

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TESLA, INC.,
Petitioner

v.

AUTONOMOUS DEVICES, INC.,
Patent Owner

Case IPR2023-01054
Patent 10,452,974

**PETITIONER'S OPPOSITION TO
PATENT OWNER'S MOTION TO AMEND**

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EXHIBIT LIST

TESLA1001	U.S. Patent No. 10,452,974 to Cosic (“the ’974 Patent”)
TESLA1002	Declaration of Jason Janet, Ph.D.
TESLA1003	Curriculum Vitae of Jason Janet, Ph.D.
TESLA1004	U.S. Patent No. 9,604,359 (“Grotmol”)
TESLA1005	U.S. Patent No. 8,639,644 (“Hickman”)
TESLA1006	Service, Robert F., <i>Minds of Their Own</i> , Sci. Magazine. Oct. 10, 2014, 346(6206):182-183, available at, https://www.usna.edu/AcResearch/_files/documents/Science_Minds_of_Their_own_182.full1.pdf
TESLA1007	Prosecution File History of U.S. Patent No. 10,452,974 (“the ’974 Prosecution History”)
TESLA1008	U.S. Patent No. 11,238,344 (the “’344 patent”)
TESLA1009	<i>Autonomous Devices, LLC v. Tesla, Inc.</i> , Stipulation and Order Granting Leave to File First Amended Complaint and to Amend Scheduling Order, Case No. 22-1466-MN (D. Del.)
TESLA1010	Second Declaration of Dr. Jason Janet
TESLA1011	Transcript of Dr. Eli Saber Deposition in IPR2023-01054
TESLA1012	Transcript of Dr. Eli Saber Deposition in IPR2023-01055
TESLA1013	U.S. Pub. No. 2014/0089232 (“Buibas”)
TESLA1014	RESERVED
TESLA1015	U.S. Patent Apl. Pub. No. 2010/0063663 (“Tolstedt”)
TESLA1016	U.S. Patent No. 9,335,766 (“Silver”)

TESLA1017	U.S. Patent No. 9,435,653 (“Zeng”)
TESLA1018	Patent Owner’s Response (Paper 26) in IPR2023-01055 on U.S. Patent 11,238,344

I. INTRODUCTION

Patent Owner (“**PO**”)’s Motion to Amend (“**MTA**”): (1) includes substitute claims 21-24 to contingently amend claims 4, 5, 7, and 11, respectively, and (2) cancels claims 14 and 15 and substitutes them with claims 25 and 26, respectively, without any contingency. Petitioner (“**Tesla**”) opposes the MTA at least because the Substitute Claims are unpatentable under 35 U.S.C. §§ 101 and 103.

35 U.S.C. § 101: The Substitute Claims are not directed to patent eligible subject matter because they are directed to an abstract idea of determining a manner of operating a device in a current circumstance based on how that that device, or another device, operated in similar circumstance(s) in the past. This abstract idea is a mental process implemented using conventional computer components.

35 U.S.C. § 103: Patent Owner’s proposed Substitute Claims amend issued claims 4, 5, 7, 11, 14, and 15 to incorporate five features, each of which are rendered obvious by Grotmol, Hickman, and Tolstedt, as described in Section III below.

II. THE SUBSTITUTE CLAIMS ARE UNPATENTABLE UNDER § 101

Substitute claims in a MTA may be reviewed for subject matter eligibility. *Uniloc 2017 LLC v. Hulu, LLC*, 966 F.3d 1295, 1304 (Fed. Cir. 2020). The Supreme Court in *Alice Corp. Pty. Ltd. v. CLS Bank International*, 573 U.S. 208, 217-18 (2014), set forth a two-step framework for assessing eligibility under § 101. As explained below, PO’s substitute claims fail at both steps of the *Alice* framework.

A. *Alice* Step 1: The Substitute Claims Are Directed to an Abstract Idea

PO's substitute claims are directed to an abstract idea of determining a manner of operating a device in a current circumstance based on how that that device, or another device, operated in similar circumstance(s) in the past. TESLA1010, ¶¶60-61. This familiar concept a mental process that continues to be performed in the mind by humans in countless contexts each day. *CyberSource Corp. v. Retail Decisions, Inc.*, 654 F.3d 1366, 1373 (Fed. Cir. 2011) (“[C]omputational methods which can be performed entirely in the human mind are the types of methods that embody the ‘basic tools of scientific and technological work’ that are free to all men and reserved exclusively to none.”) (quoting *Gottschalk v. Benson*, 409 U.S. 63, 67 (1972)); *Elec. Power Grp., LLC v. Alstom, S.A.*, 830 F.3d 1350, 1354 (Fed. Cir. 2016) (“[W]e have treated analyzing information by steps people go through in their minds, ... without more, as essentially mental processes within the abstract-idea category.”) (citations omitted).

For well over a century, people have used their mental faculties to make real-time decisions driving automobiles informed by their past experiences. TESLA1010, ¶¶62-63. Each time a driver decides to take a detour based on traffic conditions that resemble conditions of the past (e.g., a circumstance where the detour was previously taken), the driver mentally performs the claimed abstract idea. *Id.* Likewise, a driver performs the abstract idea whenever he or she slows for a

pedestrian who appears poised to jaywalk based on experience with other pedestrians jaywalking under similar conditions in the past. *Id.* The fact that people frequently base their present actions on past experiences should not be controversial. *Id.* PO's substitute claims simply take this basic human intuition and apply it in a purportedly computer-implemented method. *See* Appendix A, Claim Element [1.1].

The substitute claims' abstract nature is further evidenced by the generic, non-technical character of their constituent claim elements, both individually and in combination. Here, the substitute claims recite limitations broadly directed to accessing "correlation" data stored in a "knowledgebase," receiving data representative of a device's "circumstance," and comparing the received data to other data in the knowledgebase to anticipate (e.g., lookup) instructions for operating the device in that circumstance. These limitations closely resemble limitations that courts and the Office have previously and repeatedly deemed abstract.

The "accessing" limitation (Element [1.2]¹), for example, simply refers to a "knowledgebase" that includes first and second correlations between circumstance representations and instruction sets. But the "knowledgebase" is broadly recited divorced from any technical context, and the data that is included in the

¹ Appendix A assigns numeric identifiers to the claim elements in PO's substitute claims.

knowledgebase can be equivalently stored and recalled from a human mind as well. *Elec. Power Grp.*, 830 F.3d at 1353-54 (“[W]e have treated collecting information, including when limited to particular content (which does not change its character as information), as within the realm of abstract ideas.”); *Ericsson Inc. v. TCL Comm. Tech. Holdings Ltd.*, 955 F.3d 1317, 1328 (Fed. Cir. 2020) (“Merely claiming those functions in general terms, without limiting them to technical means for performing the functions that are arguably an advance, does not make a claim eligible at step one.”) (citations and internal quotations omitted).

Substitute claim elements [1.3], [4.1*], [4.2], [4.3*], [7.1*], [7.2*], [11*], [14*], [15.2*], and [Sub-1]-[Sub-5] likewise form part of the recited abstract idea and can be carried out in the mind for similarly to the “accessing” step of [1.2]. TESLA1010, ¶¶62-64. Noticeably, these claim elements merely define attributes of the *content* of data in the knowledgebase, including content of the first and second circumstance representations and content of a fourth correlation between a fourth circumstance representation and a fourth instruction set. Simply storing and accessing data in a manner that could be performed in the mind falls squarely in the realm of abstract ideas. *Elec. Power Grp.*, 830 F.3d at 1353-54. And while the claims do refer to certain “learning process[es]” for learning correlations in the knowledgebase (e.g., Elements [1.3], [4.1*], [4.2], [11*]), these “learning process[es]” are recited inferentially and are not even actions in the claimed

methods. A human could mentally store and recall the correlations, even if they were learned in the generic “learning process[es]” as claimed. *Id.*

Substitute claim elements [1.4], [1.5], [5*], and [15.1*] further recite generic data processing/analysis steps capable of performance in the mind. TESLA1010, ¶64. Element [1.4], for instance, recites “generating or receiving a third circumstance representation,” but describes no specific techniques or devices for the generating or receiving steps. *Elec. Power Grp.*, 830 F.3d at 1353-54 (“analyzing information by steps people go through in their minds, ... without more, [are] essentially mental processes within the abstract-idea category”); *Ericsson*, 955 F.3d at 1328. The only additional language in [1.4] adds that “the third circumstance representation represents a third circumstance detected at least in part by [] one or more sensors of the first device or at least in party by one or more sensors of a second device”—i.e., another limitation on the *content* of the third circumstance representation that falls squarely within the realm of abstract ideas. *Elec. Power Grp.*, 830 F.3d at 1353-54. A human can generate or receive data representing a circumstance, even if the circumstance itself was detected by sensors outside the mind (e.g., by watching TV).

The limitations related to “anticipating the first one or more instruction sets” recited in Elements [1.5] and [5*] are similarly directed to basic data processing and mental steps of the kind that courts have consistently found abstract. The human

mind is adept at comparing circumstances and anticipating actions, which as described above, people commonly do in their daily lives—even without the aid of a computer. Correlating items based on their temporal correspondence (Element [15.1*]) is also a simple data analysis step capable of performance in the mind.

The substitute claims' additional elements also fail to integrate the abstract idea into a practical application or otherwise cure their deficiencies under *Alice* Step 1. Elements [1.1]-[1.2] refer to “a computing system that includes one or more processor circuits” and a “memory” that stores the knowledgebase, but recitation of generic computer components and mere instructions to implement the abstract idea on a computer are insufficient to confer eligibility under § 101. *Alice Corp. v. CLS Bank*, 573 U.S. 208, 221, (2014) (“Stating an abstract idea while adding the words ‘apply it with a computer’ ... [yields] the same deficient result” and does not “provide[] any practical assurance that the process is more than a drafting effort designed to monopolize the abstract idea itself.”) (quoting *Mayo Collaborative Servs. V. Prometheus Labs., Inc.*, 566 U.S. 66, 72 (2012)); MPEP § 2106. That the circumstance representations represent circumstances detected by “one or more sensors” of a device similarly fails to save the claims at *Alice* Step 1, not least because the steps for detecting circumstances are recited inferentially apart from actions of the claimed methods themselves. Regardless, generically claiming “one or more sensors” fails to impose any meaningful limit on the abstract idea itself.

Elec. Power Grp., 830 F.3d at 1353-56 (rejecting claims that “do not include any requirement for performing the claimed functions ... by use of anything but entirely conventional, generic technology).

Finally, the “executing” step (Element [1.6]) is merely incidental to the abstract idea itself and amounts to no more than insignificant post-solution activity. By the terms of claim 1, the “first one or more instructions sets” are explicitly instructions “for operating” a device. Simply executing the “first one or more instruction sets” to operate the first or second device according to the instructions’ stated function does nothing to meaningfully limit the application of the abstract idea or otherwise integrate it into a practical application. MPEP § 2106.05(g).

Accordingly, and for each of the foregoing reasons, the substitute claims are directed to an abstract idea.

B. *Alice* Step 2: The Substitute Claims Lack an Inventive Concept

The substitute claims further lack any additional elements beyond the abstract idea itself. *Alice*, 573 U.S. at 217-18 (“We have described step two of this analysis as a search for an ‘inventive concept’—i.e., an element or combination of elements that is ‘sufficient to ensure that the patent in practice amounts to significantly more than a patent upon the [ineligible concept] itself.’”); MPEP § 2106.05.

For example, as discussed above, the additional elements in PO’s substitute claims consist of merely generic computer components, conventional sensors, and

an insignificant post-solution executing step. *See, e.g.*, Elements [1.1] (“a computing system that includes one or more processor circuits”), [1.2] (“a memory ...”; “detected at least in part by one or more sensors of the first device”). None of these elements, whether individually or in combination, can supply an “inventive concept” as required by *Alice* and its progeny. *Alice*, 573 U.S. at 223 (“[I]f a patent’s recitation of a computer amounts to a mere instruction to ‘implemen[t]’ an abstract idea ‘on . . . a computer,’ that addition cannot impart patent eligibility.”); *Elec. Power Grp.*, 830 F.3d at 1355 (“We have repeatedly held that such invocations of computers and networks that are not even arguably inventive are ‘insufficient to pass the test of an inventive concept in the application’ of an abstract idea.”), *id.* (“do not even require a new source or type of information, or new techniques for analyzing it”); *Parker v. Flook*, 437 U.S. 584, 588-89 (“The notion that post-solution activity, no matter how conventional or obvious in itself, can transform an unpatentable principle into a patentable process exalts form over substance.”).

The additional limitations of the substitute claims added by amendment, including Elements [Sub-1]-[Sub-5] do not contribute to an inventive concept for at least the reasons described in the preceding section. Even if they were considered under *Alice* Step 2, however, they too fail at this stage of the analysis. The added Elements [Sub-1]-[Sub-5] specify that the circumstance representations including a collection of object representations that represent multiple objects in a data structure

that includes labels indicating types of the multiple objects and coordinates indicating locations of the multiple objects. But the concept of storing data identifying types and locations of objects was well-understood, routine, and conventional long before the earliest possible priority date of the '974 patent (Nov. 2, 2016). *See also* TESLA1005, FIG. 3, 10:37-24:64; TESLA1015, ¶¶101, 120, 130, 31, 68-69, 73, 83-88; TESLA1016, 2:26-59, 10:18-24, Abstract. The recitation of a generic “data structure” is similarly not inventive for purposes of the eligibility analysis.

The substitute claims also provide no meaningful technological improvement. Tellingly, PO’s own description of the alleged “Advantages Provided by the '974 Patent” focus on the mere application of “Existing Technology” to enable “autonomous[]” operation of a device. POR, pp. 2-3. PO contends that the '974 patent “utilize[ed] a sophisticated system for learning the circumstances encountered by a device and distilling those circumstances into a set of circumstance representation data structures and corresponding instructions that can be efficiently performed autonomously.” *Id.* But automating conventional processes or instructing a computing system to apply an abstract idea are not the types of improvements that courts have deemed permissible under § 101. Like the claims at issue in *Electric Power Group*, here, “the focus of the claims is not on such an improvement in computers as tools, but on certain independently abstract ideas that

use computers as tools.” *Elec. Power Grp.*, 830 F.3d at 1354. PO’s substitute claims in this proceeding stand in stark contrast to the claims in *Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327, 1339 (Fed. Cir. 2016), for example, where claims directed to a “specific type of data structure designed to improve the way a computer stores and retrieves data in memory” were deemed eligible under § 101. The present claims recite no such improvements, and indeed the record is devoid of any evidence at all that the recited “data structure” or any other aspects of the proposed claims provided a comparable technical advantage. *Cf.*, TESLA1001, 65:45-63 (description of “data structure” breadth in ’974 patent).

For at least the foregoing reasons, the Substitute Claims fail to recite an inventive concept and should be rejected as directed to ineligible subject matter under § 101.

III. THE SUBSTITUTE CLAIMS ARE UNPATENTABLE UNDER § 103

The original claims are unpatentable for the reasons provided in the Petition and further elaborated upon in the Petitioner Reply. The Substitute Claims merely add well-known features to the original claims. TESLA1010, ¶65. These well-known features are addressed by combinations of the following prior art:

- U.S. Patent No. 10,452,974 (“Grotmol” or TESLA1004)
- U.S. Patent No. 8,639,644 (“Hickman” or TESLA1005)

- U.S. Patent Apl. Pub. No. 2010/0063663 (“Tolstedt” or TESLA1015)²

Original Claim	Original Invalidity Ground(s)	Substitute Claim	Substitute Invalidity Ground(s)
4	102: Grotmol 103: Grotmol and Hickman	21	103: Grotmol and Hickman 103: Grotmol and Tolstedt
5	102: Grotmol	22	103: Grotmol and Hickman 103: Grotmol and Tolstedt
7	102: Grotmol	23	103: Grotmol and Hickman 103: Grotmol and Tolstedt
11	103: Grotmol in view of POSITA knowledge 103: Grotmol and Hickman	24	103: Grotmol, POSITA knowledge, and Hickman 103: Grotmol, POSITA knowledge, and Tolstedt 103: Grotmol and Hickman

² Hickman and Tolstedt were both filed and published more than a year before the earliest effective filing date of the '974 patent (Nov. 2, 2016) and qualify as prior art under 35 U.S.C. §§ 102(a)(1) and 102(a)(2). Grotmol is prior art under § 102(a)(2).

14	102: Grotmol	25	103: Grotmol and Hickman 103: Grotmol and Tolstedt
15	102: Grotmol	26	103: Grotmol and Hickman 103: Grotmol and Tolstedt

A. Motivation to Combine

1. Grotmol and Hickman

The Petition explains why a POSITA would have been motivated and found it obvious to supplement the teachings of Grotmol with a POSITA's knowledge (Ground 2) and to combine Grotmol with Hickman (Ground 3) in a manner that would have rendered the issued '974 patent claims obvious. Pet. 56-66. For example, the Petition explains that a POSITA would have applied, to Grotmol, Hickman's suggested use of a cloud computing system with client devices (e.g., robots) to facilitate the sharing of knowledge between the various client devices. Pet. 58-61.

Like Grotmol, Hickman discloses the storage of training data, including images and instructions, in a memory. TESLA1004, FIG. 8, 33:13-35, 38:33-41; TESLA1005, FIG. 3, 10:37-24:64. Hickman's shared robot knowledge base 306 includes several knowledge bases 307-311 that include a unique object knowledge base 207 and a general object knowledge base 308. TESLA1005, FIG. 3. The general object knowledge base 308 includes one or more data structures 314 with

data fields, including, but not limited to, “an individual general object identifier (GID) [that] may have the following corresponding data: (i) language data (LNG); (ii) image data (IMG); (iii) manufacturer data (MFG) (if applicable); (iv) model number data (MOD)” and “may contain more or less information.” TESLA1005, 15:28-20:20, FIG. 3. The unique object knowledge base 207 includes one or more data structures 313 with another set of data fields. TESLA1005, 11:47-15:27, FIG. 3. Hickman explains that the knowledge base has flexibility in design and the various knowledge bases can be combined into one knowledge base or distributed over the computer system. TESLA1005, 10:57-11:7; TESLA1010, ¶67.

In addition to the reasons noted in the Petition, it would have been obvious to combine Grotmol and Hickman because the combination merely entails the simple substitution of one known element for another to obtain predictable results. TESLA1010, ¶68. For instance, applying Hickman’s use of knowledge base(s) to facilitate sharing across a cloud computing system would have involved the modification of Grotmol’s storage structure to include one or more knowledge bases with Hickman’s data structures. *Id.* The choice of whether to include one knowledge base, as in Grotmol, or various knowledge bases, as in Hickman, would be a designer’s choice that was well-within the capabilities of a POSITA, as described in Hickman. *Id.*; TESLA1005, 10:57-11:7. The use of the data structures like those disclosed by Hickman (e.g., data structures 313-316) in Grotmol’s system

would have been accomplished by programming and memory storage techniques well within a POSITA's capabilities. TESLA1010, ¶68.

Moreover, a POSITA would have had a reasonable expectation of success implementing the Grotmol-Hickman combination (“**GHC**”). TESLA1010, ¶69. For instance, the choice to store data in one knowledge base or multiple knowledge bases, was well-known, as disclosed by Hickman, whose filing date predates Grotmol's filing date by at least two years. *Id.*; TESLA1005, 10:57-11:7. Grotmol and Hickman belong to the same field of endeavor related to enhancing the autonomous operation of robotic devices, and both describe the training of robots in an analogous manner making their combination predictable. TESLA1010, ¶69. In addition, the use of various types of data structures to store data would have been entirely predictable particularly when extending Grotmol's system to a cloud system with various types of robots and devices connected to the cloud system. Applying Hickman's data structures in Grotmol's system would not have required extraordinary skill and would have been within the ordinary capabilities of a POSITA. TESLA1010, ¶69.

The GHC storage system would better allow for robot queries in the cloud system to be received and processed, and for relevant data to be retrieved from the shared knowledge base. TESLA1005, 10:41-56, 11:9-30; TESLA1010, ¶70. For example, if information obtained from an image includes a very specific type of car,

then the information stored in data structure 313 of the unique object knowledge base 307 could be used for comparison purposes (and subsequent retrieval of instructions) because such a knowledge base includes information that can identify unique objects, such as a specific car model, as taught by Hickman. However, if the information obtained from an image does not provide information that could identify a specific type of car, then the information stored in data structure 314 of the general object knowledge base 308 could be used for comparison purposes (and subsequent retrieval of instructions) because such a knowledge base includes information that can identify general objects, e.g., a car. In some implementations of the combination, multiple data fields could be combined if two or more knowledge bases are combined and a POSITA would have understood that the combination would have provided greater information for any one object than if individual knowledge bases were used. As can be appreciated from the foregoing, using these different knowledge bases, data structures, and combinations thereof would have improved knowledge sharing and object matching capabilities, thereby improving performance of Grotmol's system. TESLA1010, ¶70.

The motivation to combine Hickman with Grotmol in view of POSITA knowledge would have involved the same reasons noted above. TESLA1010, ¶71.

2. Grotmol and Tolstedt

Tolstedt, like Grotmol, is directed to robotic vehicle navigation, and more

specifically to methods “for controlling the autonomous operation of a vehicle.”

TESLA1015, ¶[2]; TESLA1004, Abstract, 16:15-23; TESLA1010, ¶72. Tolstedt discloses classifying data received from sensors, such as cameras, that obtain images. TESLA1015, ¶¶[68], [30]-[31], [70], [73], [82], [87], FIG. 4. Tolstedt also teaches that:

This classification may include identifying objects that have been detected in the environment” such as “a person, curb, tree, waste container, light pole, driveway, or some other type of object. ... The classification may be performed to provide information about objects in the environment. This information may be used to generate a thematic map, which may contain a spatial pattern of attributes. The attributes may include classified objects. The classified objects may include dimensional information, such as, for example, location, height, width, color, and other suitable information. This map may be used to plan actions for the vehicle. The action may be, for example, planning paths to follow an operator in a side following mode or performing object avoidance.

TESLA1015, ¶[83]. This classification information is subsequently used when Tolstedt’s system receives environmental data (e.g., images) and determines how to

instruct a vehicle to move based on matches with the classification data stored in a knowledge base 800. TESLA1015, ¶¶[84]-[87], FIG. 8; TESLA1010, ¶73.

A POSITA would have combined Grotmol and Tolstedt, as doing so would have involved combining prior art elements according to known methods to yield predictable results. TESLA1010, ¶74. Here, applying Tolstedt's known classification method involving the use of (1) a knowledge base 800 that provides information on the type and location of objects, along with instructions associated with these objects, and (2) the generation of a thematic map incorporating the object information would have yielded the predictable result of improving Grotmol's object recognition and matching capabilities through the use of a more detailed classification system, and the rendering of a thematic map that would better facilitate object avoidance when the robot is a vehicle. TESLA1010, ¶74.

Moreover, the Grotmol and Tolstedt combination would have been predictable and a POSITA would have had a reasonable expectation of success implementing the combination. TESLA1010, ¶75. Grotmol and Tolstedt both describe techniques directed to improving autonomous operation of a vehicle, and both use object imagery to train the system and facilitate vehicle navigation. *Id.* A POSITA looking to improve Grotmol's system would have turned to Tolstedt to realize the above-noted benefits and would have had a reasonable expectation of success, especially since incorporating Tolstedt's teachings in Grotmol's system

would have been well within the capabilities of a POSITA and would have merely involved additional conventional programming and routine system modifications to realize Tolstedt's classification algorithm and map generation feature. *Id.*

The motivation to combine Tolstedt with Grotmol in view of POSITA knowledge would have involved the same reasons noted above. TESLA1010, ¶76.

B. The Amended Features were Known in the Art and Obvious

1. Substitute Feature 1 (Element [Sub-1])

Substitute feature 1 added to each of the substitute claims is:

“wherein the first circumstance representation includes a first collection of object representations, and the second circumstance representation includes a second collection of object representations.”

As noted in the Petition, “circumstance representation” is not defined in the '974 patent specification, but would have been understood to include representations of objects. Pet., 13. In Grotmol, the “*circumstance representation*” includes various types of data including, but not limited to, a collection of object representations, such as images of objects in a training set detected by one or more robot sensors, and data structures related to the objects and images. TESLA1004, FIGS. 20A, 20B; 38:43-39:12. For example, as illustrated in Grotmol's FIGS. 20A, 20B, image 2000 is an example part of a “*first circumstance representation*” and “may comprise representations [of] one or more objects, e.g., a tree 2002, a rectangle, a ball 2008, and/or other objects.” TESLA1004, FIG. 20A, 38:43-39:12.

A subsequent image 2010 is an example part of a “*second circumstance representation*,” and may comprise representations of objects from image 2010. TESLA1004, FIG. 20B, 38:43-39:12. Thus, images 2000 and 2010 respectively include first and second collections of object representations. Thus, Grotmol discloses substitute feature 1. TESLA1010, ¶78.

2. Substitute Feature 2 (Element [Sub-2])

Substitute feature 2 added to each of the substitute claims is:

“wherein the first collection of object representations represents multiple objects detected at a first time or during a first time period, and comprises a first data structure that includes: labels indicating types of the multiple objects, and coordinates indicating locations of the multiple objects.”

Grotmol’s FIGS. 20A and 20B illustrate how images 2000 and 2010 may be shifted “based on relative motion between the images (e.g., motion speed and time interval $t_2 - t_1$ between the images).” TESLA1004, FIGS. 20A, 20B, 38:43-39:12. A POSITA would have understood that time t_1 corresponds to the time at which the first image (e.g., image 2000) was taken. Accordingly, Grotmol teaches at least “*wherein the first collection of object representations represents multiple objects detected at a first time or during a first time period.*” TESLA1010, ¶80.

(a) Hickman

Hickman discloses that data associated with a particular object that is stored

in a knowledge base can include one or more of the object's physical dimensions, weight, material composition, object identifier, serial number, image data, and location of the object (LOC). TESLA1005, 2:65-3:7, 12:5-18; FIG. 3. "The location data (LOC) may include GPS coordinates and/or other location-based information, e.g., an association with (or a link to) one or more maps stored in the map knowledge base 310." TESLA1005, 14:3-29. In some cases, when a general object knowledge base is being used, the stored data associated with an object may include "data about different 'types' of objects that a robot may encounter or interact with in its environment, including different 'types' of 'unique' and 'non-unique' objects." TESLA1005, 14:61-19:22. Such object data is stored in data structures, e.g., data structures 313, 314, or 315, which along with object image data corresponds to the *"first collection of object representations"* in *"the first circumstance representation."* Accordingly, GHC renders obvious *"a first data structure that includes: labels indicating types of the multiple objects, and coordinates indicating locations of the multiple objects."* TESLA1010, ¶81.

(b) Tolstedt (alternative to Hickman)

Tolstedt also discloses that sensor data (one or more images) is processed to classify objects detected in the data and identify attributes of the detected objects such as the type, dimensional information, location, height, width, and color of the object, and actions for the vehicle to take in association with the object (e.g.,

performing object avoidance). TESLA1015, ¶¶83-88. This information is stored in a data structure in a knowledge base. *Id.*; TESLA1010, ¶82.

In some cases, this data structure may also be a map that the vehicle uses for navigation purposes and includes labels for the types and locations of objects. TESLA1015, ¶¶83-88 (“[t]his information may be used to generate a thematic map, which may contain a spatial pattern of attributes”), 73, 103, 123, 134; TESLA1001, 65:45-66:2. This map can be stored in the knowledge base. TESLA1015, ¶¶84-87; TESLA1010, ¶83.

Tolstedt also teaches that the location information is obtained using the Global Positioning System. TESLA1015, ¶¶101, 120, 130, 31, 68-69, 73. Thus, it would have been obvious to a POSITA that the location information of the objects would have been “*coordinates indicating locations of the multiple objects.*” TESLA1010, ¶84; TESLA1017, 1:8-2:6. Accordingly, the Grotmol-Tolstedt system renders obvious “*a first data structure that includes: labels indicating types of the multiple objects, and coordinates indicating locations of the multiple objects.*” This first data structure along with images of detected objects are included in the “*first collection of object representations*” of “*the first circumstance representation.*”

3. Substitute Feature 3 (Element [Sub-3])

Substitute feature 3 added to each of the substitute claims is:

“*wherein the second collection of object representations represents the multiple objects detected at a second time or during a second time*”

period, and comprises a second data structure that includes: labels indicating types of the multiple objects, and coordinates indicating locations of the multiple objects.”

In the example of FIGS. 20A and 20B, Grotmol teaches that an amount of shift between images 2000 and 2010 may be shifted “based on relative motion between the images (e.g., motion speed and **time interval t2-t1 between the images**).” TESLA1004, FIGS. 20A, 20B, 38:43-39:12. A POSITA would have understood that time t2 corresponds to the time at which the second image (e.g., image 2010) was taken. TESLA1010, ¶86. Accordingly, Grotmol teaches at least *“wherein the second collection of object representations represents multiple objects detected at a second time or during a second time period.”*

(a) Hickman

For the reasons explained above with respect to feature 2, Hickman discloses data structures (“*second data structure*”) that store “*labels indicating types of the multiple objects, and coordinates indicating locations of the multiple objects.*” It would have been obvious to a POSITA that, in the GHC, a row or set of rows in Hickman’s structure 314 (or 313) that include Grotmol’s image 2000 and objects therein may correspond to the “first data structure,” and a row or set of rows in Hickman’s structure 314 (or 313) that include Grotmol’s image 2010 and objects therein may correspond to the “second data structure.” The depiction of objects in the images together with the first and second data structures provide the claimed

“first collection of object representations” and *“second collection of object representations,”* respectively. TESLA1010, ¶87.

(b) Tolstedt (alternative to Hickman)

Tolstedt also renders substitute feature 3 obvious for the same or similar reasons noted above in Section III.B.2(b). It would have been obvious to a POSITA that Tolstedt discloses a *“second data structure.”* TESLA1010, ¶88. This *“second data structure”* would have included images at a time (and/or location) and a set of objects from the objects that may be different than the images (and/or location) associated with the first data structure in Section III.B.2(b). *Id.* In some cases, the second data structure can be a second map of a second location different from the first location and on which multiple objects and their coordinates are added. TESLA1015, ¶¶123, 134, 83-88. In other cases, the knowledge base includes the same type of information as added to the second map. The depiction of objects in the images together with the first and second data structures provide the claimed *“first collection of object representations”* and *“second collection of object representations,”* respectively. For these reasons, Grotmol-Tolstedt renders obvious substitute feature 3. TESLA1010, ¶88.

4. Substitute Feature 4 (Element [Sub-4])

Substitute feature 4 added to each of the substitute claims is:

“wherein the first data structure is correlated with the first one or more instruction sets for operating the first device.”

(a) Hickman

Hickman teaches that for each detected object, the knowledge base may store “relevant tasks that a robot may perform with the object” in the task data (TASK) field. TESLA1005, 2:65-3:8, 15:28-43, 18:34-20:20; FIG. 3. Accordingly, a POSITA would have understood that because the tasks for the robot (“*the first one or more instruction sets for operating the first device*”) are part of the first data structure and provide instructions for the robot, “*the first data structure is correlated with the first one or more instruction sets.*” TESLA1010, ¶90.

(b) Tolstedt (alternative to Hickman)

Tolstedt’s system also determines actions (“*the first one or more instruction sets for operating the first device*”) for a vehicle to take in association with a detected object (e.g., performing object avoidance). TESLA1015, ¶¶83-88. In addition to storing classification data on detected objects in the sensor data, Tolstedt’s knowledge base also provides information to a machine control process 602 to “determine which commands [(“*instruction sets*”)] to send to the vehicle’s steering, braking, and propulsion components.” TESLA1015, ¶84. It would have been obvious to a POSITA that a portion of the knowledge base storing information on an object or a map showing the object (“*first data structure*”) is correlated with instructions/actions for operating the vehicle/robot such as object avoidance (“*correlated with the first one or more instruction sets for operating the first device*”). TESLA1010, ¶91.

5. Substitute Feature 5 (Element [Sub-5])

Substitute feature 5 added to each of the substitute claims is:

“wherein the second data structure is correlated with the second one or more instruction sets for operating the first device.”

(a) Hickman

For reasons similar to those noted above with respect to substitute feature 4, it would have been obvious to a POSITA that in GHC, tasks (*“second one or more instruction sets for operating the first device”*) for operating the robot when objects in image 2010 are detected, are stored in a second data structure. TESLA1010, ¶93. Thus, GHC renders obvious substitute feature 5.

(b) Tolstedt (alternative to Hickman)

For reasons similar to those noted above with respect to substitute feature 4, it would have been obvious to a POSITA that the Grotmol-Tolstedt system renders obvious substitute feature 5. TESLA1010, ¶94. Here, it would have been obvious to a POSITA that the second data structure could include object data and correlated instructions for objects detected at a different time and/or location than objects for which information is stored in the first data structure. *Id.*

Respectfully submitted,

Dated May 30, 2024

/Usman Khan/
W. Karl Renner, Reg. No. 41,265
Nicholas Stephens, Reg. No. 55,402
Usman A. Khan, Reg. No. 70,439
Matthew Colvin, Reg. No. 75,201
Fish & Richardson P.C.
60 South Sixth Street
Minneapolis, MN 55402
T: 202-783-5070
F: 877-769-7945

Attorneys for Petitioner

CERTIFICATION UNDER 37 CFR § 42.24(d)

Under the provisions of 37 CFR § 42.24(d), the undersigned hereby certifies that the word count for the foregoing Petitioners' Opposition to Patent Owner's Motion to Amend totals 25 pages, which is equal to the 25 page limit allowed under 37 CFR § 42.24.

Respectfully submitted,

Dated May 30, 2024

/Usman Khan/
W. Karl Renner, Reg. No. 41,265
Nicholas Stephens, Reg. No. 55,402
Usman A. Khan, Reg. No. 70,439
Matthew Colvin, Reg. No. 75,201
Fish & Richardson P.C.
60 South Sixth Street
Minneapolis, MN 55402
T: 202-783-5070
F: 877-769-7945

Attorneys for Petitioner

CERTIFICATE OF SERVICE

Pursuant to 37 CFR §§ 42.6(e)(1) and 42.6(e)(4)(iii), the undersigned certifies that on May 30, 2024, a complete and entire copy of this Petitioner's Reply to Patent Owner's Response was provided via email to the Patent Owner by serving the email correspondence addresses of record as follows:

Arvind Jairam Reg. No. 62,759
John Holley Reg. No. 65,683
Stuart McCommas Reg. No. 71,834
MCKOOL SMITH, P.C.
1999 K St. NW, Suite 600
Washington, DC 20006
Telephone: (202) 370-8300
Facsimile: (202) 370-8344

George Fishback Reg. No. 76,345
MCKOOL SMITH, P.C.
303 Colorado Street, Suite 2100
Austin, TX 78701
Telephone: (512) 692-8700
Facsimile: (512) 692-8744

E-mail: Autonomous_IPRs@mckoolsmith.com

/Crena Pacheco/
Crena Pacheco
Fish & Richardson P.C.
60 South Sixth Street, Suite 3200
Minneapolis, MN 55402
pacheco@fr.com

APPENDIX A:
Listing of Claim Elements in PO's Substitute Claims ('974 Patent)

Element	Claims	Language
[1.1]	21-26	A method implemented using a computing system that includes one or more processor circuits, the method comprising:
[1.2]	21-26	accessing a memory that stores at least a knowledgebase that includes: a first correlation including a first circumstance representation correlated with a first one or more instruction sets for operating a first device and a second correlation including a second circumstance representation correlated with a second one or more instruction sets for operating the first device, wherein the first circumstance representation represents a first circumstance detected at least in part by one or more sensors of the first device and the second circumstance representation represents a second circumstance detected at least in part by the one or more sensors of the first device,

Element	Claims	Language
[1.3]	21-26	and wherein at least a portion of the first correlation and at least a portion of the second correlation are learned in a learning process that includes operating the first device at least partially by a user;
[1.4]	21-26	generating or receiving a third circumstance representation, wherein the third circumstance representation represents a third circumstance detected at least in part by the one or more sensors of the first device or at least in part by one or more sensors of a second device;
[1.5]	21-26	anticipating the first one or more instruction sets for operating the first device learned in the learning process based on at least partial match between the third circumstance representation and the first circumstance representation; and
[1.6]	21-26	at least in response to the anticipating, executing the first one or more instruction sets for operating the first device learned in the learning process, wherein the first device or the second device autonomously performs one or more operations

Element	Claims	Language
		defined by the first one or more instruction sets for operating the first device learned in the learning process.
[4.1*]	21	wherein the learning process includes: generating or receiving the first circumstance representation, and generating or receiving the second circumstance representation; and
[4.2]	21	obtaining or receiving the first one or more instruction sets for operating the first device, and obtaining or receiving the second one or more instruction sets for operating the first device,
[4.3*]	21	and wherein the knowledgebase further includes a fourth correlation including a fourth circumstance representation correlated with a fourth one or more instruction sets for operating the second device, and wherein the fourth circumstance representation represents a fourth circumstance detected at least in part by the one or more sensors of the second device, and wherein at least a portion of the fourth correlation is learned in another learning process that includes: generating or receiving the fourth circumstance

Element	Claims	Language
		representation; and obtaining or receiving the fourth one or more instruction sets for operating the second device;
[5*]	22	wherein the anticipating the first one or more instruction sets for operating the first device learned in the learning process based on the at least partial match between the third circumstance representation and the first circumstance representation includes: determining that a number of at least partially matching portions of the third circumstance representation and portions of the first circumstance representation exceeds a threshold number, or determining that a percentage of at least partially matching portions of the third circumstance representation and portions of the first circumstance representation exceeds a threshold percentage;
[7.1*]	23	wherein the knowledgebase further includes a fourth correlation including a fourth circumstance representation correlated with a fourth one or more instruction sets for operating: the first device, the second device, or a third device,

Element	Claims	Language
[7.2*]	23	and wherein a first connection is generated to connect the first correlation with the second correlation, and wherein a second connection is generated to connect the second correlation with the fourth correlation;
[11*]	24	wherein the knowledgebase further includes a fourth correlation including a fourth circumstance representation correlated with a fourth one or more instruction sets for operating the second device, and wherein the fourth circumstance representation represents a fourth circumstance detected at least in part by the one or more sensors of the second device, and wherein at least a portion of the fourth correlation is learned in another learning process that includes operating the second device at least partially by another user;
[14*]	25	wherein the first circumstance representation includes a first collection of object representations, and wherein the second circumstance representation includes a second collection of object representations, and wherein the third circumstance representation includes: one or more object representations, or one or more collections of object representations;

Element	Claims	Language
[15.1*]	26	wherein, to correlate the first circumstance representation with the first one or more instruction sets for operating the first device, a determination is made that the first one or more instruction sets for operating the first device temporally correspond to the first circumstance representation,
[15.2*]	26	and wherein the first circumstance representation includes a first collection of object representations, and wherein the second circumstance representation includes a second collection of object representations;
[Sub-1]	21-26	wherein the first circumstance representation includes a first collection of object representations, and the second circumstance representation includes a second collection of object representations;
[Sub-2]	21-26	wherein the first collection of object representations represents multiple objects detected at a first time or during a first time period, and comprises a first data structure that includes: labels indicating types of the multiple objects, and coordinates indicating locations of the multiple objects;

Element	Claims	Language
[Sub-3]	21-26	wherein the second collection of object representations represents the multiple objects detected at a second time or during a second time period, and comprises a second data structure that includes: labels indicating types of the multiple objects, and coordinates indicating locations of the multiple objects;
[Sub-4]	21-26	wherein the first data structure is correlated with the first one or more instruction sets for operating the first device; and
[Sub-5]	21-26	wherein the second data structure is correlated with the second one or more instruction sets for operating the first device.