

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 PRELIMINARY RESPONSE

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I. INTRODUCTION

Patent Owner iQar, Inc. F/K/A Invently Automotive, Inc. respectfully submits that 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”) should be denied.

While Petitioner challenges all claims in the ’161 Patent (the “challenged claims”), claims 1 and 10 are the only independent claims. Because none of Petitioner’s Grounds meet its burden to prove a reasonable likelihood that independent claims 1 or 10 are invalid, the Petition should be denied.

Petitioner makes two arguments challenging independent claims 1 and 10. In Ground 1, Petitioner asserts that these claims are obvious in view of U.S. Patent Publication No. 2004/0068359 to Neiss (Ex. 1005, “Neiss”). In Ground 2, Petitioner asserts these 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. For example, the ’426 Patent claims require “receiving a route” and then “segmenting said route into segment destinations.” Petitioner relies on Neiss for these limitations, but Neiss does not receive or segment a route. Instead, it deliberately limits its consideration to an area around the current vehicle position (which it calls the “Prediction Horizon”) to

reduce the amount of memory and calculations necessary. As Neiss explains, that Prediction Horizon may be a portion of the vehicle's route, but is not the route itself. Further, Neiss makes clear that at most it optimizes across its Prediction Horizon. Thus, Neiss does not calculate the claimed plurality of energy values based on variations in a target speed that would be consumed by the vehicle to travel between pairs of segment destinations across the route or determine the efficient speeds that achieve a best summation of such energy values.

Petitioner's Schramm and Clapper arguments are also flawed. First, there is no reason a POSITA would have been motivated to modify Schramm, which explains that it uses a *speed-constant system* by design, into the claimed system where the speed varies across a route. Further, neither Schramm nor Clapper discloses the required efficient speeds and variations in target speed .

Because Petitioner has not shown a reasonable likelihood that either of the independent claims are invalid in light of either asserted Ground, Institution should be denied.

II. THE '161 PATENT

The '161 Patent describes devices, systems, and methods for managing and optimizing the power consumption of an automotive vehicle. Ex. 1001, 2:15-17. The '161 Patent explains that accurate control of fuel consumption may optimize the energy efficiency of a car. *Id.*, 1:16-24. Prior to its invention, however, drivers

sought to 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.*

Thus, before the invention of the '161 Patent, there was a need to better manage a vehicle's power consumption. Ex. 1001, 1:60-2:6. The '161 Patent explains a solution to this problem, wherein the power management logic may be used by a motor control mechanism to 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 calculating a number of parameters for each segment that can be used to calculate the optimal applied power for that segment. Ex. 1001, 5:8-31. For example, a number of possible segments can be seen in Fig. 3A of the '161 Patent. Ex. 1001, Fig. 3A:

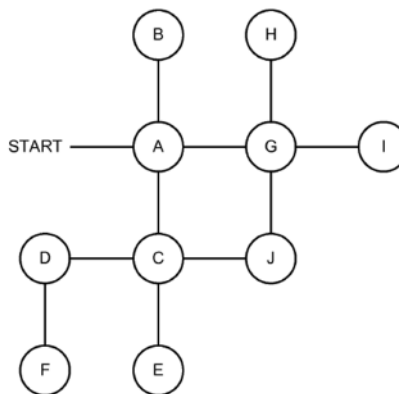


FIG. 3A

If the vehicle is currently located at START, one possible destination for the route is location C. Ex. 1001, 12:44-13:38. In that situation, one way to segment the route from START to C is by segmenting the route to treat location A as an intermediate destination, so that route START→A→C has two segments: START→A and A→C. *Id.*

The '161 Patent teaches that 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. Ex. 1001, 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 teaches determining the plurality of target speeds that achieve a best summation of energy values across the route and then either notifying the vehicle’s operator about those efficient speeds or applying the corresponding power to the vehicle’s engine so that the vehicle travels between each of the segment destinations. *See, e.g.*, Ex. 1001, 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. LEVEL OF ORDINARY SKILL IN THE ART

Petitioner argues that a person of ordinary skill in the art (“POSITA”) relating to the subject matter of the ’161 Patent would have had a bachelor’s degree in electrical engineering, computer engineering, mechanical engineering (including automotive engineering), civil engineering (transportation systems), physics, or a related field, and at least four years of experience (or the academic equivalent) in the field of transportation systems. Petition at 2-3. Petitioner also argues that additional education could substitute for professional experience, and *vice versa. Id.*

For purposes of this Preliminary Response, Patent Owner does not dispute this characterization.

IV. CLAIM CONSTRUCTION

Petitioner argues that no claim constructions are necessary. Petition at 2 (citations omitted). For purposes of this Preliminary Response, Patent Owner does not believe that any specialized constructions are necessary because Petitioner fails to establish a reasonable likelihood of prevailing under any claim interpretation.

V. THE ASSERTED GROUNDS AND REFERENCES

The Petition seeks institution on the following Grounds, asserting obviousness under 35 U.S.C. § 103:

<u>Ground</u>	<u>Claim(s)</u>	<u>References</u>
1A	1-3, 5-6, 8-15, 17-18	Neiss
1B	4	Neiss-Hirasago
2	1, 3, 6-10, 12-13, 15-18	Schramm-Clapper

As discussed in detail below, Petitioner fails to establish a reasonable likelihood of prevailing with respect to independent Claims 1 and 10 for either Ground 1 (Neiss) or Ground 2 (Schramm-Clapper). Because the other challenged claims all depend from Claim 1 or Claim 10, Petitioner fails to meet its burden for those claims for at least the same reasons. Thus, it is not necessary at this stage to address the additional deficiencies in Ground 1B or for the dependent claims.

A. Overview of Neiss

Neiss is directed toward a rudimentary vehicular cruise control system, in which an onboard computer, which it calls a “Predictive Cruise Control (PCC),” 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.” Ex. 1005, Abstract. Thus, unlike the '161 Patent, in Neiss’s iterative system, there is no route or destination. 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,” as shown in Fig. 2. *Id.*,

¶0031, Fig. 2:

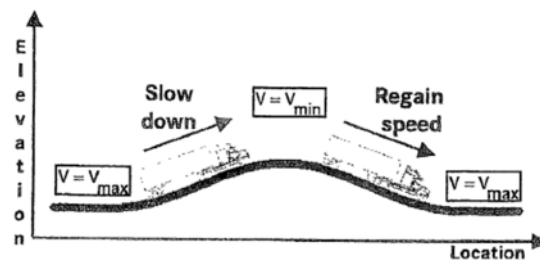
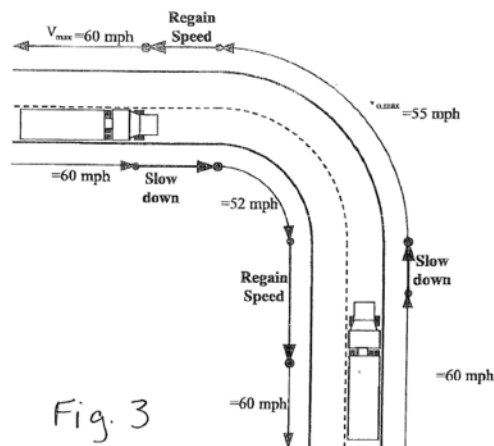


Fig. 2

Similarly, as the vehicle “approaches a curve, the speed can automatically be reduced as shown in FIG. 3.” Ex. 1005, ¶0032, Fig. 3:



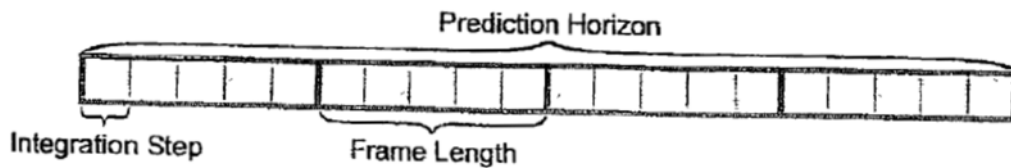
Neiss's PCC performs these immediate calculations for a "Prediction Horizon," which Neiss explains covers only "an area around the current vehicle positioned [sic]." Ex. 1005, ¶¶0161-0162. Neiss explains it considers only this limited area (and not the full route) to avoid a system "in which the stored 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.

Neiss continues distinguishing its system from a route-based system (like that of the '161 Patent) by explaining its decision to calculate a speed based on the vehicle's current position rather than a road it may travel on:

While the optimization calculation could be performed for every computational cycle given enough computing power, **this approach was not used** in the current implementation. Rather, a new optimization calculation only occurs once the vehicle has covered a specified distance, which is referred to hereinafter as a 'frame', or when the set speed is changed.

Ex. 1005, ¶0169 (emphasis added).

As shown in Fig. 10, Neiss breaks up the area around the current vehicle position (what Neiss calls its “Prediction Horizon”) into “Frames,” and in turn breaks up each Frame into “Integration Steps.” Ex. 1005, ¶0170, Fig. 10:



But neither Neiss’s Prediction Horizon, Frames, nor Integration steps correspond to a route or route segment because these are simply subdivisions in the direction the vehicle is currently facing and not representative of the route the vehicle will take.

B. Overview of Schramm

Schramm is directed to a system for determining an energy-optimum route for a vehicle to take between an origin and a destination, using a computer onboard the vehicle. Ex. 1009, Abstract. The computer accesses a database containing both topographical map information and vehicle energy consumption data, which it uses to determine and display an energy-optimum route. *Id.*

Schramm determines the energy-optimum route using a routing module that receives certain inputs, as shown in Fig. 2: the start point “A,” destination point “B”, and the specific speed to the user desires to travel between the two points.

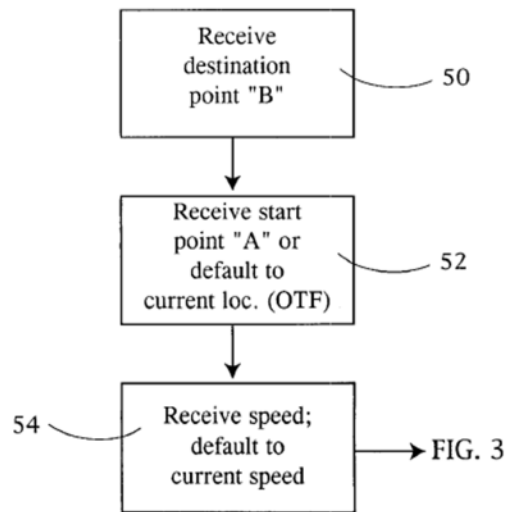


FIG. 2

Ex. 1009, Fig. 2; *see also* 5:1-20.

Importantly, Schramm explains that this specific desired speed is *a single speed* that is used *for the entire route*. *See, e.g.*, Ex. 1009, 5:14-20 (“Next, at block 54 of FIG. 2, the logic receives *the desired average speed* at which the operator intends to drive vehicle to the destination point ‘B’”. If desired, the operator may indicate a desire to select, as a default, the current speed of the vehicle 12. Accordingly, the computer 14 would access the speedometer of the vehicle 12 to set the default speed at block 54.”) (emphasis added), 5:45-49 (“Then, at block 60 the logic accesses the energy consumption module described below to determine the energy consumption that would be required for the vehicle 12 to traverse the route segment under test at the speed that was input at block 54 of FIG. 2.”), 6:44-49 (“If it is determined that the energy consumption of the route

is greater than or equal to the relevant onboard energy reserve of the vehicle 12, the logic moves to block 78 to return a signal indicating that 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 (“the data obtained at blocks 94 and 98 is added to a pending bin that represents actual energy consumption *for the particular speed*”) (emphasis added), 5:61-6:7, 7:18-25, 7:47-50, Fig. 2, Fig. 6).

Schramm’s system takes these inputs – the start point, destination point, and specific desired speed – and evaluates possible routes from the start to the destination, all of which are evaluated to see which has the lowest overall energy consumption, using the specific desired speed for the entirety of the possible routes. *See, e.g.,* Ex. 1009, 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.”), 6:29-32 (“when it is determined at decision diamond 68 that the last route has indeed been tested, the logic returns the route with the lowest overall energy consumption at block 72”), 3:25-27, 4:24-27, 5:21-52, 6:11-18. This evaluation is summarized in Fig. 3. Ex. 1009, Fig. 3:

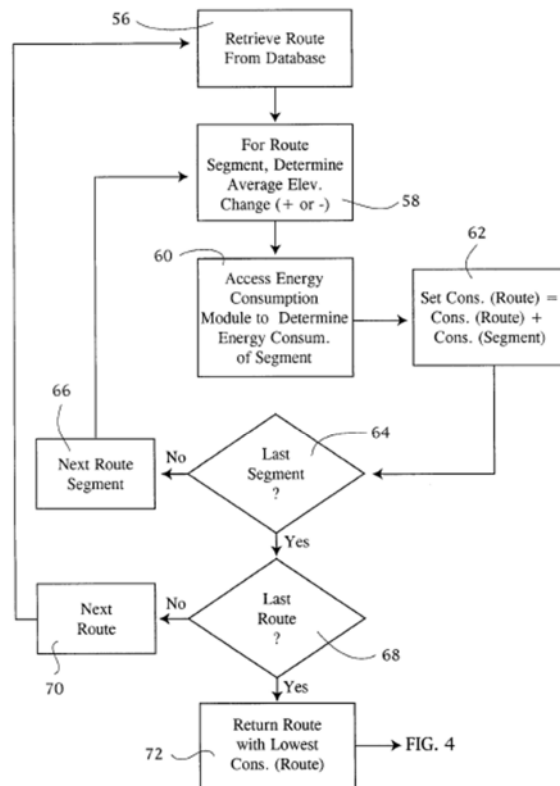


FIG. 3

In short, Schramm discloses selecting 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.” Ex. 1009, 6:44-49.

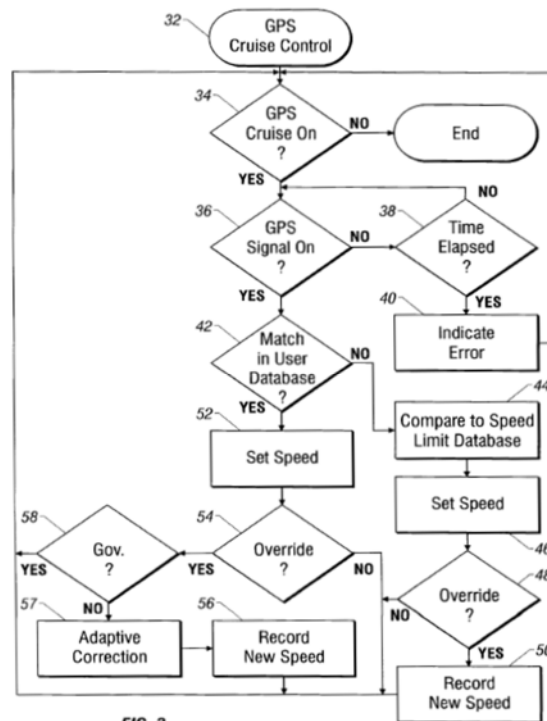
Thus, Schramm's determination of which route to take at a specific speed is fundamentally different from the '161 Patent, which manages the power

consumption of a vehicle by determining what varying speeds should be used to travel each of a number of route segments.

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.*

Fig. 3 summarizes what Clapper does, which is nothing more than a way of setting the current speed of a car and recording the current speed of the car for future reference:



Ex. 1006, Fig. 3; *see also, e.g.*, 1:20-25 (“Based on the vehicle’s position, information may be automatically provided that suggests a vehicular speed.”), 1:53-56 (“Based 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.”).

As shown in Fig. 4, the speeds for the current location that Clapper is concerned with are the current speed of the vehicle, a previous speed of the vehicle at the current location, and a database speed for the current location, which is usually the speed limit of the current road:

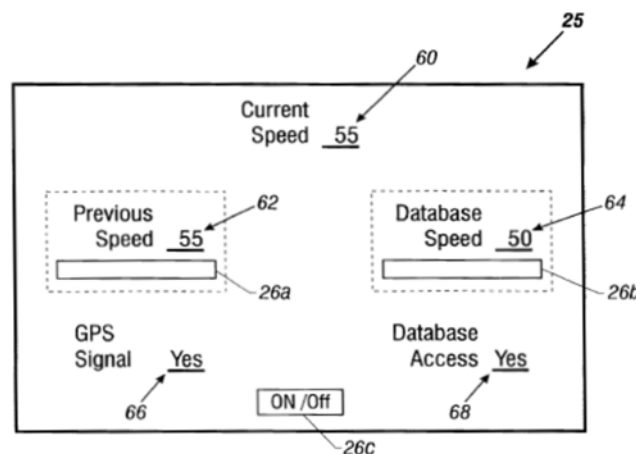


FIG. 4

Ex. 1006, Fig. 4; *see also, e.g.*, 1:50-53, 2:30-44, 2:45-60, 3:38-45.

As a simple cruise control system that is only concerned with a vehicle’s current location, Clapper does not discuss a relevant route, destination, or energy consumption. Clapper thus has no relevant similarities to the ’161 Patent, which

involves managing the power consumption of a vehicle by determining a number of differing speeds that change across segments of a route that is taken to a destination.

VI. THERE IS NO REASONABLE LIKELIHOOD THAT PETITIONER WILL PREVAIL ON ANY CLAIM

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. Because neither Ground discloses the following limitations of independent Claims 1 and 10, and also because a POSITA would not have been motivated to combine Schramm and Clapper, Petitioner fails to establish a reasonable likelihood of prevailing with respect to any of the challenged claims.

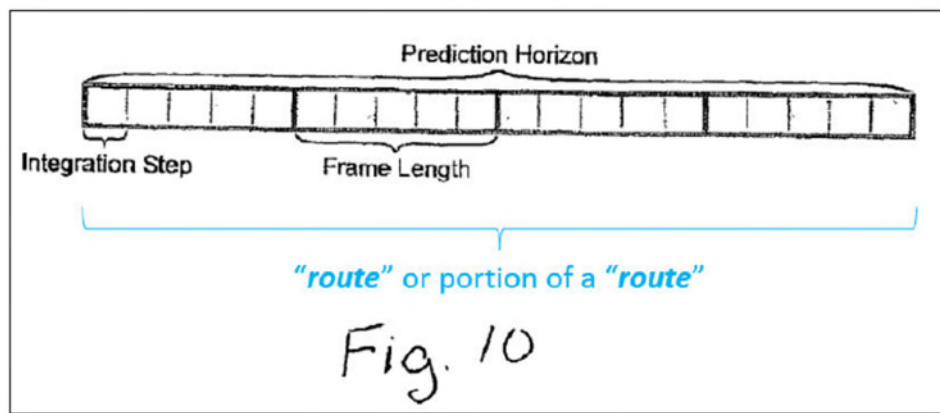
A. There Is No Reasonable Likelihood that Petitioner Will Prevail on Ground 1 (Neiss)

In Ground 1, Petitioner argues that Neiss renders the challenged claims obvious. Because Neiss does not disclose the following limitations of independent Claims 1 and 10, Petitioner fails to establish a reasonable likelihood of prevailing with respect to any of the challenged claims.

1. Neiss Does Not Disclose "Receiving a Route at a Computer of Said Vehicle" (All Challenged Claims)

Both independent claims require the step of "receiving a route at a computer of said vehicle." Petition Limitations [1a], [10a]. Because Neiss does not disclose receiving a route, Petitioner has failed to meet its burden.

Petitioner 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,” and that this Prediction Horizon shown in blue in the below figure “corresponds to *a route* because it constitutes a path traveled by the vehicle.” Petition at 13-14 (emphasis original).



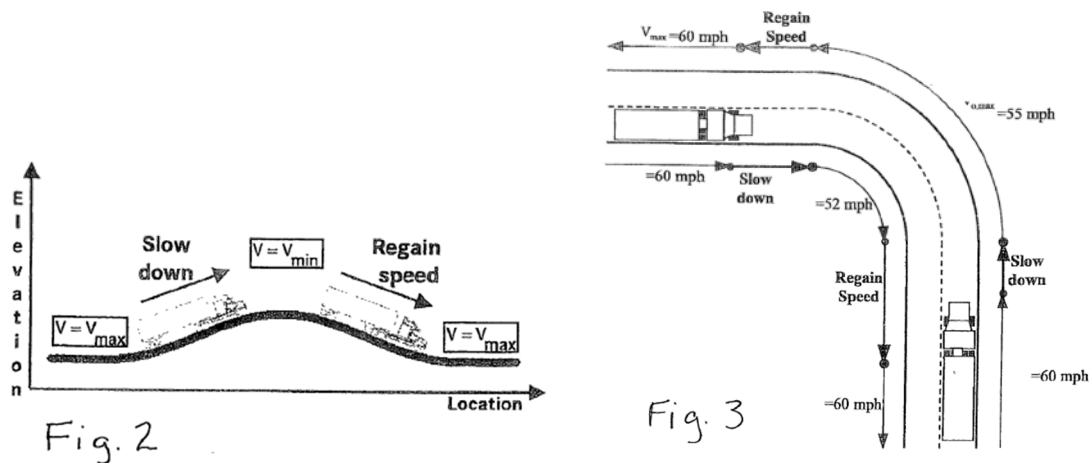
TESLA-1005, FIG. 10 (annotated)

Petitioner’s conclusion that Neiss’s Prediction Horizon is a “route” is unsupported. The ’161 Patent repeatedly explains that a “route” is the path from the vehicle’s starting position to a final destination. *See, e.g.*, Ex. 1001, 11:13-17 (“To determine an optimally efficient speed [()or the optimal power to be supplied to the engine), *a route is determined 201 from the starting position and an actual or estimated ending position*, the route is segmented 203 into one or more segments ...”), 11:31-32 (“The route is determined based on the current position of the vehicle and a final destination position.”) (emphasis added); *see also* 12:15-26

(discussing a “highway” and “work” as destinations), 12:44-13:38, Fig. 8 (listing “1600 Pennsylvania Ave Washington DC” as a destination).

In contrast, Neiss’s Prediction Horizon is not a route from the starting position and an actual or estimated ending position. Rather, it is simply a portion of the road immediately in front of, and visible from, the vehicle’s current location. *See, e.g.*, Ex. 1005, ¶0048 (“the controller gains are calculated for the approaching road within the Prediction Horizon”), ¶0162 (“For an area around the current vehicle positioned [sic] (‘Prediction Horizon’)”).

Indeed, there is no destination in Neiss at all – the word “destination” never even appears in its disclosure. Neiss’s system is completely unaware of either the vehicle’s final destination or any intermediate destinations. Rather, Neiss simply relates to adjusting a vehicle’s cruise control to compensate for the geography immediately visible in front of it, such as the hill shown in Fig. 2 or the curve shown in Fig. 3. Ex. 1005, Figs. 2-3:



Neiss's Prediction Horizon is nothing more than a fraction of this immediate geography. Indeed, Neiss expressly states that its Prediction Horizon is simply a "predetermined distance ... along the route ahead of the vehicle." Ex. 1005, ¶0015. By defining the Prediction Horizon as a distance "along the route ahead of the vehicle," Neiss makes clear that it is not the route, itself.

Petitioner seems to understand that Neiss's Prediction Horizon is not the claimed "route" because it goes on to argue that:

Alternatively/additionally, Neiss's optimization operations are performed iteratively for portions of an overall route ahead of the vehicle as the vehicle travels the overall *route* between a starting point and a final destination.

Petition at 14 (emphasis original); *see also* 16 (arguing that "Neiss's algorithm operates 'iteratively' to identify subsequent Prediction Horizons (as the vehicle continues driving) and accesses road information about each Prediction Horizon from the map, which are then used for the iterative optimizations").

This alternative argument also fails because the challenged claims require "receiving a route," (limitations [1a], [10a]) which is not the same as performing calculations "for portions of an overall route ahead of the vehicle as the vehicle travels the overall route." Simply traveling over a route is not the same as "receiving a route," particularly when no record of the route is maintained. This is further confirmed by the requirements that the received route be segmented into

“segment destinations” (limitations [1b], [10b]) and then energy values to be consumed by the vehicle to travel the route based on variations in a target speed between pairs of those segment destinations (limitations [1c], [10c]). Once a plurality of efficient speeds that achieve a best summation of those energy values is determined (limitations [1d], [10d]), then the vehicle’s operator can be notified of the efficient speed (limitation [1e]) or the corresponding power can be applied (limitation [10e]). But, in either case, this is so that the vehicle can “travel between each of said segment destinations.” Limitations [1e], [10e]. From this, it is clear that the route must be received before it can be segmented and that the claimed speeds and energy values must be calculated so that the vehicle can travel between the segment destinations. Neiss does not disclose this and its Prediction Horizon “along the route ahead of the vehicle” is not sufficient.

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 (emphasis original). This argument also fails. As discussed above, Neiss fails to disclose any relevant “route,” and so clearly does not and cannot teach an “entire route” for the same reasons.

Moreover, Petitioner presents no evidence in support of its conclusion that an

“entire route” would have been obvious in view of Neiss. This is improper hindsight.

Receiving an entire route from start to finish in advance (rather than simply knowing the path the vehicle took by the end of the trip) is a non-trivial concept that Petitioner simply hand-waves away. Petitioner does not explain how or why a POSITA would take a system like Neiss, where a calculation is performed only for the road immediately in front of a vehicle with no destination in mind, and modify it to perform a series of calculations for an entire route to a specific destination.

Petitioner cites a single background reference (that is not part of its obviousness combination) to argue that “a vehicle onboard computer receiving an entire end-to-end route (e.g., from external map applications) was well-known in the context of vehicle control systems and enabled receipt of accurate routes, e.g., accounting for real-time road/traffic conditions.” Petition at 17. However, Petitioner does not articulate any credible reason for modifying Neiss to incorporate an entire end-to-end route.

Similarly, modifying Neiss to take into account route information also makes no sense. Petitioner says that “receiving the entire route at once would be computationally efficient because it would enable quicker computations on upcoming route segments/frames.” Petition at 17. Not only does it provide no support for this conclusion, but it is wrong. A simple system like Neiss’s, which

only makes a single calculation at a time, without worrying about a route or destination, is already as computationally simple and efficient as possible – trying to expand this to an entire route makes it more, not less, complicated.

Indeed, Neiss expressly explains that its PCC computer deliberately implements a “cost minimizing algorithm” that covers only “an area around the current vehicle positioned [sic].” Ex. 1005, ¶¶0161-0162. Neiss explains that it does so in order 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.” *Id.*, ¶¶0163, 0164; *see also* ¶0169 (“While the optimization calculation could be performed for every computational cycle given enough computing power, this approach was not used in the current implementation. Rather, a new optimization calculation only occurs once the vehicle has covered a specified distance, which is referred to hereinafter as a ‘frame’, or when the set speed is changed. In addition, the calculation is distributed over several computational cycles to reduce the computational burden.”).

A system like that of the ’161 Patent performs calculations for an entire route. These are exactly the sort of complicated and memory intensive computations that Neiss expressly disparages. Petitioner’s unsupported argument

that a POSITA would have been motivated to modify Neiss in this way is mistaken.

2. Neiss Does Not Disclose “Segmenting Said Route into a Plurality of Segment Destinations” (All Challenged Claims)

Petitioner relies entirely on Neiss to allege that Ground 1 discloses the ’161 Patent independent claim limitation “segmenting said route into a plurality of segment destinations.” Petition Limitations [1b], [10b]; Petition at 18-21, 46. Petitioner’s argument fails because it is premised on a faulty claim construction.

While Petitioner states that “[n]o claim constructions are necessary,” (Petition at 2), for this limitation Petitioner’s argument is premised on its assumption that limitation “[1b] encompasses segmenting a route into a plurality of segments, each having an endpoint/destination.” Petition at 18. In other words, Petitioner seeks to broaden the claims by replacing the claim term “segment destinations” with simply “segments.”

Petitioner seeks to justify its claim construction by alleging that “[t]he ’161 Patent’s specification does not use the phrase “segment destinations.” Petition at 18. But that is flatly wrong. The ’161 Patent’s specification discloses multiple embodiments of segmenting a route not merely into segments (as Petitioner contends) but rather into the claimed “segment destinations.” *See, e.g.*, Ex. 1001, 5:9-14 (“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.”) (emphasis added), 9:33-39, 14:19-23, 20:13-16. Because Petitioner does not address the claim limitation and Petitioner’s claim construction is unsupported, its Petition fails.

In sum, Petitioner improperly assumes that a “segment destination” is a “segment” in an effort to force Neiss—which does consider units of data but never makes any destination determinations—into the claim scope. This is wrong. Even if it is assumed that Neiss’s system considers “segments” of a route, it indisputably does not identify or employ any “segment destinations.” Petitioner’s re-writing of the claims should be rejected.

3. Neiss Does Not Disclose “Calculating a Plurality of Energy Values Consumed by Said Vehicle to Travel Said Route Based on a Plurality of Variations in a Target Speed of Said Vehicle Between Pairs of Said Segment Destinations” or “Determining a Plurality of Efficient Speeds that Achieve a Best Summation of Said Energy Values” (All Challenged Claims)

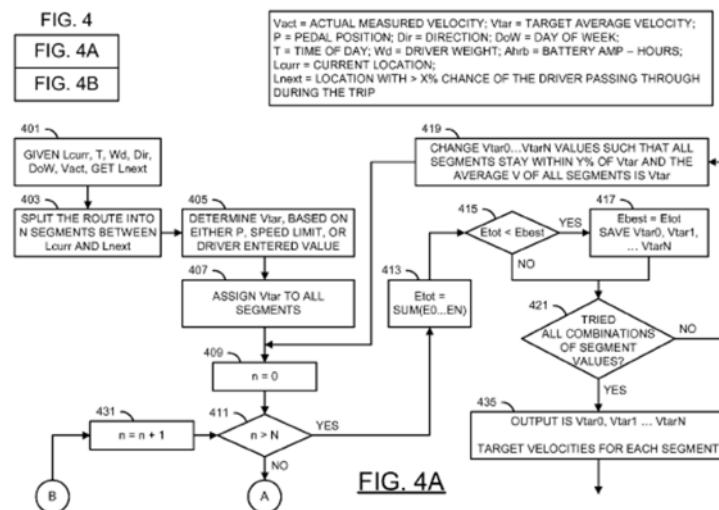
Central to the invention of the ’161 Patent is that the energy is optimized based on the entire route. That is why, as explained above, all of its claims require first *receiving a route* and then *segmenting said route into a plurality of segment*

destinations. All claims then expressly require “calculating a plurality of energy values consumed by said vehicle *to travel said route* based on a plurality of variations in a target speed of said vehicle between pairs of said segment destinations.” Limitations [1c], [10c] (emphasis added). Calculating the energy values for each route segment of the route, and then for the route as a whole, allows the invention of the ’161 Patent to then perform the step of “determining a plurality of efficient speeds that achieve a best summation of said energy values.” Limitations [1d], [10d]. By considering the impact of variations in the target speed on the energy that will be required to travel each route segment of the route, the claimed method can then notify the vehicle’s operator of the different efficient speeds to travel between each of the segment destinations (limitation [1e]) or apply the power corresponding to those efficient speeds to the vehicle’s engine (limitation [10e]).

The ’161 Patent specification teaches that, as the claims require, this optimization be done “for all of the segments” and “over a given route.” See Ex. 1001, 2:56-58 (“By calculating and then averaging the efficient speed *over a given route*, the system can optimize energy usage within the driver's stated speed and range.”) (emphasis added); 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.*)” (emphasis added).

Consistent with the claims, the '161 Patent teaches that “Optimization of Engine Efficiency” is performed by the steps of: “1. Determine Route,” “2. Segment Route,” and then “3. Calculate Energy *for the Route.*” Ex. 1001, 11:10-14:14 (emphasis added). The '161 Patent further explains that “FIGS. 4A, B describe a method of calculating an array of optimized velocities *for an entire route* that has been broken up into segments,” based on the total energy used over all of the segments. *Id.*, 16:51-53 (emphasis added); *see generally* 15:55-16:64, Figs. 4A-B:



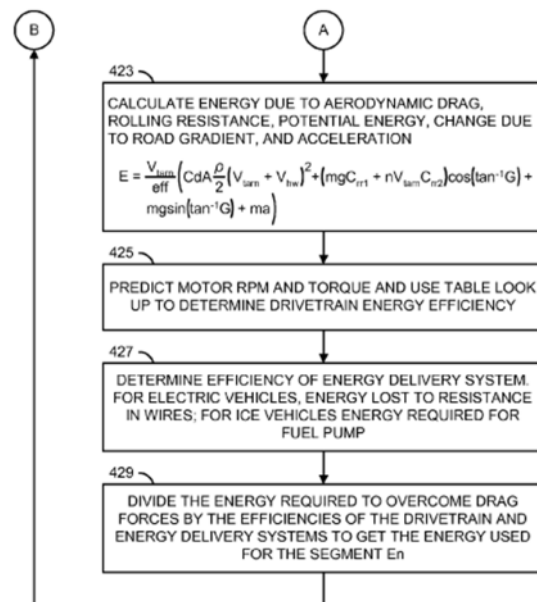


FIG. 4B

In short, these limitations relate to determining a series of different variations of a target speed and energy values across an entire route, with a speed and energy value for each pair of segment destinations, in order to determine the plurality of efficient speeds that achieve a best summation of energy values across the entire route.

As explained above, however, Neiss does not receive the route and does not segment that route into a plurality of segment destinations that, together, comprise the route from the vehicle's starting position to its ending position. Thus, Neiss also does not render obvious limitations [1c] and [10c] because Neiss does not calculate or optimize energy values for the route as a whole.

Even assuming for purposes of this response that Neiss calculates a plurality of energy values based on a plurality of variations in a target speed (which Patent Owner does not concede), those values are not the “energy values consumed by said vehicle *to travel said route*” as required by each challenged claim. Instead, at most Neiss “optimize[s] the vehicle operating cost function for a predetermined Prediction Horizon along the route ahead of the vehicle.” Ex. 1005, Abstract; *see also* ¶¶0015 (“optimize the vehicle operating cost function for a predetermined distance (referred to as a ‘Prediction Horizon’) along the route ahead of the vehicle”). Neiss expressly teaches that its “Prediction Horizon” is merely “an area ... around the current vehicle position[]” and not its route. *See, e.g., id.*, ¶¶0047, 0162.

Neiss makes clear that it only optimizes across the Prediction Horizon and never the route. Specifically, the predictive cruise control (“PCC”) of Neiss’s invention includes a ring buffer memory that only has “a capacity that corresponds to the length (in frames and integration steps) of the Prediction Horizon” and not the entire route. Ex. 1005, ¶0171.

Moreover, Neiss explains that it only potentially optimizes across the Prediction Horizon and not the entire route because it is an “object of the invention is to provide a vehicle control system in which optimal vehicle control values are continuously calculated online during operation of the vehicle.” Ex. 1005, ¶0012.

Neiss considered this a benefit because “[l]ess memory is needed” and “[a]n online determination gives the opportunity to change the route while driving.” *Id.*, ¶¶0163-65. In other words, Neiss intentionally teaches away from the ’161 Patent’s approach of calculating a plurality of energy values that would be “consumed by said vehicle to travel said route.”

The Petition acknowledges this difference between Neiss and the challenged claims. Specifically, Petitioner argues that Neiss’s cost function J_{fuel} or its value L (which Petitioner calls an “element” of this cost function) are the plurality of energy values Neiss allegedly calculates. Petition at 26. But Petitioner admits that this cost function is only “calculated for the locations in each frame of the Prediction Horizon....” *Id.* Thus, at most, this cost function “represents the vehicle’s ‘fuel consumption’ as it traverses the Prediction Horizon” and not a route. Petition at 26.

For similar reasons, Neiss also does not disclose “determining a plurality of efficient speeds that achieve a best summation of said energy values.” Petition Limitations [1d], [10d]. This limitation follows from the “calculating...” limitation and utilizes the previously calculated plurality of energy values consumed by the vehicle to travel each segment of the route to determine a “plurality of efficient speeds that achieve a best summation of said energy values,” *i.e.*, to calculate an efficient speed for each segment of the route.

As discussed, Neiss does not receive the route that the vehicle will take and does not segment that route into a plurality of segment destinations that, together, cover the route from the vehicle's starting position to its ending position. Thus, Neiss does not render obvious limitations [1d] and [10d] because Neiss does not determine a plurality of efficient speeds that achieve a best summation of said energy values for the route as a whole.

Thus, Petitioner has failed to carry its burden to show a reasonable likelihood that any challenged claim is obvious in light of Ground 1 (Neiss).

B. There Is No Reasonable Likelihood that Petitioner Will Prevail on the Schramm and Clapper Ground

Petitioner's Ground 2 requires a showing that the combination of Schramm and Clapper renders the challenged claims obvious. Petitioner fails to establish a reasonable likelihood of prevailing with respect to all of the challenged claims because: (i) a POSITA would not have been motivated to combine Schramm and Clapper and (ii) even if they had, neither Schramm nor Clapper discloses all limitations of independent Claims 1 and 10.

1. A POSITA Would Not Have Been Motivated to Combine Schramm and Clapper

Schramm and Clapper present diametrically opposed ways of driving a vehicle, such that a POSITA would not have been motivated to combine them. These differences are compounded by the fact that Schramm's manner of

determining an energy efficient route is fundamentally different than that of the '161 Patent.

Schramm discloses a method of determining the optimal route to a specific, known destination at *a single speed* that is used *for the entire route*. See, e.g., Ex. 1009, 5:14-20 (“Next, at block 54 of FIG. 2, the logic receives *the desired average speed* at which the operator intends to drive vehicle to the destination point ‘B’. If desired, the operator may indicate a desire to select, as a default, the current speed of the vehicle 12. Accordingly, the computer 14 would access the speedometer of the vehicle 12 to set the default speed at block 54.”), 5:45-49 (“Then, at block 60 the logic accesses the energy consumption module described below to determine the energy consumption that would be required for the vehicle 12 to traverse the route segment under test at the speed that was input at block 54 of FIG. 2.”), 6:44-49 (“If it is determined that the energy consumption of the route is greater than or equal to the relevant onboard energy reserve of the vehicle 12, the logic moves to block 78 to return a signal indicating that 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 (“the data obtained at blocks 94 and 98 is added to a pending bin that represents actual energy consumption *for the particular speed*”) (emphasis added), 5:61-6:7, 7:18-25, 7:47-50, Fig. 2, Fig. 6.

While Schramm's system can evaluate multiple possible routes, the route with the lowest overall energy consumption is chosen as the optimal route, which is the only route that is actually utilized. *See, e.g.*, Ex. 1009, 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."), 6:29-32 ("when it is determined at decision diamond 68 that the last route has indeed been tested, the logic returns the route with the lowest overall energy consumption at block 72"), 3:25-27, 4:24-27, 5:21-52, 6:11-18, Fig. 3. The result of this choice is thus a route that uses only one speed for the entire route, while the amount of energy consumption varies across the route.

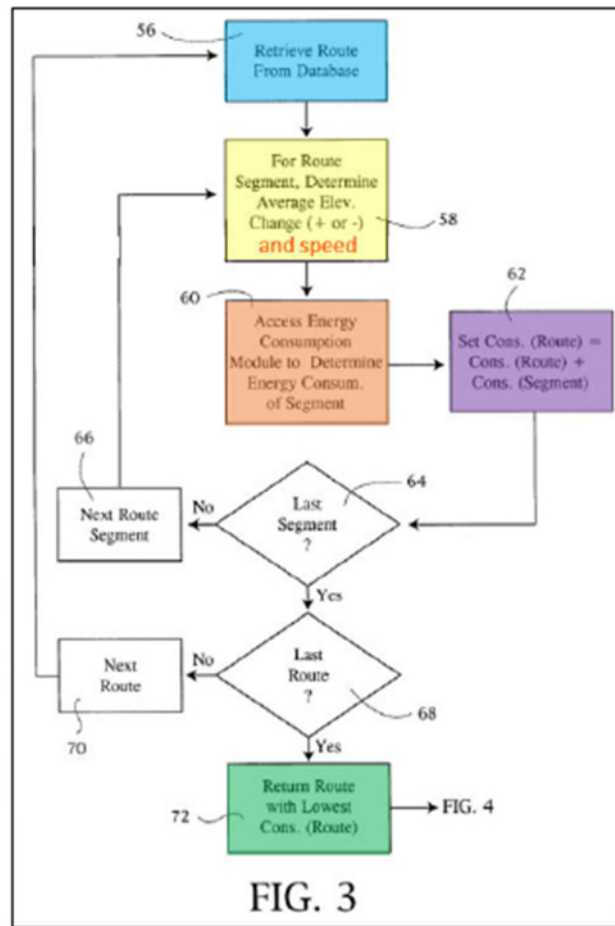
Clapper is very different than Schramm. Clapper discloses a basic, automatic cruise control system that can set or display a vehicle's speed based on its current location. *See, e.g.*, Ex. 1006, Abstract, 1:20-25 ("SUMMARY": "a method includes determining the position of a vehicle. Based on the vehicle's position, information may be automatically provided that suggests a vehicular speed."), 1:53-56 ("Based 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."), Fig. 3. The set or displayed speed can be the vehicle's current speed, a previous speed at the vehicle's location that

had been stored, or a speed suggested by a database, such as a speed limit. *See, e.g., id.*, 1:50-53, 2:30-60, 3:38-45, Fig. 4.

In contrast to Schramm, which centers around choosing one speed and adjusting the route to minimize energy consumption, Clapper does not discuss a relevant route, destination, or energy consumption at all. The only thing Clapper teaches is that the speed set by a cruise control system can sometimes change. Clapper's incidental change in speed as a vehicle travels, however, is fundamentally incompatible with Schramm's disclosure of traversing a route, as Schramm makes explicitly clear that the speed should never change during a route. *See, e.g.*, Ex. 1009, 5:14-20, 5:45-49, 6:44-49, 7:40-42, 5:61-6:7, 7:18-25, 7:47-50, Fig. 2, Fig. 6.

Petitioner acknowledges that "Schramm's route identification process applies a single speed (e.g., 'desired average speed' or current vehicle speed) to all route segments being evaluated." Petition at 59. Despite this express teaching, Petitioner concludes without support that "a vehicle would not necessarily travel all segments at the same speed," so a "POSITA thus would have adjusted Schramm's optimization process, per Clapper, to account for different per-segment speeds." *Id.*

As shown in Petitioner's modified figure, Petitioner essentially just adds the phrase "and speed" to box 58 in Schramm's Fig. 3. Petition at 61:



Schramm-Clapper composite figure based on Schramm, FIG. 3

Schramm, however, expressly says that its Fig. 3 receives one, specific desired speed that does not vary as an input. Ex. 1009, 5:14-24. The modification Petitioner proposes is thus expressly rejected by Schramm itself.

Petitioner's unsupported conclusion is facially improper hindsight. Petitioner does not explain why a POSITA would reject Schramm's one-speed process, but still rely on cherry-picked bits and pieces of disclosure from that process. Petition at 59.

Nor does Petitioner even attempt to explain how Clapper could provide a disclosure of “different per-segment speeds,” which is necessary for its theory, given that Clapper does not teach the concept of segments at all. Petition at 59.

There is simply no credible argument that could overcome Schramm’s own express explanation that its teachings apply to a system where the speed does not change during a route. This shows that there is no motivation to combine.

Additionally, it is significant that Schramm’s manner of determining which route would be most energy efficient given a set speed is fundamentally different than the ’161 Patent’s approach of determining what speeds would be most energy efficient to travel a particular received route. The ’161 Patent works by “calculating and then averaging the efficient speed over a given route,” *i.e.*, varying speed over a route. Ex. 1001, 2:56-57; *see also, e.g.*, 5:8-14, 6:54-56, 11:11-29. Schramm takes essentially the opposite approach, as it uses a given speed as the constant, and can analyze potential routes to take at that speed. *See, e.g.*, Ex. 1009, 3:2-12, 3:25-27, 4:24-27, 5:14-52, 5:45-49, 6:11-18, 6:29-32, 6:44-49, 7:40-42, 5:61-6:7, 7:18-25, 7:47-50, Fig. 2, Fig. 3, Fig. 6.

Petitioner’s argument that a POSITA would have been motivated to modify Schramm and end up with what the ’161 Patent requires is thus not credible. Simply put, there is no good reason why a POSITA would modify Schramm’s

deliberately speed-constant/route-variable system into a route-constant/speed-variable system.

This ground fails because Petitioner's arguments assume a combination of Schramm and Clapper that a POSITA would not have been motivated to arrive at.

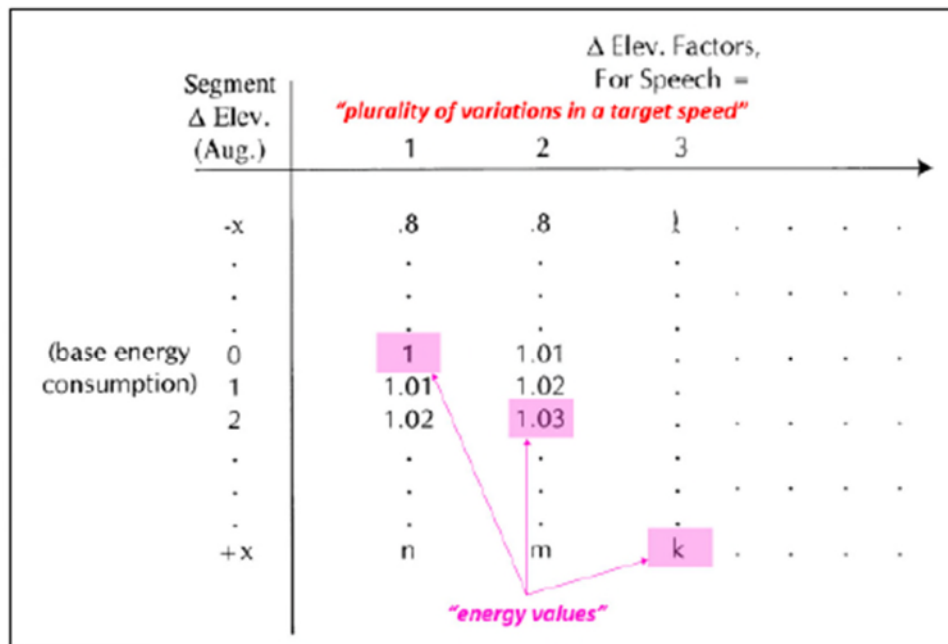
2. Neither Schramm Nor Clapper Discloses “Calculating a Plurality of Energy Values Consumed By Said Vehicle to Travel Said Route Based on a Plurality of Variations in a Target Speed of Said Vehicle Between Pairs of Said Segment Destinations” (All Challenged Claims)

Even were a POSITA motivated to combine Schramm and Clapper, neither reference discloses the '161 Patent independent claim limitation “calculating a plurality of energy values consumed by said vehicle to travel said route based on a plurality of variations in a target speed of said vehicle between pairs of said segment destinations.” Limitations [1c], [10c].

Schramm does not disclose “a plurality of variations in a target speed of said vehicle between pairs of said segment destinations,” because, as discussed above, Schramm deliberately uses *a single desired speed for the entire route*. See, e.g., Ex. 1009, 5:14-20 (“Next, at block 54 of FIG. 2, the logic receives the *desired average speed* at which the operator intends to drive vehicle to the destination point ‘B’. If desired, the operator may indicate a desire to select, as a default, the current speed of the vehicle 12. Accordingly, the computer 14 would access the speedometer of the vehicle 12 to set the default speed at block 54.”) (emphasis

added), 6:44-49 (“If it is determined that the energy consumption of the route is greater than or equal to the relevant onboard energy reserve of the vehicle 12, the logic moves to block 78 to return a signal indicating that 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 (“the data obtained at blocks 94 and 98 is added to a pending bin that represents actual energy consumption *for the particular speed*”) (emphasis added), 5:61-6:7, 7:18-25, 7:47-50, Fig. 2, Fig. 6.

Petitioner claims that Schramm Fig. 6 shows a “plurality of variations in a target speed” by way of the three numbers at the top of the figure. Petition at 73:



Schramm, FIG. 6 (annotated)

However, Schramm repeatedly explains that its system evaluates a number of possible routes but *selects only one optimal route*. See, e.g., Ex. 1009, 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.”), 6:29-32 (“when it is determined at decision diamond 68 that the last route has indeed been tested, the logic returns the route with the lowest overall energy consumption at block 72”), 3:25-27, 4:24-27, 5:21-52, 6:11-18, Fig. 3.

The numbers at the top of Fig. 6 are thus three different possible routes, only one of which Schramm actually selects and uses. Ex. 1009, 5:61-64 (“the example table shown in FIG. 6 includes speed columns headed ‘1’, ‘2’, ‘3’ . . . , with the headings representing the desired speed of the vehicle 12 along the route segment”). And what the Petition suggests are a “plurality of variations in a target speed” are not variations “between pairs of said segment destinations” of one route (as the asserted claims require) but rather between entirely different routes.

Thus, Schramm does not teach this limitation both because there are not a “plurality of variations in a target speed of said vehicle between pairs of said segment destinations” for the chosen route, and also because there is only one constant speed across each different route.

The Petition also alleges that Clapper discloses different target speeds for different locations, because its “set speed may vary,” for example, based on changing speed limits. Petition at 74. However, the mere disclosure of a speed

that “may vary” is not a disclosure of calculating a plurality of energy values **based on** a plurality of speeds as required by the challenged claims. Clapper does not disclose calculating energy values at all, much less calculating a plurality of energy values consumed by a vehicle to travel a route.

Knowing this, Petitioner turns to Schramm’s disclosure of calculating different energy values for different segments, relying on a statement that Schramm updates a table of energy values. Petition at 76-77. This, too, fails because the table entries Petitioner points to are energy consumption values that are “updated as the energy consumption module 44 ‘learns’ about the actual energy consumption of the particular vehicle 12.” Ex. 1009, 6:7-10; *see also* 7:14-22, Fig. 5. This means that those values are simply stored for future reference and could be used in calculating future routes, not that a plurality of energy values are calculated for segments of the currently calculated route, as this limitation recites. And even if Schramm did update its energy consumption values mid-route, as already discussed, Petitioner cannot reasonably rely on Schramm here, because Schramm’s calculations are expressly **not** based on variations in speed but rather a single constant speed. *See, e.g., id.*, 5:14-20, 6:44-49, 7:40-42, 5:61-6:7, 7:18-25, 7:47-50, Fig. 2, Fig. 6.

3. Neither Schramm Nor Clapper Discloses “Determining a Plurality of Efficient Speeds that Achieve a Best Summation of Said Energy Values” (All Challenged Claims)

Even if a POSITA were motivated to combine Schramm and Clapper, neither discloses the '161 Patent independent claim limitation “determining a plurality of efficient speeds that achieve a best summation of said energy values.” Limitations [1d], [10d].

As discussed, Schramm deliberately uses *a single desired speed for the entire route*. See, e.g., Ex. 1009, 5:14-20, 6:44-49, 7:40-42, 5:61-6:7, 7:18-25, 7:47-50, Fig. 2, Fig. 6. Petitioner notes that energy values can vary across Schramm’s segments, but ignores the fact that Schramm explains that its speed never varies. Petition at 81-82. Petitioner concludes that Schramm’s identification of its energy-optimum route “determines (e.g., specifies) the segments and thus their corresponding speeds,” even though, again, Schramm’s speed never varies. *Id.* Because Schramm’s speed never varies, it does not disclose the claimed “plurality of efficient speeds.”

Petitioner next asserts that in Clapper, “each segment has a corresponding speed, e.g., ‘the speed that the driver used previously’ on that segment or the ‘speed limit’ of that segment.” Petition at 81. This is wrong, as Clapper does not disclose any “destinations” or “segments” at all, and the word “route” appears only

once in an irrelevant context. Nor does Clapper even discuss “efficiency,” “energy,” or any other related concepts.

Clapper’s system is nothing more than an automated cruise control system that suggests a current speed for use at the current location of the vehicle. *See, e.g.,* Ex. 1006, Abstract, 1:20-25 (“SUMMARY”: “a method includes determining the position of a vehicle. Based on the vehicle’s position, information may be automatically provided that suggests a vehicular speed.”), 1:53-56 (“Based 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.”), Fig. 3. Clapper thus does not even disclose a plurality of speeds for a plurality of segments of a route, much less a “plurality of efficient speeds that achieve a best summation of said energy values” for a plurality of segments of a route, as claimed.

Petitioner next argues that “[a]lternatively/additionally, the above-described efficient speeds are determined as the vehicle drives the segments of the identified energy-optimum route, e.g., using ‘automatic cruise control,’” per Clapper. Petition at 82-83. But this fails to resolve any of the above issues, because Clapper does not disclose anything resembling driving an “energy-optimum route” (but rather simply setting the cruise control), and Schramm expressly explains that its speed does *not* vary across its optimum route by design. Petitioner’s final

argument, that “[a]lternatively/additionally, the efficient speeds (e.g., the speeds for the segments of the energy-optimum route) are determined as the vehicle drives the segments of this route,” is flawed for the same reasons. Petition at 83-34.

VII. CONCLUSION

For at least the foregoing reasons, Patent Owner respectfully submits that institution should be denied.

Date: May 13, 2024

Respectfully submitted,

ORRICK, HERRINGTON & SUTCLIFFE LLP

/K. Patrick Herman/

K. Patrick Herman, Reg. No. 75,018
Orrick, Herrington & Sutcliffe LLP
51 West 52nd Street
New York, NY 10019
Telephone: (212) 506-3596
Email: P52PTABDocket@orrick.com

Counsel for Patent Owner iQar, Inc.

WORD COUNT CERTIFICATION

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 7,942 words.

Date: May 13, 2024

By: /K. Patrick Herman/

K. Patrick Herman, Reg. No. 75,018
Orrick, Herrington & Sutcliffe LLP
51 West 52nd Street
New York, NY 10019
Telephone: (212) 506-3596
Email: P52PTABDocket@orrick.com

Attorney for Patent Owner

CERTIFICATE OF SERVICE

The undersigned hereby confirms that the foregoing paper was caused to be served on May 13, 2024 via email upon the following counsel of record for

Petitioner:

W. Karl Renner, Roberto Devoto, Gretchen A. DeVries
FISH & RICHARDSON P.C.
Email: IPR49649-0020IP1@fr.com

Ashraf A. Fawzy
TESLA, INC.
Email: afawzy@tesla.com

Date: May 13, 2024

/K. Patrick Herman/

K. Patrick Herman, Reg. No. 75,018
Orrick, Herrington & Sutcliffe LLP
51 West 52nd Street
New York, NY 10019
Telephone: (212) 506-3596
Email: P52PTABDocket@orrick.com