

UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD

TESLA, INC.,
Petitioner,
v.
iQAR INC.,
Patent Owner.

Case No. IPR2024-00543
U.S. Patent No. 10,882,399 B2

PATENT OWNER'S RESPONSE

TABLE OF CONTENTS

I.	INTRODUCTION	1
II.	ARGUMENT	3
A.	THE '399 PATENT'S INVENTION.....	3
B.	CLAIM CONSTRUCTION.....	5
C.	THE PRIOR ART DOES NOT TEACH WHAT THE CLAIMS REQUIRE	5
1.	Claims 1 and 11.....	6
a.	“[A] segment of a vehicle route”	6
b.	“[A]pplying calculated electric power to the vehicle to travel along the segment of the vehicle route at a calculated speed”	21
c.	“[C]alculated electric power ... to travel along the segment of the vehicle route at a calculated speed”	30
2.	Claim 6.....	32
3.	Claim 8.....	34
III.	CONCLUSION.....	35

TABLE OF EXHIBITS

Exhibit No.	Description
2001	“Frequently Asked Questions About Selective Availability” (Oct. 2001), available at https://www.gps.gov/systems/gps/modernization/sa/faq/
2002	Global Positioning System Standard Positioning Service Performance Standard (Oct. 2001)
2003	Global Positioning System Standard Positioning Service Performance Standard (Sept. 2008)
2004	Bullock et al., “Analysis of the Use of Digital Road Maps in Vehicle Navigation,” IEEE (1994)
2005	Liu et al., “Map Matching for Urban High-Sampling Frequency GPS Trajectories,” ISPRS Int’l Journal of Geo-Information (2020)
2006	Najjar et al., “A Road-Matching Method for Precise Vehicle Localization Using Belief Theory and Kalman Filtering,” Autonomous Robots 19, 173-191 (2005)
2007	Declaration of Craig J. Hoff
2008	Transcript of the October 28, 2024 Deposition of Dr. Vassilios Morellas

I. INTRODUCTION

Patent Owner iQar Inc. submits this response to Tesla, Inc.'s Petition for Inter Partes Review (Paper 1, the "Petition") of U.S. Patent No. 10,882,399 (the "'399 patent").

There are numerous fundamental differences between the '399 patent's claims and the prior art references on which the Petition relies (Hongo, Obradovich, and Niki). The '399 patent discloses—and the claims all require—a method and system that determines a "segment of a vehicle route" and then calculates the electric power that needs to be applied "to the vehicle to travel along the segment" at a "calculated speed." In other words, the patent requires (1) determination of the vehicle's route, (2) dividing that route into segments, and then (3) a prospective determination of the electric power needed to travel along a not yet traveled segment of a vehicle route at a certain speed.

This is not what the prior art teaches. Hongo—the primary reference on which the Petition relies—is directed to a basic cruise control system that constantly adjusts vehicle speed as the vehicle travels. Hongo's system is concerned only with the vehicle's present position. It does not consider and is ***unaware of the vehicle's route***. Because it does not know the vehicle's route, it does not and cannot determine any route segments.

Despite this, the Petition attempts to correlate historical data indexed using what Hongo calls “block numbers” or “BKN” with the claimed route segments. In doing so, it misinterprets Hongo. According to the Petition, Hongo collects many GPS position measurements as the vehicle travels and then divides these measurements into 20 meter (or “20m”) chunks for storage and later use when making a speed determination. It does not. Instead, Hongo collects only a single position for each block and then stores this position as a range to (1) reflect the minimum unit in its map database, and (2) account for inaccuracies inherent in GPS systems. In other words, each block represents only a *specific vehicle position*, not a portion of a route that either has been or is being travelled by the vehicle. The range of coordinates stored in each block is simply static, unchanging map data. The Petition has failed to explain how Hongo’s actual teachings render the claims obvious.

If this were not enough, Hongo makes clear that its system considers only the vehicle’s *current* position and condition when calculating the speed. Hongo does not make any determinations regarding the appropriate power/speed for upcoming portions of the route. The claims here, however, require calculation of power and speed for upcoming, *not yet traveled* segments of the routes. Neither Obradovich nor Niki fix this problem. Obradovich relates to a voice-controlled multimedia

system for a vehicle. Niki teaches a hybrid vehicle that also makes vehicle power determinations based on the vehicle's current condition.

Petitioner—and Board in its Institution decision—gave the '399 patent's claim language little weight. Instead, both the Petition and the Board repeatedly compared the prior art to ***embodiments*** in the '399 patent's specification. This is not how obviousness is determined. Whether or not the '399 patent's specification includes passages that sound similar to Hongo and other prior art of record is irrelevant. That prior art must render the ***claims*** obvious. It does not do so here: the art does not calculate power and speed for upcoming vehicle route segments.

II. ARGUMENT

A. The '399 Patent's Invention

The '399 patent relates to “methods and systems for controlling power applied to a vehicle....” (Ex. 1001, 1:17-18.) The patent explains that “FIGS. 1A and 1B compare a traditional ‘cruise control’ device (in FIG. 1A) to” the patent’s “power management device ... (in FIG. 1B).” (*Id.*, 6:61-63.) In Figure 1A, “[a]s the vehicle moves across ... roads having different elevations ..., or through different weather conditions, the traditional cruise control device adjusts the power supplied to the vehicle[] (and thus the speed) based only on the set velocity” and the vehicle’s current condition. (*Id.*, 6:63-7:7.) In other words, in prior art systems, speed and

power determinations are continuously made for individual points along a travel route as the vehicle travels past those points. (*See id.*)

This type of active or continuous “velocity control ... cruise control device” is different from that of the ’399 patent shown in FIG. 1B. (*Id.*, 7:7-10.) In that figure, “the power management system receives ... information” regarding “the location and grade (e.g., steepness of any uphill/downhill portions) of the road” along the “route” the vehicle will be traveling. (*Id.*, 7:11-18.) Using this, along with “information about the state of the vehicle,” “the power management system may calculate applied power to the engine, and may derive a speed (or set of speeds) that optimizes the applied power.” (*Id.*, 7:8-27.) By tailoring the vehicle’s speed and applied power to better match the route the vehicle is expected to travel, the ’399 patent reduces power consumed by the vehicle compared to a typical “cruise control system.” (*Id.*, 7:24-31; Figs. 1A-1B.)

Fundamental to the ’399 patent’s power management system is the ability to “deduce[] information about the” vehicle’s destination and “route.” (*Id.*, 7:14-16.) Once determined, the route “may be broken up into segments that may be used by [the] power management device to optimize the power needed to travel th[e] segment.” (*Id.*, 14:5-32.) “The more segments that the route is split into, the more accurate” the power optimization. (*Id.*, 14:38-45.)

B. Claim Construction

Patent Owner submits that none of the terms of the '399 patent's claims require express construction. The claims can be afforded their ordinary meaning. The Petition does, however, employ erroneously overbroad understanding of certain claim elements that effectively read these elements out of claims. This includes, for instance, the elements referencing a “segment of the vehicle route,” “applying calculated electric power to the vehicle to travel along the segment of the vehicle route at a calculated speed,” and “calculated electric power ... to travel along the segment of the vehicle route at a calculated speed.” Each of these elements—and their ordinary meaning—will be discussed in greater detail below.

C. The Prior Art Does Not Teach What the Claims Require

The '399 patent includes two independent claims: 1 and 11. (*See generally* Ex. 1001.) The Petition makes the same basic argument for both claims. The Petition relies on Hongo (Ex. 1005) for most claim elements. *See* Petition at 4-11. Hongo teaches a cruise control system for a vehicle that determines the vehicle's current position and collects various other condition information from sensors. It then uses the position and condition information to query stored driving history data to determine the appropriate speed for the current position/conditions. *See id.* The Petition relies on another reference—Obradovich (Ex. 1008)—only for its teaching of a cruise-control system that receives “voice commands.” *See* Petition at 12. And

the Petition relies on a third reference—Niki (Ex. 1009)—because it teaches a hybrid vehicle that apportions the power being requested by a vehicle between an internal combustion engine and an electric motor. (See Petition at 21-25.)

As explained below, this combination of art does not teach what independent claims 1 and 11 of the '399 patent require. It also does not teach the additional elements of dependent claims 6 and 8.

1. Claims 1 and 11

The prior art fails to teach numerous of the limitations required by independent claims 1 and 11. These are discussed in turn below.

a. “[A] segment of a vehicle route”

Claim 1 requires “determining a segment of a vehicle route.” (Ex. 1001, '399 patent, claim 1.) Claim 11 similarly requires use of “a segment of a vehicle route.” (*Id.*, claim 11.) The Petition argues that Hongo determines and uses the claimed “segment of a vehicle route” because its ACC system “acquires position information (current position coordinates r) from the GPS 170.” Petition at 26. According to the Petition, this position information is purportedly then divided into “driving block[s] (block number[s])” that correspond to “approximately ... 20m in the driving direction on the road being driven on.” *Id.* This is not what the claims require. And it is not what Hongo actually teaches.

(1) Hongo Is Unaware of the Vehicle's Route

To begin, these claim elements plainly require that the “route” being traveled by the vehicle be known. Otherwise, the “segment” that is “determin[ed]” in claim 1 or used in claim 11 would not be “a segment *of a vehicle route*.” (See Ex. 2007, ¶¶ 90-99.)

This is exactly what the '399 patent discloses. The patent repeatedly explains that its system is able to “deduce[] information about the” vehicle’s destination and “route.” (Ex. 1001, 7:14-16; *see also id.*, 5:31-49.) The vehicle’s “route” is the path it will travel “determined based on the current position of the vehicle and a final destination position.” (*Id.*, 11:48-49, 11:64-65; *see also id.*, 12:4-5 (referencing a “route to the final destination”); 14:6-10 (“[t]he route ... typically includes a starting position..., an ending position, ... and any intermediate positions between the initial and final positions”).) This can be, for instance, the path the vehicle will travel “from point A to point B.” (*Id.*, 7:14-16.) It is this already known and determined route that is then “broken up into segments” or “portions.” (*Id.*, 14:5-15; *see also id.*, 5:49-51 (explaining that “the route is divided up into segments”); 14:17-18 (again explaining that “[t]he route may be segmented”); 14:38-39 (likewise explaining that “the ... route (or the ... predicted route) may be divided up into N segments”); 18:33-36 (“every route may be divided into a finite number of segments”); 20:19-25 (discussing “segmenting the route into segments”); *see also* Ex. 2007, ¶¶ 91-94.)

Because the “segments” are portions of a known and determined route, in all cases the ’399 patent’s system and method determines the route *before* segmenting that route. Figure 2 exemplifies this. As shown, “a route is” first “determined” at step “201” using the vehicle’s “starting position” and “an actual or estimated ending position.” (Ex. 1001, 11:44-50.) Then, this determined route is “segmented” at the following step “203 into one or more segments.” (*Id.*, 11:50.)

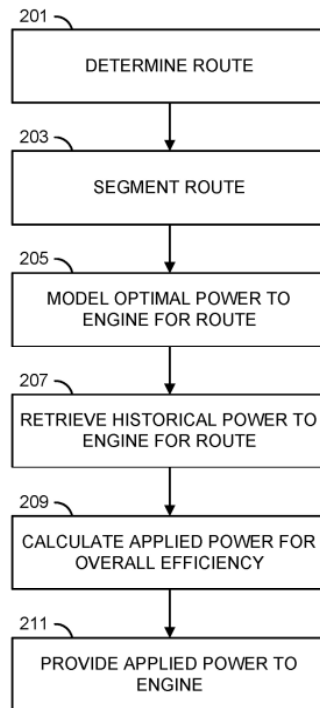


FIG. 2

(*Id.*, Fig. 2; *see also id.*, 14:5-45 (similarly explaining that in the ’399 patent, an already determined “route” is “broken up, “portion[ed],” “divided,” or “split” into segments); *see also* Ex. 2007, ¶¶ 96-98, 102-106.)

Contrary to the claims—and unlike the system discussed throughout the '399 patent—Hongo is indifferent to and never determines the vehicle's destination. (*See id.*, ¶¶ 97-99.) Because of this, it also does not determine the “route” along which the vehicle will travel. It follows that Hongo's system does not and cannot determine or use any route “segments.” Without knowing the vehicle's destination or the route over which the vehicle will travel, Hongo's system can neither “determin[e]” a “segment of a vehicle route” nor use such a “segment of a vehicle route” when calculating power and speed. (*See id.*)

(2) The Petition Misinterprets Hongo

Despite this fundamental difference between Hongo and the claimed subject matter—Hongo is unaware of the vehicle's route—the Petition nonetheless attempts to analogize Hongo's stored block numbers / BKN with the claimed “segment of a vehicle route.” A POSITA would not have understood the block numbers / BKN to be route “segment[.]”

Hongo is directed to and teaches an “adaptive cruise control system that automatically controls the speed of a vehicle.” (Ex. 1005, ¶¶ [0001].) The system employs the “current position of the vehicle” and “real-time road environment information related to weather and sunlight conditions” to make cruise control speed determinations. (*Id.*, ¶¶ [0002], [0008].) In addition to collecting current vehicle position and condition information, Hongo's system uses two databases of data. The

first of these is a “driving history DB 10.” (*Id.*, ¶ [0026].) This database “stores driving history ... from when the user drove in the past.” (*Id.*, ¶ [0003].) The records in this database are indexed by “BKN” or “block number.” (*Id.*, ¶ [0027].) Each indexed record includes position data and various weather, vehicle speed, road curvature, and other data. (*See id.*, ¶ [0027]-[0031]; Fig. 3.) Hongo also includes another database, “driving block DB20[,]” that allows current vehicle position to be converted to a “block number BKN” for purposes of querying the other driving history database DB 10. (*Id.*, ¶¶ [0027], [0032], [0038], [0044]; Fig. 2.) This database includes static map data. Hongo explains that historical driving data indexed by “block[s]” or “BKN” is generated during a so-called “trace mode.” (*See id.*) This “trace mode” is separate from, and not used when, Hongo’s cruise-control is active: “The trace mode is a dedicated mode for constructing the driving history DB 10 consisting of driving history data; while this trace mode is being implemented, the target vehicle speed V0 is not output, and the above mentioned-ACC system is not used.” (*Id.*, ¶ [0026].)

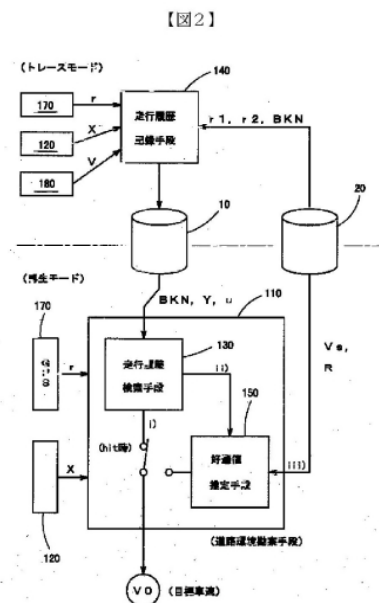
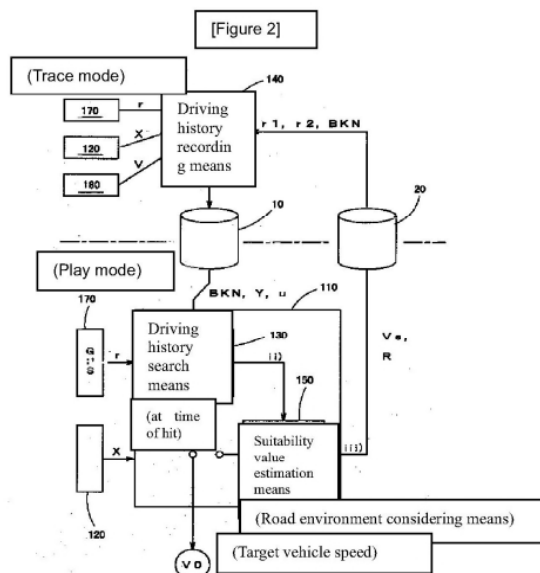
Again, the Petition correlates Hongo’s block numbers / BKN with the claimed “segment[s] of a vehicle route.” Petition at 26. Underlying this is an assumption that Hongo’s system collects vehicle position data very frequently during “trace” mode using its GPS 170 and then groups multiple sequentially collected instances of position data into 20m “blocks” for storage. More specifically, the Petition argues

that Hongo’s “driving history recording means 140” “acquir[es] position information (current position coordinates r) from the GPS 170” and then divides this GPS position information “into sections approximately every 20m in the driving direction on the road being driven.” *Id.* at 8-9. According to the Petition these divided chunks of GPS data are then “stored in driving block DB 20.” *Id.* at 9. Petitioner’s expert confirmed at his deposition that his opinions are premised on this understanding of Hongo’s operation. (See Ex. 2008, 11:4-16:21, 18:16-20:4, 34:22-36:8, 37:19-39:22.) Put another way, the Petition’s arguments are premised on the assumption that the ranges of position coordinates stored in Hongo’s blocks are all positions over which the vehicle actually traveled in the past and is again traveling in the future. This is **not** what Hongo teaches.

Hongo does note that historical data indexed by block number / BKN is generated by its “driving history recording means 140” during a so-called “trace mode.” (Ex. 1005, ¶¶ [0026]-[0027].) And means 140 does collect “position information (current position coordinates r)” from GPS 170 during this process. (*Id.*) But Hongo **does not** divide this position information into “sections approximately every 20m” as the Petition argues. Nor does it store any of the GPS position data it collects in DB 20. Instead, DB 20—which stores static map data—provides driving history recording means 140 with **input** during trace mode. The block range coordinates (r1, r2) stored in each block in Hongo’s separate historical DB 10 during

Hongo's "trace mode" are not points over which the vehicle has (or ever will) necessarily traveled. Instead, this range is only static, unchanging map data provided by DB 20 that has no direct correlation to any "route" being traveled by the vehicle. (See *id.*, ¶¶ [0026]-[0027]; see also *id.*, ¶ [0044] (explaining that "block range coordinates (r1, r2)" may be "read directly from the ... driving block DB 20"); Ex. 2008, 27:6-29:14 (recognizing that block range coordinates (r1, r2) are supplied as inputs to means 140).)

Petitioner's misinterpretation of Hongo—and its improper assumption that r1 and r2 represent GPS determined positions actually traversed by the vehicle—may have resulted from its translation. The translation modified Hongo's Figure 2 in a way that obscured the input arrow leading out of DB 20 and into means 140. The provision of input from DB 20 to means 140—including r1, r2, and BKN—can, however, be clearly seen in Figure 2 of original, Japanese version of Hongo:



(Compare Ex. 1005, Fig. 2 with Ex. 1007, Fig. 2.)

Because Petition’s misinterpreted Hongo—it improperly assumed that the range of coordinates stored in each of Hongo’s block represent positions traveled by the vehicle—there has been a failure of proof. The Petition ***never explained*** how Hongo’s real teachings satisfy the claims. The Petition’s arguments are premised on operations that Hongo does not in fact perform. The Petition was required to show how the ***prior art’s*** teachings render the claims obvious. By misinterpreting Hongo and comparing the claims to something not disclosed by Hongo, the Petition did not do so. This failure of proof alone requires rejection of the Petition’s arguments.

Next, even if the Petition had properly analyzed Hongo (it did not), it only would only have confirmed that Hongo does not teach what the claims require. In Hongo, each block number / BKN represents just a ***single vehicle position***. Again, only one “current position coordinate[] r” is collected by GPS 170 for each BKN. (See Ex. 1005, ¶ [0027].) While Hongo’s system then stores “block range coordinates (r1, r2)” in each BKN, as explained, these are not points over which the vehicle has (or ever necessarily will) travel. Instead, they are just road data provided to means 140 from DB 20 when that database is queried using a particular vehicle position. (See *id.*; Ex. 2008, 32:6-33:16 (Petitioner’s expert agreeing that a single position “r” is collected and used to query map data stored in DB 20); 42:3-11

(Petitioner’s expert agreeing that Hongo’s system “continuously matches ... positions”).)

Because it improperly assumes that the data in DB 20 comes from GPS 17, the Petition fails to explain what these “block range coordinates (r1, r2)” are or how they are generated in Hongo. The “block range coordinates (r1, r2)” are just road data—and not actual points traversed by the vehicle. (*See* Ex. 2007, ¶¶ 100-101, 107-124.) Hongo’s system never determines if the vehicle passed stored coordinate r1. (*See id.*, ¶¶ 125-127.) Likewise, Hongo never determines if—and is indifferent to whether—the vehicle is in fact traveling to stored coordinate r2. (*See id.*; *see also id.*, ¶¶ 128-131 (explaining that Hongo engages in “map-matching”); Ex. 2008, 44:1-48:18 (noting that Hongo considers “current position information”); 48:19-49:12, 50:7-12 (agreeing that Hongo is indifferent to whether the vehicle is traveling to the end of the “block range coordinates”).) All that matters is that the vehicle is currently located at a point that falls somewhere within the block coordinate range. (*See* Ex. 2007, ¶¶ 125-131, 143-144.) Put another way, the “block range coordinates (r1, r2)” are simply the minimum quantum of the road data stored in Hongo’s DB 20. (*See id.*) They are not representative of a portion of the route the vehicle is traveling. (*See id.*, ¶ 131 (explaining that Hongo’s block range coordinates are analogous to static, unchanging highway mile-markers.)

Next, a POSITA would have understood that Hongo's use of "block range coordinates" when storing speed data for a particular position was simply meant to account for the limitations of typical GPS systems in the 2005-time frame. During its "trace mode," Hongo collects GPS data from a moving vehicle. (Ex. 1005, ¶¶ [0026]-[0027].) Consumer GPS navigation systems available in the 2000s—the period of time spanning Hongo's and the '399 patent's filings—sampled position relatively slowly (*i.e.*, on the order of once every 1 second). (*See, e.g.*, Ex. 2005 (noting that by 2020—15 years after the '399 patent was filed—GPS systems were still only sampling signals about once every "1 or 5 s"); *see also* Ex. 2007, ¶¶ 129, 132-133.) A vehicle traveling at 75 mph—a typical highway speed—covers approximately 33.5 m/s. (*See id.*) Thus, even when sampling at a fast rate of once per second, Hongo's system would collect only a single position sample every 33.5 m. (*See id.*) It would not collect multiple such samples over 20 m of roadway. (*See id.*) A vehicle traveling at 45 mph—a typical non-highway speed—covers approximately 20.1 m/s. (*See id.*) Even at this slower speed, position data would only be collected every 20.1 m when the GPS sampling rate of 1 sample every second and no two samples would be within 20 m. (*See id.*)

Moreover, in the 2000s unless other equipment not referenced by Hongo was used, GPS systems resolved position with an accuracy of approximately ± 10 m. (*See, e.g.*, Ex. 2001 ("Users in the U.S. and the rest of the world should now be

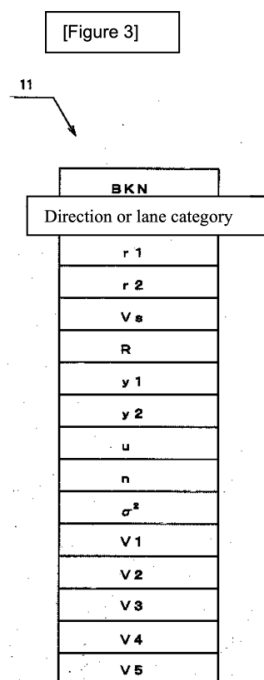
experiencing the same basic GPS accuracy of 10-20 meters or better”); Ex. 2002 at 15 (referencing GPS accuracy in the range of 13-36 meters in the 2001-time frame); Ex. 2003 at 22 (referencing an accuracy in the range of 6-12.8 meters in the 2008-time frame); *see also* Ex. 2007, ¶ 134.) Thus, even if a vehicle did somehow manage to increase its sampling frequency or travelled at a speed that allows multiple instances of position data could be collected within 20 m of roadway, it would still be unlikely that the collected position data would be meaningfully distinct. (*See id.*)

Rather than representing a “segment” of a road as the Petition argues, a POSITA would have understood that Hongo’s blocks are designed to address these sampling frequency and GPS accuracy limitations. Hongo repeatedly explains that its system considers the “current **position** of the vehicle while driving” when making a speed determination. (*E.g.*, Ex. 1007, ¶ [0008] (emphasis added); *see also id.*, ¶¶ [0015] (again noting that “current position of the vehicle” is considered); [0016] (explaining that the system stores vehicle speeds for “a certain passing point”); [0017] (noting that “position” information is stored).) However, infrequent GPS sampling, along with imperfect GPS accuracy, would have made it difficult to match the vehicle’s current position to any stored position. (*See* Ex. 2007, ¶¶ 135-136.) To account for this, Hongo stores recorded GPS positions not as discrete points in space, but as a range in each of its “driving block.” (*See, e.g.*, Ex. 1005, ¶ [0027].)

But this does not mean that Hongo collects position data for a variety of points spanning each block. Hongo does explain that in its system, “the position of a driving block (block number) ... is defined by dividing it into sections approximately every 20m in the driving direction on the road being driven.” (*Id.*) But again, Hongo is **not** saying that it collects significant volumes of position data and then divides that data into 20m blocks. The “driving block (block number)” and “sections approximately every 20m in the driving direction on the road being driven on” is map information provided by DB 20. It is not GPS data. A POSITA would have understood that Hongo stores “block range coordinates (r1, r2)” in its BKN rather than the single “current position coordinate[] r” it collects from GPS 170 to more readily facilitate determining the vehicle’s position with respect to the stored maps. Rather than requiring the current vehicle position to exactly match a single position on a map, by storing a range the current position only needs to correspond to a 20m “section” of mapped road—represented by “block range coordinates (r1, r2)” —for there to be a position match. (See Ex. 2007, ¶¶ 137-142.) Put another way, Hongo **abstracts** the position data it collects to better facilitate position-to-position matches. (See *id.*) The mere fact that Hongo abstracts position data and stores it as a range in a data element it labels a “block” does not somehow transform the individual positions into “segments.” The positions are still positions. The single instance of position data collected for each block has just been provided with some buffer to

account for the limitations associated with GPS position determinations and the map data Hongo stores. (*See id.*) Because of this, a POSITA would not understand Hongo's blocks to be the claimed "segment[s]." They are nothing more than **individual points or positions** along a road formatted in a way to ensure Hongo's system operates as intended. (*See id.*) Similarly, while Hongo does use the word "section" when characterizing the road data stored in its DB 20 (Ex. 1005, ¶ [0027]), as explained this data is only a static, unchanging "section" of road. (*See* Ex. 2007, ¶¶ 145-147.) It is not a "segment of **a vehicle route.**" (*See id.*)

Hongo's block numbers / BKN are not "segment[s] of a vehicle route" for yet another reason: they are simply an identifier Hongo uses to organize and index data in its "driving history DB10." (Ex. 1005, ¶¶ [0027]-[0028].) Indeed, Hongo says as much, explaining that the position and other data in these databases is stored "**in association with** the block number BKN." (*Id.*, ¶ [0027] (emphasis added).) Figure 3 provides an example of one such database "record" of "driving history data 11 recorded in the driving history DB 10" that is indexed by a BKN:



(*Id.*, Fig. 3.) Confirming that Hongo’s BKNs are just database indexes—and not route segments—Hongo repeatedly explains that its system uses the BKN as a “key” to access and search for data entries in its driving history DB 10. (*Id.*, Abstract; ¶¶ [0032], [0050]; *see also* Ex. 2007, ¶¶ 148-151.)

The type of data associated with each of Hongo’s BKNs further shows that they are not “segment[s] of a vehicle route.” (*See id.*, ¶¶ 152-157.) All the data indexed by BKN is historical: it relates only to past vehicle travels and not the route the vehicle is currently traveling. Again, Hongo explains that its cruise control system includes both a “trace mode” and a “playback mode.” (Ex. 1005, ¶ [0025].) The “trace mode is a dedicated mode for constructing the driving history DB 10 consisting of driving *history data*....” (*Id.*, ¶ [0026] (emphasis added).) Not only is

the data associated with each BKN historical, but it is collected during multiple, different past drives. As shown in Figure 3, a single BKN can include a “number of valid vehicle speed data” entries, such as speed data “V1 to V5.” (*Id.*, ¶ [0031]; Fig. 3; *see also id.*, ¶ [0015] (“there may be a plurality of vehicle speeds V”).) Multiple speeds are stored because the vehicle may “travel at the same point” multiple times at multiple different speeds. (*Id.*) All these different speeds are stored in the same BKN. (*See id.*) Moreover, the data associated with a BKN does not even need to be the vehicle driver’s own data. Instead, the data in the “driving history DB” can be “public, shared, or integrated (sharing) with others (or other vehicles).” (*Id.*, ¶ [0069].) For example, the BKN stored in DB 10 can be “standardized” and “shared among a plurality of drivers.” (*Id.*, ¶ [0070].)

So, in sum, the Petition has pointed to nothing in Hongo corresponding to the claimed “segment of a vehicle route.” Hongo ***never determines*** the vehicle’s route. Thus, it cannot determine or use any route “segment[s].” Moreover, Hongo’s block numbers / BKNs represent only ***single points*** along a route, not route segments. The position data has simply been abstracted to better allow for position matches. And the blocks bear no relation to the route the vehicle is traveling or its intended destination. They are simply ***database indexes*** used to store ***historical data*** accumulated from multiple past drives (including those made by other drivers). (*See* Ex. 2007, ¶¶ 158-162.)

b. “[A]pplying calculated electric power to the vehicle to travel along the segment of the vehicle route at a calculated speed”

After “determining a segment of a vehicle route” the method of claim 1 requires “applying calculated electric power to the vehicle to travel along the segment of the vehicle route at a calculated speed.” (Ex. 1001, Claim 1.) The system of claim 11 must similarly “calculate electric power and speed over a segment of a vehicle route” and then “apply calculated electric power to the vehicle to travel along the segment of the vehicle route at the calculated speed.” (*See id.*, Claim 11.)

Here, the Petition argues that “[i]n Hongo, the ‘target speed’ is ‘determined based on the past driving history in which both the position and road environment real-time road information match.” Petition at 40 (quoting Ex. 1005, ¶ [0017]).) More specifically, a “target speed” is “calculated based on means 140 determining a block number BKN identifying a driving block in the driving block DB 20...” *Id.* This is not what the claims require for two different reasons.

First, as explained above, Hongo’s system does not determine any “segment[s] of a vehicle route.” The system is unaware of the vehicle’s route. And Hongo’s block numbers / BKNs are individual positions, not “segment[s].” Because no “segment[s]” are determined, Hongo’s system cannot “apply[] calculated electric power to the vehicle to travel along the segment of the vehicle route at a calculated speed.” (*See* Ex. 2007, ¶¶ 163-169.)

Second, even if one improperly assumed that Hongo's block numbers / BKNs are "segment[s] of a vehicle route" (they are not), this claim element would still not be satisfied. Both claims 1 and 11 require an ordered, two-step process (or a system configured to perform such a two-step process). Claim 1 first "determin[es] a segment of a vehicle route." Then, "calculated electric power" must be "appl[ied]" "to the vehicle to travel along the segment of the vehicle route at a calculated speed." Similarly, claim 11 requires first "calculat[ing] electric power and speed over a segment of a vehicle route." Then, the "calculated electric power" must be "appl[ied]" "to the vehicle to travel along the segment of the vehicle route at the calculated speed." These interrelated claim limitations require that the "segment of a vehicle route" be one that the vehicle has not yet reached. If the "segment of a vehicle route" were not determined in advance before the vehicle reaches the segment and power is calculated, the claims make no sense. It is not possible to "apply[]" "calculated electric power to the vehicle to travel along the segment of the vehicle route at a calculated speed" as required by the claim if the vehicle is already traveling over, or has completed traveling over, the route segment. In such circumstances, it is too late to apply the "calculated" power. The time for doing so has already passed. Put another way, the claims require **prospective** speed/power calculations: calculations must be performed for upcoming not yet reached route

segments to allow the vehicle “to travel” subsequently over those segments at the calculated speed using the calculated power.

Once again, this is exactly what the ’399 patent discloses. More particularly, the patent’s system uses information about “the next segments (or upcoming segments)” to calculate power and speed. (Ex. 1001, 3:55-4:10; *see also id.*, 5:49-55 (noting that “speeds for current and upcoming route segments can ... be calculated”); Fig. 2 (showing that power is applied at step 211 after it is calculated for a segment at 209).)

According to Petitioner, interpreting the ’399 patent’s claims to require prospective power/speed determinations somehow “depart[s] from plain meaning.” Preliminary Reply (Paper 7) at 2. Likewise, in instituting IPR, the Board took the position that there is no “requirement in claim 1 that electric power and speed for a route segment be calculated prior to the vehicle traveling along the segment.” Institution Decision (Paper 9) at 16; *see also id.* at 22. Per the Board, “claim 1 does not specify how or when electric power and speed are calculated.” *Id.*

Respectfully, this is not the case. When read as a whole, the claims **do** require a prospective determination of power and speed. Per claims 1 and 11, the applied “calculated electric power” must cause “the vehicle **to travel along the segment** of the vehicle route” that has been determined “at a calculated speed.” Put another way, the claims require that application of the calculated power **have a specific result**: it

must cause the vehicle to travel “along” an already determined “segment of the vehicle route” at a calculated speed. It is not enough to simply “apply[] calculated electric power” and travel “at a calculated speed.” This, however, is how both Petitioner and the Board appear to interpret the claims. In doing so, the requirement that the vehicle be caused “***to travel along the segment***” “at a calculated speed” has been read out of the claims.

Petitioner also argues that the “specification refutes” this straightforward claim interpretation. Preliminary Reply at 1. The Board similarly noted in its Institution Decision that the ’399 patent’s claims should be broadly interpreted because the patent “explicitly discloses calculating and applying power to a vehicle based on the route segment in which the vehicle is currently traveling.” Institution Decision at 17.

Nothing about the specification requires reading an element out of the claims. The specification plainly describes prospective determinations/calculations. For instance, Figure 2 depicts an ordered process where a route is determined/segmented at steps 201 and 203, power is calculated at step 209, and then calculated power is applied at step 211. (Ex. 1001, Fig. 2; *see also* 11:44-50.) The specification similarly explains that the patent’s system determines the vehicle’s “next segment (or upcoming segments)” and calculates power and speed for that segment. (*Id.*, 3:55-4:10.) Likewise, “speeds for ... upcoming route segments can ... be calculated.”

Id., 5:49-55.) Indeed, this is the central purpose of the '399 patent's system: the patent seeks to improve on "traditional 'cruise control' device[s]" that simply "adjust[] the power supplied to the vehicle" based on current conditions. (*Id.*, 6:61-7:10.) The '399 patent does so by considering and accounting for the "route" over which the vehicle will be traveling. (*Id.*, 7:11-18.)

The '399 patent does explain—as both Petitioner and the Board have noted—that its system is optionally able to make power/speed determinations using the vehicle's current position. For instance, the patent explains that "applied power ***may*** be calculated continuously ... for current and upcoming route segments." (*E.g.*, Ex. 1001, 5:38-55 (emphasis added).) This reference to an optional, additional feature does not mean that the claim language should be ignored. Indeed, the Federal Circuit has repeatedly explained that it is improper to "infer that any particular embodiment is included in a claim when there is probative evidence that sufficiently indicates the contrary." *SIMO Holdings Inc. v. Hong Kong uCloudlink Network Tech. Ltd.*, 983 F.3d 1367, 1378 (Fed. Cir. 2021); *August Tech. Corp. v. Camtek, Ltd.*, 655 F.3d 1278, 1285 (Fed. Cir. 2011) ("the mere fact that there is an alternative embodiment disclosed in [a] patent ... does not out-weigh the language of the claim...."); *Rolls-Royce, PLC v. United Techs. Corp.*, 603 F.3d 1325, 1334 (Fed. Cir. 2010) (disclosed embodiment do not 'outweigh the language of the claim...."). Here, the claim language itself requires that a route segment must be determined (and power and

speed must be calculated) prospectively. Construing the claims as Petitioner proposes and the Board did when instituting reads out this requirement.

The '399 patent's specification also discusses the use of the vehicle's current position and historical data to determine energy efficient vehicle speeds. (*E.g.*, Ex. 1001, 5:51-55.) But this is also identified as optional, alternative functionality present in "some variations." (*Id.*) Once again, the mere fact that the use of historical data is identified as alternative in the specification does not somehow mandate that it be within the scope of the claims. See *SIMO Holdings*, 983 F.3d at 1378. Moreover, the specification identifies the use of a vehicle's current position to look up historical speed data as an alternative to calculation of power and speed on a segment-by-segment basis: "[i]nstead of trying to calculate the predicted power usage based on physics modeling, this method looks at all the previous data to determine the power that would be utilized to drive each segment at a particular speed." (*Id.*, 18:4-9.) Here, the claims require calculation of energy/speed for a determined route segment. As a result, the fact that analogy can be made between passages in the '399 specification and Hongo's active cruise control system does not establish obviousness. The prior art must teach the ***claimed*** subject matter.

The Petition does not account for any of this. While Hongo's system does determine an appropriate cruise control speed, it does not do so in the way the '399 patent's claims require. Hongo repeatedly explains that in its ACC system, "speed

determinations” are made by looking up the “current position of the vehicle” in its databases and extracting the appropriate speed stored in the databases for that position. (Ex. 1005, [0008]; *see also id.*, [0015] (explaining that the “current position of the vehicle currently driving and the real-time road environment information” is used to search historical data for purposes of calculating speed).) Put another way, Hongo speed determination entails little more than a simple lookup: the vehicle’s current position is used to query saved speed data to determine what speed the vehicle traveled in the past when at that position. But what Hongo does not do is (1) determine a route segment, and then (2) prospectively calculate the power needed for the vehicle to travel at a calculated speed over that route segment. This, however, is what the ’399 patent discloses and what its claims require. (*See* Ex. 2007, ¶¶ 170-212.)

There are other differences between Hongo and the claims. Hongo explains that data records with associated BKN are created and stored in its databases only during a separate “trace mode.” (*E.g.*, Ex. 1005, Abstract (“The trace mode is a dedicated mode for constructing a driving history DB 10 consisting of driving history data.”); ¶ [0026] (same).) But “while ... trace mode is being implemented, the target vehicle speed V_0 is not output, and the above-mentioned ACC system is not used.” (*Id.*, ¶ [0026].) Vehicle speed is determined and controlled only during a separate “[p]layback mode.” (*Id.*, ¶ [0032].) In other words, in Hongo, *separate*

methods are employed to (1) store data with associated block numbers / BKNs and (2) determine a speed for the ACC system. (See Ex. 2007, ¶¶ 213-217; see also Ex. 2008, 54:6-56:1 (Petitioner’s expert agreeing that trace and play modes occur at different times).) Hongo does not teach, however, a single method that does both of these things. This is what claims 1 and 11 require. “[A] segment of a vehicle route” must be determined. Then, as a part of the same method, “calculated electric power” must be “applied” for purposes of “travel[ing] along the” just determined “segment of the vehicle route at a calculated speed.”

Hongo is also limited to simple lookup procedure when determining appropriate speed: it uses the vehicle’s current position to query the position ranges in each of the stored data records indexed by block number. (See Ex. 1005, ¶ [0032] (“[T]he driving history DB 10 is searched for driving history data with matching keys (BKN,Y)” using either a BNK obtained by searching DB 20 or by “directly using r (coordinates as a key).”); see also Ex. 2007, ¶¶ 205-211.) Because of this, the vehicle will have already passed the beginning of the data record’s position range and would be within that range at the time Hongo’s system makes a speed determination. (See *id.*, ¶ 212.) Thus, Hongo does not—and cannot—“apply[] calculated electric power to the vehicle to travel along the segment of the vehicle route at a calculated speed” as the vehicle would have already traversed at least part of the “segment.” Again, the ’399 patent’s claims require travel “***along the segment***”

“at a calculated speed.” It is not enough to simply travel at a calculated speed for a particular position. This, however, is all that Hongo’s system does: it controls speed for the vehicle’s current position and then updates that speed as the position changes. This further shows that, unlike the claims of the ’399 patent which require a prospective determination, Hongo is concerned only with the vehicle’s **current** position and the **current** speed. (See *id.*, ¶¶ 205-212.) Hongo does not “calculate[] speed” or “calculate[] electric power” to travel “along” any route “segment.” (See *id.*)

Once again, this disclosure deficiency is not remedied by any of the other references in the Petition. The Petition cites Obradovich only for its teaching of voice control. See, e.g., Petition at 15. And the Petition cites Niki only for its disclosure of a hybrid vehicle. See *id.* at 21. While Niki does make a determination of how its hybrid vehicle’s engine and electric motor power should be apportioned to meet vehicle torque demands, this takes into account only the vehicle’s current operating state, i.e., the instantaneously required torque. (See, e.g., Ex. 1009, 8:35-63 (torque currently required either by driver input or CC system determined); 9:1-10:23 (currently required torque is distributed between motor and engine following Niki’s teachings). Niki—like Hongo—does not calculate the power that should be applied to maintain speed over a not yet traveled route segment.

Petitioner’s expert adds nothing to this deficient analysis. Instead, the expert merely repeats the Petition’s arguments almost verbatim. (See, e.g., Ex. 1003, ¶¶ 96-98.)

c. “[C]alculated electric power ... to travel along the segment of the vehicle route at a calculated speed”

Claims 1 and 11 also require a method that determines and a system that uses both a “calculated electric power” and a “calculated speed.” Here, the Petition argues that Hongo’s cruise control itself teaches what these elements require because it is able to “calculate[] speed.” Petition at 37-38. According to Petitioner, “controlling vehicle movement using the target vehicle speed itself involves calculating and applying a power corresponding to the target vehicle speed [of] the vehicle engine.” *Id.* at 39. This, however, reads an element out of the claims. The claims require both a “calculated speed” and “calculated electric power.” The mere calculation of speed alone is insufficient.

In instituting IPR, the Board took the position that calculating speed—but not power—is sufficient for purposes of the claims because “the ’399 patent discloses calculating power as a function of the calculated speed.” Institution Decision at 22. While the specification does discuss embodiments where only speed calculations are performed (see, e.g., Ex. 1001, 2:53-55), in other embodiments the patent employs **both** speed and power calculations (see, e.g., *id.*, 5:31-38). The claims here require the latter: both types of calculations are necessary. Once again, the mere fact that

alternative embodiments are discussed in the specification does not justify reading limitations out of the claims or interpreting those claims in a way that negates their plain meaning.

Next, Petitioner points to Niki and argues that it separately teaches “control[ling] the internal combustion-engine E and the motor M so that the vehicle travelling speed VP detected in a vehicle speed sensor S1 becomes the target vehicle speed.” Petition at 39. But Niki does not “calculate[] electric power” needed to “travel along the segment of the vehicle route at a calculated speed” as claims 1 and 11 require. It only performs *instantaneous* power and speed calculations for single, discrete positions. (Ex. 1009, 8:35-63; 9:1-10:23.) There are no calculations of power/speed needed to “travel along the segment of the vehicle’s route.” Moreover, further distancing it from the ’399 patent, rather than considering a prospective route segment when calculating power, Niki’s electric power apportionment determinations are premised on the current state of battery charge. (Id., 2:20-25 (“state of charge” used to control “lock-up clutch” that determines transmission of motor power to driveshaft); 3:26-54 (similar); 10:18-23 (“state of charge” of the battery is used to “limit power”); 14:50-56 (similar).)

So, all the Petition has done here is point to one reference that calculates the current speed for an active cruise control system (Hongo), and another that determines the relative proportion of power that can be supplied by an electric motor

based on the current state of charge (Niki). But, what the Petition has not done is explain why these teachings result in what the claims require: “calculate[ing] electric power” that must be applied to the “vehicle to travel along the segment of the vehicle route at a calculated speed.” (See Ex. 2007, ¶¶ 221-229.)

2. Claim 6

The prior art also does not teach what dependent claim 6 requires. This claim depends on claim 1 requires that the “vehicle route segment determination” “further comprises determining multiple route segments, each route segment having a separate calculated speed and selected drive train parameter.” In other words, **multiple** route segments must be determined at the **same time** as part of the **same segment determination step**. And separate speed and drive train parameters must be calculated for each such segment. The ’399 patent’s specification explains that this type of segmentation—*i.e.*, “divid[ing] the “route up into N segments”—makes the power and speed calculations “more accurate.” (Ex. 1001, 14:38-35.)

Here, the Petition argues that “[g]iven that each block is a 20m portion, a route longer than 20m includes multiple driving blocks.” Petition at 45-47. In other words, Hongo’s system will use the vehicle’s position at one time to identify a data record indexed by one block number, then use the position at a different later time to identify a different data record indexed by another block number, and so on. Hongo’s system never, however, identifies more than a single block number at a

time. (See, e.g., Ex. 1005, ¶¶ [0044] (“[I]n step 41, the block on which the vehicle is running is specified based on the input current position r.”); [0046]-[0048] (noting that the “vehicle speed” is updated if the “the block number BKN has changed”); see also *id.*, Fig. 6.) Thus, “multiple route segments” are never determined as claim 6 requires. (See Ex. 2007, ¶¶ 230-238.)

Similarly, Hongo’s system also never identifies “separate calculated speed[s] and selected drive train parameter[s]” for multiple determined route segments. To begin, when discussing this part of claim 6 the Petition points only to calculations performed by Hongo when “block number BKN misses.” Petition at 47 (quoting Ex. 1005, ¶ [0036].) In such circumstances, Hongo’s system has been **unable to ascertain** the block number corresponding to the vehicle’s current position. It follows that no “segment of the vehicle route” has been determined. When a block number is identified, Hongo uses a different procedure to determine vehicle speed. (See Ex. 1005, ¶¶ [0033]-[0035] (discussing speed determination when either “two keys are hit,” or when “only block number BKN is hit”).) The Petition never explains why it would be obvious to replace the speed determination Hongo employs when a block number is identified with the different determination method used in the opposite circumstances. In any event, Hongo’s system performs only a single speed determination at a time. (See generally *id.* at Fig. 6; [0043]-[0063].) Because of this, the system never determines “separate calculated speed[s] and selected drive

train parameter[s]” for multiple segments at the same time as this claim requires. (See Ex. 2007, ¶¶ 239-245.)

3. Claim 8

Dependent claim 8 specifies that “determining information about operational status of a vehicle” “further comprises the step of communicating with a remote database.” In connection with this limitation, the Petition argues that it would have been obvious to graft the lane departure warning system of Newstrom (Ex. 1012) onto Hongo. See Petition at 77-82. Newstrom, however, employs only a “geospatial database 20” stored on the vehicle itself when identifying lane departures. (Ex. 1012, 4:12-16; Fig. 1.) A database located on the vehicle is, of course, not the “remote database” required by claim 8.

In an attempt to address this disclosure deficiency, the Petition argues that in Newstrom, “database 20 can be loaded by database manager 22 ... through a ‘wireless connection to server[.]’” Petition at 83. This, however, is referring only to the process by which “database manager 22 is *first initialized.*” (Ex. 1012, 8:27-28.) No contact with any such “server” occurs during use or detection of a lane departure. Claim 8, however, requires “communicating with a remote database” when “determining information about *operational* status of a vehicle.” Pre-loading a database from a remote server is not the same as using a remote database to make a determination about the vehicle’s “operational status.” (See Ex. 2007, ¶¶ 246-256.)

Next, apparently recognizing that remote database communication must occur during vehicle operation for claim 8 to be satisfied, the Petition argues that in Newstrom “the vehicle can use a wireless connection to the server as the vehicle is being driven.” Petition at 83. There is no such disclosure in Newstrom. All that Newstrom teaches is that its database manager 22—located on the vehicle—can load different portions of database 20—again, already stored on the vehicle—as the vehicle moves to different locations. (See Ex. 1012, 8:29-38.) The only time there is any “wireless connection to server” is during “initializ[ation].” (*Id.*) Database 20 is static and unchanging while the vehicle is driving. Indeed, it would make little sense for Newstrom’s system to query a remote database for purposes of determining lane departures. Such determinations need to be made quickly and without delay. Communication with a remote database would slow down this process. (See Ex. 2007, ¶ 254.) Moreover, Petitioner has pointed to nothing showing where the “server” in Newstrom is located. Thus, it may just be another, more permanent storage location within the vehicle itself as opposed to the “remote database” the claim here requires. (See *id.*, ¶ 255.)

III. CONCLUSION

For the above reasons, Patent Owner respectfully requests that the Board reject Petitioner’s arguments and confirm the patentability of the ’399 patent’s claims.

Respectfully submitted,

ORRICK, HERRINGTON & SUTCLIFFE LLP

Dated: November 5, 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

Counsel for Patent Owner iQar, Inc.

CERTIFICATE OF WORD COUNT

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 8,158 words.

Dated: November 5, 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 November 5, 2024 via email upon the following counsel of record for Petitioner:

W. Karl Renner, Roberto Devoto, Gretchen A. DeVries
FISH & RICHARDSON P.C.
Email: IPR49649-0022IP1@fr.com

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

/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