and achieve an “optimal” speed even when unforeseeable circumstances are encountered by the vehicle. (*Id.*, ¶¶ [0163]-[0168].) Modifying Neiss in the way Petitioner proposes negates this benefit. Neiss’s system would no longer be adaptable as speed calculations would be performed in advance rather than

in real time as the vehicle travels. (See Ex. 2003, ¶¶ 176-180.) These advanced calculations would not account for any of the variety of unforeseeable circumstances—like slow cars, poor conditions, construction, emergency vehicles, or pedestrians—vehicles routinely encounter during a drive. (See *id.*, ¶ 180.) “If a proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification.” MPEP § 2143.01 (citing *In re Gordon*, 733 F.2d 900 (Fed. Cir. 1984).) This is what Petitioner’s proposed modification does here: Neiss’s system would no longer perform real time calculations and would no longer be able to adapt the vehicle’s speed to address unforeseeable events along the vehicle’s route. (See Ex. 2003, ¶¶ 179-180.)

Next, Petitioner is also wrong when it argues that modification of Neiss to perform calculations for an entire route would be more “computationally efficient.” Again, Neiss explains that “it is necessary to adjust the subsequent driving parameters” whenever an unforeseeable event—like a slow driver—is encountered. (Ex. 1005, ¶ [0008].) Because of this, modifying Neiss to perform calculations would be ***exceedingly inefficient***. Under Petitioner’s modified version of Neiss, optimal speeds would be calculated at the beginning of the route for the entire route. Then, each and every time some sort of unforeseen event is encountered, calculations would need to be re-performed for the entire remainder of the route. (See Ex. 2003,

¶¶ 181-186.) Assuming this is even possible without overburdening Neiss's system, it likely would require re-calculation after re-calculation. (*See id.*, ¶ 186.) Each time an unforeseen event is encountered—many such events may be encountered in a typical drive—all the old calculations would be thrown away and new calculations would be performed. This type of repeated, unnecessary calculation is the opposite of efficiency. (*See id.*) Neiss's current system avoids this by performing calculations in real-time for only a limited area ahead of the vehicle. Thus, it does not perform volumes of unnecessary calculations and is able to quickly adapt when conditions change. (*See id.*) Petitioner once again negates this functionality and would make Neiss **materially worse**. (*See id.*, ¶¶ 186-187.)

Next, Neiss's system is purposefully designed to minimize the burdens on its vehicle computer. A ring buffer stores only a single Prediction Horizon of real time data to minimize memory requirements. (*See Ex. 1005*, ¶¶ [0163]-[0164].) And the optimization algorithm and frequency of calculation is specifically tailored to reduce the computational burden on the system. (*See id.*, ¶ [0169].) Once again, Petitioner ignores this and proposes a modification to Neiss that would (1) vastly increase the storage requirements, (2) require repeated and wasteful recalculations, and (3) transform Neiss's limited-scope calculations for a Prediction Horizon into more expansive and computationally expensive calculations for an entire route. (*See Ex. 2003*, ¶¶ 188-192.) Put another way, rather than minimizing the burdens on Neiss's

system, Petitioner’s proposal would maximize them. (*See id.*) A POSITA would have no reason to make such a drastic change. (*See id.*, ¶ 192.)

2. Neiss Does Not Teach “Segmenting Said Route into a Plurality of Segment Destinations”

Claims 1 and 10 also require “*segmenting said route into a plurality of segment destinations.*” The Petition identifies Neiss’s frames as “segments” and the end of each frame as a “segment destination.” *See, e.g.*, Petition at 20. Because Neiss’s Prediction Horizon is not a “route,” its frames are not “segments” and have no “segment destinations.” The frames—like the Prediction Horizon—are simply the area immediately ahead of the vehicle. They have nothing to do with the vehicle’s route or destination. (*See Ex. 2003*, ¶¶ 193-196.)

B. Ground 2: Schramm and Clapper Do Not Render the Claims Obvious.

The combination of Schramm and Clapper—the two references at issue in the Petition’s second ground—also do not render the ’161 patent’s claims obvious.

Claims 1 and 10 both require “*determining a plurality of efficient speeds that achieve a best summation of said energy values.*” As is apparent from the claim language itself, this element requires a “plurality” of speed “determin[ations].” Further, these determined speeds must be “efficient speeds that achieve a best summation of said energy values.” The ’161 patent repeatedly discusses how its system calculates multiple efficient or optimal speeds at which the vehicle should

travel. (See, e.g., Ex. 1001, 3:18-20 (noting that the patent’s system determines the optimal speeds to drive throughout the route”); 5:25-27 (noting that “[e]nergy efficient speeds for current and upcoming route segments can ... be calculated”); 16:51-54 (“optimized speeds are calculated”); 18:26-27 (“probable optimal speeds may be identified for the entire route”); 19:12-15 (“efficient speeds” are determined); 25:14-19 (referencing the selection of “optimum speeds to drive the segments of the route”).) This, however, is not taught by Schramm and Clapper.

Rather than teaching a method for **determining** efficient speeds, Schramm’s system simply uses speed as an **input**. In particular, according to Schramm, during operation, of its system’s “logic receives the desired average speed at which the operator intends to drive [the] vehicle to the destination point ‘B’.” (Ex. 1009, 5:14-20; see also *id.*, 5:45-49 (referencing use of “the speed that was input”), 6:44-49 “energy consumption” determinations are made for travel “at the desired speed.”), 7:40-42 (similarly referencing calculations performed “for the particular speed”), Figs. 2, 6.)

In view of this disclosure shortcoming, the Petition points to Clapper and argues that a POSITA “would have adjusted Schramm’s” route “optimization process, per Clapper, to account for different per-segment speeds” such as the “driver’s pervious speed[s]” or “speed limits on existing roads and highways” that are “stored” in Clapper’s databases. Petition at 59. The claims here, however,

require the determination of a “***plurality of efficient speeds that achieve a best summation of said energy values.***” Clapper’s speeds have nothing to do with efficiency and are not designed to achieve a best summation of energy values. As the Petition recognizes, Clapper’s system stores—and then outputs—either “speeds used at given locations in the past” or “a speed limit.” (Ex. 1006, 1:50-56, 3:13-15; *see also id.*, 2:52-60 (referencing the storage and use of an “existing speed from prior trips”); Fig. 4 (showing a “previous speed” database 55 and a speed limit database 50); *see also* Ex. 2002, 72:24-73L15 (summarizing speeds stored by Clapper).)

Clapper’s database stored speeds may, of course, be extraordinarily ***inefficient***. A given driver may constantly drive at either a very high, or a very low, rate of speed. (See Ex. 2003, ¶¶ 198-204, 208-214.) These speeds will be stored in Clapper’s database and Clapper’s system will output them for use by its cruise control when the driver traverses the same locations again regardless of whether the high/low speeds are efficient. (See *id.*, ¶¶ 210-212.) Likewise, if there is no stored driver data, Clapper simply uses the speed limit. But stored speed limits also have little to do with efficiency. (See *id.*, ¶¶ 213-214.) For example, if the speed limit on a highway is 75 mph, Clapper’s system will return this value regardless of whether it would be more efficient to travel at a slower speed. (See *id.*, ¶ 213.) Or, if the speed limit for a road that travels up and then down a mountain is a constant 45 mph, Clapper’s system will return this value even though it may be more efficient to travel

up the mountain at a slower speed and down the mountain at a faster speed. (*See id.*) While Clapper does note that stored speeds may be “moderated” to take into account “current driving conditions” like the weather (*see, e.g.*, Ex. 1006, 2:18-20), this does not transform Clapper’s stored speeds into the what the claims require. The speeds are still based on the stored, inefficient driver speeds. And while reducing speed because it is dark, raining, or snowing may bear on safety, it has nothing to do with efficiency and thus is not determination of a **“plurality of efficient speeds that achieve a best summation of said energy values.”** (*See* Ex. 2003, ¶ 214.)

Application of Clapper to Schramm does not resolve this problem. In combination, Schramm will simply use whatever speeds are output by Clapper—including inefficient stored driver speeds and speed limits—as an input to its route calculation. The combined system will not calculate or determine any efficient speeds, let alone the “plurality of efficient speeds that achieve a best summation of said energy values” the claim here requires. (*See id.*, ¶¶ 215-218.) The Petition offers no explanation to the contrary.

VI. CONCLUSION

For at least the foregoing reasons, Patent Owner respectfully submits that patentability of the challenged claims should be confirmed.

Respectfully submitted,

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The undersigned certifies that the foregoing paper complies with the type-volume limitation in 37 C.F.R. § 42.24. According to the utilized word-processing system's word count, the paper—excluding any portions mentioned in § 42.24(a)(1)—contains 6,737 words.

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