

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TEXTRON SPECIALIZED VEHICLES INC.

Petitioner

v.

SZ DJI TECHNOLOGY CO. LTD.

Patent Owner

Case IPR 2023-01217
U.S. Patent No. 11,462,116

PETITION FOR INTER PARTES REVIEW
OF U.S. PATENT NO. 11,462,116

Submitted Electronically

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EXHIBIT LIST

Exhibit No. ¹	Description
1001	U.S. Patent No. 11,462,116 (“the ’116 Patent”)
1002	Prosecution History for the ‘116 Patent.
1003	Declaration of David H. Williams
1004	U.S. 7,164,986 (“Humphries”)
1005	U.S. 8,019,532 (“Sheha”)
1006	U.S. Patent Pub. 2010/0094500 (“Jin”)
1007	U.S. Patent 8,531,293 (“Putz”)
1008	U.S. 6,718,235 (“Borugian”)
1009	Complaint, SZ DJI Technology Co. Ltd. v. Textron Specialized Vehicles Inc., Case No. 1:23-cv-00055 (DE), filed January 17, 2023
1010	PACER Docket Report, SZ DJI Technology Co. Ltd. v. Textron Specialized Vehicles Inc., Case No. 1:23-cv-00055 (DE), filed January 17, 2023 (as of July 17, 2023)

¹ Citations to patents are made by column and line cite; citations to U.S. patent publications are made by paragraph number; citations to International patent applications are made by page number; citations to other exhibits are made with reference to the Bates-stamped pagination.

I. INTRODUCTION

Textron Specialized Vehicles, Inc. (“Petitioner”) submits this petition for *Inter Partes* Review (“IPR”) of Claims 1-23 of U.S. Patent 11,462,116. The claims of the ’116 Patent are directed to the concept of forming a restricted region and triggering an alarm or other automated response if a vehicle is determined to be near or within the restricted region. Forming restriction regions relates to a well-known and well-developed field of art known as “geofencing.” It has been well-known in the art for at least two decades prior to the earliest conceivable priority date the ’116 Patent to create geofences using well-known graphical user interfaces and drawing tools. *See* Section VI.A. (overview of Humphries), below. And geofences have been well-known to have uses in tracking ground vehicles and automating responses if the geofence is violated. *Id.* (Humphries); Section VI.B-D (Jin, Putz, Borugian).

The ’116 Patent was not filed until 2015, well after these geofencing technologies were developed. The ’116 Patent describes drawing geofences (claimed as “restriction regions”) by generating “restriction strips” that “defin[e] at least a portion of the restriction region.” EX1001, Cl. 1. In prosecution, the ’116 Patent gained allowance by amending the independent claim to require at least one of these restriction strips to have a specific geometric shape—“*an area encompassed by a first circle, a second circle, and one or more lines running tangent to the first circle and the second circle.*” While the Examiner apparently did not locate a prior

art geofence drawn using this specific shape, the prior art presented in this petition was not before the Examiner and discloses these limitations exactly.

The remaining concepts of Claim 1 and its dependent Claims 2-23 recite well-known geofencing concepts that had well-known benefits. As a result, the '116 Patent is not novel or non-obvious advance over the prior art, and Petitioner respectfully requests institution of IPR and a finding that all challenged claims are unpatentable.

II. MANDATORY NOTICES UNDER 37 C.F.R. §42.8

A. Real Party-in-Interest Under 37 C.F.R. §42.8(b)(1)

Textron Specialized Vehicles Inc. is the Petitioner. No other parties exercised or could have exercised control over this Petition and no other parties funded or directed this Petition. Textron Specialized Vehicles Inc. further identifies Textron Inc. and Textron Innovations, Inc. as potential real-parties-in-interest.

B. Related Matters Under 37 C.F.R. §42.8(b)(2)

SZ DJI Technology Co. Ltd. has asserted the '116 Patent in the following civil action: *SZ DJI Technology Co. Ltd. v. Textron Specialized Vehicles Inc.*, Case No. 1:23-cv-00055 (DE), filed January 17, 2023 (the "District Court Litigation"). See EX1009, (Complaint).

C. Lead and Back-Up Counsel Under 37 C.F.R. §42.8(b)(3)

Petitioners provide the following designation of counsel.

LEAD COUNSEL	BACK-UP COUNSEL
Brian W. Oaks MCDERMOTT WILL & EMERY 111 Congress Ave., Suite 500 Austin Texas 78701 Tel: 512.726.2574 boaks@mwe.com Reg. No. 44,981 <u>Back-up Lead Counsel:</u> Jeffery S. Becker BAKER BOTTS L.L.P. 2001 Ross Ave., Suite 900 Dallas, TX 75201-2980 Phone: 214-953-6526 Fax: 214-661-4526 jeff.becker@bakerbotts.com Reg. No. 68,553	Harrison Rich BAKER BOTTS L.L.P. 2001 Ross Avenue, Suite 900 Dallas, Texas 75201 Phone: 214.953.6896 Fax: 214.535.6813 harrison.rich@bakerbotts.com Reg. No. 65,132 Lance J. Goodman BAKER BOTTS L.L.P. 401 South 1st, Suite 1300 Austin, Texas 78704 Phone: 512.322.2629 Fax: 512.322.2501 lance.goodman@bakerbotts.com Reg. No. 77,989

D. Service Information Under 37 C.F.R. §42.8(b)(4)

A copy of this entire Petition, including all Exhibits and a Power of Attorney, is being served by FEDERAL EXPRESS, costs prepaid, to the address of the attorney or agent of record for Patent Owner at the USPTO for the '116 Patent: ANOVA LAW GROUP, PLLC, 21495 Ridgetop Circle, Suite 300, Sterling, VA 20166.

Petitioner consents to electronic service at the e-mail addresses provided above for lead and back-up counsel. A Power of Attorney is filed concurrently herewith under 37 C.F.R. §42.10(b).

III. FEES

The Office is authorized to charge the fee in 37 C.F.R. § 42.15(a) to Deposit Account No. 02-0384 and any additional fees that are due.

IV. REQUIREMENTS UNDER 37 C.F.R. § 42.104

A. Grounds for Standing

Petitioner certifies that the '116 Patent is eligible for IPR and that Petitioner is not barred or otherwise estopped.

B. Priority Date

The '116 Patent ultimately claims priority to PCT/CN2015/073915, filed Mar. 9, 2015. Because all prior art relied on in the instant petition pre-dates Mar. 9, 2015, Petitioner presumes without conceding this as the earliest priority date for the '116 Patent.

C. Prior Art

Exhibit 1004 – U.S. Patent 7,164,986 to Humphries (“Humphries”) was filed Jan. 16, 2004 and issued on Jan. 16, 2007. Humphries qualifies as prior art under at least post-AIA 35 U.S.C. §§ 102(a)(1) and (2).

Exhibit 1005 – U.S. Patent 8,019,532 to Sheha (“Sheha”) was filed on Mar. 7, 2006 and issued on September 13, 2011. Sheha qualifies as prior art under at least post-AIA 35 U.S.C. §§ 102(a)(1) and (2).

Exhibit 1006 – U.S. Patent Pub. 2010/0094500 to Jin (“Jin”) was filed Mar. 13, 2009 and published on April 15, 2010. Jin qualifies as prior art under at least

post-AIA 35 U.S.C. §§ 102(a)(1) and (2).

Exhibit 1007 – U.S. Patent 8,531,293 to Putz (“Putz”) was filed October 20, 2010 and issued on September 10, 2013. Putz qualifies as prior art under at least post-AIA 35 U.S.C. §§ 102(a)(1) and (2).

Exhibit 1008 – U.S. Patent 6,718,235 to Borugian (“Borugian”) was filed Mar. 6, 2002 and issued on April 6, 2004. Borugian qualifies as prior art under at least post-AIA 35 U.S.C. §§ 102(a)(1) and (2).

D. Identification of Challenge and Statement of Precise Relief Requested

Petitioner requests IPR of Claims 1-23 of the ’116 Patent based on the following grounds:

- **Grounds 1(a) and 1(b)** – Claims 1-8, 10-12, 15-19, 22, and 23 are unpatentable as 1(a) anticipated or 1(b) obvious over Humphries.
- **Ground 2** – Claim 13 is unpatentable as obvious over Humphries in light of Sheha.
- **Ground 3** – Claims 14, 16, 20, and 21 are unpatentable as obvious over Humphries in light of Jin.
- **Ground 4** – Claim 14 is unpatentable as obvious over Humphries in light of Putz.
- **Ground 5** – Claims 9, 17, and 20-21 are unpatentable as obvious over Humphries in light of Borugian.

Submitted with this Petition is a declaration of David H. Williams (EX1003), a qualified technical expert.

E. Institution is Proper under § 314(a)

The factors in *General Plastic Industrial Co., Ltd. v. Canon Kabushiki Kaisha*, IPR2016-01357, Paper 19 (P.T.A.B. Sept. 6, 2017) favor institution. This is the first and only petition challenging the '116 Patent. The factors in *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11, 6 (P.T.A.B. Mar. 20, 2020) ("*Fintiv-I*") (precedential) also favor institution. Petitioner submits that the Board should not exercise its discretion because the merits of this petition are compelling. Further, Petitioner filed this petition quickly, within six months of DJI filing its complaint in the District of Delaware. EX1009. The Delaware litigation is just beginning. TSV has yet to answer the complaint and the Court has yet to decide TSV's pending motion to dismiss. EX1010. Because that litigation is just beginning, the *Fintiv* factors favor institution.

F. Institution is Proper Under § 325(d)

The Board should not exercise its discretion under 35 U.S.C. § 325(d). The prior art presented in this petition was not prior art of record before the Examiner and is materially different from and not cumulative to the prior art involved during examination. The prosecution history indicates that the Examiner did not locate prior art teaching at least "*wherein at least one of the restriction strips is configured*

to have an area encompassed by a first circle, a second circle, and one or more lines running tangent to the first circle and the second circle” as recited by independent Claim 1. These limitations, along with the other recited limitations of Claim 1, however, are taught by Petitioner’s primary reference, Humphries. See Section VIII.A.5.

V. OVERVIEW OF ’116 PATENT

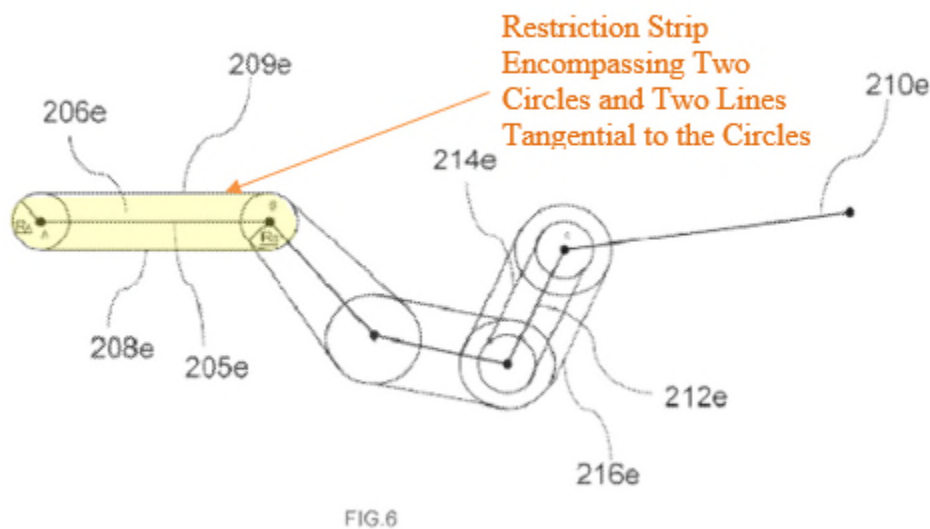
A. ’116 Patent

The ’116 Patent contains one independent claim (Claim 1), followed by twenty-two dependent claims (Claims 2-23). The claims of the ’116 Patent are directed to the concept of forming a restricted region and triggering an alarm or other automated response if a ground vehicle is determined to be near or within the restricted region.

The steps of the claimed method covered by independent Claim 1 can be described as follows: (a) receiving two or more points associated with the restriction region, (b) generating one or more “restriction strips” along a boundary of the restriction zone using a specific geometric shape (described below), and (c) automatically causing a ground vehicle to take one or more response measures based on a location or movement characteristic relative to the restriction region.

The purported novelty of the claimed method is the specific geometric shape used to form the “restriction strip” – as claimed, least one restriction strip must be

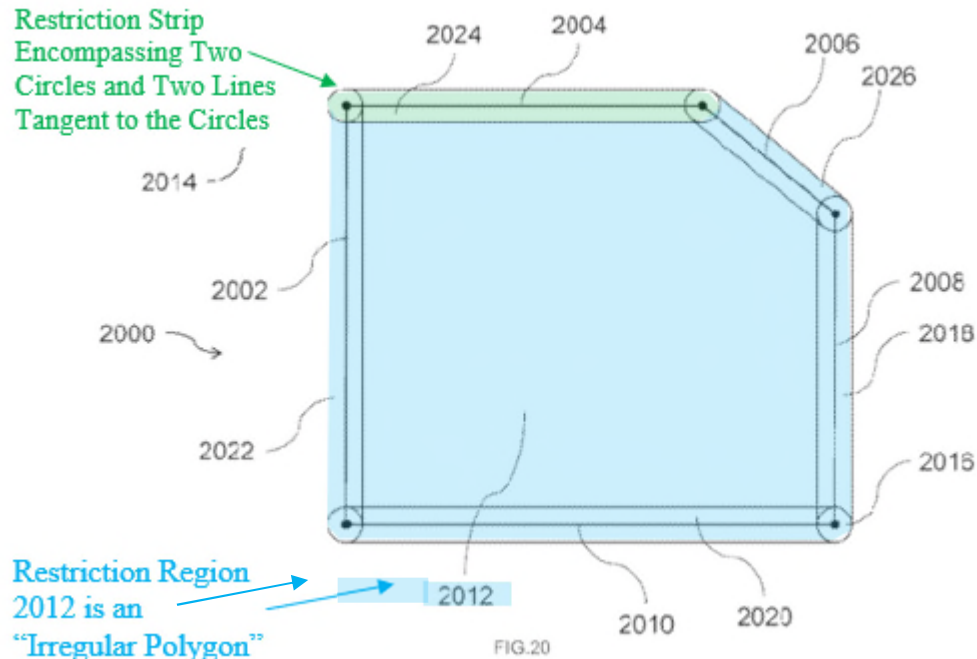
configured to “*have an area encompassed by a first circle, a second circle, and one or more lines running tangent to the first circle and the second circle.*” The ’116 Patent describes that restriction strips are formed along the lines that form the boundary of the restricted region and that the two circles defining the ends of each strip are centered at the two endpoints of each line. EX1001, 23:19-22. The purpose of creating these restriction strips along the boundary of the restricted region is to “give a width or a *buffer* such that the UAV cannot fly too close to the flight restricted region.” EX1001, 23:61-66. An example of a “restriction strip” as described by the claim is shown below in Figure 6 as reproduced and annotated below:



EX1001, 21:65-67; 23:19-22.

The ’116 Patent describes that various restriction strips may together define an enclosed area, such as a “regular” or “irregular” polygon. EX1001, 25:12-14,

25:25-27. An example of restriction strips forming an irregular polygon is shown below in Figure 20, as reproduced and annotated below:



EX1001, 25:66-67. As described by the patent the various restriction strips shown above may be added to the boundary of a [restriction region \(2012\)](#). EX1001, 26:1-6; 26:18-21. The [restriction strips](#), which compasses [restriction strip 2024](#) as well as the [area](#) defined by the other [restriction strips 2018, 2020, 2022, and 2026](#), form a [restriction zone](#). EX1001, 27:1-8.

[Region 2012](#) “may be associated with flight response measures.” EX1001, 27:2-4. “For example, each of the five flight restriction strips may be associated with flight response measures that prevent a UAV from entering the flight restriction strips.” EX1001, 27:8-10. Response measures, however, do not necessarily restrict

flight in the restricted zone—as another example, “a flight response measure . . . sends an alert to an operator of the UAV while permitting flight within the flight restriction strip.” EX1001, 27:16-18.

B. ’116 Patent Prosecution History

The continuation application that led to the issuance of the ’116 Patent was filed on November 10, 2021. EX1002, 360.

On March 29, 2022, the Examiner issued an office action rejecting then pending claims 1-3 and 8-24 but objecting to claims 4-7 as being allowable but dependent from a rejected base claim. EX1002, 127, 134. At the time of the office action, Claim 4 depended on independent Claim 1 and recited “*wherein at least one of the restriction strips is configured to have an area encompassed by a first circle, a second circle, and one or more lines running tangent to the first circle and the second circle.*” Then-pending Claims 5-7 each depended from intervening Claim 4.

In response to the Office Action, the Patent Owner amended independent Claim 1 to recite the allowable subject matter previously recited in Claim 4. EX1002, 113. Claim 4 was canceled and then-pending Claims 5-7 were also amended to depend from independent claim 1. *Id.*, 114. In response, the Examiner issued a notice of allowance on June 1, 2022, the patent issued on October 4, 2022. EX1002, 1-2.

Given the Examiner’s objection and allowance of Claim 1 as amended above,

the Examiner apparently did not locate prior art teaching generating a restriction strip along the boundary of a restriction region, where the strip has the specified geometric shape recited in the amendment above (which is connecting two circles with lines). As is disclosed herein, however, forming restriction regions using such shapes has been well-known and disclosed within the art over twenty years prior to the earliest conceivable priority date of the '116 Patent. See Section VIII.A.5. If the Examiner had the benefit of the art presented in this petition, Petitioner submits that Claim 1 would never have been allowed.

C. Level of Ordinary Skill in the Art

As of the earliest claimed priority date, a person of ordinary skill in the art (“POSITA”) would be a person with a B.S. degree in electrical engineering, computer engineering, or equivalent training or job experience, along with 1-2 years of experience in the field of GPS, location-based-services, and/or geofencing. EX1003, ¶¶63-66. Additional education could compensate for less practical experience and vice versa. *Id.*

VI. SUMMARY OF PRIOR ART GEOFENCE TECHNOLOGY²

A. Humphries (EX1004)

² The references relied on in this petition sometimes refer to a “geofence” using a hyphenated version of the term (e.g., “geo-fence”). For consistency, this petition normalizes all quotes and references to use the non-hyphenated version.

Humphries discloses forming geofences using hysteresis buffers, including buffers of the exact same shape as is claimed by the '116 Patent. Humphries' hysteresis buffers are identical in form and function to the "restriction strips" claimed by the '116 Patent—they provide a "buffer" around the restricted region. *See* EX1001, 23:61-66.

Humphries relates to "device tracking," and more specifically, "ensuring location adherence for a tracked device . . . by employing geofencing technology." EX1004, 1:8-12. Humphries discloses setting up a geofenced restriction region by receiving "a set of coordinates" and associating them with "a boundary area." EX1004, 2:4-9. Based on the coordinates and the tracked device's location, "it is determined whether the tracked device is inside the boundary area or outside the boundary area." EX1004, 2:9-12. If the device has crossed the geofence, "an alert signal is generated." EX1004, 13-15.

Humphries discloses that a geofenced area (i.e., restriction region) can include a "hysteresis buffer" that adds a radius to the boundary of the geofence. EX1004, 7:45-50. Humphries' "hysteresis adds a small buffer area to the normal geographic boundary of a geofence object in order to ensure that erroneous alert messages are not received from a tracked device." EX1004, 8:15-19.

Humphries goes on to disclose that the geofence object may have an irregular polygon shape, including hysteresis buffer H, as shown below in Figure 7B as

reproduced and annotated below:

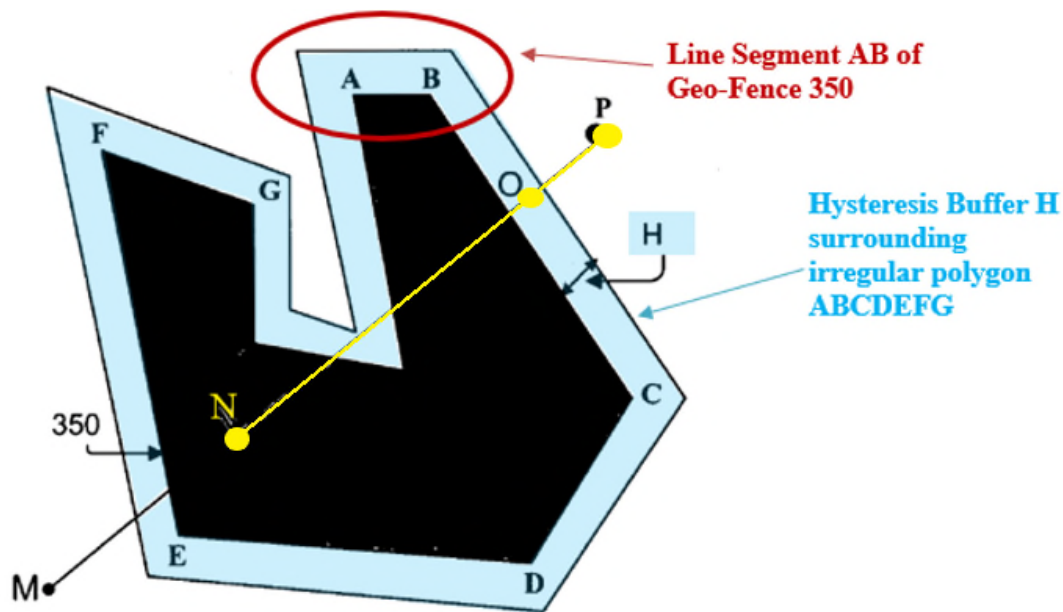


FIG. 7B

EX1004, 10:49 (“FIG. 7B depicts an polygon geofence 350.”). “The polygon fence [] includes an area represented by a [hysteresis, H](#), surrounding the boundary of the geofence object [].” EX1004, 10:50-52. As shown above, the hysteresis zone effectively extends the restriction region by [H](#). EX1003, ¶85. If, for example, O crosses the boundary set by the line BC, the system will still consider O inside the fence because O is still inside the hysteresis buffer H. *Id.*

Humphries discloses that the hysteresis buffers shown above may be created using restriction strips of the *exact shape* that was relied on by the Patent Owner to obtain allowance of the ‘116 Patent. See EX1002, 113. As seen below in reproduced

and annotated Figure 7C in accordance with the specification, geofence 350 (shown at the top of Figure 7B) includes a hysteresis, H , formed “between endpoints A and B” (i.e., Line Segment AB, annotated in Figure 7B above). EX1004, 11:1-4.

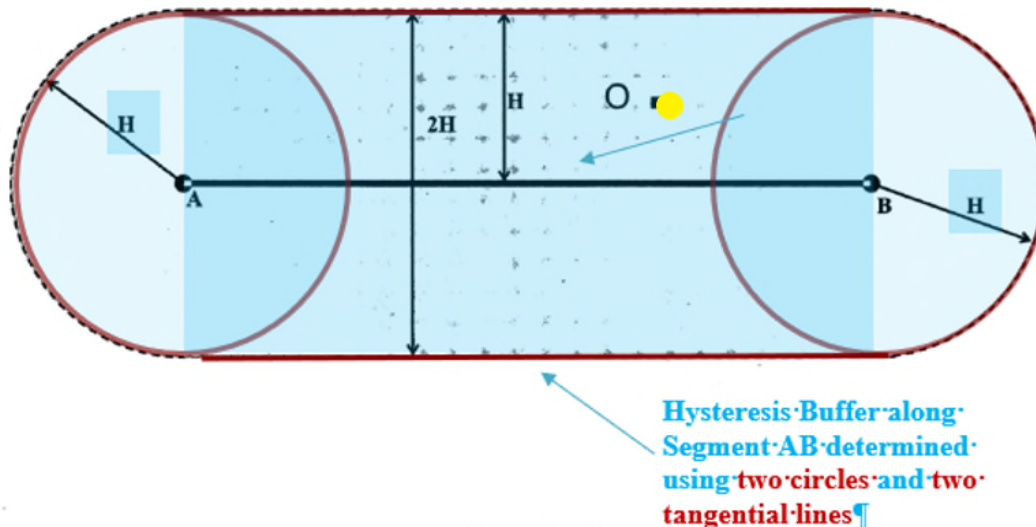


FIG. 7C

As described by Humphries:

Beyond endpoints A and B the buffer area is determined as if each of the endpoints is the center of a circle with radius H . If the location of the tracked device is located in any of the buffer areas of any line segment in the polygon, then it is determined to reside within the predetermined area defined by the hysteresis value H .

EX1004, 11:4-9. As discussed above, because the tracked object is located at point O (seen also in Fig. 7C), “no alert will be generated.” EX1004, 11:9-12. But, turning back to Figure 7B, once the device moves from O to P, “the tracked device is located outside both the geofence object and the additional area provided by the hysteresis, H ” and “an alert will be generated.” EX1004, 11:12-17.

B. Sheha (EX1005)

Sheha discloses methods for “selecting, assigning, and creating Geofences based on using known map elements and/or point of interest (POI) data, such as parks, golf courses, schools, buildings, etc. using a plurality of user interface (UI) computing devices.” EX1005, 1:16-20. Sheha discloses that in addition to polygons and other closed shapes, geofences can be defined by an open boundary (e.g., along a “river, stream, [or] ocean.” 2:28-29. To create open boundaries, Sheha discloses the concept of using a “polyline” to define the geofence. 2:41-47. In Figure 4, Sheha discloses that map objects (including highlighted object 407 below) “which have some shape to them that can be represented by a geofence.” EX1005, 6:19-25.

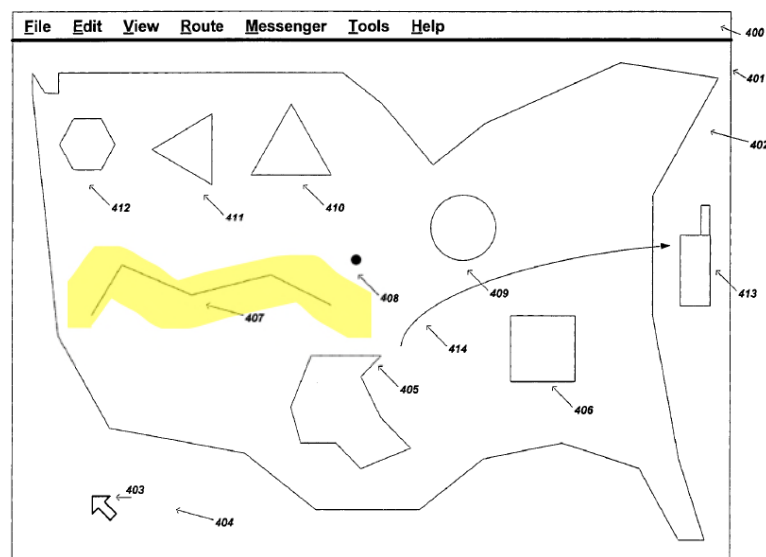


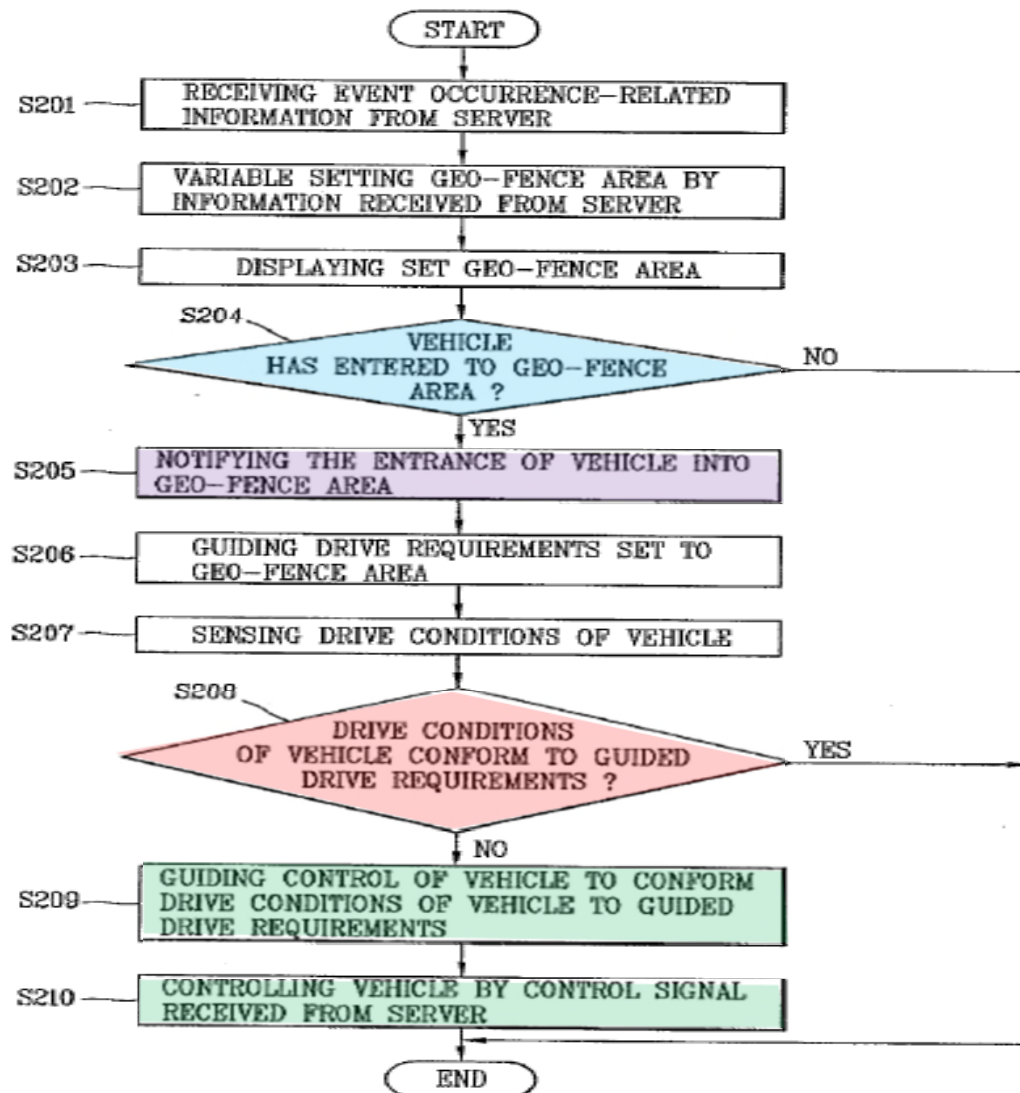
FIG. 4

As can be seen in Figure 4, Sheha discloses the concept of creating geofenced objects that have an open boundary (e.g., 407). See EX1005, Fig. 6 (element 603).

C. Jin (EX1006)

Jin discloses methods for controlling vehicles, including a method for “receiving coordinates of a geofence area” and then using the geofence coordinates to determine “whether the vehicle is in the geofence,” and if the vehicle has entered the geofence, “controlling the vehicle to meet predetermined drive requirements set for the geofence area.” EX1006, Abstract. An example of Jin’s vehicle control method is shown in Figure 3:

FIG. 3



As shown above, Jin teaches that the “controller 190 may notify a passenger of drive requirements which correspond to the geofence area” using an audio output or visual display message. EX1006, [0105]-[0106]. If, while in the geo-fenced area, the drive conditions do not conform to the geofence area’s drive requirements (S208), the method includes “guiding control of vehicle to conform drive conditions of vehicle to guided vehicle requirements” (S209) or “controlling vehicle by control signal received from server” (S210). Fig. 3, above.

D. Putz (EX1007)

Putz discloses a predictive geofence system that “predicts a geofence crossing” by a tracked object. EX1007, Abstract. Putz’s geofence system “generates an alert if the predicted future positions of the objects result in a geofence crossing or the predicted future positions cross a geofence in less than a set time.” *Id.* Putz’s geofence crossing predictions are made based on “spatial characteristics for objects such as position, speed of travel, direction of travel, etc.” EX1007, 1:31-36. The object being tracked include ground vehicles such as a “tractor trailers, a truck, a train, etc.” EX1007, 2:56-57.

E. Borugian (EX1008)

Borugian discloses methods for ensuring route adherence and does so by including determining whether a “vehicle has deviated from the planned route.” EX1008, 2:56-60. Borugian also discloses controlling a vehicle by defining a

perimeter around a restricted area and “[w]hen it is determined that a location of the vehicle is inside the perimeter around the restricted area, the vehicle is shut down.” EX1008, 4:1-4; 1:55-60. Borugian further discloses that taking similar actions in response to determining whether the vehicle “*is approaching*” the restricted perimeter. EX1008, Fig. 9; 12:1-8; 12:38-66 (emphasis added). To accomplish this system, Borugian discloses that the system may detect the vehicle (1) has deviated from a route more than an acceptable deviation radius, or (2) has entered or is approaching a perimeter around a restricted area. EX1008, 3:34-48; 4:1-12; 12:1-8; 12:38-66. If the vehicle has not returned to the authorized area within a predetermined time period (or entered an authorization code), vehicle shut down begins. EX1008, 12:1-31, 38-66.

VII. CLAIM CONSTRUCTION

Petitioner respectfully submits that the Board need not expressly construe any term because the prior art invalidates the claims under any plausible construction, in accordance with 37 C.F.R. § 41.100(b). EX1003, ¶79.

VIII. ASSERTED GROUNDS 1(A) AND 1(A) OF INVALIDITY: CLAIMS 1-8, 10-12, 15-19, 22, AND 23 ARE UNPATENTABLE AS 1(A) ANTICIPATED OR 1(B) OBVIOUS OVER HUMPHRIES.

A. Claim 1

- 1. [1p] A method for supporting a vehicle restriction region, comprising:**

To the extent the preamble is limiting, Humphries discloses [1p]. EX1003,

¶¶98-103. Humphries discloses methods for creating geofence object(s) associated with a vehicle (which maps to the claimed “vehicle restriction region”). EX1004, 4:26-32 (disclosing method where a user creates “*geofence object(s)* that can be associated with the one or more tracked devices 120 (e.g., associated with a *vehicle* such as an automobile, truck or the like) as boundaries for tracking the movements of the tracked device 120.”); EX1004, 1:8-10; 1:44-50 (describing that “geofencing has been utilized . . . to depict areas in which tracked objects *are to be confined.*”).

Humphries discloses that a geofence object is a *restriction region* as claimed because it corresponds to a geographic region of a map and “*depicts areas in which tracked objects are to be confined.*” EX1003, ¶99; EX1004, 1:44-50; 5:23-25; EX1004, 5:30-34. Humphries describes that a geofence object “is one more sets of *geographic boundaries* used to monitor tracked device 120.” EX1004, 5:23-25. “Once the geofence objects are created, the mapping application 150 resolves the boundaries into *a set of coordinates (e.g., longitude and latitude)*. The coordinates are next associated with a specific tracked device 120, or set of tracked devices.” EX1004, 5:30-34.

Figure 2 illustrates **geofenced objects 220** (annotated below **red**), which represent a region of a map to which fleet vehicles may be confined:

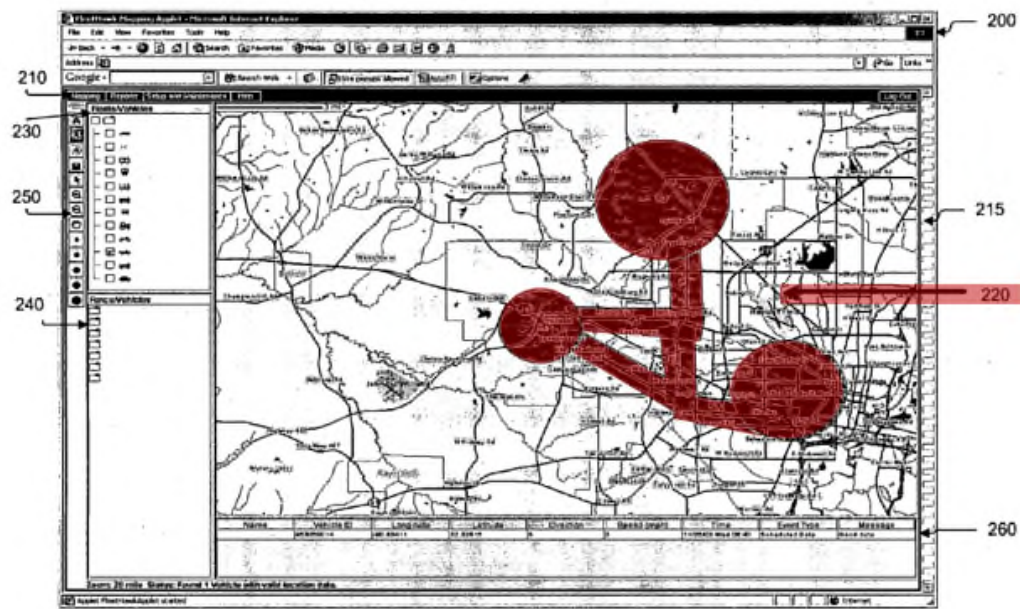


FIG. 2

EX1004, 7:1-3 (“The mapping window 215 shows the current **geofence objects 220** that are associated with the highlighted vehicle”).

Humphries’ confines vehicles to the region encompassed by the geofence object (e.g., object 220 above) by “*ensuring route adherence*” of one or more vehicles in a fleet. EX1004, 1:8-12; Figs. 4-6; 8. Humphries ensures route adherence of vehicles to their associated geofences with a “location adherence application 124,” “route adherence application 126,” and “alert generation application 128.” EX1004, 5:61-6:21; Figs. 4-6; 8:1-4; 9:6-8; 9:30-35.

Location adherence application 124 is to determine whether the tracked device moves “into a geofence object or out of a geofence object boundary since the

last location determination,” while route adherence application 126 is to “determine if the tracked device is progressing along a predetermined route of geofenced objects.” EX1004, 5:61-6:5. Then, if the geofence object boundary has been violated, “alert generation application 128 acts in concert with transmission hardware . . . to generate and transmit an alert to data center 140 when either the location adherence application 124 or the route adherence application 126 determines that an alert should be sent.” EX1004:6:16-21. Accordingly, Humphries’ geofenced objects disclose the claimed “vehicle restriction region.” EX1003, ¶¶98-103.

2. [1a] receiving, via one or more processors, two or more points associated with the restriction region

Humphries discloses that a datacenter 140 application called mapping application 150 receives two or more coordinates (which map to the claimed “*two or more points*”) associated with a geofence object (the claimed “*restriction region*”). EX1004, 5:18-23. After the coordinates are received by mapping application 150, tracked devices 120 also receive the coordinates associated with the geofenced object from mapping application 150. EX1004, 3:29-33; 5:34-38; 12:14-51.

Figure 1 illustrates **mapping application 150** (annotated below in **green**), which receives geofence objects created by a user of **client 160** (**red**) via the **link 180** (**blue**):

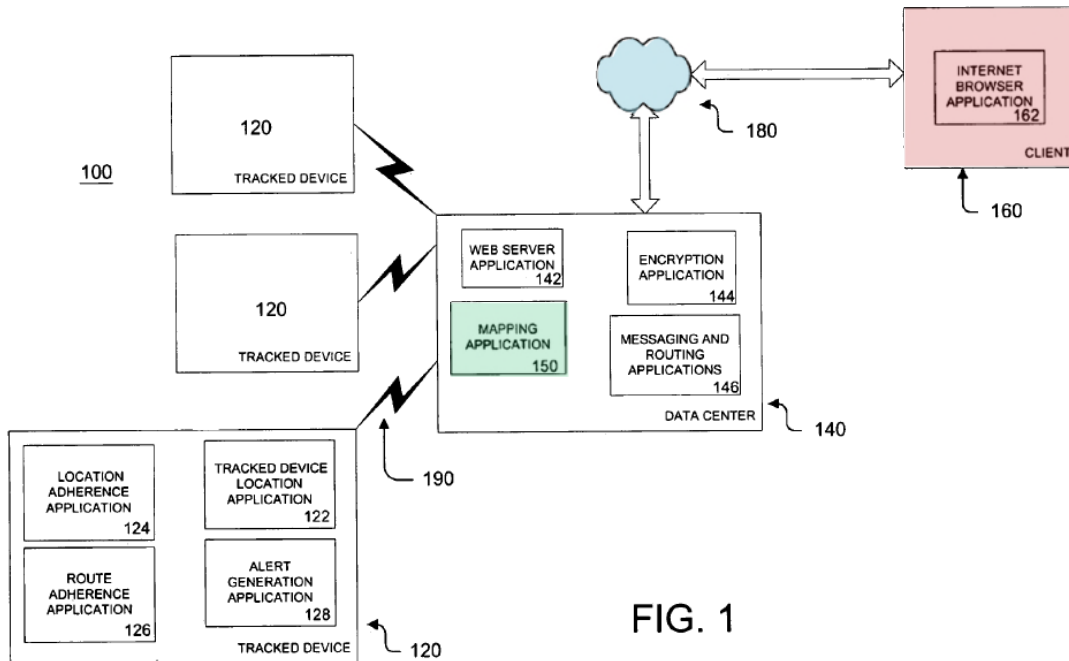


FIG. 1

As disclosed by Humphries, **mapping application 150** “can be employed by a user, at **client 160**, once logged into the datacenter [140] via the web server 142. Specifically, the user can create geofence objects by using the mapping application 150.” EX1004, 5:18-23. “A geofence object . . . is one or more sets of geographic boundaries used to monitor tracked device 120.” EX1004, 5:23-25. Mapping application 150 provides maps via the user interface, and the “user can then create and edit the specific geofence in accordance with the user’s desires.” EX1004, 5:25-29.

Figure 2 illustrates user interface 200 to mapping application 150, including an example of user-created **geofenced objects 220** (annotated below **red**):

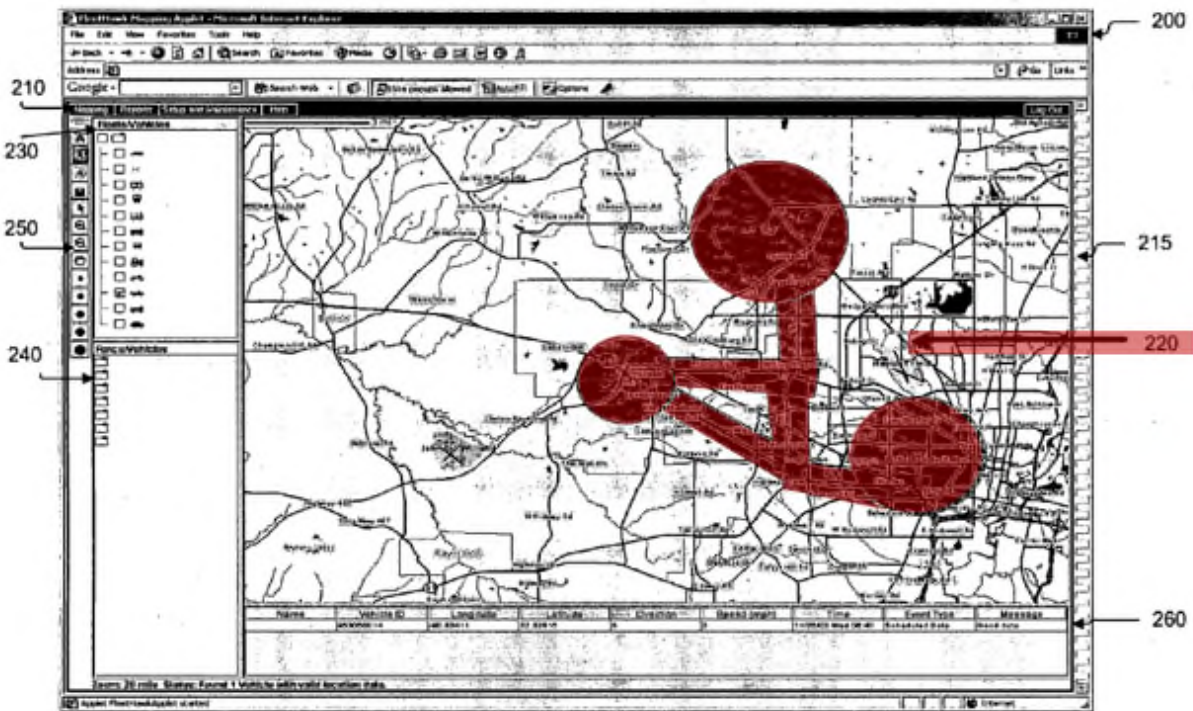


FIG. 2

EX1004, 6:33-35 (“FIG. 2 depicts a geofence creation screen 200 presented to the client once the mapping application 150 has been accessed and executed.”); 7:1-3 (“The mapping window 215 shows the current **geofence objects 220** that are associated with the highlighted vehicle”).

“Once the geofence objects are created, the mapping application 150 *resolves the boundaries into a set of coordinates (e.g., longitude and latitude).*” EX1004, 5:30-34. Datacenter 140 can be implemented on a computer system 1000 (see Figure 10), which includes processor 1003 for executing the functions of mapping application 150, including the receiving steps described above. EX1004, 12:52-65; 13:43-46. Humphries thus discloses that mapping application 150, which is

implemented at datacenter 104 on one or more processors (Fig. 10, element 1003), receives one or more coordinates (points) associated with a geofence object (“restriction region”).

Humphries provides several examples of a geofenced object and associated coordinates (“*points*”) that may be created by user of client 160 and received by mapping application 150 and/or tracked device 120. EX1004, 7:4-16 (“A user, located at client 160, is able to utilize the tools located in the drawing window 250 to create geofence objects in the mapping section 210. As discussed in more detail below, the geofence objects can either be circular or polygons and can be grouped in accordance with the user’s wishes.”); EX1004, 11:1-6 (referring to coordinates of a segment of a geofence polygon as “*points*”).

One such example is given in Figure 7B, which “depicts [a] polygon geofence 350.” EX1004, 10:49. Figure 7 is reproduced below, with annotations to identify coordinate points ABCDEFG defining the geofenced object:

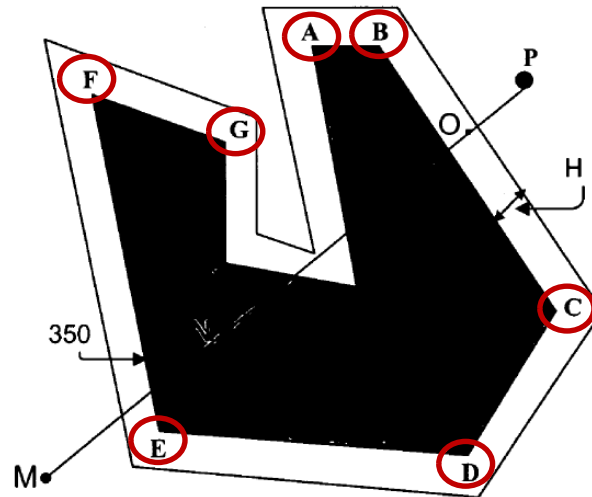


FIG. 7B

Humphries further discloses that these geofence points/coordinates are received by one or more processors of the tracked devices. EX1004, 5:34-38 (“The set of coordinates can then be encrypted through the use of the encryption application 144 and to ensure secure transmission and forwarded through the use of the messaging and routing applications 146 to the associated tracked device 120 for storage and use.”); 3:29-33 (“The device tracking location adherence and route adherence technology, according to an exemplary embodiment of this invention, least provides *a tracked device receiving, a set of coordinates associated with a boundary area*, and obtaining a position of the tracked device.”); 12:14-51 (disclosing details of computing system 700 employed within tracked device 120, including “processor 903” which executes the “instructions” of tracked device 120).

Indeed, Humphries explains “[t]he tracked device 120 can be implemented

using one or more general purpose computer systems, microprocessors, digital signal processors, micro-controllers, etc., programmed according to the teachings of the embodiments of the present invention (e.g., using the computer system of FIG. 9)” EX1004, 12:4-9. Moreover, Humphries also explains that “[a]ppropriate software implementing the function described above can be readily prepared by programmers of ordinary skill based on the teachings of the present disclosure, as will be appreciated by those skilled in the software art.” *Id.*, 12:9-13. Humphries also makes clear that the operations may be performed in some embodiments by the processor of the tracked device 120 or other devices within the system. *See id.* 12:14-51; 4:43-49. Thus, Humphries discloses that a processor performs this operation and a POSITA would recognize that the operation of receiving the coordinates at the processor in order to perform the remaining operations was expressly disclosed in Humphries. EX1003, ¶110.

To the extent that it is argued that the disclosure does not expressly say that this operation is performed by the processor, it would have been understood and/or obvious to the POSITA that the “instructions” executed by the processor 903 of tracked device 120 correspond to the functions described above, including receiving the coordinates from datacenter 104. EX1003, ¶¶111-115. For example, a POSITA would recognize that the operations of Humphries were to be performed by the one or more processors because it was well-known to use processors to execute software

stored in the memory of the computer at the time of filing (and long before). *Id.* Thus, a POSITA would recognize that the operation of receiving the coordinates at the processor in order to perform the remaining operations was obvious in Humphries. *Id.*

Accordingly, Humphries discloses the receiving step of [1a], including by one or more processors of mapping application 150 and one or more processors of tracked device 120. EX1003, ¶¶104-115.

3. [1b] generating, via the one or more processors, one or more restriction strips along a boundary of the restriction region by connecting adjacent points of the two or more points

Humphries discloses that the tracked device 120 generates a “hysteresis buffer” (corresponding to the claimed “restriction strip”) along a boundary of the geofenced object by connecting adjacent points of the two or more points. EX1004, Figs. 7B, 7C, 10:49-11:17; 12:14-51; EX1003, ¶¶116-122.

Humphries describes that the determination as to whether a tracked device is within a geofenced area (i.e., restriction region) includes analyzing whether the object is within a “hysteresis buffer,” i.e., an added a radius to the boundary of the geofence. EX1004, 7:45-50. Humphries discloses that the “hysteresis adds a small buffer area to the normal geographic boundary of a geofence object in order to ensure that erroneous alert messages are not received from a tracked device.” EX1004, 8:15-19. As shown in Figure 7B below, the hysteresis buffer is formed along each

of the boundaries of the polygon geofence by connecting the adjacent points of the polygon to form line segments (e.g., AB, BC, CD, DE, EF, FG, etc.):

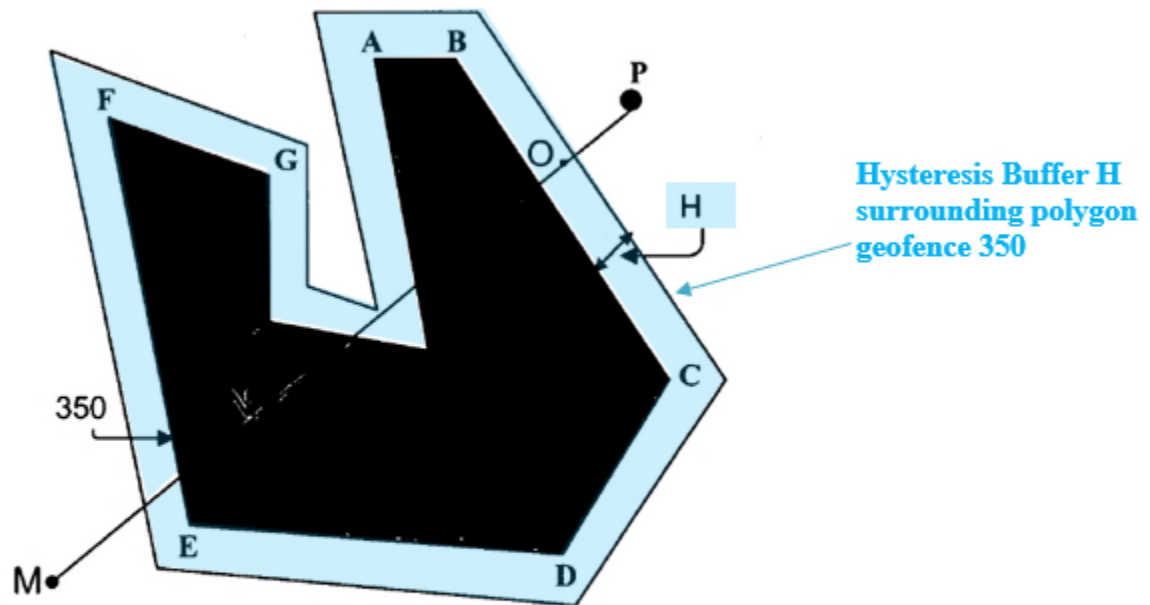


FIG. 7B

EX1004, 10:49 (“FIG. 7B depicts an polygon geofence 350.”). “The polygon fence [] includes an area represented by a [hysteresis, H](#), surrounding the boundary of the geofence object [].” EX1004, 10:50-52. “The hysteresis buffer area for each line segment includes the area above and below the line segment to a height of the hysteresis, H, between endpoints A and B.” EX1004, 11:1-4; 10:65-11:1 (“With regard to the polygon depicted in FIG. 7B, each of the line segments of the polygon is individually analyzed to determine whether point O is within a hysteresis buffer

area.”). “The hysteresis buffer area for each line segment thus discloses the claimed “restriction strip(s)”. EX1003, ¶120.

Furthermore, tracked device 120 generates the restriction strips using one or more processors. EX1004, 12:14-51 (disclosing details of computing system 700 employed within tracked device 120, including “processor 903” which executes the functions of tracked device 120); EX1003, ¶¶116-117. It would have been understood and/or obvious to the POSITA that the “instructions” executed by the processor 903 of tracked device 120 correspond to the functions described above, including generating the hysteresis buffer along the boundary of the geofenced object as described above. EX1003, ¶¶117-118.

Accordingly, Humphries discloses the generating step of [1b], including by one or more processors of mapping application 150 and one or more processors of tracked device 120 (or at the very least renders this obvious, to the extent it might be argued that the use of processors to perform the claimed function is not expressly disclosed). EX1003, ¶¶116-122.

4. [1c] the one or more restriction strips defining at least a portion of the restriction region

Humphries discloses that the hysteresis buffers define at least a portion of the geofenced object 350 (i.e., “*restriction region*”) at least because the tracked device 120 is considered within the geofenced object if the object is within the hysteresis buffer H. EX1004, 9:45-55; 9:58-10:10; 10:32-36; 10:65-11:17; EX1003, ¶¶123-

126.

Humphries discloses, for example, that the tracked device is outside the geofenced object *and* the hysteresis, “then the status is set to outside” the geofence, otherwise the object’s “status is set to inside” the geofence. EX1004, 9:51-55; 10:2-5 (“If the distance of the tracked device is greater than the hysteresis value then the status is set to outside the polygon geofence object.”); 11:6-9 (“If the location of the tracked device is located in any of the buffer areas of any line segment in the polygon, then it is determined to reside within the predetermined area defined by the hysteresis value H.”). This is illustrated with respect to Figure 7B, reproduced and annotated below to highlight the illustrated movement of an object from point N to point O to point P with respect to geofence object 350 (in this case, the tracked object is to stay inside the geofence 350):

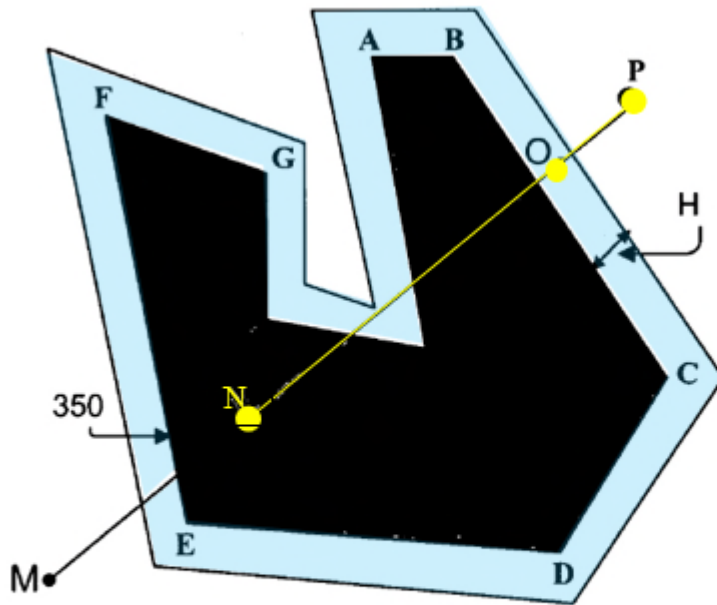


FIG. 7B

At point N, “the tracked object is located inside the geofence object 250.” EX1004, 10:56-57. At point O, “the location of the tracked object is outside the geofence object 250,” but because the object is still “located within the predetermined area defined by the tracked device,” and “no alert will be generated by the tracked device.” EX1004, 10:60-61; 11:10-13. As taught by Humphries, the tracked device’s “status is set to inside” the geofence when it is located at point O, because it is inside the hysteresis buffer H. EX1004, 9:51-55; 10:2-5; 11:6-9. “However, at point P, the tracked device is located outside both the geofence object and the additional area provided by the hysteresis, H. Thus, in accordance with the

present invention, an alert will be generated.” EX1004, 11:13-17.

Accordingly, Humphries teaches that the hysteresis buffer, H, defines a portion of the geofenced object (i.e., restriction region) as required by [1c]. EX1003, ¶¶123-126.

5. **[1d] wherein at least one of the restriction strips is configured to have an area encompassed by a first circle, a second circle, and one or more lines running tangent to the first circle and the second circle**

As noted above in Sections V.B (prosecution history), the limitations of 1[d] were the basis for allowance, apparently because the Examiner did not locate prior art that used restriction strips of the precise geometric shape required. Humphries, which was not previously before the Examiner, discloses forming restriction strips of the *exact* geometric shape required by [1d]. EX1003, ¶¶127-131.

As explained above in element [1b], Humphries’ hysteresis buffer discloses the claimed “restriction strip(s).” See VIII.A.3. Humphries goes on to disclose that the geofence object may have an irregular polygon shape, including hysteresis buffer H, as shown below in Figure 7B as reproduced and annotated below:

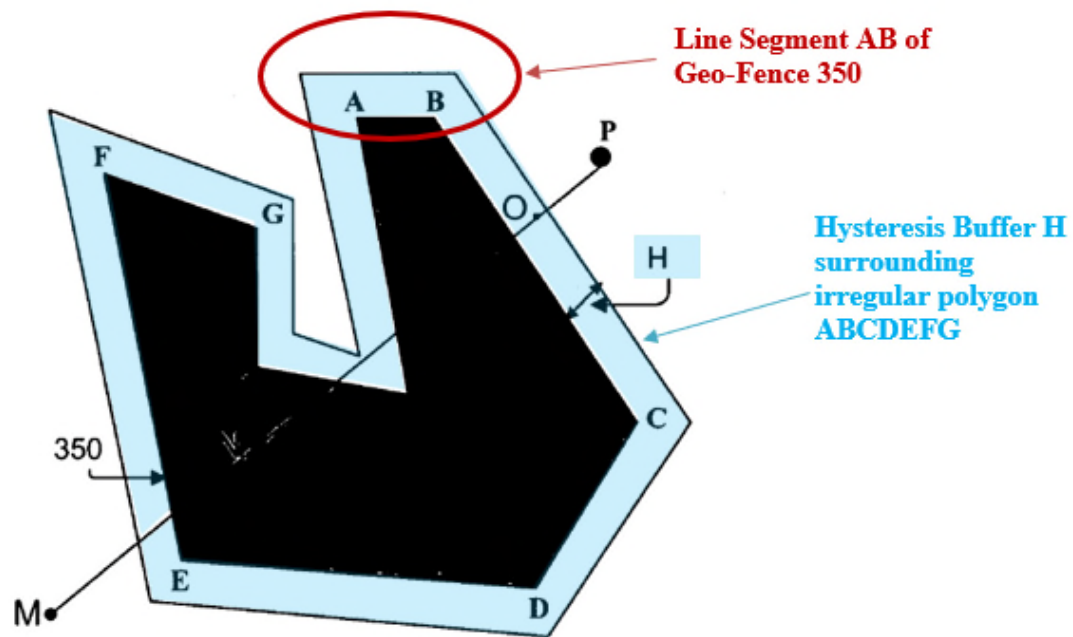


FIG. 7B

EX1004, 10:49 (“FIG. 7B depicts an polygon geofence 350.”).

In Figure 7C, Humphries goes on to provide additional detail about the restriction strip AB shown above. As seen below in reproduced and annotated Figure 7C, geofence 350 (shown at the top of Figure 7B) includes a hysteresis, H, formed “between endpoints A and B.” EX1004, 11:1-4. This hysteresis is formed using two circles having radius H, centered respectively at points A and B and connected by two lines tangential to each circle:

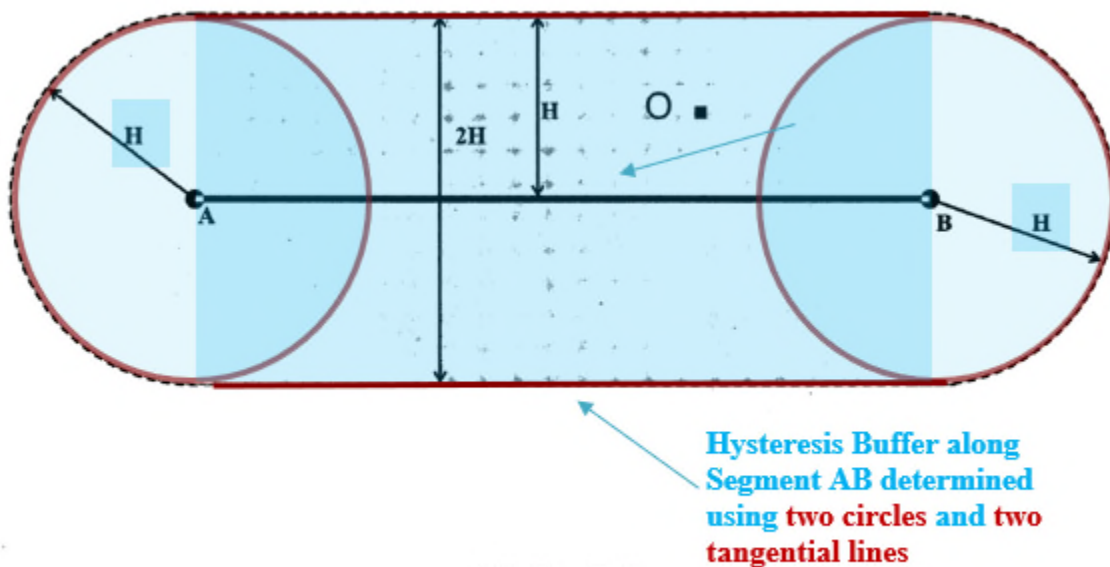


FIG. 7C

As described by Humphries:

Beyond endpoints A and B the buffer area is determined as if each of the endpoints is the center of a circle with radius H. If the location of the tracked device is located in any of the buffer areas of any line segment in the polygon, then it is determined to reside within the predetermined area defined by the hysteresis value H.

EX1004, 11:4-9.

Accordingly, Humphries discloses the limitations of [1d], which formed the basis of the allowance of the '116 Patent. EX1003, ¶¶127-131.

6. [1e] automatically causing a ground vehicle to undertake one or more response measures based on at least one of a location or a movement characteristic of the ground vehicle relative to the restriction region

Humphries discloses that the tracked devices 120 may correspond to a ground vehicle such as an “automobile, truck or the like,” (4:26-30), or “cars, boats, trucks

trains” (5:44-46), and that the tracked device is configured to send an alert if it is determined that the device’s status has changed with respect to being inside or outside the boundary of the geofence. EX1004, 3:33-39; 5:39-44; 6:2-5; 6:12-15; 6:18-32; 11:13-17. Providing an alert meets these limitations at least because the ’116 Patent expressly claims this activity as within the scope of the claimed “response measures” in Claim 18. EX1001, Claim 18 (claiming that the claimed “responsive measures” include “providing an alert” as one such measure); EX1003, ¶¶132-137.

As disclosed in Figure 1 as annotated below, tracked device 120 includes various applications, including location adherence application 124, route adherence application 126, and alert generation application 128:

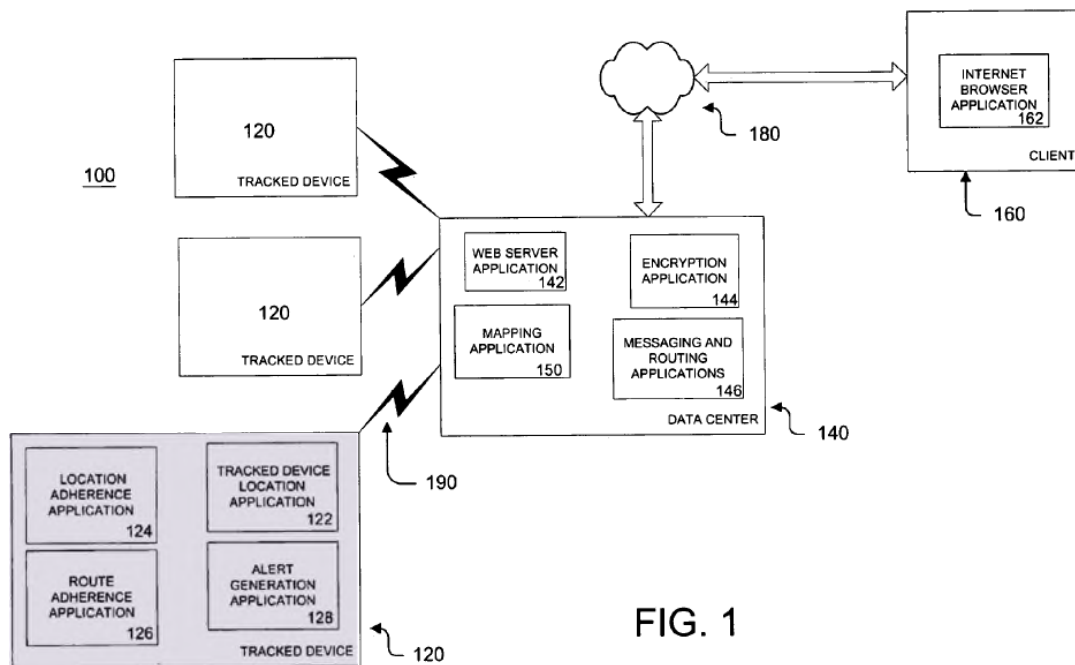


FIG. 1

Humphries discloses that after receiving the coordinates of a geofenced object, “a determination is made as to whether the tracked device is located inside the boundary area or outside the boundary area. An alert signal is then generated and transmitted if the result of the determining is different from an immediately previously obtained result.” EX1004, 3:33-39. Humphries thus discloses automatically generating an alert from the tracked device if it has crossed a geofence boundary. EX1003, ¶134.

For example, “if the object has moved into or out of a geofence object, the alert generation application is able to send an alert message to the data center 140.” EX1004, 6:3-6. As another example, “if the object is determined to not be moving in accordance with the predetermined route of geofence objects, the alert generation application is able to send an alert message to the data center 140.” EX1004, 6:12-15. More specifically, the [alert generation application 128](#) (shown above to be part of tracked device 120), “acts in concert with transmission hardware . . . to generate and transmit an alert to datacenter 140 when either the location adherence application 124 or the route adherence application 126 determines that an alert should be sent.”). In the context of Figure 7B, “at point P, the tracked device is located outside both the geofence object and the additional area provided by the hysteresis, H. Thus, in accordance with the present invention, an alert will be generated.” EX1004, 11:13-17; see Section [1d] above.

Automatically causing the tracked device to send an “alert” based on its location relative to a geofenced object discloses the requirements of element [1e], including causing the ground vehicle to undertake “one or more responsive measures based on at least one of a location or a movement characteristic of the ground vehicle relative to the restriction region” as claimed. EX1003, ¶132-137; see EX1001, Claim 18 (expressly claiming that the claimed “responsive measures” include “providing an alert” as one such measure).

B. Claim 2

1. [2] The method of claim 1, wherein the two or more points are input by a user

Humphries discloses that the two or more points are input by a user. EX1004, 5:22-29 (disclosing that “the user can create geofence objects be using mapping application 150” and the “user can then create and edit the specific geofence in accordance with the user’s desires.”); 5:30-33 (once “the geofence objects are created, the mapping application 150 resolves the boundaries into a set of coordinates (e.g., longitude and latitude).”); 7:4-16 (“A user, located at client 160, is able to utilize the tools located in the drawing window 250 to create geofence objects in the mapping section 210. As discussed in more detail below, the geofence objects can either be circular or polygons and can be grouped in accordance with the user's wishes.”). EX1003, ¶¶138-139.

C. Claim 3

1. **[3] The method of claim 1, wherein the two or more points correspond to coordinate information of the boundary.**

Humphries discloses that the points correspond to coordinate information of the boundary. See Element [1a]; EX1003, ¶¶140-141. Specifically, the user can create geofence objects by using the mapping application 150.” EX1004, 5:18-23. “A geofence object . . . is one or more sets of geographic boundaries used to monitor tracked device 120.” EX1004, 5:23-25. Mapping application 150 provides maps via the user interface, and the “user can then create and edit the specific geofence in accordance with the user’s desires.” EX1004, 5:25-29. “Once the geofence objects are created, the mapping application 150 *resolves the boundaries into a set of coordinates (e.g., longitude and latitude).*” EX1004, 5:30-34.

D. Claim 4

1. **[4] The method of claim 1, wherein the first circle and the second circle are centered, respectively, at the adjacent points that are connected, to generate the at least one restriction strip.**

Humphries discloses that the first and second circle are centered on adjacent points (AB) that are connected to generate the hysteresis buffer (i.e., “*restriction strip*”). See Element [1b], Element [1d]; EX1003, ¶¶142-143. As seen below in reproduced and annotated Figure 7C, geofence 350 (shown at the top of Figure 7B) includes a hysteresis, H, formed “between endpoints A and B.” EX1004, 11:1-4. The first and second circle are centered at the adjacent points A and B (which, as

explained above, corresponds to line segment AB of polygon ABCDEFG of Figure 7B):

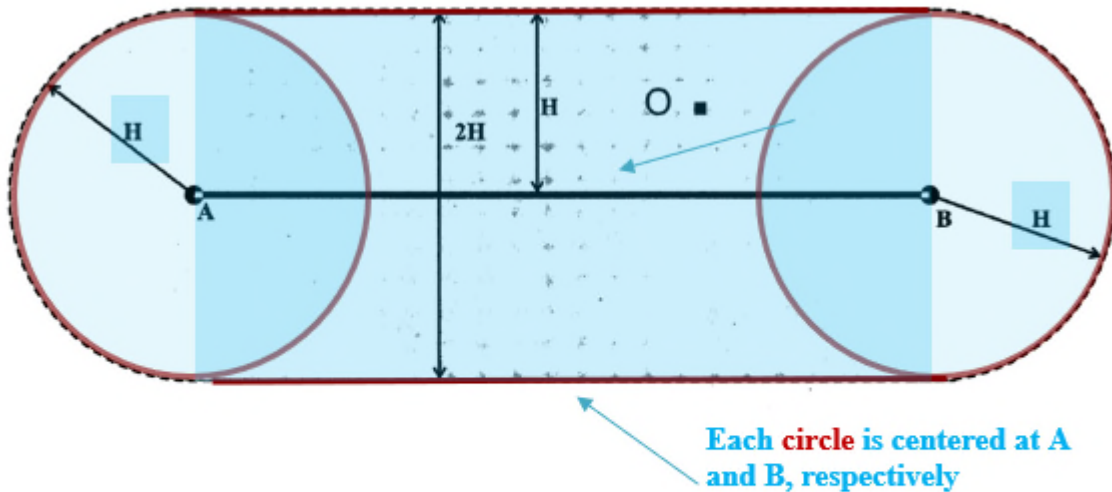


FIG. 7C

As described by Humphries:

Beyond endpoints A and B the buffer area is determined as if each of the endpoints is the center of a circle with radius H. If the location of the tracked device is located in any of the buffer areas of any line segment in the polygon, then it is determined to reside within the predetermined area defined by the hysteresis value H.

EX1002, 11:4-9.

E. Claim 5

1. [5] The method of claim 1, wherein the first circle and the second circle have the same radius.

See Element [1d], and [4] above. Each of the circles in Figure 7C have the same radius H defined by the hysteresis buffer. EX1003, ¶¶144-145.

F. Claim 6

- 1. [6] The method of claim 1, wherein a radius of the first circle or a radius of the second circle is defined based on a width of the at least one restriction strip.**

See Element [1d], and [4] above. As shown in Figure 7C, the radius of both circles is defined by H, which based on the width of the hysteresis buffer, 2H, which extends H from each side of line segment AB. EX1004, 11:1-4 (“The hysteresis buffer area for each line segment includes the area above and below the line segment to a height of the hysteresis, H, between end points.”); EX1003, ¶¶146-147.

G. Claim 7

- 1. [7] The method of claim 1, wherein the one or more restriction strips correspond to one or more restriction lines that define the restriction region.**

See Element [1d], and [4] above. As shown in Figures 7B and 7C, the hysteresis buffer, H, corresponds to each of the line segments of the polygon (e.g., line segment AB) that define the geofence object (i.e., “*restriction region*”). EX1004, 11:1-4 (“The hysteresis buffer area *for each line segment* includes the area above and below the *line segment* to a height of the hysteresis, H, between end points.”). EX1003, ¶¶148-149.

H. Claim 8

- 1. [8] The method of claim 1, wherein each of the one or more restriction strips is configured with a width that is larger than or equal to a minimum width.**

Humphries discloses that the width of the hysteresis buffer (i.e., restriction

strip(s)) is configured with a width that is larger than or equal to a minimum width. EX1004, 10:8-19; EX1003, ¶¶150-151. For example, Humphries discloses that the width of the hysteresis buffer is configured to “limit the number of alert messages generated and sent from the tracked device 120 to the data center 140.” EX1004, 10:8-10. Humphries goes on to describe the following:

Due to slight variations in location measurement readings, and to variations in software calculations, as well as environmental conditions such as weather, an exemplary embodiment of the present invention employs the use of hysteresis to account for these small variations/errors. The hysteresis ***adds a small buffer area to the normal geographic boundary of a geofence object in order to ensure that erroneous alert messages are not received*** from a tracked device located near or on the outer edge of a geofence object.

EX1004, 10:10-19. Humphries thus discloses that the width of the hysteresis zone should be defined to be “small,” but of sufficient width to enough to ensure that erroneous alert message are not received from the tracked device. *Id.*; EX1003, ¶150. Humphries thus discloses that the hysteresis buffer should be larger to or equal to a minimum width sufficient to avoid erroneous alert messages. EX1003, ¶150-151.

I. Claim 10

- 1. [10] The method of claim 1, wherein the boundary is a closed boundary and the restriction region is a closed region.**

See Element [1d]. Element 350 of Figure 7B is a closed boundary and the

restriction region is a closed region (i.e., the boundary completely encloses the restriction region). EX1003, ¶152-153.

J. Claim 11

- 1. [11] The method of claim 10, wherein the one or more restriction strips have ends, and wherein an end of one restriction strip overlaps with an end of another restriction strip to enclose the restriction region.**

See Element [1d] above. Humphries teaches that each of the line segments of geofence polygon 350 depicted in Figure 7B should be “individually analyzed to determine whether point O is within a hysteresis buffer area as depicted in Figure 7C.” EX1004, 10:65-11:1. Thus, while Figure 7C uses line segment AB of geofence polygon 350 as an example, Humphries teaches that this exercise should be repeated for each of the line segments of the polygon. *Id.*; 11:1-6. Applying the teachings of Figure 7C to Figure 7B, a POSITA would have understood (and at the very least have found obvious) that the hysteresis buffers for two line segments that share a common endpoint would overlap. EX1003, ¶154.

For example, as demonstrated below, a portion of hysteresis buffer for line segment BC overlaps a portion of hysteresis segment for line segment AB:

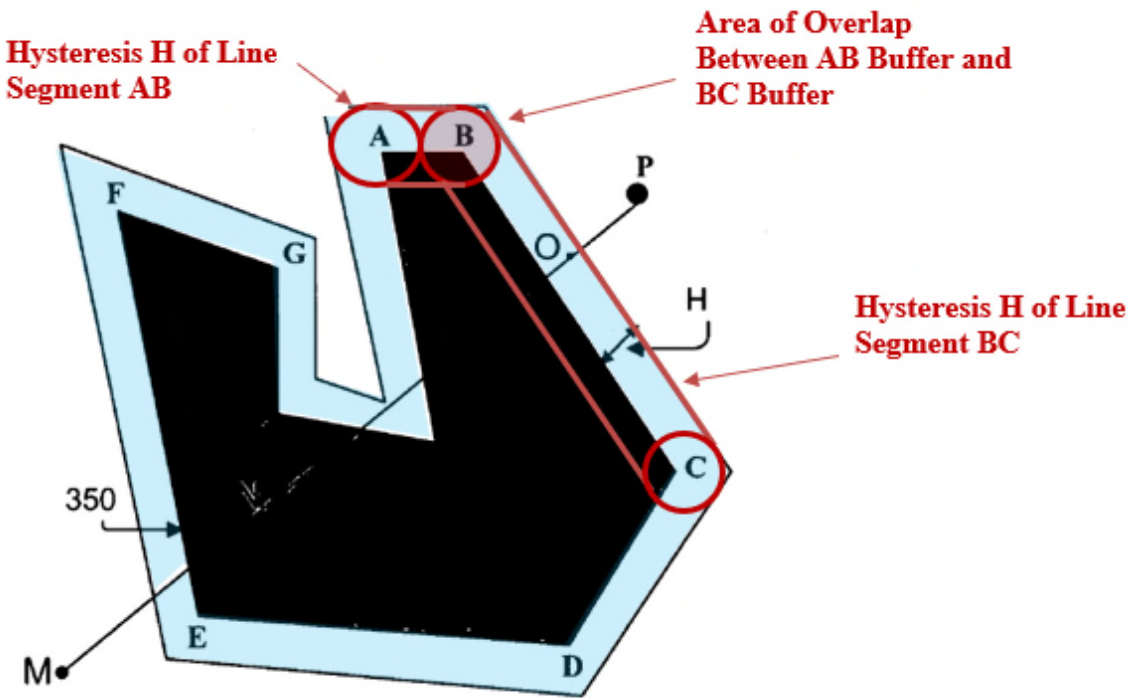


FIG. 7B

EX1004, 10:49 (“FIG. 7B depicts an polygon geofence 350.”). According to the teachings of Figure 7C, each of the hysteresis buffers corresponding to each line segment of the polygon overlaps with its adjacent buffers to enclose the polygon. EX1003, ¶155. A POSITA would have understood from the disclosure of Humphries that applying the teachings of Figure 7C (using the example of line segment AB) to the other line segments of geofence 350 in Figure 7B would have had the result of generating overlapping hysteresis buffers, such as the example shown in the annotation above. EX1003, ¶154-156. And to the extent that an incorrect argument is made that there is not an express disclosure of this in

Humphries, a POSITA would have readily recognized that the teachings of Figure 7C to Figure 7B render obvious what is shown in the annotated figure above—that the hysteresis buffers for two line segments that share a common endpoint would overlap. *Id.* Accordingly, Humphries teaches (or at least renders obvious) the limitations of Claim 11.

K. Claim 12

- 1. [12] The method of claim 11, wherein the one or more response measures are undertaken only in an area outside the restriction region.**

See Elements [1d], [1e]. As explained in detail above, tracked device 120 only generates an alert if the tracked device has crossed the border of the geofence. In the case of Figure 7B and 7C, the device generates an alert only if it passes hysteresis buffer (e.g., is located at point O). EX1003, ¶157-158; EX1004, 3:33-39; 5:39-44; 6:2-5; 6:12-15; 6:18-32; 11:13-17.

L. Claim 15

- 1. [15] The method of claim 1, wherein causing the ground vehicle to undertake the one or more response measures includes: calculating a distance between the location of the ground vehicle and the boundary of the restriction region; and determining whether to cause the ground vehicle to undertake the one or more response measures based at least in part on comparing the calculated distance to a distance threshold.**

Humphries' calculation of the location of the tracked device with respect to the boundary of the geofence object and hysteresis buffer H discloses these

limitations. See Element 1[c]. Specifically, Humphries discloses determining the location of the tracked devices relative to a boundary AB of the geofenced object (*“calculating a distance between the location of the ground vehicle and a boundary of the restriction region”*) and determining the tracked vehicle is outside the geofenced object if its distance (e.g., from segment AB) is greater than a hysteresis value H (i.e., *“determining whether to cause the ground vehicle to undertake the one or more response measures based at least in part on comparing the calculated distance to a distance threshold”*). EX1004, 9:51-55; 10:2-5 (*“If the distance of the tracked device is greater than the hysteresis value then the status is set to outside the polygon geofence object.”*); 11:6-9 (*“If the location of the tracked device is located in any of the buffer areas of any line segment in the polygon, then it is determined to reside within the predetermined area defined by the hysteresis value H.”*).

This is illustrated with respect to Figure 7B, reproduced and annotated below to highlight the illustrated movement of an object from point N to point O to point P with respect to geofence object 350 (in this case, the tracked object is to stay inside the geofence 350):

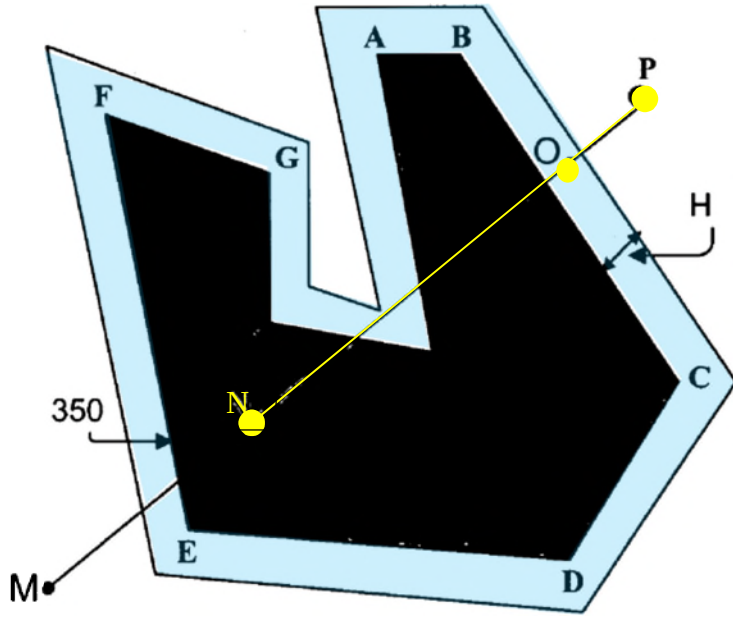


FIG. 7B

At point N, “the tracked object is located inside the geofence object 250.” EX1004, 10:56-57. At point O, “the location of the tracked object is outside the geofence object 250,” but because the object is still “located within the predetermined area defined by the tracked device,” and “no alert will be generated by the tracked device.” EX1004, 10:60-61; 11:10-13. As taught by Humphries, the tracked device’s “status is set to inside” the geofence when it is located at point O, because it is inside the hysteresis buffer H. EX1004, 9:51-55; 10:2-5; 11:6-9. “However, at point P, the tracked device is located outside both the geofence object and the additional area provided by the hysteresis, H. Thus, in accordance with the present invention, an alert will be generated.” EX1004, 11:13-17; EX1003, ¶¶161.

Accordingly, Humphries teaches that the tracked object's location (e.g., O) must be greater than H away from the boundary formed by the geofenced object (e.g., line segment AB). Only if the distance of the object is greater than H (i.e., the claimed "*distance threshold*") is the object determined to have crossed the geofence and an alert is generated (i.e., determine to take the responsive measure). EX1003, ¶¶159-163.

M. Claim 16

1. [16] The method of claim 1, further comprising:
determining which of the one or more response measures to cause the ground vehicle to undertake, based on the location or the movement characteristic of the ground vehicle relative to the restriction region.

See Element 1[e]. Humphries discloses determining which response measure to cause the tracked device to take (e.g., determine to send an alert) based on the location of the tracked device relative to the geofenced object. EX1003, ¶¶164-166. For example, "if the object has moved into or out of a geofence object, the alert generation application is able to send an alert message to the data center 140." EX1004, 6:3-6. As another example, "if the object is determined to not be moving in accordance with the predetermined route of geofence objects, the alert generation application is able to send an alert message to the data center 140." EX1004, 6:12-15.

More specifically, the [alert generation application 128](#) (shown above to be

part of tracked device 120), “acts in concert with transmission hardware . . . to generate and transmit an alert to datacenter 140 when either the location adherence application 124 or the route adherence application 126 determines that an alert should be sent.”). In the context of Figure 7B, “at point P, the tracked device is located outside both the geofence object and the additional area provided by the hysteresis, H. Thus, in accordance with the present invention, an alert will be generated.” EX1004, 11:13-17; EX1003, ¶165.

To the extent it is (incorrectly) argued that Claim 16 requires determining which of *more than one* responsive measure to take (despite the plain language of the claim to the contrary) it would have been obvious to the POSITA to determine which of any one of a number of different responsive measures to cause, in addition to or alternatively to alerts, based on the disclosure of Jin. *See* Section X.D.

N. Claim 17

1. [17] **The method of claim 1, wherein causing the ground vehicle to undertake the one or more response measures based on the location or the movement characteristic of the ground vehicle includes: calculating an estimated amount of time for the ground vehicle to approach the restriction region, or a time or distance for the ground vehicle to begin to experience a response measure.**

Claim 17 requires (1) calculating an estimated amount of time for the ground vehicle to approach the restriction region, OR (2) calculating a time for the ground vehicle to begin to experience a response measure, OR (3) calculating a distance for

the ground vehicle to begin to experience a response measure. When a claim, such as this one, recites a list of multiple alternatives (i.e., a “Markush” group), the entire element is disclosed by the prior art if one alternative is disclosed. *See Fresenius USA, v. Baxter Int’l*, 582 F.3d 1288, 1297-98 (Fed. Cir. 2009) (“the entire element is disclosed by the prior art if one alternative in the Markush group is in the prior art.”). Humphries discloses at least “*calculating a distance for the ground vehicle to begin to experience a response measure*” as recited by Claim 17. EX1003, ¶¶167-171.

As explained with respect to Element 1[b], Humphries discloses adding a hysteresis buffer, H, to the border of a geofence object (i.e., “*calculating a distance*” as claimed). EX1004, 8:15-19 (the “hysteresis adds a small buffer area to the normal geographic boundary of a geofence object in order to ensure that erroneous alert messages are not received from a tracked device.”). EX1004, 10:50-52 (“The polygon fence [] includes an area represented by a **hysteresis, H**, surrounding the boundary of the geofence object [].”); EX1004, 11:1-4 (“The hysteresis buffer area for each line segment includes the area above and below the line segment to a height of the hysteresis, H, between endpoints A and B.”); 10:65-11:1. Figure 7B is reproduced as annotated below:

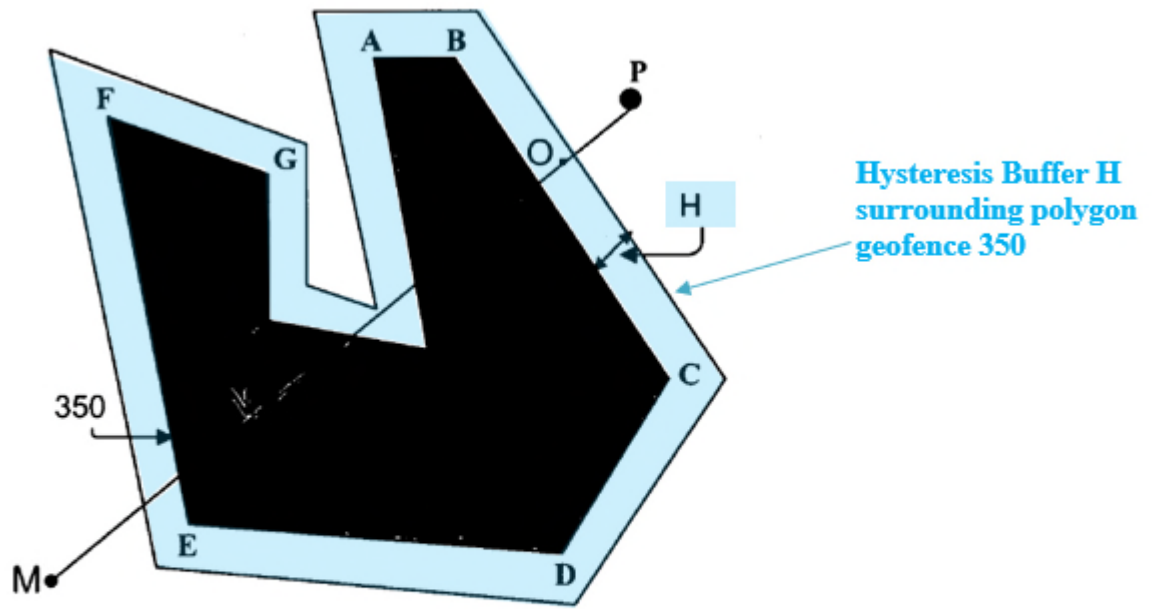


FIG. 7B

EX1004, 10:49 (“FIG. 7B depicts an polygon geofence 350.”).

The hysteresis buffer, H, represents a distance for the tracked device 120 to begin experiencing a response measure after crossing a boundary of a geofenced object. EX1003, ¶169; EX1004, 11:1-4; 10:65-11:1 (“With regard to the polygon depicted in FIG. 7B, each of the line segments of the polygon is individually analyzed to determine whether point O is within a hysteresis buffer area.”); 9:51-55; 10:2-5 (“If the distance of the tracked device is greater than the hysteresis value then the status is set to outside the polygon geofence object.”). Once the tracked device “is located outside both the geofence object and the additional area provided by the hysteresis, H . . . an alert will be generated.” EX1004, 11:13-17.

Accordingly, the initial response to crossing the geo-fence (e.g., point O) is to set the tracked device's location to within the geo-fence while it is still within H of the geofence, and only a tracked device that crosses the border of a geofenced object (e.g., AB above) by a distance H will receive an alert. EX1003, ¶170. Accordingly, the tracked device will not begin to experience a response measure (e.g., generate an alert) until the tracked device is located at least a distance (H) away from the geofenced object. EX1003, ¶¶167-171.

O. Claim 18

1. **[18] The method of claim 1, wherein the one or more response measures include at least one of: decelerating the ground vehicle; providing a safety measure to prevent the ground vehicle from entering the restriction region; changing a direction of the ground vehicle; adjusting a path of the ground vehicle; or providing an alert regarding the ground vehicle.**

See Element [1e]. Humphries discloses at least one of the options set forth by Claim 18, rendering the entire Markush group invalid. *Fresenius USA*, 582 F.3d at 1297-98; *Cisco Systems, Inc. v. WSOU Investments Inc.*, IPR2021-01117, Paper No. 28, 26 (PTAB Jan. 5, 2023) (finding a prior art disclosure of element “[A]” disclosed entire Markush group recited as “at least one of [A], [B], and [C]”). Specifically, Humphries discloses “providing an alert” regarding the ground vehicle. See Element 1[e]; EX1004, 3:33-39; 5:39-44; 6:2-5; 6:12-15; 6:18-32; 11:13-17. EX1003, ¶172-173.

P. Claim 19

- 1. [19] The method of claim 1, wherein the ground vehicle includes a housing configured to carry a person.**

See Element [1e] above. Humphries discloses that the tracked devices 120 may correspond to a ground vehicle such as an “automobile, truck or the like,” (4:26-30), or “cars, boats, trucks trains” (5:44-46). As is known to even small children, each of these vehicles include a housing to carry people (e.g., a cabin, interior, etc. including one or more seats for a person). EX1003, ¶¶174-175.

Q. Claim 22

- 1. [22] The method of claim 1, wherein the restriction region has an irregular shape.**

See Elements [1b] to [1d] above. Humphries discloses that the geofenced objects can have irregular polygon shapes. *See* Figure 7B. EX1003, ¶¶176-177.

R. Claim 23

- 1. [23] The method of claim 1, wherein the restriction region corresponds to a man-made feature.**

See Element [1a] above. Humphries discloses that mapping application 150 displays “drawing window 250 to create geofence objects in the mapping section 210.” EX1004, 7:4-6. Humphries discloses that any geofenced object can be created according to “the user’s desires.” EX1004, 5:25-29; 7:6-9 (describing that “geofence objects can be either circular or polygons and can be grouped in accordance with the user’s wishes.”). And, Figure 2 discloses a user-created

geofence that corresponds to routes, roadways, and metropolitan areas. *See* Figure 2; 6:6-15 (geofences may correspond to “predetermined routes”). Geofences corresponding to routes, roads, and metropolitan areas are each examples of geofences corresponding to man-made features. EX1003, ¶178-180.

To the extent that it is (incorrectly) argued that this element is not expressly disclosed, a POSITA would have readily found it obvious. It was well known and would have been obvious to the POSITA that geofences could be used to mark boundaries of natural or man-made features according to the user’s desires. EX1003, ¶179; EX1008, 13:17-26 (listing nuclear facilities, military posts, water supplies, oil refineries, bridges, and tunnels among locations that may be protected by a restricted area); EX1005, Fig. 5 (identifying a geofenced airport, park, and country club); Fig. 6 (identifying Dodger Stadium). The ’116 Patent concedes that providing restriction zones near man-made objects is prior art. *See* EX1001, Background (conceding that “it may be desirable to provide flight restriction zones near airports or important buildings”). To the extent that it is incorrectly argued that Humphries does not disclose adding geofences corresponding to man-made features (even though it is evident from Humphries’ Figure 2 that argument is incorrect), it would have nonetheless been manifestly obvious to the POSITA to use mapping application 150 to create geofences that correspond to man-made features. *Id.* Creating geofences corresponding to man-made features is an obvious capability of the system disclosed

by Humphries, which would have been available to *any user* of the system let alone a POSITA. EX1003, ¶179.

IX. ASSERTED GROUND 2 OF INVALIDITY: CLAIM 13 IS UNPATENTABLE AS OBVIOUS OVER HUMPHRIES IN LIGHT OF SHEHA.

Ground 1, demonstrating that Humphries discloses the elements of Claims 1-8, 10-12, 15-19, 22, and 23, is incorporated herein by reference. *See* Section VIII.

A. Rationale and Motivation to Combine

Humphries discloses mapping application 150, which allows a user to create and edit geofences using drawing window 250. EX1004, 5:18-29; 7:4-7. Humphries specifically explains that the user may draw geofences using circles, ellipses, polygons, cones, cylinders, and ellipsoids. EX1004, 7:13-26. The POSITA would have found obvious to modify Humphries' mapping application 150 and drawing window 250 to allow the user to define geofences of any arbitrary shape. EX1003, ¶¶182-183. For example, Sheha teaches that in addition to circles and polygons, the user can create a geofence defined by a "polyline." EX1005, 6:59-67. Polylines can be used to create geofences along open boundaries such as rivers. *Id.*

"[I]f a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond that person's skill." *KSR Int'l Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1731 (2007). The

POSITA would have been motivated to include the known technique of drawing polylines as taught by Sheha into the similar drawing tools provided by Humphries' mapping application 150. EX1003, ¶¶182-18. The POSITA would have recognized Sheha's polyline geofences would have provided the same benefit to Humphries as is taught by Sheha –the ability to create open geofences corresponding to natural boundaries such as rivers and state borders. *Id.* The POSITA would have recognized the benefit of providing such a geofenced boundary, which would have included the ability to better ensure route adherence in accordance with the user's desires. *Id.* For example, this would have provided the ability for the tracked device to generate an alert if it crosses a state border. *Id.* This would have had the predictable result of the mapping application 150 having the ability to draw geofences using a polyline drawing tool and would have been well-within the skill of a POSITA to do so. *Id.*; *KSR* at 1739 (“The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.”).

B. Reasonable Expectation of Success

The POSITA would have had a reasonable expectation of success, as the combination of references discussed above would have merely involved the additional programming of providing a drawing tool allowing for a polyline to be drawn in the mapping application 150 of Humphries, which already taught how to create relatively more complicated geofences such as circles and polygons (which

consist of multiple line segments). EX1003, ¶184. Doing so would have involved, for example, merely modifying the mapping application 150's polygon drawing tool to permit geofences to be created using a single line segment. *Id.*

C. Claim 13

1. [13] The method of claim 1, wherein the boundary is an open boundary and the restriction region is an open region.

Humphries discloses creating geofenced objects having various closed boundaries. EX1004, 7:13-26; EX1003, ¶¶185-188. To create open boundaries, Sheha discloses the concept of using a “polyline” to define the geofence. 2:41-47. In Figure 4, Sheha discloses several map objects (including highlighted object 407 below) “which have some shape to them that can be represented by a geofence.” EX1005, 6:19-25.

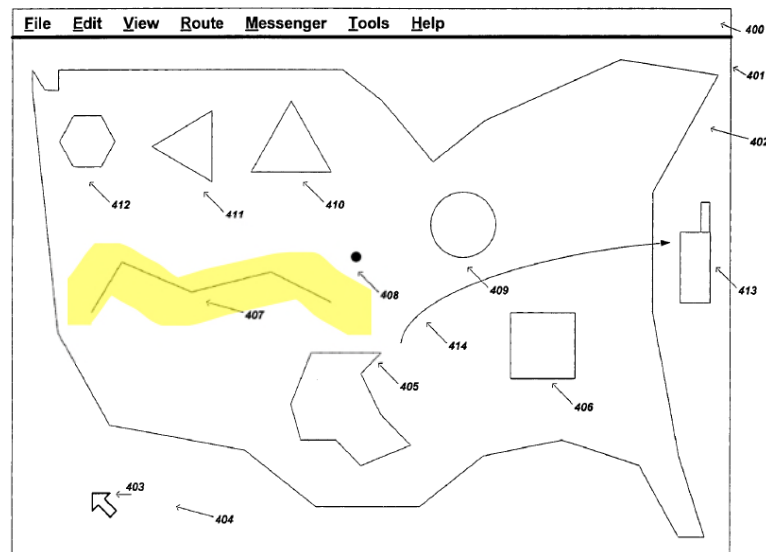


FIG. 4

As can be seen in Figure 4, Sheha discloses the concept of creating geofenced

objects that have an open boundary (e.g., 407). Sheha goes on to describe that such geofences can be used to create, e.g., a geofenced representation of a river (element 603 highlighted in blue below). See EX1005, 6:59-67.

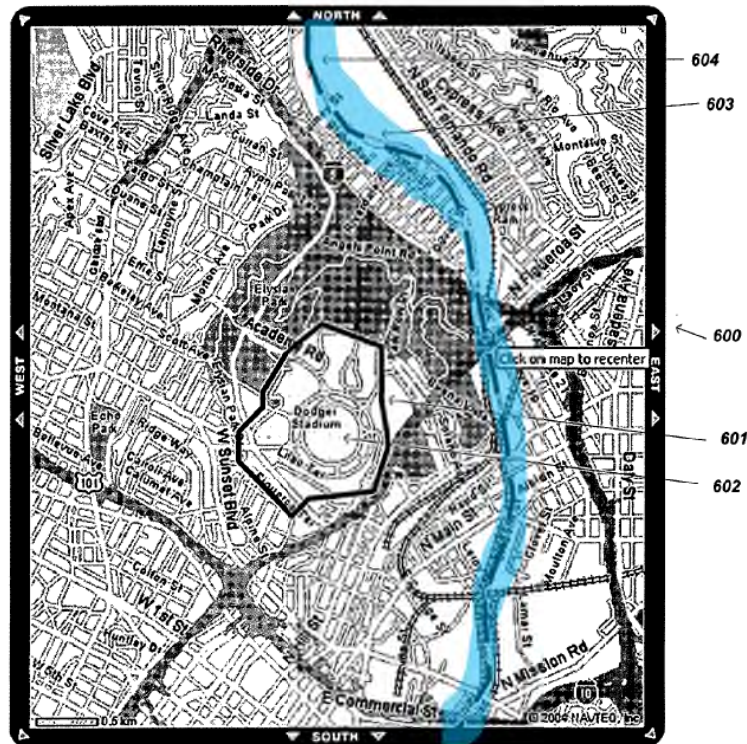


FIG. 6

Sheha states:

FIG. 6 illustrates other polygon and *polyline items that can be geofenced* from a map view 600, such as Dodger Stadium 602 and its geofenced representation 601. *Additionally, a polyline, such as a river 603 can also have a geofenced representation 604 illustrated by a dashed line in this embodiment.* For a polyline, a geofenced polygon and/or polyline with a boundary distance of D distance units that are perpendicular to the polyline that creates the geofenced boundary can be created for use in event alerts, etc., defined by the user.

Id.

It would have been obvious to the POSITA to include the ability to draw geofenced objects corresponding to polylines in the system of Humphries. EX1003, ¶187; Section IX.A-B. For example, it would have been apparent to the POSITA that to the extent that a user desired a geofenced object comprising a large region or state border (such as one side of a river as taught by Sheha), that the restriction region would be on one side of the geofence defined by the polyline. *Id.* Crossing the polyline by more than a hysteresis buffer, H, would thus trigger an alert according to the combined teachings of Humphries and Sheha. *Id.*

X. ASSERTED GROUND 3 OF INVALIDITY: CLAIMS 14, 16, 20, AND 21 ARE UNPATENTABLE AS OBVIOUS OVER HUMPHRIES IN LIGHT OF JIN.

Ground 1, demonstrating that Humphries discloses the elements of Claims 1-8, 10-12, 15-19, 22, and 23, is incorporated herein by reference. *See* Section VIII.

A. Rationale and Motivation to Combine

As discussed above in Ground 1, Humphries teaches the use of geofenced objects to ensure route adherence and tracking a fleet of vehicles. EX1004, 3:29-45. Humphries teaches that a tracked device may transmit an alert to a datacenter if the vehicle crosses a geofenced boundary. EX1004, 6:2-5. Jin also teaches techniques for geofences, including teaching that drive requirements may be set to a geofenced area (Jin's geofenced areas are functionally the same as Humphries' geofences as well as the claimed restriction regions). EX1006, [0016], [0019]; EX1003, ¶¶190-

192. Jin teaches that setting such drive requirements may, for example, “prevent[] a drive speed of a vehicle from exceeding a preset maximum speed” set for the geofence area. EX1006, [0098], [0100].

Jin’s geofence speed enforcement techniques would have been recognized as an improvement to the system of Humphries’ similar geofence system for tracking vehicles and ensuring route adherence. *KSR*, 1731. The POSITA would have been motivated by Jin to improve Humphries system in the same way as taught by Jin—by adding to the ability to set a speed limit to one or more of Humphries’ geofenced objects and to provide Jin’s speeding prevention controls to the tracked devices 120. EX1003, ¶190-192. This would have had the predictable result of preventing Humphries’ geofenced tracked devices from exceeding known speed limits set for geofenced areas (such as element 350 of Figure 7B). EX1003, ¶¶190-192; *KSR*, 1739.

For example, it would have been well within the skill of a POSITA to program Jin’s ability to set a speed limit for the geofenced object within Humphries’ mapping application 150. EX1003, ¶192. This would have had the predictable result of a system that used Jin’s method for vehicle control, including to inform the driver of the tracked device of the speed limit when crossing into a geofenced object (e.g., element 350), and to control the vehicle to follow the preset speed limit. *Id.* Humphries base system would have been predictably improved by ensuring that the

monitored fleet adhered to both their intended routes (taught by Humphries) and obeyed the speed laws within those areas (taught by Jin). *Id.*

B. Reasonable Expectation of Success

The POSITA would have had a reasonable expectation of success, as the combination of references discussed above would have merely involved the mere addition of the vehicle control settings taught by Jin to the geofences and tracked devices 120 of Humphries. EX1003, ¶193. The POSITA would have had a reasonable expectation of successfully adding the programming to tracked devices 120 to account for the driver speed warnings upon entering a geofence and the vehicle guidance messages and controls that prevent violation of the speed limit as taught by Jin. *Id.* It would have taken no more than ordinary skill to successfully incorporate the additional vehicle controls and warnings taught by Jin into the base system of Humphries. *Id.*

C. Claim 14

- 1. [14] The method of claim 1, wherein the movement characteristic includes at least one of a velocity, an acceleration, a deceleration, a direction of travel, or a projected path of the ground vehicle.**

Humphries in light of Jin renders at least one of the elements of Claim 14's claimed Markush group obvious, rendering Claim 14 obvious. EX1003, ¶¶194-198

As explained in detail above with respect to Element 1[e], Humphries discloses automatically causing a tracked device (i.e., a *vehicle*) to generate an alert

based on the location of the tracked vehicle being beyond a hysteresis buffer H of a geofence object. See Element 1[e]. Although Humphries focuses on location, it was well known to also trigger geofence alerts based on various movement characteristics of the tracked object relative to a geofence. EX1003, ¶195. For example, Jin discloses a method for controlling a vehicle that includes “notifying drive requirements set to the geofence area.” EX1006, [0016]. “The drive requirements may relate to at least one of . . . a maximum or minimum speed of a vehicle.” EX1006, [0019]. After setting the geofence (and its requirements), the method includes to “determine whether or not the vehicle has entered to the geofence area and control the vehicle to meet drive requirements set to the geofence area.” EX1006, [0022].

The method disclosed by Jin may be used for “preventing a drive speed of a vehicle from exceeding a preset maximum speed” within a particular geofence. EX1006, [0098], [0099]-[0100]. When the geofence is entered, controller 190 of the vehicle may notify the driver, “do not exceed 55 miles per hour.” EX1006, [0109]; see [0121], [0126]-[0127]. If the driver exceeds the geofenced speed limit, the controller may instruct the driver to “slow down, please.” EX1006, [0109]. Or, the controller may “perform a control operation” that may “include an increase or decrease of a drive speed.” EX1006, [0101]. Accordingly, Jin discloses automatically causing a vehicle to undertake a responsive measure (alert the driver,

slow down the car) based on a movement characteristic that includes velocity (i.e., speed) in relation to a restriction region (geofence). EX1003, ¶196.

It would have been obvious to the POSITA to modify the system of Humphries to add the additional geofence capabilities taught by Jin, including setting and enforcing a geofence's set speed limit as discussed above. See Section X.A-B; EX1003, ¶¶194-198.

D. Claim 16

- 1. [16] The method of claim 1, further comprising:
determining which of the one or more response measures to
cause the ground vehicle to undertake, based on the location
or the movement characteristic of the ground vehicle
relative to the restriction region.**

As explained in Ground 1, Humphries discloses and renders obvious Claim 16. See Section VIII.M (explaining how Humphries discloses determining which response measure to cause the tracked device to take (e.g., determines to send an alert) based on the location of the tracked device relative to the geofenced object.). EX1003, ¶¶199-204.

To the extent it is incorrectly argued that Claim 16 requires determining *which of multiple* different response measures to cause the vehicle to undertake, Claim 16 is nevertheless obvious over Humphries in light of Jin. EX1003, ¶199. Jin discloses a method for controlling a vehicle that includes a controller that determines which of multiple potential responsive measures to take, depending on the vehicle's

location and movement characteristics in relation to the geofence. EX1006, [0016], [0019], [0121], [0106]-[0107], [0110], [0126]-[0127]; [0108]-[0109].

To explain further, Jin's method includes "notifying drive requirements set to the geofence area." EX1006, [0016]. "The drive requirements may relate to at least one of . . . a maximum or minimum speed of a vehicle." EX1006, [0019]. "If the vehicle is determined to have entered the geofence area, the controller 190 may notify such information through the output unit 160 (S105)" and may "inform or control one or more of the drive requirements corresponding to the geofence area." EX1006, [0121]. This may include, "a voice message," visual display, or text message informing the driver "do not exceed 55 miles per hour." EX1006, [0106]-[0107], [0110]. Once in the geofence area, the sensor "determines whether or not the drive conditions of the vehicle meet the drive requirements of the geofence area," and if not met, "the controller 190 may control the vehicle by the control signal (S210). EX1006, [0126]-[0127]. Alternatively, "controller 190 may guide the control of the vehicle such that the vehicle meets the drive requirements." EX1006, [0108]. For example, a voice message may tell the driver "slow down, please." EX1006, [0109]; *See also* EX1003, ¶¶200-203.

Accordingly, the method taught by Jin discloses determining which of multiple responses to cause the vehicle to undertake (e.g., notify driver of geofence drive requirements, control vehicle, guide vehicle driver) based on a location

(entering the geofence boundary, being located inside geofence) and movement characteristic (violating a preset drive requirement such as a maximum speed). *Id.*

It would have been obvious to the POSITA to modify the system of Humphries to add the additional geofence capabilities taught by Jin, including setting and enforcing a geofence's set speed limit using the response measures as discussed above. *See* Ground 3, Section X.A-B; EX1003, ¶¶199-204.

E. Claim 20

- 1. [20] The method of claim 1, wherein causing the ground vehicle to undertake one or more response measures includes taking control away from a user of the ground vehicle.**

As explained with respect to Ground 1, Humphries discloses sending an alert if the vehicle has crossed the geofence boundary. *See* Ground 1, Element 1[e] above. Jin discloses that a controller of the ground vehicle causes the ground vehicle to slow down if the driver of the vehicle is not obeying the speed limits set for the geofenced area. EX1006, [0126]-[0127]. (“the controller 190 may control the vehicle by the control signal (S210).”); [0121] (“the controller 190 may control the vehicle *such that the drive conditions are met.*”); [0085] (confirming controller 190 is a computerized component). This may include an “increase or decrease of a drive speed,” depending on “the control signal received from the server.” EX1006, 121. A POSITA would have understood, and at the very least found obvious, that using a computerized controller to control a vehicle *such that the drive conditions are met*

would involve taking control away from a user of the vehicle. EX1003, ¶¶205-207. For example, least the driver's ability to exceed the maximum speed limit is taken away when the controller enforces the preset speed limits. *Id.* Claim 20 would have been obvious for the same reasons set forth above for Claim 16, and those reasons are incorporated here by reference. *See Id.*; Ground 3, Claim 16.

F. Claim 21

- 1. [21] The method of claim 1, wherein causing the ground vehicle to undertake one or more response measures includes ceasing to take commands from a user of the ground vehicle.**

See Element [20]. A POSITA would have understood, and at the very least found obvious, that using a computerized controller to control a vehicle *such that the drive conditions are met* would involve taking ceasing to take commands from a driver of the vehicle. EX1003, ¶¶208-209. For example, the driver's ability to command the vehicle to exceed the maximum speed limit is taken away when the controller enforces the preset speed limits. *Id.* Claim 21 would have been obvious for the same reasons set forth above for Claim 16, and those reasons are incorporated here by reference. *See* Ground 3, Claim 16. *Id.*

XI. ASSERTED GROUND 4 OF INVALIDITY: CLAIMS 14 IS UNPATENTABLE AS OBVIOUS OVER HUMPHRIES IN LIGHT OF PUTZ.

Ground 1, demonstrating that Humphries discloses the elements of Claims 1-8, 10-12, 15-19, 22, and 23, is incorporated herein by reference. *See* Section VIII.

A. Rationale and Motivation to Combine

Humphries' route adherence and vehicle tracking system teaches responding to the crossing of a geofenced boundary by sending an alert to a datacenter. EX1003, ¶211. Putz teaches a similar geofence system that includes the known technique of predicting when a geofence will be crossed based on the vehicle's location, speed, direction of travel, and projected path. EX1007, Abstract; 1:31-36; 2:56-57; 3:35-37. A POSITA would have been motivated to modify Humphries to include the known predictive geofence technology provided by Putz's geofence prediction system to Humphries' base vehicle tracking system, which would have provided the same improvements to Humphries in the same way as is taught by Putz. EX1003, ¶211; *KSR*, 1731. For example, a POSITA would have been motivated to extend the capabilities of Humphries' geofence crossing determination to also include the ability to predict when a geofence will be crossed. EX1003, ¶211. This would have had the predictable result of added capabilities in Humphries for ensuring route adherence, including providing a warning when tracked device 120 is predicted to cross a geofence). EX1003, ¶211; *KSR*, 1739.

B. Reasonable Expectation of Success

The POSITA would have had a reasonable expectation of success, as the combination of references discussed above would have merely involved the mere addition of the geofence crossing prediction algorithms taught by Putz to the tracked

devices 120 of Humphries. EX1003, ¶212. The POSITA would have had a reasonable expectation of successfully adding the programming to predict geofence crossings to devices 120. *Id.* It would have taken no more than ordinary skill to successfully incorporate the prediction algorithms taught by Putz to the base system of Humphries. *Id.*

C. Claim 14

1. [14] The method of claim 1, wherein the movement characteristic includes at least one of a velocity, an acceleration, a deceleration, a direction of travel, or a projected path of the ground vehicle.

Humphries in light of Putz renders at least one of the elements of Claim 14's claimed Markush group obvious, rendering Claim 14 obvious. EX1003, ¶213-214. Putz discloses using a tracked vehicle's velocity, direction of travel, and projected path to predict when a geofence will be crossed. EX1007, Abstract; 1:21-43; 1:31-36; 2:42-50; 2:56-61; 3:5-9; 3:21-34; 3:21-37; 3:55-4:7; 4:16-28. For example, Putz's geofence system includes a "platform that receives information relating to spatial characteristics for objects such as position, speed of travel, direction of travel" and "predicts future positions of objects based on the stored information." *Id.* at 1:31-36. If a geofence crossing is predicted, an alert will be generated. *Id.* at 1:38-43; 3:56-4:15 7:568:23. It would have been obvious to the POSITA to modify Humphries system to include the predictive geofence calculations taught by Putz. *See* Ground 4, Section XI.A-B.

XII. ASSERTED GROUND 5 OF INVALIDITY: CLAIMS 9, 17, AND 20-21 ARE UNPATENTABLE AS OBVIOUS OVER HUMPHRIES IN LIGHT OF BORUGIAN.

Ground 1, demonstrating that Humphries discloses the elements of Claims 1-8, 10-12, 15-19, 22, and 23, is incorporated herein by reference. *See* Section VIII.

A. Rationale and Motivation to Combine

Humphries' route adherence and vehicle tracking system is a known device ready for improvement. EX1003, ¶216. For example, Humphries discloses responding to the crossing of a geofenced boundary by sending an alert to a datacenter. *Id.* Borugian teaches the known technique of taking further responsive measures in response to crossing (or potential crossing) of a geofence, which could include providing a warning to the driver and/or shutting down the vehicle after a predetermined amount of time. *Id.* (EX1008, 12:30-31; 12:61-66; 13:1-3).

A POSITA would have been motivated to modify Humphries to include known features and techniques provided by Borugian's vehicle tracking system to Humphries' base vehicle tracking system, which would have provided the same improvements to Humphries in the same was as is taught by Borugian. EX1003, ¶217; KSR, 1731. For example, a POSITA would have been motivated to extend the capabilities of Humphries' tracked devices to, in addition to transmitting an alert, provide "a response to the detected conditions that *assures* that the usage is not unauthorized or *shuts down the vehicle.*" EX1008, 1:56-60; EX1003, ¶217.

The POSITA would have immediately recognized the benefit of Borugian's vehicle controls, including enforcing adherence of fleet vehicles to authorized routes and zones. EX1003, ¶¶216-218. The POSITA would have been motivated to include such controls as an optional capability in the system of Humphries, which is directed to the same problem as Borugian—enforcing adherence to routes. *Id.* This would have had the predictable result of providing the base system taught by Humphries with the added capability to shut down a vehicle that has crossed a geofence boundary (as seen, e.g., in Figure 7B). *Id.*; KSR, 1739.

B. Reasonable Expectation of Success

The POSITA would have had a reasonable expectation of success, as the combination of references discussed above would have merely involved the mere addition of the vehicle controls taught by Borugian to the tracked devices 120 of Humphries. EX1003, ¶219. The POSITA would have had a reasonable expectation of successfully adding the programming to tracked devices 120 to account for the driver warnings and vehicle shutdown commands taught by Borugian. *Id.* It would have taken no more than ordinary skill to successfully incorporate the additional vehicle controls and warnings taught by Borugian into the system of Humphries. *Id.*

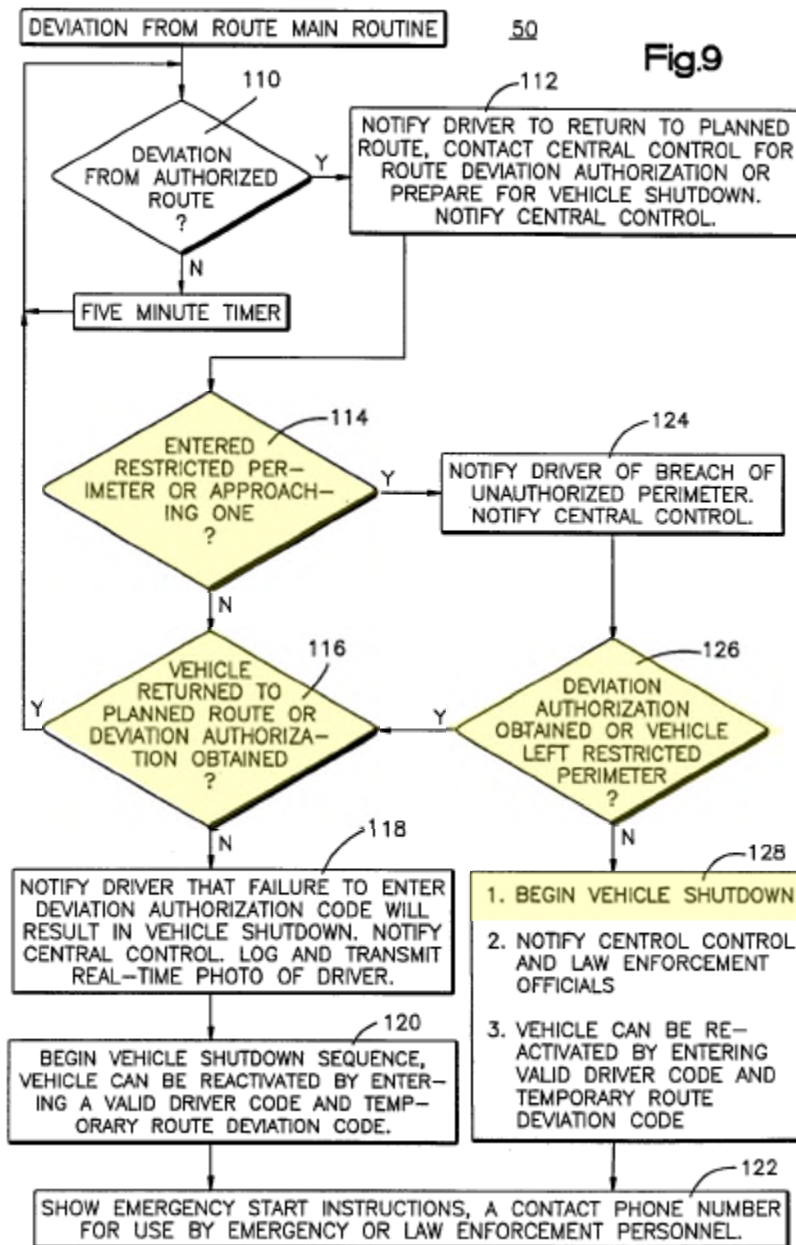
C. Claim 9

- 1. [9] The method of claim 8, wherein the minimum width is defined to prevent the ground vehicle from encroaching in the restriction region.**

Humphries and Borugian render Claim 9 obvious. EX1003, ¶¶220-225. As

explained with respect to Ground 1, Humphries discloses sending an alert if the vehicle has crossed a distance H from the geofence boundary. See Ground 1, Element 1[e] above. Humphries discloses that the alert may be sent whenever a geofence boundary is crossed, that is, when the vehicle enters the geofence and when the vehicle exits the geofence. EX1004, 6:2-6 (“In accordance with the present invention, if the object has moved into or out of a geofence object, the alert generation application is able to send an alert message to the data center 140.”).

Borugian discloses the ability to define perimeters around restricted areas to prevent a vehicle from encroaching the restricted area. EX1008, 3:67 (“A perimeter is defined around a restricted area.”); 4:1-3 (“When it is determined that a location of the vehicle is inside the perimeter around the restricted area, the vehicle is shut down.”). Borugian discloses the prevention of encroachment of a vehicle into a restricted area by shutting down the vehicle if it is determined to be *approaching* a boundary. *Id.*; Fig. 9; 12:1-8; EX1003, ¶221. Figure 9 illustrates this process as reproduced below (with highlights added):



Borugian discloses that the vehicle's onboard computer "checks to determine whether the vehicle has entered a restricted perimeter or is approaching a restricted perimeter at 114." EX1008, 12:1-8. "In the illustrated embodiment, the vehicle onboard computer 18 determines that the vehicle 12 is in a restricted perimeter when the distance between the vehicle global positioning system location and the restricted

perimeter global positioning system location is less than a predetermined distance X.” *Id.* at 12:4-8.

If the vehicle has not returned to a planned route (i.e., left the restricted area) or entered a deviation code **at 116 or 118**, “the system 10 **begins vehicle shutdown 128**.” EX1008, 12:49-65. And, in “one embodiment, vehicle shutdown begins immediately.” *Id.*, 12:65-66.

It would have been obvious to the POSITA to modify Humphries’ base system to permit the drawing of geofences around restricted areas to prevent the encroachment of fleet vehicles into such areas as taught by Borugian. EX1003, ¶222-225. *see* Section XII.A-B. The combined system would have predictably resulted in a combined system that permitted a user of mapping application 150 to create geofenced objects (such as geofence object 350 in Figure 7B) for restricted areas into which vehicles should be prevented from entering by automatically shutting them down *before* they cross into the area. *Id.* Such a system would have predictably included a predetermined distance X, around each geofence, which has a minimum width defined to prevent encroachment of the region. *Id.*

D. Claim 17

- 1. [17] The method of claim 1, wherein causing the ground vehicle to undertake the one or more response measures based on the location or the movement characteristic of the ground vehicle includes: **calculating** an estimated amount of time for the ground vehicle to approach the restriction**

region, or a time or distance for the ground vehicle to begin to experience a response measure.

As explained with respect to Ground 1, Humphries discloses sending an alert if the vehicle has crossed a distance H from the geofence boundary. *See* Ground 1, Element 1[e] above. Borugian discloses “*calculating . . . a time for the ground vehicle to begin to experience a response measure*” as claimed. For example, Borugian discloses calculating a time for the vehicle to begin to experience a response measure: Borugian discloses that once a geofence boundary has been crossed, “vehicle shutdown begins after the predetermined amount of time lapses at 120.” EX1008, 12:30-31.

The POSITA would have been motivated to include these calculations in the functionality of tracked devices 120 in order to provide time for the driver to heed the additional warnings regarding the vehicle’s potential departure from (or impending entry into) a geofenced object (e.g., element 350 of Figure 7B) before shutting down the vehicle. EX1003, ¶226-228; *see* Section XII.A-B.

E. Claim 20

- 1. [20] The method of claim 1, wherein causing the ground vehicle to undertake one or more response measures includes taking control away from a user of the ground vehicle.**

As explained with respect to Ground 1, Humphries discloses sending an alert if the vehicle has crossed the geofence boundary. *See* Ground 1, Element 1[e] above. Borugian discloses “*taking control away from a user of the ground vehicle*” by

shutting down the vehicle. EX1003, ¶229; EX1008, 12:30-31; 12:61-66. After a vehicle shutdown has occurred, control is only returned to the driver (i.e., vehicle is reactivated) by entering a valid driver code and temporary deviation code. EX1008, 13:1-3 (“The vehicle 12 can be reactivated by entering a valid driver code and temporary route deviation code.”); EX1003, ¶229.

It would have been obvious to the POSITA to take away the control from the driver in response to violating a geofenced boundary. EX1003, ¶¶229-231; see Section XII.A-B.

F. Claim 21

- 1. [21] The method of claim 1, wherein causing the ground vehicle to undertake one or more response measures includes ceasing to take commands from a user of the ground vehicle.**

As explained with respect to Ground 1, Humphries discloses sending an alert if the vehicle has crossed the geofence boundary. See Ground 1, Element 1[e] above. Borugian discloses “*ceasing to take commands from a user of the ground vehicle*” by shutting down the vehicle. EX1003, ¶¶232-234; EX1008, 12:30-31; 12:61-66. After a vehicle shutdown has occurred, command is only returned to the driver (i.e., vehicle is reactivated) by entering codes. EX1008, 13:1-3 (“The vehicle 12 can be reactivated by entering a valid driver code and temporary route deviation code.”); EX1003, ¶232.

It would have been obvious to the POSITA to cease taking commands from

the driver in response to violating a geofenced boundary. EX1003, ¶¶232-234; see Section XII.A-B.

XIII. CONCLUSION

Petitioner respectfully requests institution of IPR and cancelation of Claims 1-23 of the '116 Patent as unpatentable.

July 19, 2023

Respectfully submitted,

/Brian W. Oaks/

Brian W. Oaks (Reg. No. 44,981)

LEAD COUNSEL FOR PETITIONER

**CERTIFICATE OF COMPLIANCE WITH TYPE-VOLUME
LIMITATION, TYPEFACE REQUIREMENTS, AND TYPE STYLE
REQUIREMENTS**

This Petition complies with the type-volume limitations as mandated in 37 C.F.R. §42.24, totaling less than 13,998 words. Counsel has relied upon the word count feature provided by Microsoft Word.

Respectfully submitted,

BAKER BOTTS L.L.P.

/Brian W. Oaks/

Brian W. Oaks
MCDERMOTT WILL & EMERY
111 Congress Ave., Suite 500
Austin Texas 78701
Tel: 512.726.2574
boaks@mwe.com
Reg. No. 44,981

*Lead Attorney for Petitioner
Textron Specialized Vehicles Inc.*

Date: July 19, 2023

BAKER BOTTS L.L.P.

Jeffery S. Becker
Reg. No. 68,553

Phone: 214-953-6526
jeff.becker@bakerbotts.com

Harrison Rich
Reg. No. 65,132
Phone: 214.953.6896
harrison.rich@bakerbotts.com
2001 Ross Ave., Suite 900
Dallas, TX 75201-2980
Fax: 214-661-4526

Lance J. Goodman
Phone: 512.322.2629
Reg. No. 77,989
lance.goodman@bakerbotts.com
401 South 1st, Suite 1300
Austin, Texas 78704
Fax: 512.322.2501

CERTIFICATE OF SERVICE

The undersigned hereby certifies on this July 19, 2023, a true and correct copy of the foregoing **Petition for *Inter Partes* Review of U.S. Patent No. 11,462,116**, Exhibits 1001-1010, and Powers of Attorney were served to the following parties via electronic mail and Federal Express:

Anova Law Group, PLLC
21495 Ridgetop Circle, Suite 300
Sterling, VA 20166

Additionally, a complete and entire copy of this Petition for *Inter Partes* Review and all supporting exhibits were served via e-mail on:

Wilson Sonsini Goodrich & Rosati

Christopher D Mays (cmays@wsgr.com)
James C Yoon (jyoon@wsgr.com)
650 Page Mill Road
Palo Alto, CA 94304-1050

Jennifer A Ward (jward@wsgr.com)
Ian R Liston (iliston@wsgr.com)
222 Delaware Avenue
Suite 800
Wilmington, DE 19801-5225

Jennifer Celine Liu (celine.liu@wsgr.com)
1700 K Street NW
Fifth Floor
Washington, DC 20006-3814

Jordan R Jaffe (jjaffe@wsgr.com)
One Market Plaza
Spear Tower, Suite 3300
San Francisco, CA 94105-1126

Petitioner knows this to be an additional address likely to effect service (on litigation counsel).

/Brian W. Oaks/

Brian W. Oaks
MCDERMOTT WILL & EMERY
111 Congress Ave., Suite 500
Austin Texas 78701
Tel: 512.726.2574
boaks@mwe.com
Reg. No. 44,981

*Lead Attorney for Petitioner
Textron Specialized Vehicles Inc.*

Date: July 19, 2023

BAKER BOTTS L.L.P.

Jeffery S. Becker
Reg. No. 68,553
Phone: 214-953-6526
jeff.becker@bakerbotts.com
Harrison Rich
Reg. No. 65,132
Phone: 214.953.6896
harrison.rich@bakerbotts.com
2001 Ross Ave., Suite 900
Dallas, TX 75201-2980
Fax: 214-661-4526

Lance J. Goodman
Phone: 512.322.2629
Reg. No. 77,989
lance.goodman@bakerbotts.com

401 South 1st, Suite 1300
Austin, Texas 78704
Fax: 512.322.2501