

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

U.S. Patent No. 11,462,116

**DECLARATION OF DAVID HILLIARD WILLIAMS IN SUPPORT OF
PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO.
11,462,116**

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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, David Hilliard Williams, declare as follows:

I. Introduction

1. I have been retained on behalf of Textron Specialized Vehicles Inc. (“Textron”) for the above-captioned *inter partes* review (IPR) proceeding. I am being compensated for my time in connection with this IPR at my standard hourly consulting rate. I understand that this proceeding involves U.S. Patent No. 11,462,116 (“the ’116 Patent”) titled “Polygon Shaped Vehicle Restriction Zones” by Xinan Xu, Yun Yu, Canlong Lin, Xi Chen, Mingyu Wang, and Jianyu Song, and that the ’116 Patent is currently assigned to SZ DJI Technology Co., Ltd..

2. I have reviewed and am familiar with the specification of the ’116 Patent filed on November 10, 2021. I understand that the ’116 Patent has been provided as EX1001. I will cite to the specification using the following format: EX1001, ’116 Patent, 1:1-10. This example citation points to the ’116 Patent specification at column 1, lines 1-10.

3. I have reviewed and am familiar with the file history of the ’116 Patent. I understand that the file history has been provided as EX1002.

4. I understand that the ’116 Patent has a filing date of November 10, 2021. I am informed by Textron’s counsel that the ’116 Patent has an earliest possible priority date of March 9, 2015 (the filing date of International Application

No. PCT/CN2015/073915), which I have used as the priority date for the purposes of formulating my opinions.

5. In preparing this Declaration, I have also reviewed and am familiar with the following prior art used in the Petition for *Inter Partes* Review of the '116 Patent and/or in my declaration below:

U.S. Patent No. 11,462,116 to (Xu et al.)

6. The '116 Patent describes 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. Ex. 1001, Cl. 1.

7. I have been asked to provide my technical review, analysis, insights, and opinions regarding the '116 Patent and the above-noted references that form the basis for the grounds of rejection set forth in the Petition for *Inter Partes* Review of the '116 Patent.

II. Qualifications

8. In formulating my opinions, I have relied upon my training, knowledge, and experience in the relevant art. I have summarized in this section my educational background, career history, publications, and other relevant qualifications. My full curriculum vitae is attached as Appendix A to this Declaration.

A. Educational Background

9. I received a B.S. degree in Electrical Engineering from Purdue University in 1983 with top honors, with a minor in Mathematics. I received an MBA degree in Information Systems Management from The University of Texas at Austin in 1987, also with top honors.

B. Career History

10. I have over 30 years of experience in wireless location services, including experience designing, implementing, and managing numerous location-based service (LBS) applications such as mobile social networking, family tracking, and mobile resource management, as well as working in all fields within the location services ecosystem including all forms of location determination technologies, map data, handset technologies, and associated Information Technology systems including identification, authentication, privacy, security, and other related capabilities such as network engineering and operations.

11. I am currently the President of the company E911-LBS Consulting, and I have been with the company since 2002. As the President of E911-LBS Consulting,

I provide services across the entire wireless value chain, particularly with respect to technology and business strategic planning and product design and development associated with LBS, Global Positioning Satellite (GPS) systems, E911, WiFi-Based and other medium/long-range Real-Time Location Systems (RTLS), Radio Frequency Identification (RFID), Bluetooth, Near Field Communications (NFC), and beacon-based and other short-range communications/location systems, and other location determination and sensing technologies and services.

12. I have extensive expertise in all aspects of LBS delivery across the wireless location ecosystem including enabling network, map data, geospatial platform, chipset, data management, device, and location determination infrastructure and integration providers. I am an expert in all related aspects of LBS, including data privacy and security management.

13. For example, in the 1995 to 2000 timeframe, as an Associate Partner in the Communications & High Technology Practice of Accenture (one of the world's leading technology companies), I focused on using wireless location technologies to provide services to the public sector and commercial markets. In particular, from 1998 to 2000, I led the development of the LBS product/technology strategy and roadmap for Nextel Communications, Inc. My work with Nextel resulted in some of the earliest LBS applications in the U.S. market and included extensive research into the potential use of various technologies in providing and enabling a wide array of

location-based services, including Mobile Resource Management (MRM) worker tracking and vehicle/fleet management applications. This work also including leading the development of the underlying network and Information Technology architectures that would be required to support the LBS applications product strategy and roadmap.

14. In 2003, I led the development of part of AT&T Wireless's E911 infrastructure, including the development of systems, processes, and reporting infrastructure to manage and track the deployment of time difference of arrival-based location determination technologies. I managed the testing and Federal Communications Commission reporting of network location inaccuracies, with a particular focus on detecting and troubleshooting out-of-norm technology deployment and inaccurate location conditions.

15. From 2005 to 2007, I worked with NAVTEQ—the leading provider of map data and services essential to creating LBS applications—to develop the company's web developer website content and tools. Specifically, I designed and managed the site map and overall content, including the development of comprehensive technical and business web content for all NAVTEQ map product and service lines. Through the developer site, application developers and business managers became intimately familiar with map data, Geographical Information System (GIS) platforms, and location-based services to successfully develop and

launch their LBS applications. For example, I developed the content to highlight key types of map data and to provide technical details on how NAVTEQ tools can be used in LBS design for various consumer and business applications. Also in 2007 I ghostwrote a study on Traffic/dynamic map data and system providers in the United States on behalf of ABI Research, a market research consultancy.

16. I also have extensive LBS application product design and implementation experience, which includes data privacy and security management. For example, from 2007 to 2010, I managed the design, development, and launch of several consumer and business-oriented LBS applications for AT&T Mobility. These LBS applications included navigation, mobile social networking, family tracking, local search, 411-with-LBS, mobile resource management, and asset tracking. I also developed corporate-wide location data privacy policies and associated system implementation for all LBS customers.

17. My AT&T work extensively involved various aspects of worker and vehicle/fleet management tracking. In particular, I was the Product Manager for the several of the joint AT&T-Telenav Mobile Resource Management applications, as well as various fleet management solutions. This role and work required extensive knowledge of how the various applications worked, and even required design modifications in order for it to “fit into” AT&T’s network and IT infrastructure, as well as to implement AT&T’s privacy and security policies. The work also included

designing/modifying AT&T's network and IT infrastructure to allow/enable the applications to seamless work with AT&T's location infrastructure and various IT systems used for functions including Sales, Customer Care, Fulfillment, Billing/Accounts Receivable, and various network and IT operations. Among associated activities, my efforts included closely working with AT&T Legal to develop and implement AT&T's location privacy policies. These efforts in both data privacy people tracking resulted in a patent: U.S. Patent 8,613,109, titled "Method and Apparatus for Providing Mobile Social Networking Privacy," that issued on December 17, 2013, of which I was the only non-employee inventor. I am also the inventor/co-inventor on 8 other patents involving wireless, location, and associated technologies.

18. In addition to the Location-Based Services applications, enabling location technologies, wireless communications, and privacy and security experience and expertise described above, I also have many years of Information Technology experience. For example, as a consultant in the Information Technology practices of Deloitte Consulting (originally Touche Ross), Booz Allen & Hamilton, and Andersen Consulting (now Accenture), I served in key technology development and technology leadership roles in numerous projects designing and implementing mainframe, mini-computer, and client/server-based computing systems across a wide variety of industries and a wide variety of functions/applications. I also led the

design and development of a number of different communications networks associated with those computing systems, including wide- and local-area networks, utilizing both wired and wireless technologies, involving private and public (e.g. Internet-based) communications backbones. This communications system expertise includes underlying expertise in the electrical characteristics of communications signals, extending back to the early 1980s with my Electrical Engineering degree from Purdue University in 1983 and my work as an electrical engineer in the design of the Analog-to-Digital Signal Converter unit for the F-15 fighter jet radar system digitization effort while with Hughes Aircraft Company Radar Systems Division from 1983-1985.

C. Publications

19. I have authored multiple books on wireless location, including:

- *The Definitive Guide to GPS, RFID, Wi-Fi, and Other Wireless Location-Based Services* (2005 and 2009 versions);
- *The Definitive Guide to Wireless E911*; and
- *The Definitive Guide to Mobile Positioning and Location Management* (co-author).

20. My curriculum vitae contains further details on my education, experience, publications, and other qualifications to render an expert opinion. Appendix A. My work on this case is being billed at my standard consulting rate,

with reimbursement for actual expenses. My compensation is not contingent upon the outcome of this *inter partes* review proceeding.

D. Materials and Other Information Considered

21. I have considered information from various sources in forming my opinions. I have reviewed and considered each of the exhibits listed above in the Table of Exhibits in forming my opinions.

III. Legal Understanding

22. I have applied the following legal principles provided to me by counsel in arriving at the opinions set forth in this report.

A. Legal Standard of Claim Construction

23. I understand that a patent may include two types of claims, independent claims and dependent claims. An independent claim stands alone and includes only the limitations it recites. A dependent claim can depend from an independent claim or another dependent claim. I understand that a dependent claim includes all the limitations that it recites in addition to all of the limitations recited in the claim or claims from which it depends.

24. I understand that the purpose of claim construction is to understand how one skilled in the art would have understood the claim terms at the time the claimed invention was made. I also understand that claim construction is a matter of law for the Patent Trial and Appeal Board to decide.

25. I understand that a claim construction analysis begins with the plain meaning or the ordinary and customary meaning of the claim term in the context of the patent in which the term is used. The ordinary and customary meaning is the meaning that the term would have to a person of ordinary skill in the relevant art at the time of the invention in light of what the patent teaches. I understand that in this

proceeding, I am supposed to apply what is known as the *Phillips* standard for claim construction, described in the *Phillips v. AWH Corp.* decision.

26. In comparing the claims of the '116 Patent to the prior art, I have carefully considered the '116 Patent and its file history in light of the understanding of a person of skill at the time of the alleged invention.

27. I understand that to determine how a person of ordinary skill would understand a claim term, one should look to those sources available that show what a person of skill in the art would have understood disputed claim language to mean. The available sources may include both evidence intrinsic and extrinsic to the patent. Intrinsic evidence includes the words of the claims themselves, the remainder of the patent's specification, including materials incorporated by reference, and the prosecution history of the patent, including materials cited and statements made during the prosecution history. Extrinsic evidence, which is evidence external to the patent and the prosecution history, may include materials concern relevant scientific principles, the meaning of technical terms, and the state of the art.

28. I understand that, in construing a claim term, one looks first to the intrinsic patent evidence. The extrinsic evidence may also be useful in interpreting the claim term when the intrinsic evidence alone is insufficient to correctly resolve the meaning.

29. I understand that words or terms, which may include phrases, should be given their ordinary and accepted meaning unless it appears that the inventors were using them to mean something else. In making this determination, the claims, the patent specification, and the prosecution history are of paramount importance. Additionally, the specification and prosecution history must be consulted to confirm whether the patentee has acted as its own lexicographer (i.e., provided its own special meaning to any disputed terms), or intentionally disclaimed, disavowed, or surrendered any claim scope.

30. I understand that the claims of a patent define the scope of the rights conferred by the patent. Patentees are required to particularly point out and distinctly claim the subject matter which they regard as their invention. Because patentees are required to define precisely what they claim their inventions are, it is improper to construe claims in a manner different from the plain import of the terms used consistent with a patent's specification. Accordingly, a claim construction analysis must begin with, and remain centered on, the claim language itself. Additionally, the context in which a term is used in the challenged claim can be highly instructive. Likewise, other claims of the patent in question, both challenged and non-challenged, can inform the meaning of a claim term. For example, because claim terms are normally used consistently throughout the patent, the usage of a term in one claim can often illuminate the meaning of the same term in other claims.

Differences among claims can also be a useful guide in understanding the meaning of particular claim terms.

31. I understand that a person of ordinary skill in the art is deemed to read a claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification. For this reason, the words of the claim must be interpreted in view of the entire specification. The specification is the primary basis for construing the claims and provides a safeguard such that correct constructions closely align with the specification. Ultimately, the interpretation to be given a term can only be determined and confirmed with a full understanding of what the inventors actually invented and intended to envelop with the claim as set forth in the patent itself.

32. I understand that it is improper to place too much emphasis on the plain or ordinary meaning of a claim term without adequate grounding of that term within the context of the specification of the challenged patent. Hence, claim terms should not be broadly construed to encompass subject matter that is not supported when the claims are read in light of the invention described in the specification.

33. I understand that the role of the specification is to describe and enable the invention. In turn, the claims cannot be of broader scope than the invention that is set forth in the specification. Care must be taken because a word-by-word

definition, removed from the context of the patent, leads to an overall result that departs significantly from the patented invention.

34. I understand that claim terms must be construed in a manner consistent with the context of the intrinsic record. In addition to consulting the specification, one should also consider the patent's prosecution history. The prosecution file history provides evidence of how both the Patent Office and the patentee understood the terms of the patent, particularly in light of what was known in the prior art. Further, where the specification describes a claim term broadly, arguments and amendments made during prosecution may require a narrower interpretation.

35. I understand that while intrinsic evidence is of primary importance, extrinsic evidence, including expert and inventor testimony, dictionaries, and learned treatises, can also be considered. For example, technical dictionaries may help one better understand the underlying technology and the way in which one of skill in the art would understand the claim terms. Extrinsic evidence should not be considered, however, divorced from the context of the intrinsic evidence. Evidence beyond the patent specification, prosecution history, and other claims in the patent should not be relied upon unless the claim language is ambiguous in light of these intrinsic sources. Furthermore, while extrinsic evidence can shed useful light on the relevant art, it is less significant than the intrinsic record in determining the legally operative meaning of claim language.

36. I understand that in general, a term or phrase found in the introductory words of the claim, referred to as the preamble of the claim, should be construed as a limitation if it recites essential structure or steps, or is necessary to give life, meaning, and vitality to the claim. Conversely, a preamble term or phrase is not limiting where a patentee defines a structurally complete invention in the claim body and uses the preamble only to state a purpose or intended use for the invention. In making this distinction, one should review the entire patent to gain an understanding of what the inventors claim they actually invented and intended to encompass by the claims.

37. I understand that language in the preamble may limit claim scope (i) if dependence on a preamble phrase for antecedent basis indicates a reliance on both the preamble and claim body to define the claimed invention; (ii) if reference to the preamble is necessary to understand limitations or terms in the claim body; (iii) if the preamble recites additional structure or steps that the specification identifies as important; or (iv) if the patentee relied on the preamble during prosecution to distinguish the prior art.

38. I understand that claim limitations may be stated in means-plus-function format in which a term is defined by functional language without a defined structure. In particular, I understand that a means-plus-function limitation should be interpreted to cover the recited function, and only the corresponding structure

described in the specification, and equivalents thereof. I also understand that a limitation will be presumed to be a means-plus-function limitation if (a) the claim limitation uses the phrase “means for”; (b) the “means for” is modified by functional language; and (c) the phrase “means for” is not modified by sufficient structure for achieving the specified function.

39. I understand that a structure will be considered structurally equivalent to the corresponding structure identified in the specification only if the differences between them are insubstantial. For example, a structure may be deemed to be a structural equivalent to the corresponding structure where the structure performs the same function in substantially the same way to achieve substantially the same result. I further understand that a structural equivalent must have been available at the time of the issuance of the claim.

40. I understand that an indefinite article “a” or “an” in patent parlance carries the meaning of “one or more” in open-ended claims containing the transitional phrase “comprising.” I understand that, unless the claim is specific as to the number of limitations, the article “a” receives a singular interpretation only in rare circumstances when the patentee evinces a clear intent to so limit the article, and thus, under this conventional rule, the claim limitation “a,” without more, requires “at least one.”

B. Legal Standard for Anticipation

41. I understand that, once the claims of a patent have been properly construed, the next step in determining anticipation of a patent claim requires a comparison of the properly construed claim language to the prior art on a limitation-by-limitation basis.

42. I understand that a patent claim is invalid based on anticipation if a single prior art reference discloses all of the features of that claim in a way that enables one of ordinary skill in the art to make and use the invention. Each of the claim features may be expressly or inherently present in the prior art reference. I understand that if the prior art necessarily functions in accordance with, or includes a claim's feature, then that prior art inherently discloses that feature. I have relied on this understanding in expressing the opinions set forth below.

43. I understand that a prior art reference describes the claimed invention if it either expressly or inherently describes each and every feature set forth in the claim; *i.e.*, in determining whether a single item of prior art anticipates a patent claim, one should take into consideration not only what is expressly disclosed in that item, but also what is inherently present as a natural result of the practice of the system or method disclosed in that item.

44. I understand that to establish inherency, the evidence must make clear that the missing descriptive matter is necessarily present in the item of prior art and

that it would be so recognized by persons of ordinary skill in the art. I also understand that prior art use of the claimed patented invention that was accidental, unrecognized, or unappreciated at the time of filing can still be an invalidating anticipation.

45. I understand that although multiple prior art references may not be combined to show anticipation, additional references may be used to interpret the allegedly anticipating reference and shed light on what it would have meant to those skilled in the art at the time of the invention. These additional references must make it clear that the missing descriptive matter in the patent claim is necessarily present in the allegedly anticipating reference, and that it would be so recognized by persons of ordinary skill in the art.

46. I have written this report with the understanding that in an *inter partes* review anticipation must be shown by a preponderance of the evidence.

C. Legal Standard of Obviousness

47. I understand that even if a patent is not anticipated, it is still invalid if the differences between the claimed subject matter and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person of ordinary skill in the pertinent art.

48. I understand that a person of ordinary skill in the art provides a reference point from which the prior art and claimed invention should be viewed.

This reference point prevents a person of ordinary skill from using one's insight or hindsight in deciding whether a claim is obvious.

49. I also understand that an obviousness determination includes the consideration of various factors such as (1) the scope and content of the prior art, (2) the differences between the prior art and the challenged claims, (3) the level of ordinary skill in the pertinent art, and (4) the existence of secondary considerations, also referred to as objective considerations, of non-obviousness.

50. I am informed that objective considerations of non-obviousness may include (1) a long felt but unmet need in the prior art that was satisfied by the invention of the patent; (2) failure of others where the invention succeeds; (3) commercial success or lack of commercial success of processes covered by the patent; (4) unexpected results achieved by the invention; (5) praise of the invention by others skilled in the art; (6) taking of licenses under the patent by others; and (7) deliberate copying of the invention. I also understand that there must be a relationship or nexus between any such objective considerations and the claimed invention. I am aware of no such evidence relevant to this case. If any such evidence is introduced by the Patent Owner, I reserve the right to consider that evidence at such time. I further understand that contemporaneous and independent invention by others is an objective consideration supporting an obviousness determination.

51. I understand that an obviousness evaluation can be based on a combination of multiple prior art references. I understand that the prior art references themselves may provide a suggestion, motivation, or reason to combine, but other times the nexus linking two or more prior art references may be the background knowledge of one of ordinary skill or simple common sense. I further understand that an obviousness analysis recognizes that market demand, rather than scientific literature, often drives innovation, and that a motivation to combine references may be supplied by the direction of the marketplace.

52. I understand that if 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 his or her skill.

53. I also understand that practical and common-sense considerations should guide a proper obviousness analysis, because familiar items may have obvious uses beyond their primary purposes. I further understand that a person of ordinary skill in the art looking to overcome a problem will often be able to fit the teachings of multiple publications together like pieces of a puzzle, although the prior art need not be like two puzzle pieces that must fit perfectly together. I understand that obviousness analysis therefore considers the inferences and

creative steps that a person of ordinary skill in the art would employ under the circumstances.

54. I understand that a particular combination may be proven obvious by showing that it was obvious to try the combination. For example, when there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp because the result is likely the product not of innovation but of ordinary skill and common sense.

55. I understand that the combination of familiar elements according to known methods may be proven obvious when it does no more than yield predictable results. When a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one. If a person of ordinary skill can implement a predictable variation, obviousness likely bars its patentability.

56. It is also my understanding that there are additional considerations that may be used as further guidance as to when a claim is obvious, including the following:

- the claimed invention is a simple substitution of one known element for another to obtain predictable results;

- the claimed invention uses known techniques to improve similar devices or methods in the same way;
- the claimed invention applies a known technique to a known device or method that is ready for improvement to yield predictable results; and
- there existed at the time of invention a known problem for which there was an obvious solution encompassed by the patent's claims.

57. It is further my understanding that a proper obviousness analysis focuses on what was known or obvious to a person of ordinary skill in the art, not just the patentee. Accordingly, I understand that any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed.

58. I understand that a claim can be obvious in light of a single reference, without the need to combine references, if the limitations of the claim that are not found explicitly or inherently in the reference can be supplied by the common sense of one of skill in the art.

59. I understand that a person of ordinary skill could have combined two pieces of prior art or substituted one prior art element for another if the substitution can be made with predictable results, even if the swapped-in element is different from the swapped-out element. In other words, the prior art need not be like two puzzle pieces that must fit together perfectly. The relevant question is whether

prior art techniques are interoperable with respect to one another, such that that a person of skill would view them as a design choice, or whether a person of skill could apply prior art techniques into a new combined system.

60. In sum, my understanding is that prior art teachings are properly combined where a person of ordinary skill in the art having the understanding and knowledge reflected in the prior art and motivated by the general problem facing the inventor, would have been led to make the combination of limitations recited in the claims. Under this analysis, the prior art references themselves, or any need or problem known in the field of endeavor at the time of the invention, can provide a reason for combining the limitations of multiple prior art references in the claimed manner.

61. I have been informed and understand that the obviousness analysis requires a comparison of the properly construed claim language to the prior art on a limitation-by-limitation basis.

62. I understand that in an *inter partes* review obviousness must be shown by a preponderance of the evidence.

D. Level of Ordinary Skill in the Art

63. I understand that a person of ordinary skill in the relevant art (“POSITA”) is presumed to be aware of all pertinent art, thinks along conventional wisdom in the art, and is a person of ordinary creativity—not an automaton.

64. I have been asked to consider the level of ordinary skill in the field that someone would have had at the time the claimed invention was made. In deciding the level of ordinary skill, I considered the following:

- the levels of education and experience of persons working in the field;
- the types of problems encountered in the field; and
- the sophistication of the technology.

65. My opinion below explains how a POSITA would have understood the technology described in the references I have identified herein around the March 2015 timeframe.

66. As of the earliest claimed priority date, a 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-based object tracking, location-based-services, and/or geofencing. Additional education could compensate for less practical experience and vice versa.

IV. The '116 Patent

A. Overview of the '116 Patent

67. The '116 Patent is titled “Polygon shaped vehicle restriction zones.” 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.

68. 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.

69. Claim 1 is the only independent claim, and recites the following:

1. A method for supporting a vehicle restriction region, comprising:

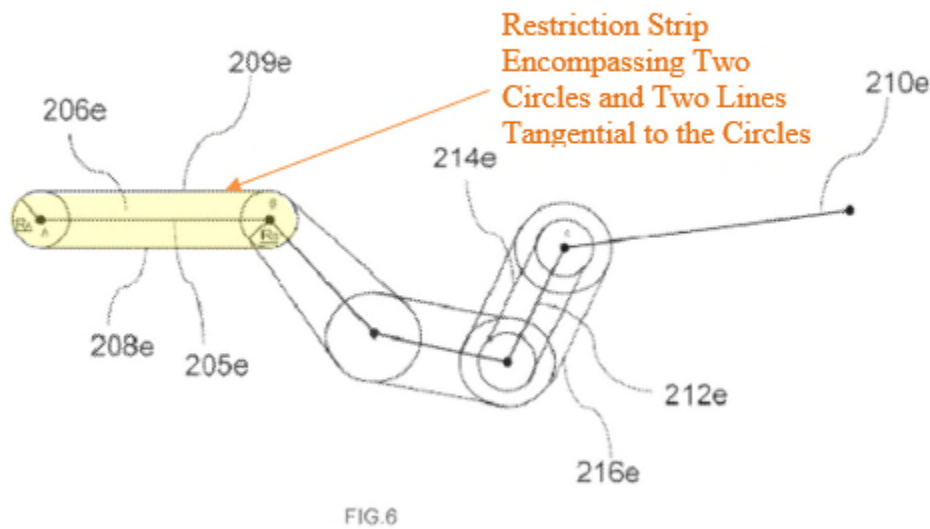
receiving, via one or more processors, two or more points associated with the restriction region;

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, the one or more restriction strips defining at least a portion of the restriction region, 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; and

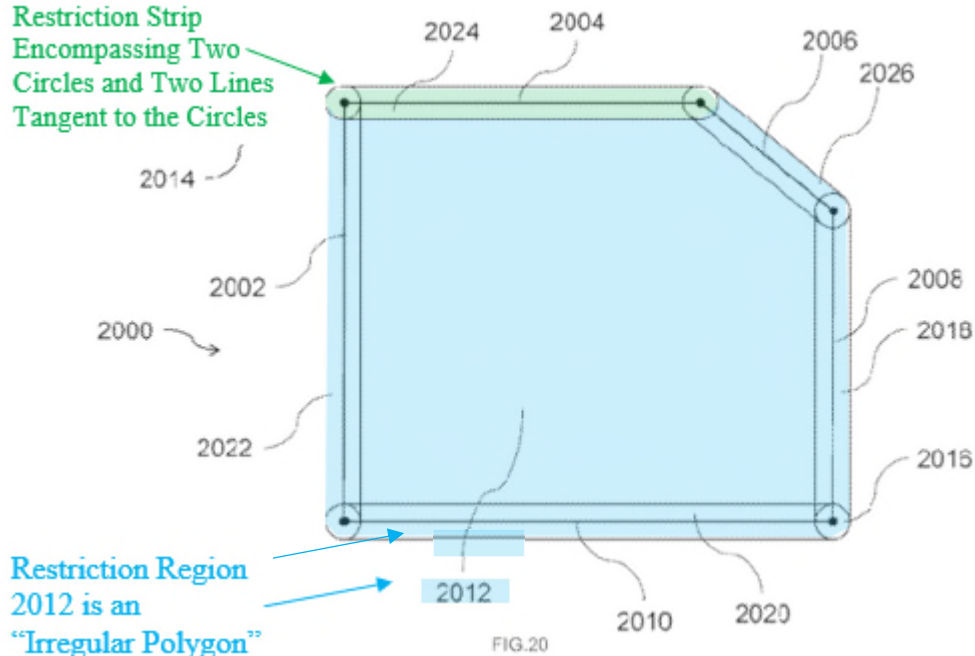
automatically causing a ground vehicle to undertake one or more response measures based on at least one of a location or a movement characteristic of the ground vehicle relative to the restriction region.

70. 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:



71. EX1001, 21:65-67 (“FIG. 6 provides a flight restriction zone defined by a plurality of flight restricted strips (also referred to herein as flight restriction strips).”); 23:19-22 (“In some embodiments, a flight-restricted strip may be defined by two circles each with respective radius R_1 and R_2 and each respectively centered at two end points of the flight restriction line”).

72. 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 (“FIG. 20 illustrates an irregular polygon area defined by a plurality of flight restricted strips”). 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.

73. [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. Prosecution History of the '116 Patent

74. The continuation application that led to the issuance of the '116 Patent was filed along with a Track One request for prioritized (one-year) examination on November 10, 2021. EX1002, 360. The Examiner granted the request for prioritized examination in an action dated January 4, 2022. EX1002, 332.

75. 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.

76. In response to the Office Action, the Patent Owner responded on March 29, 2022, to amend independent Claim 1 to recite the allowable subject matter previously recited in Claim 4:

1. A method for supporting a vehicle restriction region, comprising:

receiving, via one or more processors, two or more points associated with the restriction region;

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, the one or more restriction strips defining at least a portion of the restriction region, **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;** and

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.

EX1002, 113. Claim 4 was canceled and then-pending Claims 5-7 were also amended to depend from independent claim 1. *Id.* at 114. The Examiner responded to this amendment by issuing a notice of allowance on June 1, 2022, and the patent issued on October 4, 2022. EX1002, 1-2.

77. 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 specific geometric shape recited in the amendment above (which amounts to 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 for over twenty years prior to the earliest conceivable priority date of the '116 Patent. *See* Section VIII.A.5, *infra* (citing EX1004, FIG. 7B-7C; 10:49-11:9). In

my opinion, if the Examiner had the benefit of the art presented in this petition, Petitioner submits that Claim 1 as amended above would never have been allowed.

V. The Challenged Claims

78. The '116 Patent has 23 claims. I understand that Petitioner is challenging the patentability of Claims 1-23 of the '116 Patent in the Petition for *Inter Partes* Review. I have considered the patentability of Claims 1-23.

VI. Claim Construction

79. For the purposes of the particular grounds of patentability in this petition, I have been instructed that the challenged claims of the '116 Patent are to be given their ordinary and customary meaning as understood by one of ordinary skill in the art at the time of the invention in light of the specification and the prosecution history pertaining to the patent. I have followed these principles in my analysis set forth in this document.

VII. Overview of the Prior Art and Grounds of Unpatentability

A. Summary of the Grounds

80. Below I will explain why all claims of the '116 patent are anticipated or rendered obvious by the disclosures of Humphries (EX1004), Sheha (EX1005), Jin (EX1006), Putz (EX1007), and/or Borugian (EX1008). I note that in this discussion, I may focus on the particular language in specific claims, but it should be understood that my analysis applies to the corresponding limitations of all claims containing identical or substantially identical language. The grounds of unpatentability I present below are as follows:

- **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** – Claim 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.

B. Overview of the Prior Art Used in the Grounds

1. Overview of Humphries (EX1004)

81. 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.

82. 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, at 13-15.

83. Humphries goes on to describe that the "coordinates that define the geofence boundaries [may] compris[e] a combination of circles and polygons." EX1004, 2:36-38. Geofences can be created by a user of a mapping application, who can "create geofence object(s) that can be associated with the tracked devices 120 (e.g., associated with a vehicle such as an automobile, truck or the like)." EX1004, 4:26-32; *see* 5:18-29. Once the user creates the geofence objects, "the

mapping application 150 resolves the boundaries into a set of coordinates (e.g., latitude and longitude).” EX1004, 5:30-33. Humphries recognizes that geofences (i.e., restriction regions) can be of any arbitrary geometric shape including circles, polygons, ellipses, and even 3-D objects. EX1004, 7:13-16; 7:23-26.

84. 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.

85. 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:

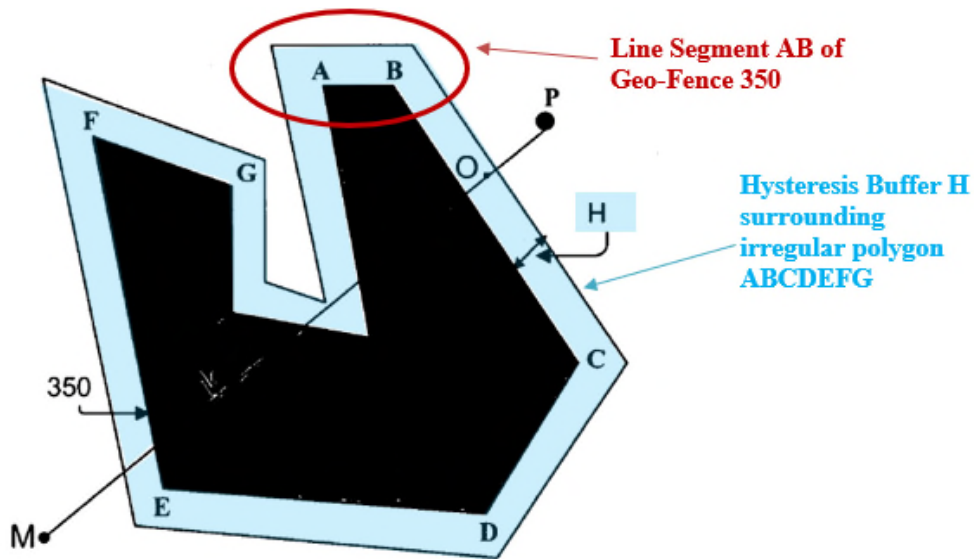


FIG. 7B

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**. 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.

86. 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, at 113. As seen below in reproduced and annotated to include the circles described in the specification Figure 7C, 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, 11:1-9. For example, the disclosure of Humphries discloses that the “buffer area is determined as if each of the endpoints is the center of a circle with radius H.” EX1004, 11:4-9. Thus, the circle annotations depict the express disclosure of Humphries.

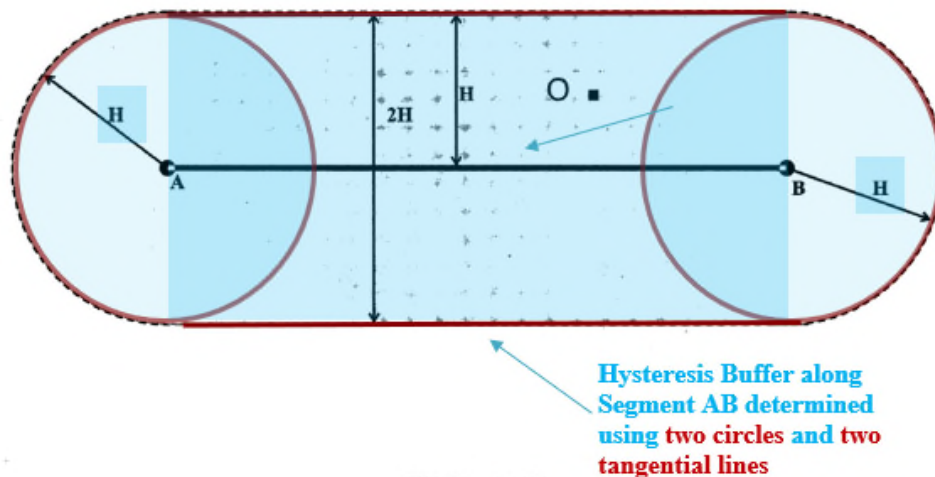


FIG. 7C

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.

2. Overview of Sheha (EX1005)

87. 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.

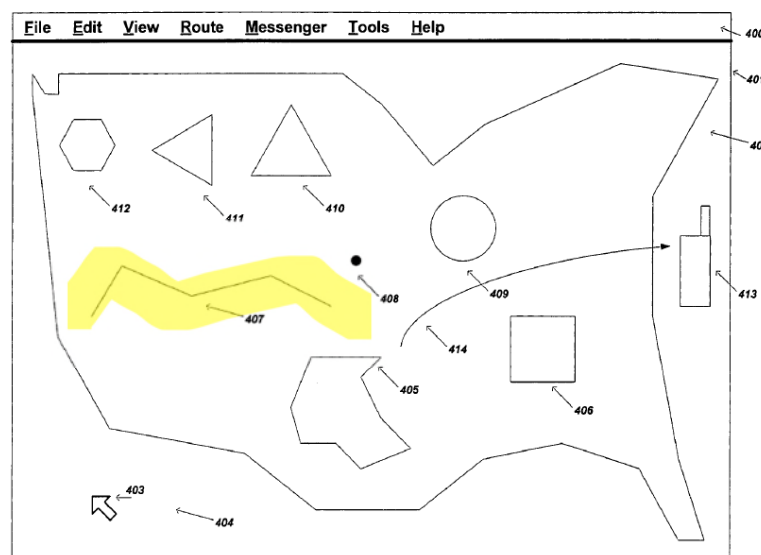


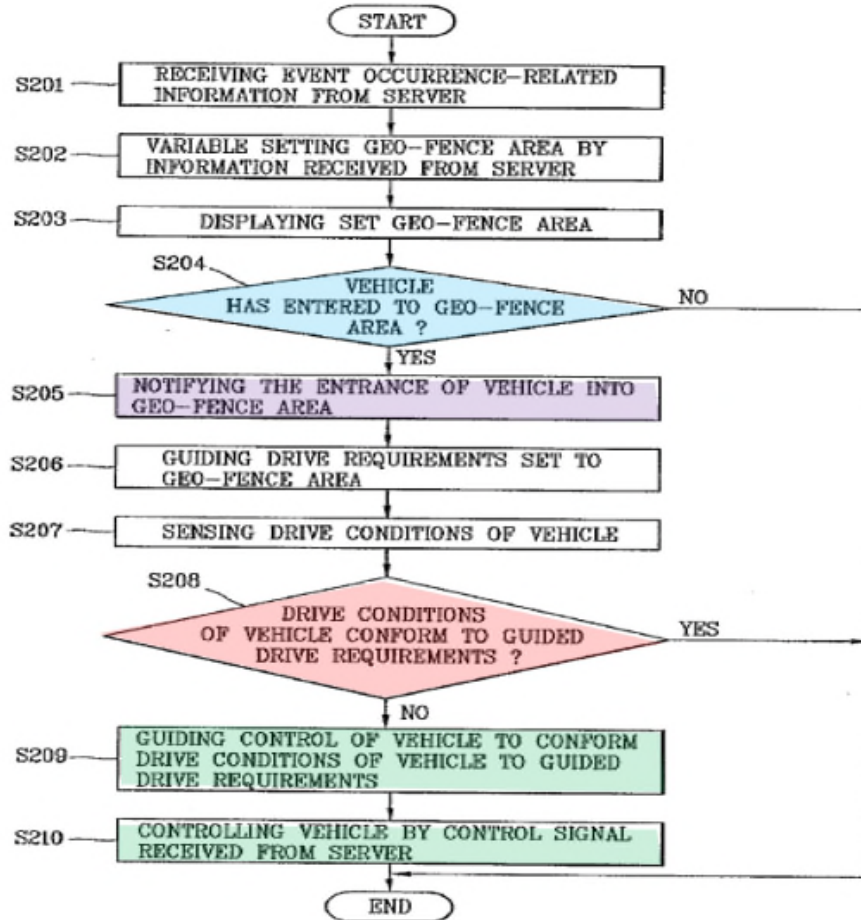
FIG. 4

88. 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).

3. Overview of Jin (EX1006)

89. 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



90. As shown above, Jin teaches that in response to determining that a vehicle has entered a geofence area (S204), controller may “notify such information through the output unit 160” (S205). EX1006, [0126]. More specifically, 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]. For example, if the geofenced area includes a “preset maximum speed” (EX1006, [0099]-[0100]), an alert can inform the passenger, “do not exceed 55 miles per hour” (EX1006, [0106]).

91. 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. “For instance, the audio output module 162 may output a voice message for guiding a control of the vehicle so as to meet the drive requirements, saying . . . “slow down, please.” EX1006, [0109]. Or, the “vehicle may perform a control operation under the control of controller 190. The control operation may include an increase or decrease of a drive speed.” EX1006, [0101].

4. Overview of Putz (EX1007)

92. Putz discloses a predictive geofence system that “predicts a geofence crossing” by a tracked object. EX1007, at 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.

93. Putz discloses an example embodiment (shown in Fig. 2) in which a geofence 204 is set up 60 miles around Memphis, Tennessee. EX1007, 3:35-37.

Figure 2 is reproduced below (with highlighting added to geofence 204):

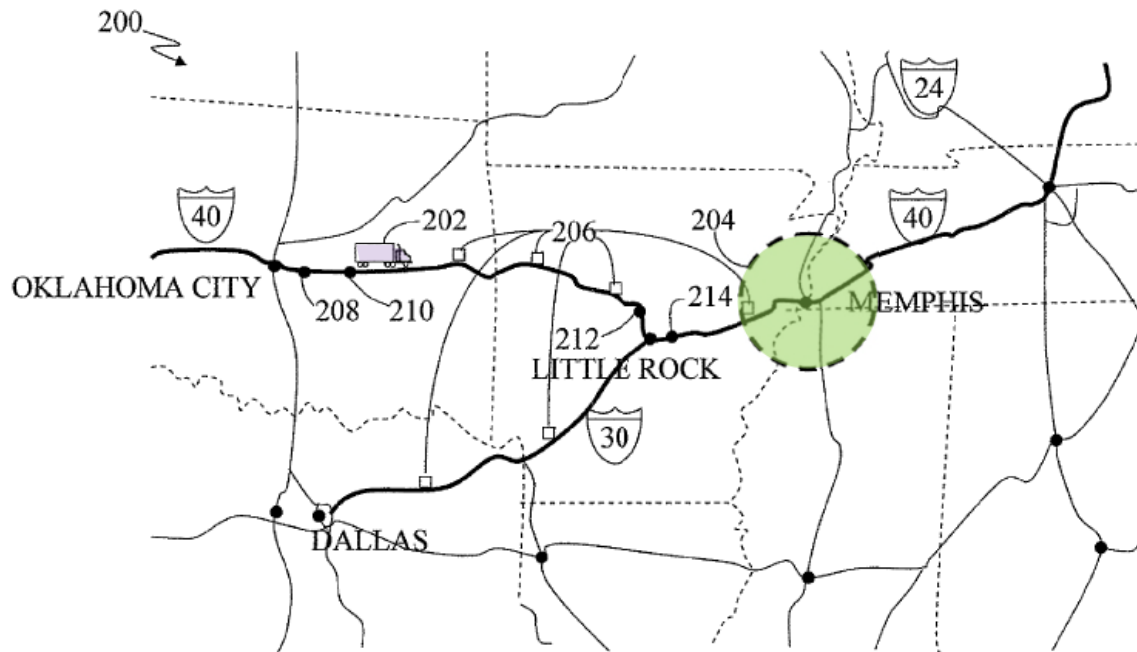


FIG. 2

94. Putz goes on to describe that its system predicts when vehicles (such as conveyance 202) will cross the geofence 204, using the vehicle's velocity, direction, speed, and predicted line of travel towards the geofence. EX1007, 3:35-4:28.

5. Overview of Borugian (EX1008)

95. 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 (disclosing an “interactive monitoring system that detects conditions that indicate unauthorized vehicle usage and provides for a response to the detected conditions that assures the usage is not unauthorized or shuts the vehicle down.”). 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). Borugian determines whether the driver has deviated from a planned route (or has entered or *is approaching* a restricted area) using “a global positioning system.” EX1008, 2:61-65; 4:3-6. At the time of the alleged invention, a POSITA would have recognized Borugian’s route and perimeter adherence techniques to be describing techniques for controlling vehicles using geofences. For example, the Abstract itself of Borugian states “[a] method and apparatus for detecting conditions that indicate unauthorized usage of a vehicle and for responding to the conditions that indicate the vehicle is being used in an unauthorized or unintended way,” which would indicate to a POSITA that the techniques described therein are applicable to monitoring vehicles and taking responsive action similar to the disclosure of Humphries. EX1008, Abstract.

96. 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.

VIII. Asserted Grounds 1(a) and 1(b) of Invalidity: Claims 1-8, 10-12, 15-19, 22, and 23 are unpatentable as 1(a) Anticipated OR 1(b) Obvious over Humphries.

97. Based on the following analysis, I conclude that a POSITA at the relevant time would have understood the limitations of claims 1-8, 10-12, 15-19, 22, and 23 of the '116 patent was expressly disclosed, described, or taught by Humphries. To the extent, an argument is made with reference to a particular element as not being “expressly” disclosed, I conclude that a POSITA at the relevant time would have found that element obvious.

A. Claim 1

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

98. To the extent the preamble is limiting, Humphries discloses [1p]. 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 software in which 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*.”).

99. 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*.” EX1004, 1:44-50; 5:23-25; EX1004, 5:30-34. Humphries describes that a geofence object “is one or 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.

100. Figure 2 illustrates **geofenced objects 220** (annotated below **red**), which represent a region of a map to which fleet vehicles may be confined: EX1004, 7:1-3 (“The mapping window 215 shows the current **geofence objects 220** that are associated with the highlighted vehicle”).

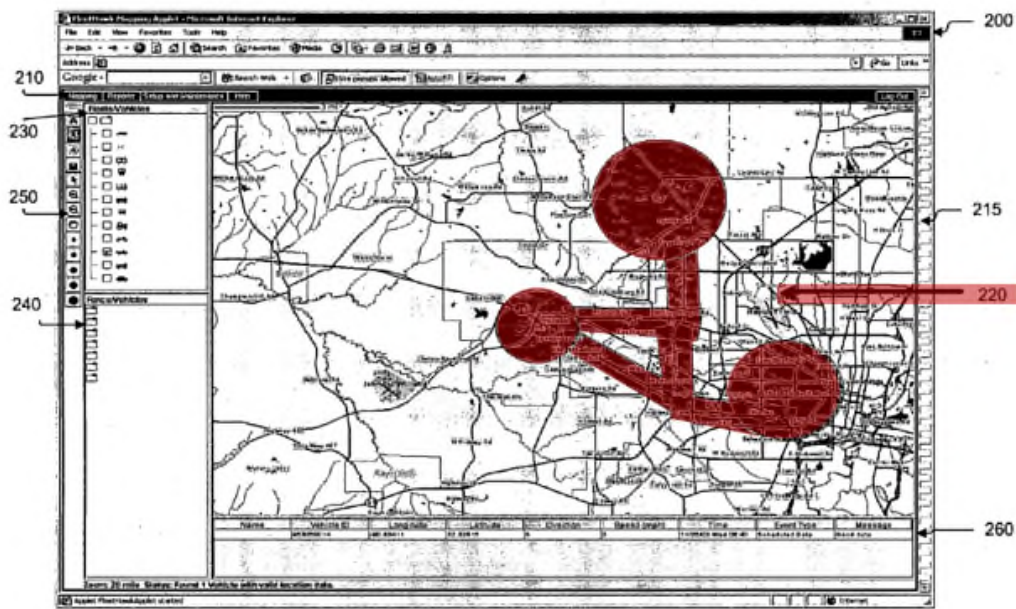


FIG. 2

101. 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.

102. 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

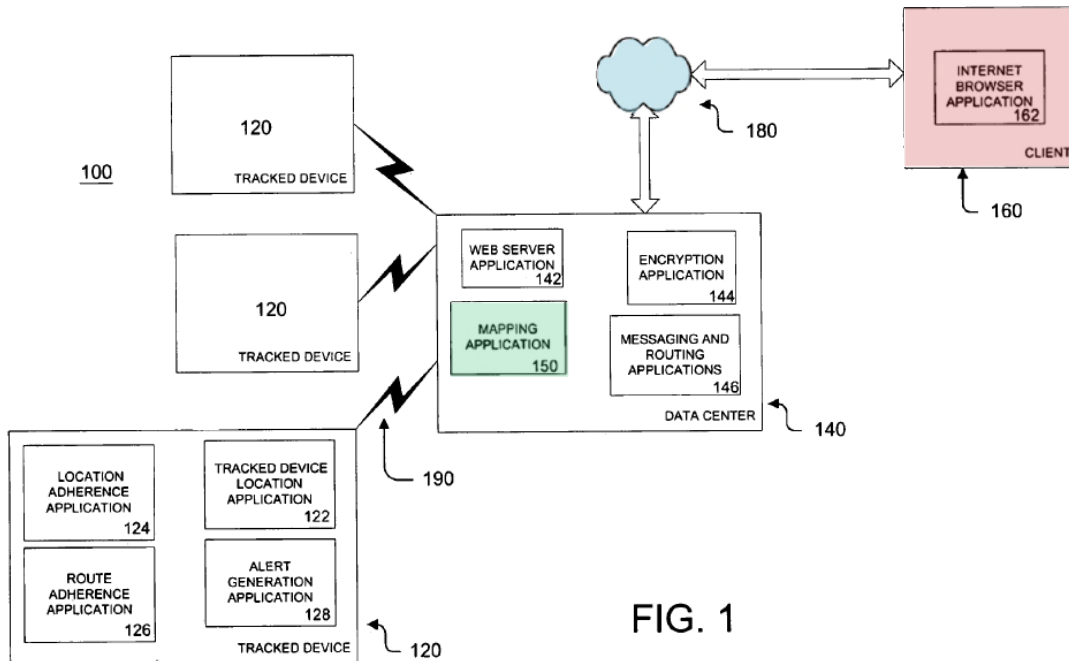
hardware . . . to generate and transmit an alert to data center 140 when either the location adherence application 124 or the route adherence application 126 determines that an alert should be sent.” EX1004:6:16-21. Accordingly, Humphries’ geofenced objects disclose the claimed “vehicle restriction region.”

103. Accordingly, Humphries teaches the limitations of Claim 1[p].

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

104. 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. Humphries discloses (or renders obvious) that this is performed via one or more processors. 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.

105. 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**):



106. 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.

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

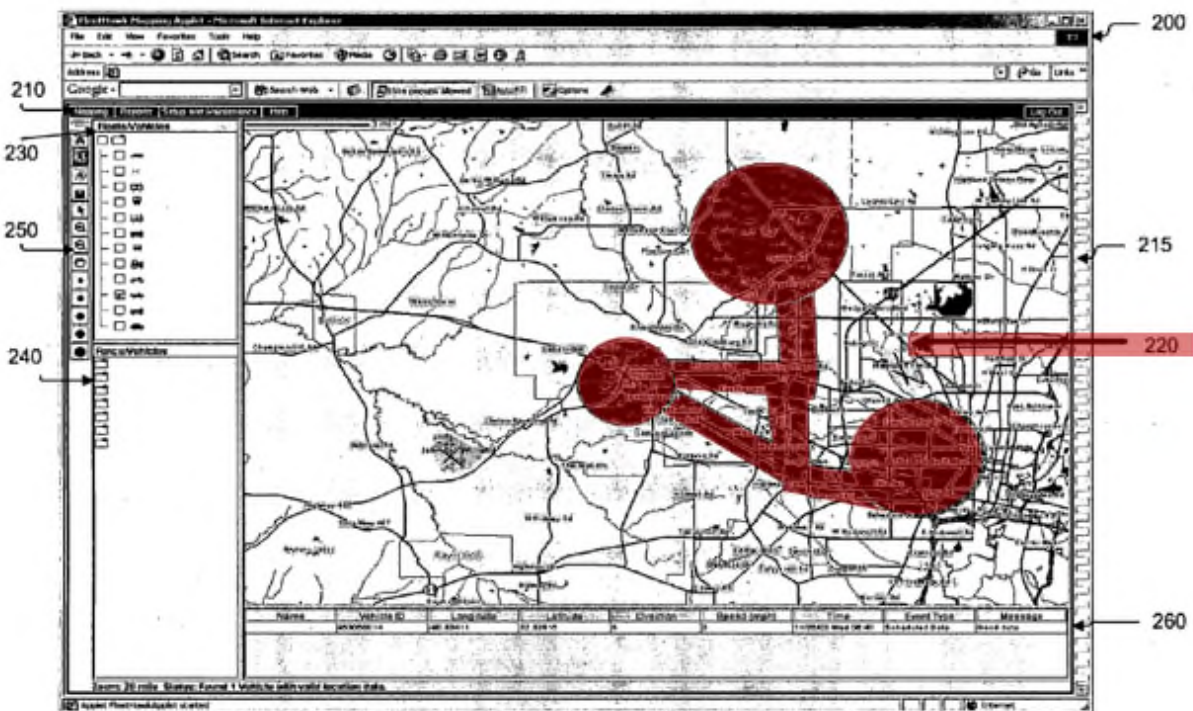


FIG. 2

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”).

108. “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”).

109. Humphries further discloses that these coordinates are also 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, at 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).

110. 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 to a POSITA 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 (“it is to be appreciated that any of the various applications or components described above can be located on one or servers or processors within a distributed network, such as a local area network, a wide area network, a telecommunications network, a dedicated network, an intra net and/or the internet, or within a dedicated secure or unsecured system.”). 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.

111. To the extent that it is argued that the disclosure does not expressly say that this operation is performed by the processor, a POSITA would certainly have found it obvious. 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. 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). 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. *See id.* 12:14-51; 4:43-45 (“it is to be appreciated that any of the various applications or components described above can be located on one or servers or processors”).

112. 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*”).

113. 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:

Figs. 7B, 7C, 10:49-11:17; 12:14-51. Humphries discloses (or renders obvious) that this is performed via the one or more processors. The term “restriction strip” is not a term of art that would have been known to a POSITA, and thus the applicant for the ‘116 Patent has acted as their own lexicographer in utilizing that term. Because of Humphries discloses particular examples of restrictions strips that are the same as examples provided in the ‘116 Patent, no claim construction of the term “restriction strips” was needed for me to reach my opinions about the disclosure of such restriction strips in Humphries. EX1001, 4:7-15; 21:65-67; 22:58-61; 23:4-18; 25:12-13; 25:27-30; 29:3-7; 29:63-30:12.

117. Furthermore, tracked device 120 generates these hysteresis buffers (i.e., 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). 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 for at least these reasons and the reasons described with reference to claim element 1[a]. See *Supra* VIII.A.2.

118. To the extent that it is argued that the disclosure does not expressly say that this operation is performed by the processor, a POSITA would certain have

found it obvious. 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. For example, a POSITA would understand in view of the specification that the generation of the “hysteresis buffer” would be performed by one or more computers or processors having instructions that allow for such operations at least because it was well-known to use processors to execute software stored in the memory of the computer at the time of filing.

119. 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” 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.):

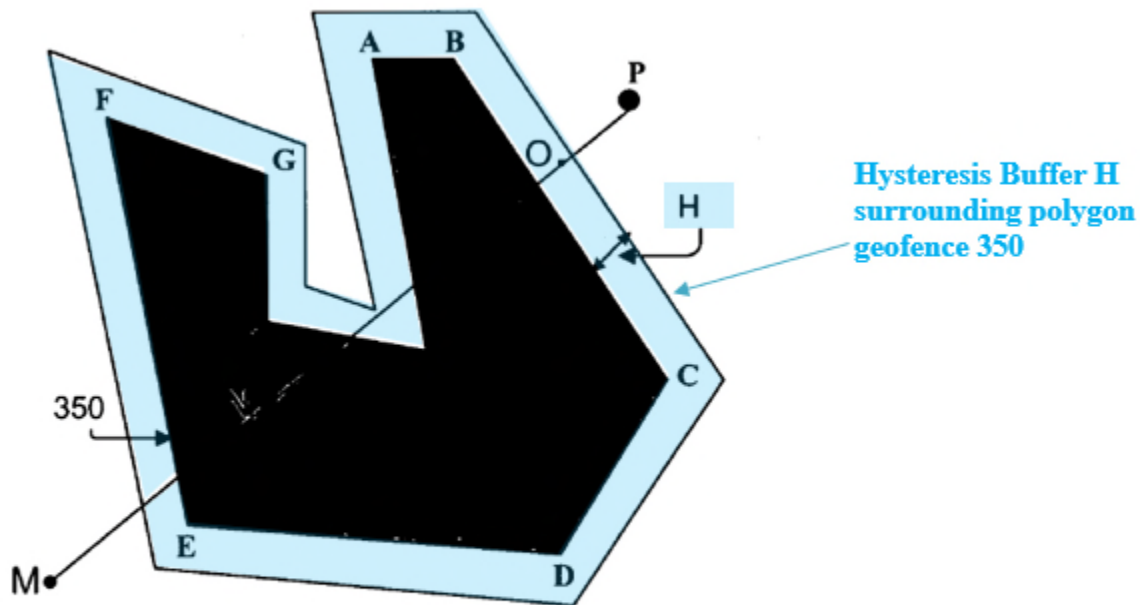


FIG. 7B

120. 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)”.

121. 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).

122. Accordingly, Humphries teaches (or at least renders obvious) the limitations of Claim 1[b].

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

123. 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.

124. 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):

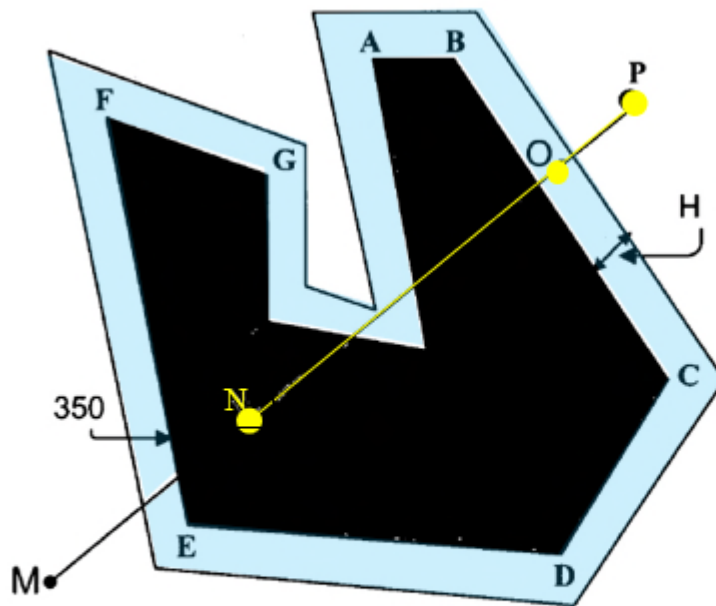


FIG. 7B

125. 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, at 11:13-17.

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

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**

127. As noted above in Sections IV.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].

128. As explained above in element [1b], Humphries’ hysteresis buffer discloses the claimed “restriction strip(s).” See Section [1b], above. 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:

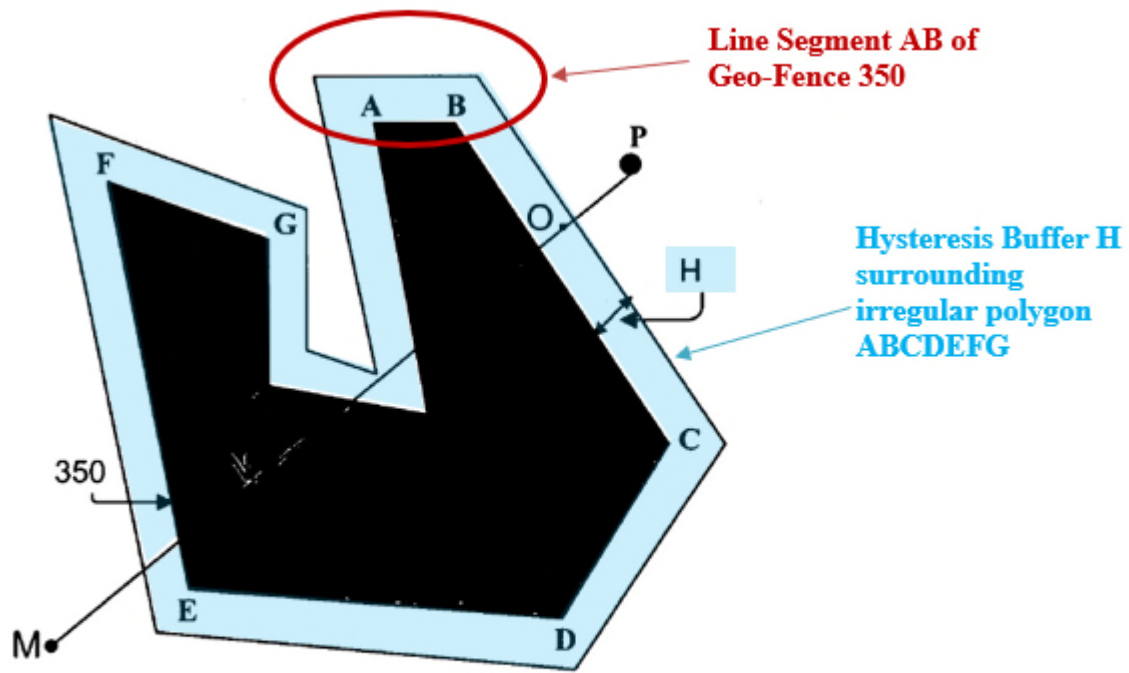


FIG. 7B

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

129. 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:

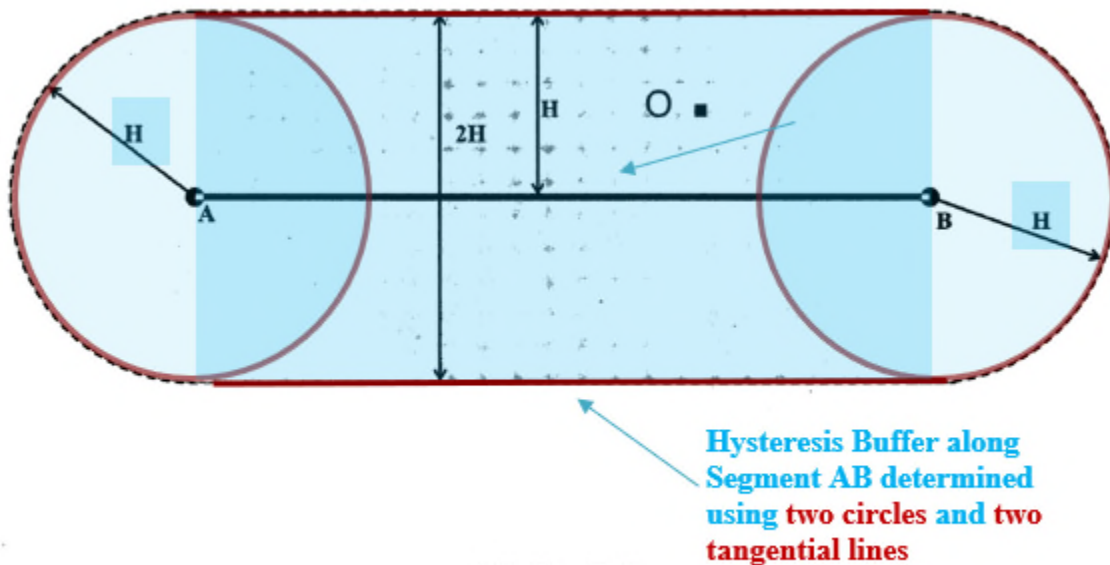


FIG. 7C

130. 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.

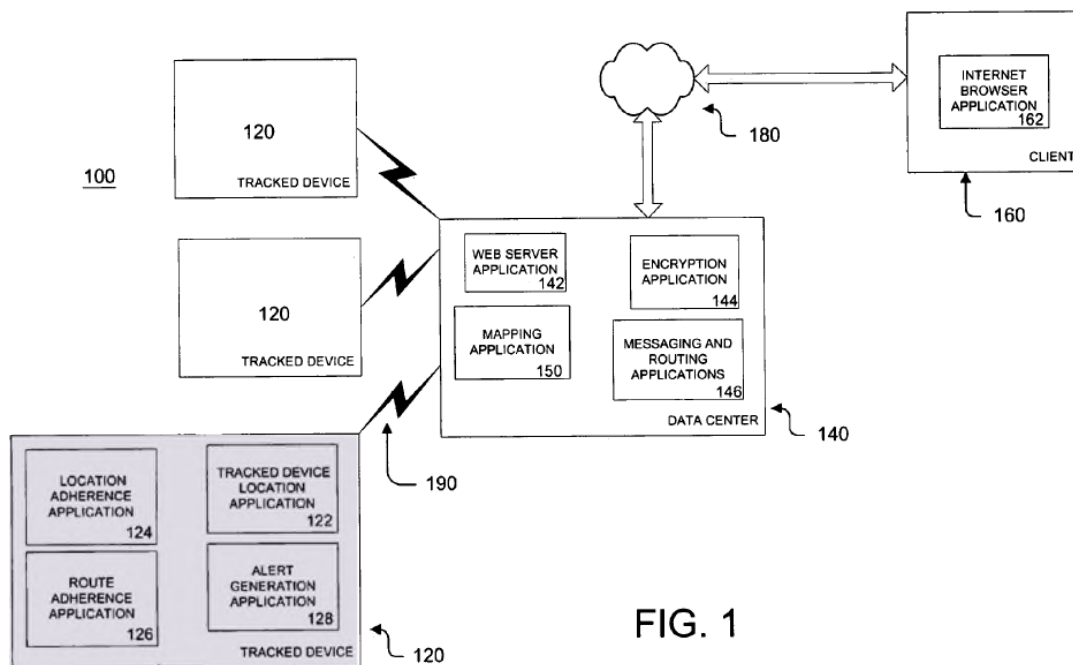
131. Accordingly, Humphries discloses the limitations of [1d], which formed the basis of the allowance of the '116 Patent.

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**

132. 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, at 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).

133. 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**:



134. 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, at 3:33-39. Humphries thus discloses automatically generating an alert from the tracked device if it has crossed a geofence boundary.

135. 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, at 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, at 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, at 11:13-17; see Section [1d] above.

136. Automatically causing the tracked device to send an “alert” based on its location relative to a geofenced object discloses the requirements of element [1f],

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. *see* EX1001, Claim 18 (expressly claiming that the claimed “responsive measures” include “providing an alert” as one such measure).

137. Accordingly, Humphries teaches (or at least renders obvious) the limitations of Claim 1[e] and thus Claim 1 as a whole.

B. Claim 2

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

138. 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.”).

139. Accordingly, Humphries teaches (or at least renders obvious) the limitations of Claim 2.

C. Claim 3

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

140. Humphries discloses that the points correspond to coordinate information of the boundary. See Element [1a], above. 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.

141. Accordingly, Humphries teaches (or at least renders obvious) the limitations of Claim 3.

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.

142. 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], 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. 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):

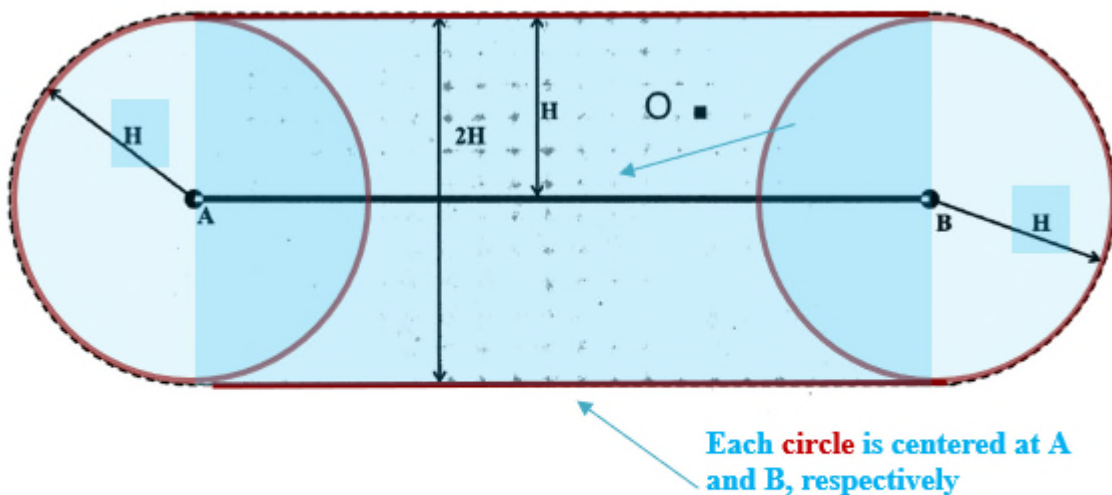


FIG. 7C

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.

143. Accordingly, Humphries teaches (or at least renders obvious) the limitations of Claim 4.

E. Claim 5

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

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

145. Accordingly, Humphries teaches (or at least renders obvious) the limitations of Claim 5.

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.**

146. 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, at 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.”).

147. Accordingly, Humphries teaches (or at least renders obvious) the limitations of Claim 6.

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.**

148. 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, at 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.”).

149. Accordingly, Humphries teaches (or at least renders obvious) the limitations of Claim 7.

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.**

150. 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. 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.* Humphries thus discloses that the hysteresis buffer should be larger to or equal to a minimum width sufficient to avoid erroneous alert messages.

151. Accordingly, Humphries teaches (or at least renders obvious) the limitations of Claim 5.

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.**

152. *See* Element [1d], above. 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, *see* EX1004, 21:19-20).

153. Accordingly, Humphries teaches (or at least renders obvious) the limitations of Claim 10.

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.**

154. See Element [1d] above. Humphries teaches (or renders obvious) 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, at 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 that the hysteresis buffers for two line segments that share a common endpoint would overlap.

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

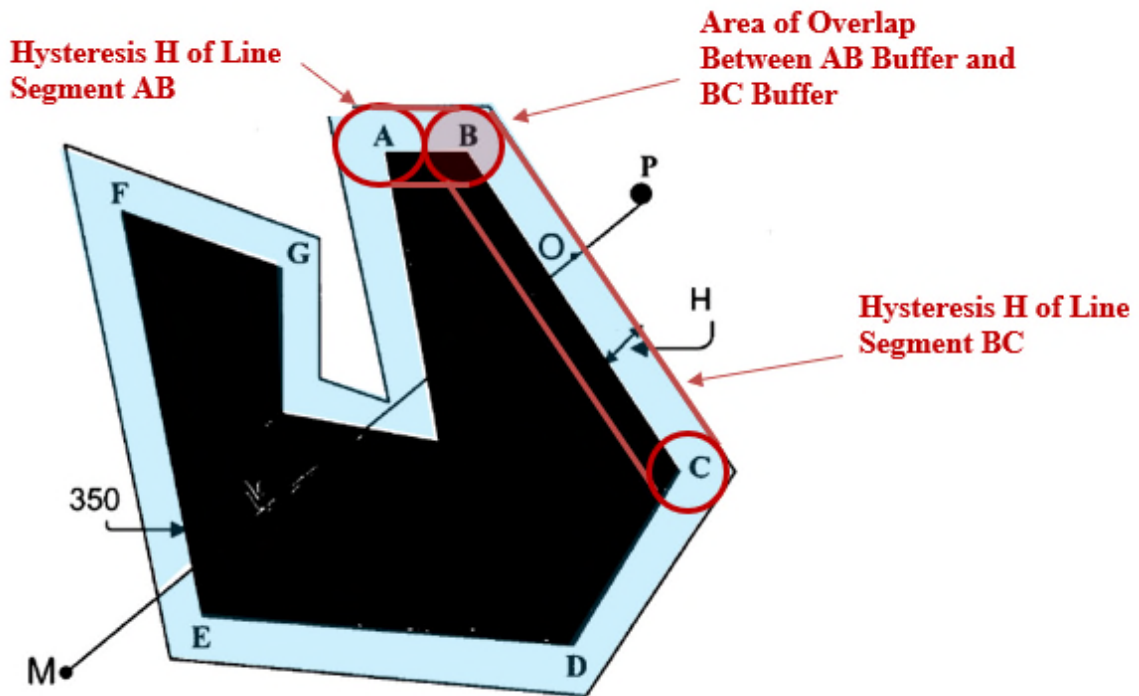


FIG. 7B

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. 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. 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.

156. 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.**

157. 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). EX1004, at 3:33-39; 5:39-44; 6:2-5; 6:12-15; 6:18-32; 11:13-17.

158. Accordingly, Humphries teaches (or at least renders obvious) the limitations of Claim 12.

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.

159. 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."*).

160. 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):

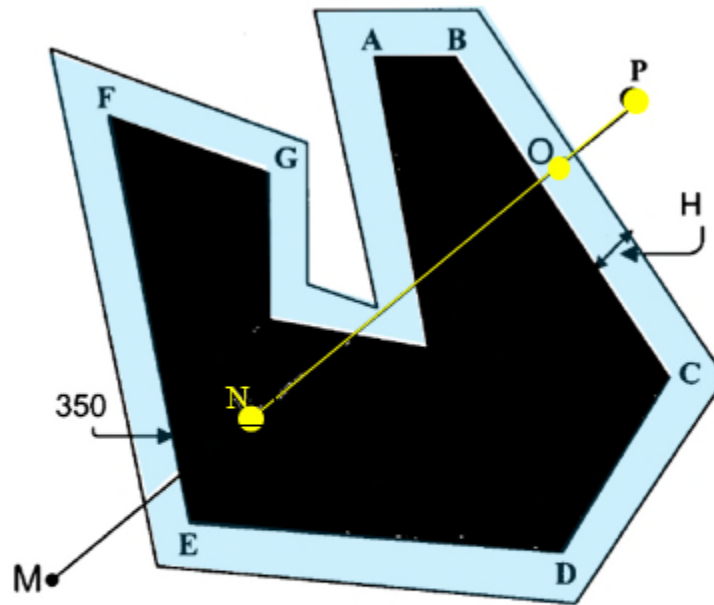


FIG. 7B

161. 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, at 11:13-17.

162. 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).

163. Accordingly, Humphries teaches (or at least renders obvious) the limitations of Claim 15.

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.**

164. See Element 1[e], *above*. Humphries discloses (or renders obvious) 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. 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, at 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, at 6:12-15.

165. 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, at 11:13-17.

166. To the extent it is (incorrectly) argued that Claim 16 requires determining which of *more than one* responsive measures 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, depending on the design considerations and goals of the geofence. *See* Section X.D (Ground 3), *infra*. Accordingly, Humphries teaches (or at least renders obvious) the limitations of Claim 16.

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.

167. Humphries discloses calculating a 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.** It is my understanding from counsel that 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. Humphries discloses at least “*calculating a distance for the ground vehicle to begin to experience a response measure*” as recited by Claim 17.

168. 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:

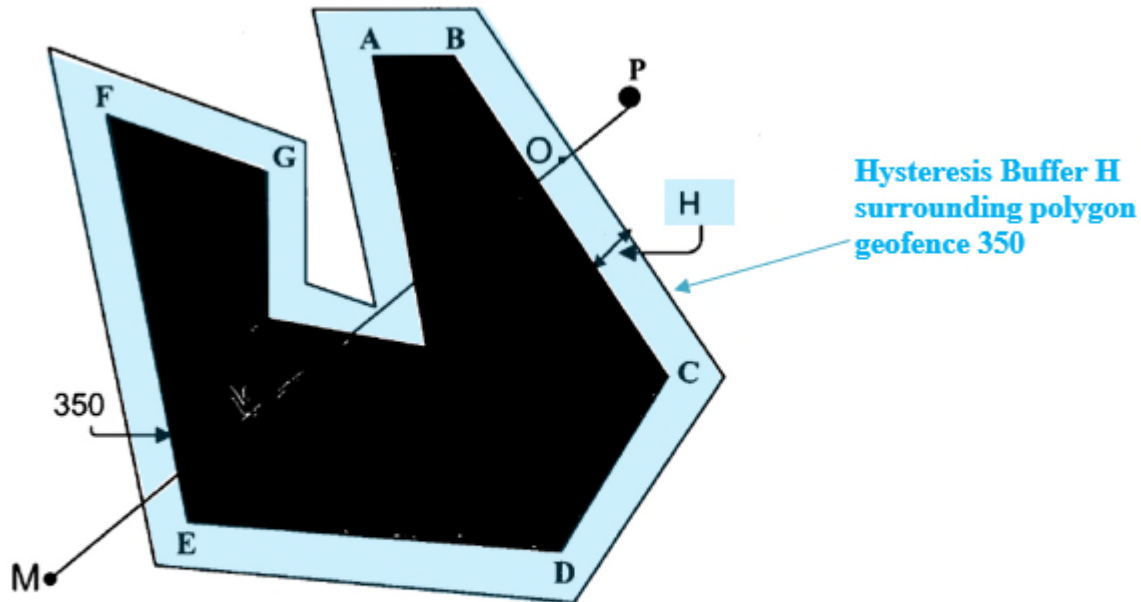


FIG. 7B

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

169. 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. 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, at 11:13-17.

170. Accordingly, the initial response to crossing the geo-fence (e.g., at 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. 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.

171. Accordingly, Humphries teaches (or at least renders obvious) the limitations of Claim 17.

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.**

172. See Element [1e], above. Humphries discloses at least one of the options set forth by Claim 18, rendering the entire Markush group invalid. Specifically, Humphries discloses “providing an alert” regarding the ground vehicle. See Element 1[e]; EX1004, at 3:33-39; 5:39-44; 6:2-5; 6:12-15; 6:18-32; 11:13-17.

173. Accordingly, Humphries teaches (or at least renders obvious) the limitations of Claim 18.

P. Claim 19

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

174. *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).

175. Accordingly, Humphries teaches (or at least renders obvious) the limitations of Claim 19.

Q. Claim 22

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

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

177. Accordingly, Humphries teaches (or at least renders obvious) the limitations of Claim 22.

R. Claim 23

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

178. See Element [1a] above. Humphries discloses (or renders obvious) that mapping application 150 displays “drawing window 250 to create geofence objects in the mapping section 210.” EX1004, at 7:4-6. Humphries discloses that any geofenced object can be created according to “the user’s desires.” EX1004, at 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.

179. To the extent that it is (incorrectly) argued that this element is not expressly discloses, 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. EX1008, at 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, at 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 obvious to the POSITA to use mapping application 150 to create geofences that correspond to man-made features. For example, Figure 2 of Humphries is a user interface display provided when accessing the mapping application of the present invention that displays a map depicting a city, including city streets and highways. EX1004, Figure 2. A POSITA would have readily understood that such a city is a man-made feature, at least the structures (such as roads, houses, business, and other infrastructure) that have been built on the natural land on which the city is situated. Moreover, a POSITA would recognize that certain man-made features such as the White House would create a desired amount of security around that feature, thus a POSITA would readily apply the techniques of the prior art to geofences corresponding to that man-made feature such as the White House. Therefore, 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.

180. Accordingly, Humphries teaches (or at least renders obvious) the limitations of Claim 22.

IX. Asserted Ground 2 of Invalidity: Claim 13 is unpatentable as obvious over Humphries in light of Sheha.

181. 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, above.

A. Rationale and Motivation to Combine Humphries with Sheha

182. Humphries discloses mapping application 150, which allows a user to create and edit geofences using drawing window 250. EX1004, at 5:18-29; 7:4-7. Humphries specifically explains that the user may draw geofences using circles, ellipses, polygons, cones, cylinders, and ellipsoids. EX1004, at 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 desired (e.g., arbitrary) shape. 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. Polygons can be used to create geofences along open boundaries such as rivers. *Id.* For similar reasons as described above with reference to claim 23, a POSITA would have understood that a geofence is best deployed when it accurately reflects whatever feature or area that the geofence is intended to either keep vehicles in or out of. For example, a POSITA would have readily understood that the geofence

would be needlessly limited or over inclusive if it was restricted to a particular shape. That is, a POSITA would understand that a rectangle is sufficient for a geofence around the White House, but a rectangle would not sufficiently or efficiently cover a geographic area such as winding river, as suggested by Sheha. Accordingly, a POSITA using ordinary skill and creativity along with the teachings in the prior art such as Sheha would have found it obvious to allow the user to define geofences of any arbitrary shape.

183. A 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. 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. 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. For example, this would have provided the ability for the tracked device to generate an alert if it crosses a state border. 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.

B. Reasonable Expectation of Success

184. 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). 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. The POSITA would have to perform no undue experimentation to reasonably expect this combination to work.

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.

185. Humphries discloses creating geofenced objects having various closed boundaries. EX1004, at 7:13-26. 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.

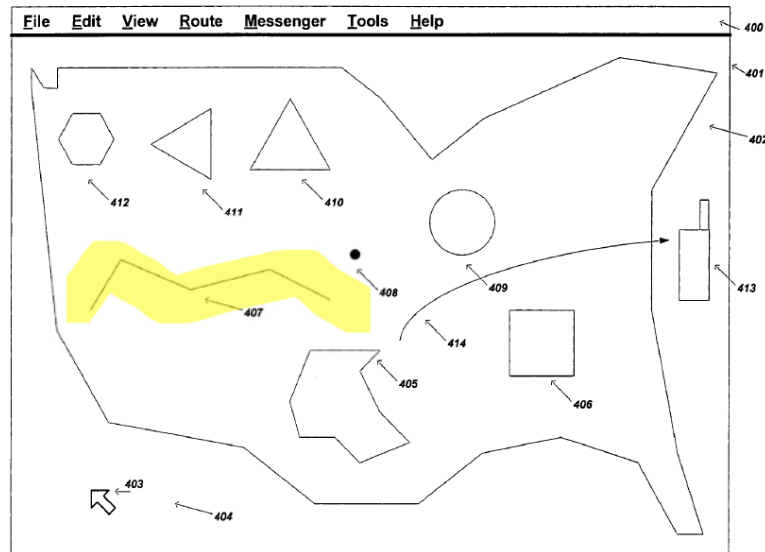


FIG. 4

186. 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.

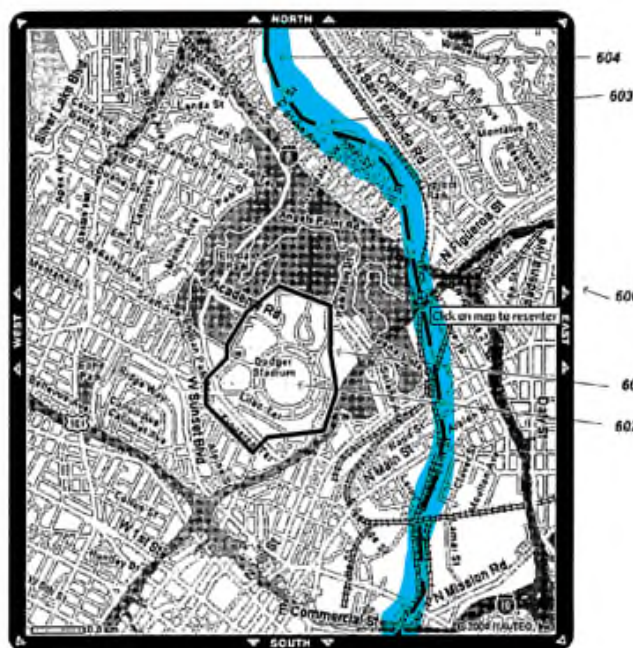


FIG. 6

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.

187. It would have been obvious to the POSITA to include the ability to draw geofenced objects corresponding to polylines in the system of Humphries. See Section X.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. Crossing the polyline by more than a hysteresis buffer, H, would thus trigger an alert according to the combined teachings of Humphries and Sheha.

188. Accordingly, Humphries and Sheha render obvious the limitations of Claim 13.

X. Asserted Ground 3 of Invalidity: Claims 14, 16, 20, and 21 are unpatentable as obvious over Humphries in light of Jin.

189. 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, above.

A. Rationale and Motivation to Combine Humphries with Jin

190. 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 be configured to 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]. 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].

191. Jin's geofence speed enforcement techniques would have been immediately recognized as an improvement to the system of Humphries' similar geofence system for tracking vehicles and ensuring route adherence. For example, Jin expressly demonstrates the benefits of speed enforcement in the example within its specification by stating, "if the geo-fence corresponds to poor road conditions by

bad weather, the drive requirements may include preventing a drive speed of the vehicle from exceeding the preset maximum speed, recommending/setting a drive type to a 4-wheel drive, and the like.” EX1006, [0099]; *see also* EX1006, [0097], [0098], [0101] The POSITA would have been motivated by Jin to improve Humphries similar system in the same way as is 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. 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), and it would have been well-within the skill of a POSITA to do so. For example, a POSITA would have understood that a vehicle that has the ability to regulate speed likely has a parameter that allows the controls of that system to regulate the speed. In such an example, a POSITA would understand that a response causing an adjustment in a magnitude of a value of the parameter would thereby implement the speed limit of the vehicle.

192. 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. 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 guide and/or control the vehicle to follow the speed limit if the maximum (or minimum) speed is violated. Humphries base system would have been predictably improved by ensuring that the fleet being monitored adhered to both their intended routes (taught by Humphries) and obeyed the speed laws within those areas (taught by Jin). Thus, the POSITA using ordinary creativity would have recognized the benefits and teaching of both Humphries and Jin and combined them with no other modifications or undue experimentation needed.

B. Reasonable Expectation of Success

193. 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. 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. 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.

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.**

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

195. 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], *above*. 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. 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].

196. 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, at [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).

197. 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, *above*.

198. Accordingly, Humphries and Jin render obvious the limitations of Claim 14.

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.**

199. As explained in Ground 1, Humphries discloses and renders obvious Claim 16. *See* Section VIII.M, *above* (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.).

200. 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. 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].

201. 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, Jin discloses that an “audio output module 162 may output a voice message for guiding a control of the vehicle so as to meet the drive requirements, saying ... ‘slow down, please,’ ... and the like.” EX1006, [0106]. That is, a POSITA would recognize that the audio alert of “slow down, please” would be in response to a speed of the vehicle, which is a movement characteristic of the vehicle. As another example, Jin discloses that a different alert message may be chosen based on the location of the vehicle. That is, Jin discloses that “the audio output module 162 may output a voice message notifying the entrance of the vehicle into the variably set geo-fence area, saying ‘you have entered an ozone alert area,’ ‘you have entered a high traffic area,’ ‘you have entered an area of poor road conditions’ or the like.” EX1006, [0103]. A POSITA would understand that this audio message would be selected from the plurality of alert messages available, in response to the system determining that a location of the vehicle was within the respective restricted region.

202. 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).

203. 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, *above*.

204. Accordingly, Humphries and Jin render obvious the limitations of Claim 16.

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.**

205. 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, at 121.

As discussed above, a POSITA would have readily understood that the alert taught by Humphries could be replaced or supplemented by the control of the ground vehicle taught by Jin. *See* Section X.A-B, above.

206. Moreover, 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. For example, at least the driver's ability to exceed the maximum speed limit is taken away when the controller determines to enforce the preset speed limits. 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* Ground 3, Claim 16, above.

207. Accordingly, Humphries and Jin render obvious the limitations of Claim 20.

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.**

208. *See* Element [20], above. 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. For example, at least the driver's ability to

command the vehicle to exceed the maximum speed limit is taken away when the controller determines to enforce the preset speed limits. 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, above.

209. Accordingly, Humphries and Jin render obvious the limitations of Claim 21.

XI. Asserted Ground 4 of Invalidity: Claim 14 Is Unpatentable as Obvious over Humphries in Light of Putz.

210. 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, above.

A. Rationale and Motivation to Combine Humphries with Putz

211. Humphries' route adherence and vehicle tracking system teaches responding to the crossing of a geofenced boundary by sending an alert to a datacenter. 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.

Indeed, Putz highlights the improvements of the predictive nature of its system. For example, Putz gives multiple examples of how the predictive alerts “may be used to help prevent undesirable circumstances” such as preventing “hazardous material from entering a high-density population area.” EX1007, 1:12-18. Thus, a POSITA would readily understand that undesirable circumstances, such as a tracked vehicle entering a sensitive area, could be prevented when the system disclosed by Putz is applied to Humphries. 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 in the future. 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), and it would have been within the skill of a POSITA to do so.

B. Reasonable Expectation of Success

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

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.**

213. Humphries in light of Putz renders at least one of the elements of Claim 14's claimed Markush group obvious, rendering Claim 14 obvious. 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, above.

214. Accordingly, Humphries and Putz render obvious the limitations of Claim 14.

XII. Asserted Ground 5 of invalidity: Claims 9, 17, and 20-21 are Unpatentable as Obvious over Humphries in Light of Borugian.

215. 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, above.

A. Rationale and Motivation to Combine Humphries with Borugian

216. Humphries' route adherence and vehicle tracking system is a known device ready for improvement. For example, Humphries discloses responding to the crossing of a geofenced boundary by sending an alert to a datacenter. 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. (EX1008, at 12:30-31; 12:61-66; 13:1-3).

217. A POSITA would have been motivated to modify Humphries to include known features and techniques provided by Borugian's vehicle tracking system to Humphries' vehicle tracking system, which would have provided the same improvements to Humphries in the same was as is taught by Borugian. 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, at 1:56-60. For example, a POSITA would understand that an

alert, although desirable in some circumstances, is not suitable in other circumstances. Indeed, Borugian explains that it is known in the prior art of monitoring a vehicles location and movement, but “[w]hat is needed is an interactive monitoring system that detects conditions that indicate unauthorized vehicle usage and provides for a response to the detected conditions that assures that the usage is not unauthorized or shuts the vehicle down,” and Borugian provides such a system. EX1008, at 1:56-60. Moreover, Borugian gives particular examples of “[r]estricted areas [that] are considered to be sensitive and should not be entered without specific authorization by the site itself” such as “1. Nuclear facilities; 2. Military posts and/or National Guard Armories 3. Water supplies 4. Oil refineries 5. Suspension bridges 6. Tunnels.” EX1008, at 13:13-25. Thus, a POSITA would understand that circumstances where potential public or private dangers may require a more significant response than a simple alert. For example, in some circumstances, such as the examples listed by Borugian, a POSITA would recognize that proactive action may be needed to be taken to enforce a restriction region that is particularly sensitive such as a region around a military base or nuclear facility. Thus, a POSITA would have been motivated to search for solutions and/or deploy ordinary creativity to modify the teachings of Humphries to deploy a more significant response measure than a simple alert. Beyond the ordinary creativity of the POSITA, which would be

sufficient, Borugian expressly teaches other response measures, and a POSITA would not have to use undue experimentation in combining the two.

218. The POSITA would have immediately recognized the benefit of Borugian's vehicle controls, including enforcing adherence of fleet vehicles to authorized routes and zones. 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. Moreover, a POSITA would have been motivated to not only shut down the vehicle if it crosses a boundary, but to do so before it crosses the boundary so that the boundary is never crossed to prevent encroachment into that sensitive area (e.g., a sensitive military base or an area that could cause damage to the vehicle if entered). 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) , and it would have been well-within the skill of a POSITA to do so.

B. Reasonable Expectation of Success

219. 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. 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. It would have taken no more than ordinary skill to successfully incorporate the additional vehicle controls and warnings taught by Borugian into the base system of Humphries.

C. Claim 9

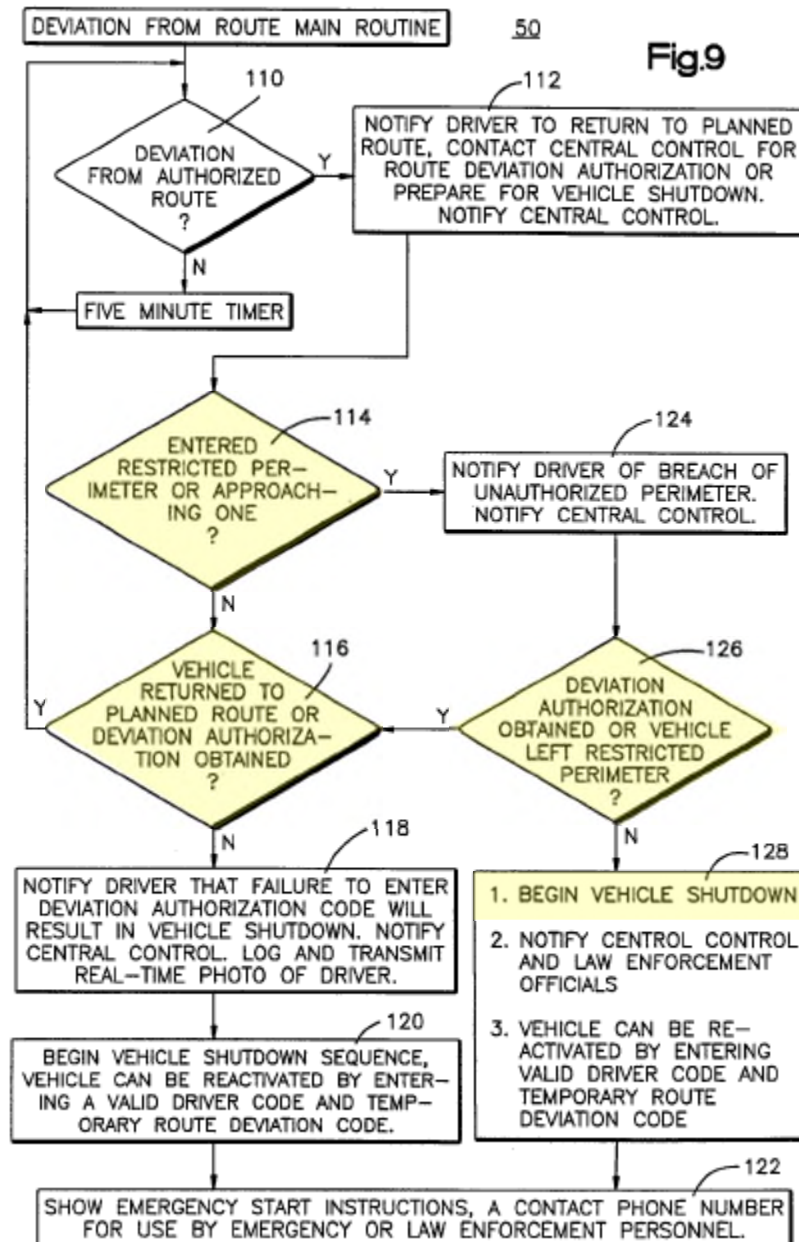
- 1. [9] The method of claim 8, wherein the minimum width is defined to prevent the ground vehicle from encroaching in the restriction region.**

220. Humphries and Borugian render Claim 9 obvious. 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.”).

221. 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 have entered the defined perimeter *or is approaching* a defined perimeter. *Id.*; Fig. 9; 12:1-8.

Figure 9 illustrates this process as reproduced below (with highlights added):



222. 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.

223. 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.

224. It would have been obvious to the POSITA to modify Humphries’ base vehicle tracking and route adherence system to permit the drawing of geofences around restricted areas to prevent the encroachment of fleet vehicles into such areas as taught by Borugian. *see* Section XII.A-B, *supra*. For example, Borugian teaches that “[t]he onboard computer 18 then checks to determine whether the vehicle ... is approaching a restricted perimeter at 114.” EX1008, 12:1-3. In response to such determination, Borugian teaches that “[i]f the onboard computer 18 determines that the vehicle has not returned to the planned route or obtained a route deviation authorization code within a predetermined amount of time, the driver is notified that failure to enter a deviation authorization code within a predetermined amount of time, five minutes in one embodiment, will result in vehicle shut down at 118.”

EX1008, 12:20-26. Borugian then discloses that “[v]ehicle shut down begins after the predetermined amount of time lapses at 120.” EX1008, 12:30-31. A POSITA would have been motivated to shut down the vehicle if it crosses a boundary as taught by Borugian and would have understood that in some circumstances, for example, in the context of a nuclear site, that the shut-down procedure should be and readily could be deployed to shut down the vehicle *before* it crosses a boundary to strictly enforce the restriction region. Thus, a POSITA would understand that, in particular circumstances such as the circumstances discussed in Borugian, that the alert taught by Humphries can be modified and/or supplemented to include the shut-down procedure described by Borugian to prevent encroachment of the restriction region. 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. Such a system would have predictably included a predetermined distance X, around each geofence, which has a minimum width defined to prevent encroachment into the restricted perimeter.

225. Accordingly, Humphries and Borugian render obvious the limitations of Claim 9.

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.

226. Humphries and Borugian render Claim 17 obvious. 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, at 12:30-31.

227. 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 if the geofenced object boundary is crossed. See Section XII.A-C, *supra*. For example, the system of Borugian can be used to modify or supplement the alert as disclosed by Humphries in order to provide time for the driver to heed the additional warnings before shutting down the vehicle as explained

above with reference to claim 9. *See* Section XII.C, *supra* A POSITA would readily understand that such time delay with escalating warnings before shutdown would provide the driver with an opportunity to remedy the situation safely without forcing a shutdown of the vehicle while also ensuring that the restriction region is enforced.

228. Accordingly, Humphries and Borugian render obvious the limitations of Claim 17.

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.**

229. Humphries and Borugian render Claim 20 obvious. 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. EX1008, at 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, at 13:1-3 (“The vehicle 12 can be reactivated by entering a valid driver code and temporary route deviation code.”).

230. As discussed above, it would have been obvious to the POSITA to take away the control from the driver in response to violating a geofenced boundary. *See* Section XII.A-C.

231. Accordingly, Humphries and Borugian render obvious the limitations of Claim 20.

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.**

232. Humphries and Borugian render Claim 21 obvious. 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. EX1008, at 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 a valid driver code and temporary deviation code. EX1008, at 13:1-3 (“The vehicle 12 can be reactivated by entering a valid driver code and temporary route deviation code.”).

233. It would have been obvious to the POSITA to take away the cease taking commands from the driver in response to violating a geofenced boundary. *See* Section XII.A-C, *supra*. A POSITA would have found such a combination to be obvious for at least the reasons described in Section XII.A-B.

234. Accordingly, Humphries and Borugian render obvious the limitations of Claim 21.

XIII. Conclusion

235. In signing this declaration, I recognize that the declaration will be filed as evidence in a contested case before the Patent Trial and Appeal Board of the United States Patent and Trademark Office. I also recognize that I may be subject to cross-examination in the case and that cross-examination will take place within the United States. If cross-examination is required of me, I will appear for cross-examination within the United States during the time allotted for cross-examination.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Executed this 17th day of July 2023, in Kirkwood, Missouri.

Respectfully submitted

A handwritten signature in black ink, appearing to read "David H. Williams", written over a horizontal line.

David H. Williams

David Hilliard Williams

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Expertise

- Location-Based Services (LBS)
- GPS Systems; Network-Based Location Determination Systems
- Wireless 911 (E911); NG911 Technology, Processes, Operations, and Funding
- Internet of Things (IoT); Real-Time Location Systems (RTLS)
- Non-Cellular/Indoor/Sensor-based Location Systems, including: RFID, Wi-Fi/WPS, BLE/Bluetooth, Beacon-based RTLS; NFC/DSRC; RF Fingerprint systems; Wearable systems; Hybrids/Combinations
- Expert Witness Litigation Support, Patent/Intellectual Property Development and Protection Services
- GPS/Cellphone Criminal and Civil Matter Forensics, using CDRs, RTT, PCMD, NELOS, EVDO, Geotab, Paraben, CellHawk, and Cellebrite
- Accident/Incident Reconstruction
- Internet of Things (IoT) Ecosystem (Sensors, Identification, Verification, Authentication, Interfaces, Edge, Network, Cloud, Data Network Management, Data Management, Analytics, Network Topologies, Integration)
- Location & IoT Data Privacy and Security; Device/User ID, Verification, Authentication
- Sensor Design; Sensor System Architecture and Interface Design; Sensor Arrays
- Wireless Communications Standards, e.g. Bluetooth/BLE, Zigbee, Wi-Fi, WPAN, etc.
- Microcontroller Design, Sensor Controls Design, IoT Design/Systems Integration
- Location Data Aggregation, Anonymizing
- LIDAR/Radar Data Sourcing; Crowdsourcing
- Indoor Positioning & App Ecosystem Design
- Artificial Intelligence (AI), Machine Learning use in Mobile Applications Design
- Short/Longer-range Positioning Technologies
- LBS and IoT Enterprise/Consumer Product & Technical Strategy, Design and Buy/Build
- Internet of Things (IoT), Cellular IoT (LTE-M, NB-IoT), LAN/PAN (Wi-Fi, BLE), LPWAN
- (Sigfox, LoRaWAN, Mesh (Zigbee, RFID) Consumer/Industrial/Commercial IoT,
- Home, Office, and Industrial Automation System Design and Integration; Control System Design, including Remote Management, Monitoring, and Control; User Interface Design (visible, audible, tactile, virtual, augmented, context-sensitive, GUI-based, directional, wearables, implants, holographic, others)
- Safety and Security, Surveillance Systems, Home Energy Management Applications and Architecture Design/Implementation
- Smart Card/Wallet/Purse, Contactless Payment Systems; Secure Elements etc.
- Mobile Resource Management (MRM) Tracking and Management; Vehicle, Fleet/ELD/AOBRD, Worker/Driver, and Freight/Trailer & Asset Tracking/Mgmt.
- Telematics; Vehicle/Engine/ECM Tracking/Monitoring, Vehicle-to-Vehicle and Internal Vehicle Communications Networks and Operating and Analytics Ecosystems including CAN and other Protocols/Systems
- Intelligent Transportation Systems (ITS)
- Mobile Devices/Systems Power Management
- Connected Cars/Autonomous Vehicles (AV)
- Navigation Systems; PNDs; Geofencing; Route Optimization; Device/App Personalization
- Location-Based/Dependent Advertising, Search
- Map Data, Digital Mapping, Media/Advertising Interfacing/Management, GIS, & IoT IT
- Mobile Social/Business Networking;
- Location/Context-Centric Enterprise Process Reengineering, Integration, & Interoperability
- SMART location, SMART Home, SMART Wearables, SMART Buildings, SMART Cities
- Context/Presence-Based LBS and IoT; AI-based context determination and utilization
- M2M, Smart Grid/Energy Systems
- Engineering, Network, and IT Process Design and Organizational Capabilities Assessment
- LBS Big Data and Cloud Computing
- AI, Metaverse, Virtual and Augmented Reality

Professional Summary

David Hilliard Williams is an internationally-known expert in the wireless/mobile location and Internet of Things (IoT) fields and President and Founder of E911-LBS Consulting. He specializes in wireless and IoT-based product and technology development and implementation, as well as Intellectual Property (IP)/patent and forensics litigation services involving technologies such as Global Positioning Satellite (GPS) systems; Network-based location determination technologies such as TDOA, ECID, and AFLT; Wireless 911 (E911) and Next Generation 911; Real-Time Location Systems (RTLS) including Radio Frequency Identification (RFID) systems, Wi-Fi-based positioning systems (WPS), BLE/Beacon-based location systems, Bluetooth, Near Field Communications (NFC), and alternative RTLS (Ultrasound, Infrared); Wearable Tags/Sensor tracking systems; Zigbee/Mesh networks; Pattern Matching; and various hybrids and combinations, as well as a broad array of IoT sensors and other systems, network (wireline and wireless, all generations), user interface, and technology enablers for management, monitoring, tracking, and control purposes, including in remote control/distributed ecosystems and associated use cases.

Mr. Williams is expert in the full range of business and consumer location-based services (LBS) and IoT applications enabled by these technologies, including safety, security, and intruder detection/monitoring, energy management, vehicle/fleet tracking/management, telematics and vehicle/engine/component/driver monitoring and analytics, local search, navigation systems, presence/context-aware apps, mobile resource management, asset and freight management, wearable tags/sensors, financial/mobile wallet, mobile hospitality/POS systems, supply chain management, family tracking, mobile social and business networking, proximity-based entertainment and leisure, gaming, and intelligent transportation systems.

Mr. Williams has extensive expertise in all aspects of LBS and IoT delivery across the mobile and IoT ecosystems including enabling sensors, network communications, location determination technologies, geofencing design, map data, location data/database management, geospatial platform/Geographical Information Systems, GPS and other chipsets, data management, control system design, remote management/utilization of such control systems, and device, infrastructure and integration provider integration and management. Mr. Williams has developed and implemented industry-leading product and technology solutions for numerous LBS and IoT applications and markets and provides consulting and research services to some of the leading carriers and enterprises in the U.S., Asia, and Europe. His client list includes Apple, AT&T, BJ's Wholesale Club, Draft Kings, Ecobee, FedEx, GE, Geotab, Green Mountain Grill, Google, Heil, the Houston Police Department, HP/Aruba, the L.A. County District Attorney's Office (both prosecution and public defender), Lyft, Macropoint, Nextel, NAVTEQ, Overhead Door, Peschke, Prova, Qualcomm, Samsung, Snap, Sprint, Target, Toyota, Twilio, Verizon Wireless, VIVINT, Volkswagen, Zillow, and ZIM.

Mr. Williams has successfully served as an expert for plaintiffs, prosecutors and defendants in patent, ITC, and criminal litigation (including assisting State Public Defender entities), as well as both sides of civil trade secrets, product liability, fraud, and other litigation. He has been deposed 32 times and has testified 11 times, including [successfully](#) in The Eastern District Court of Texas (winning both infringement and invalidity matters), and in [winning](#) in ITC Court. In total he has provided expertise in matters involving approximately 200 patents and

over 50 criminal and civil matters. His credentials in wireless/mobile/IT technologies and associated applications, infrastructure, systems, and enablers are established to the 1980s.

Mr. Williams is expert in smart location technology issues in the Internet of Things (IoT), telematics, and connected/driverless car fields, particularly in their utilization of sensor, location and context information through the practical envisioning and design of: consumer/enterprise use matters and associated application and user interface design; sensor design and deployment strategies; process (re)engineering; IT integration; data aggregation, segmentation, analysis, and management; scalability; and security and privacy issues, requirements, collaboration structures, and ongoing management. He is expert on Big Data, data mining/analytics, and emerging AI issues associated with location and IoT data.

With over thirty-five years in location, networking/communications, control, and information technology solutions design, selection, implementation and ongoing management, Mr. Williams has extensive experience in the activities and issues needed to get applications to market, including planning and design at the application, system, interface/integration, network, IT, operational and customer facing levels. He has been published and quoted by leading magazines and newspapers about mobile services, including The New York Times, CBS News.com, The Columbus (Ohio) Dispatch, The Boston Globe, Computerworld, Directions Mag, Mission Critical Communications, Popular Mechanics, and RFID Journal. Mr. Williams has authored five books on wireless location, including *The Definitive Guide to IoT Sensors (In Development)*, *The Definitive Guide to GPS, RFID, Wi-Fi, and Other Wireless Location-Based Services (two versions, third in development)*, *The Definitive Guide to Wireless E911*, and (co-authored) *The Definitive Guide to Mobile Positioning and Location Management*. Mr. Williams has authored dozens of research reports, and tracks and analyzes leading companies in the LBS, IoT, and public safety industries particularly with respect to their product and technology strategies, competitive capabilities and implementation issues. He is expert on all public policy and technology issues related to emergency services/public safety, location data privacy and security, and LBS and IoT privacy protection policies, systems, and support infrastructure. He opines on location privacy issues in various forums. He is the sole or a named inventor on nine (9) patents involving mobile location and context, sensors, IoT, sensors, and various other technologies and associated methods.

Employment History

From: 2002 **E911-LBS Consulting; E911-LBS Forensics Engineering (2015+)**

To: Present

Position: *President and Founder*

Provides services across the entire wireless value chain, particularly with respect to technology and business strategic planning and product design, development, implementation, and ongoing management and operations, plus specialized services such IP/Patent litigation associated with Location Based Services and applications, GPS, E911, IoT, RTLS, RFID, Wi-Fi, NFC, BLE/Bluetooth, beacons, & other location technologies and associated ecosystems. Projects include:

- Provided expert witness, technical consulting, and research

analysis services with respect to location-based services-related intellectual property/patent protection, licensing, and litigation (details in separate litigation support section).

- Provide forensics expertise in examination of mobile location-related events and associated data for civil and criminal matters (both prosecutor/plaintiff and defense entities).
- Developed, implemented, managed, and marketed a portfolio of LBS applications and broader offers for leading North American wireless carrier. Responsible for all dimensions of product lifecycle and associated budgets. Work included the development and launch of several LBS applications including mobile social networking, family tracking, local search, 411 w/ location, and mobile worker, fleet, and asset management. Location technologies utilized include GPS, Wi-Fi positioning, RFID, Bluetooth, Cell ID (CID), ECID, and TDOA. Worked extensively with network engineering to troubleshoot/refine new location-determination infrastructure to address/improve location accuracy, privacy and security issues.
- Conducted geofencing accuracy compliance analysis for ride-sharing company auditing their driver airport compliance record. Involved extensive use of JSON/GeoJSON records.
- Conducted comprehensive technical and intellectual property analysis of Real-Time Location Systems (e.g. RFID, Wi-Fi Positioning, Bluetooth, Infrared/Ultrasound, Others) market for European client looking to assert location-related patents.
- Provided technical guidance for mobile payments/wallet startup utilizing RFID, NFC and other technologies as key location enablers. Identified key issues and redeveloped successful patent application after initial USPTO rejection.
- Conducted technical and intellectual property analysis for Fleet Management/Telematics operator and service provider assessing potential infringement candidates.
- Conducted market research and developed market research on Telematics industry, both overall as well as tailored for specific auto manufacturers.
- Conducted analysis of location aggregation market for client interested in acquisition in that industry space.
- Ghost-wrote comprehensive study on Traffic data collection,

processing, and reporting technologies, markets, and associated companies on behalf of ABI Research.

- Provided E911 consulting expertise in support of new spectrum regulatory approval and technical implementation issues for startup carrier.
- Managed the design, collection, and analysis of E911 infrastructure deployment of western region of major wireless carrier. Data collected focused on technical issues associated with TDOA (Time Difference of Arrival) technology implementation, and collection and reporting of location accuracy data for FCC reporting purposes.
- Developed the site map and primary content for the NAVTEQ (now HERE) Network for Developers (N4D) LBS web ecosystem – <http://developer.navteq.com>. Responsible for designing and managing the site map and overall content, identifying key contributors and materials, and utilizing a variety of fragmented information to develop broad and deep technical, digital media and business content to assist various expertise levels of application developers and business management to become intimately familiar with map data, GIS platforms, and LBS applications and underlying technologies and to provide the information and guidance to successfully develop and launch their LBS applications.
- Managed the development of the Nextel (now Sprint/T-Mobile) Location-Based Services strategy. Efforts included market and technical analysis of likely LBS offerings and integrating those findings with Nextel's broader wireless voice and data strategies. Work included prioritizing applications based on focus group findings, business matter attractiveness, ease of implementation, impact on network infrastructure, and synchronization and integration with GPS terminal and E911 mandate rollout plans. Managed network engineering and consulting team to design network modifications to best support the additional demands of LBS applications and underlying bandwidth-consuming digital media content. Product strategy including researching and incorporating context-aware/presence concepts into product/device and network engineering plans.
- Developed navigation platform strategy for major international auto manufacturer. Assessed direction and technology requirements of in-car and portable navigation device (PND) technologies; developed strategy for in-car navigation platform.

- Developed numerous LBS company research reports using proprietary multi-point “report card” addressing numerous business and technology strategy dimensions and issues.
- Authored multiple books on wireless location, including *The Definitive Guide to IoT Sensors and IoT Use Cases (In Development)*, *The Definitive Guide to GPS, RFID, Wi-Fi, and Other Wireless Location-Based Services (2005/2009 versions, new version in development)*, *The Definitive Guide to Wireless E911*, and (co-authored) *The Definitive Guide to Mobile Positioning and Location Management*.
- Advised numerous small companies and startups such as i360Hygiene, LOCAID, Finder Technologies, Orion GPS, and XYVerify on LBS-related issues to enhance value propositions on business, product and technology dimensions to enhance attractiveness to potential investors/acquisition candidates.

From: 2009 **AT&T Mobility**

To: 2010

Position: *Senior Product Manager – Enterprise LBS*

Led the development, implementation, and marketing of numerous enterprise location-based services across all sales, marketing and operational channels. Work included responsibility for all dimensions of product lifecycle and associated budgets. Products managed included telematics, fleet/vehicle management, asset/freight management, and mobile resource management GPS/LBS apps on a variety of platforms such as Telenav. Played key role in design of company-wide location services product and implementation roadmap.

From: 2007 **AT&T Mobility**

To: 2009

Position: *Consumer LBS Product Realization Manager (Consultant)*

Responsible for the design, development, implementation, and ongoing lifecycle management of several high-profile Consumer LBS applications and associated operational support. Overall application design and implementation responsibilities included AT&T FamilyMap, Loopt Mobile Social Networking, 411 with location, Slifter Local Search, and CaddyHawk Game systems. Work included design, troubleshooting, and implementation of AT&T location-related network, application, user interface, digital media and content delivery, and privacy infrastructure and associated issues such as accuracy and privacy (efforts resulted in patent co-invention).

From: 1993 **Accenture**

To: 2002

Position: *Associate Partner - Communications & High-Technology Strategy;*

Information & Technology Strategy practices

Responsible for development of wireless location practice. Led development of business, technology, and product strategies for numerous communications and technology-centric companies looking to enter new markets. Specialized in new product design, development, and implementation, as well as network infrastructure design need to support next generation, high bandwidth-consuming digital media content and associated infrastructure. Efforts included assisting AT&T (re)enter local service, (then) Bell Atlantic launch long distance services, (then) GTE design and implement Intelligent Network and High Value Network services, Nextel (later part of Sprint, and now T-Mobile) develop their location-based services product strategy and enabling network and IT architectures, and Omnipoint (later part of T-Mobile) network integration strategy, as well as leading the design and implementation of voice and data communications networks and associated data management capabilities in numerous industries including communications, computer, transportation, hospitality/retail, energy, agriculture, and banking/financial services. Worked with utilities such as Ameren, Georgia Power, and Duke Energy to identify strategic opportunities utilizing technology and communications in utility-associated infrastructure and other capabilities.

- From: 1991 **Booz Allen & Hamilton**
To: 1993
Position: *Senior Associate – Information Technology Practice*
Provided and led consulting services for communications industry and other Information Technology-intensive companies in developing technology strategies for addressing new marketing opportunities and internal operational issues.
- From: 1987 **Deloitte Consulting (Originally Touche Ross)**
To: 1991
Position: *Senior Manager*
Provided consulting services for technology-intensive companies in developing business and product strategies for addressing new marketing opportunities and internal operational issues.
- From: 1983 **Hughes Aircraft Company**
To: 1985
Position: *Electrical Engineer – Radar Development*
Microcomputer and digital system design engineer on the F-15 fighter radar system as part of analog to digital platform conversion and associated tracking and control systems design. System involved designing multi-microprocessor-based system to interface to/with wide array of on-board, ground control, and other in-flight communications/control sensors/sensor arrays and systems.

Litigation Support Experience

- Date: 2022-2023 **Vorys**
Matter: BJ's Wholesale Club
Project: Providing expert consulting, support, and declarations for IPR matters involving location-related in-store ordering, fulfillment, and customer service aspects of e-commerce and m-commerce services.
- Date: 2022-2023 **Kilpatrick Townsend & Stockton LLP**
Matter: Apple
Project: Provide expert consulting, support, and reports for IPRs, invalidity and non-infringement proceedings involving eight (8) patents involving sharing of location information between multiple devices for a variety of use cases.
- Date: 2022-2023 **Venable LLP**
Matter: Verizon Wireless dba Cellco Partnership
Project: Provide expert consulting, support, and declaration for IPR matters involving georeferencing and specialty messaging techniques.
- Date: 2022-2023 **Hall Griffin**
Matter: Ben's Asphalt
Project: Provided technical expertise in assessing technical aspects of telematics breach-of-contract lawsuit. Successfully settled.
- Date: 2022-2023 **Wolf, Greenfield & Sacks, P.C.**
Matter: Snap
Project: Providing expert consulting, support, and report for IPR matter involving social-based location, mapping, matching, and display technologies. Deposition.
- Date: 2022-2023 **Dreifuss Bonacci & Parker**
Matter: Pacific Controls Inc.
Project: Providing expert consulting, report, and testimony in regards to contractual dispute between Telematics Service Provider and equipment manufacturer. Deposition and Testimony.
- Date: 2021-2022 **Greenberg Traurig**
Matter: HP Enterprises, Aruba
Project: Providing expert consulting, report, and testimony in support of non-infringement and invalidity analysis in EDTX matter involving beacons/beaconing technologies, methods, and associated systems. Depositions (2).
- Date: 2021-2023 **Keker, Van Nest & Peters LLP**
Matter: Google, Ecobee, and VIVINT (v. Ecofactor) (WDTX)
Project: Provided/ing expert consulting, report, and testimony in support of

invalidity analysis involving HVAC remote monitoring and control and associated sensors, systems, and communications capabilities. Deposition and Testimony; Ecobee and VIVINT trials pending.

- Date: 2021-2022 **Baker Botts**
Matter: Lyft (multiple matters)
Project: Providing expert consulting, support, and report for matters involving location-related applications technologies including GPS, Bluetooth, Wi-Fi positioning, RFID, and road sensors/readers.
- Date: 2022 **Winston & Strawn LLP**
Matter: ZIM Integrated Shipping
Project: Provided expert consulting in EDTX invalidity and non-infringement case involving method and apparatus for shipping information patents.
- Date: 2020-2021 **Lowe Graham Jones**
Matter: Green Mountain Grill (IoT Connected Grill) (ITC Court)
Project: Provided expert consulting, report, and testimony in ITC case involving Internet of Things (IoT), remote monitoring and control, cloud services, and various short-range communications technologies. Involves non-infringement, DI, Invalidity, and Inventorship. Deposition and Testimony.
- Date: 2021 **Munger, Tolles & Olson LLP**
Matter: Google
Project: Provided expert consulting and support for EDTX matter involving invalidity/non-infringement of smart cards and payment systems and associated capabilities such as Secure Elements.
- Date: 2021 **Jackson Walker L.L.P.**
Matter: Prova
Project: Provide expert consulting, support, and report for IPR involving buyer verification/tracking and inventory management/tracking utilizing RFID technology.
- Date: 2020-2023 **Latham & Watkins LLP**
Matter: Overhead Door (OHD-Garage Door Manufacturer) (ITC Court)
Project: Provided expert consulting, report, and testimony in ITC case involving Internet of Things (IoT), remote monitoring and control, and various short-range communications technologies. Deposition and Testimony in ITC court. Support in Customs and Enforcement.
- Date: 2020-2021 **Ropes & Gray LLP**
Matter: Target
Project: Providing expert consulting, support, and report for IPRs for several patents involving short-range communications technologies

and associated identification and location determination methods and techniques including Bluetooth, RFID, and Wi-Fi. Depositions seven (7) involving nine (9) patents.

- Date: 2020-2022 **Baker Botts**
Matter: Draft Kings
Project: Providing expert consulting, support, and report for IPRs for several patents involving validating gaming customers location in appropriate online gaming jurisdictions/geofencing. Depositions (2)
- Date: 2020 **Baker Botts**
Matter: Lyft
Project: Provided expert consulting, support, and report for IPRs involving Intelligent Transportation systems, geofences, and location technologies including GPS, Bluetooth, Wi-Fi positioning, RFID, and road sensors/readers. Deposition.
- Date: 2020-2023 **Finnegan & Henderson**
Matter: Google (3)
Project: Providing expert consulting, support, and report for IPRs involving user experience sharing, software registration, and device/user tracking involving a variety of location technologies.
- Date: 2019-2023 **Lynch Thompson LLP**
Matter: Heil
Project: Providing technical/engineering expertise in trade secrets matter involving Internet of Things, RFID, Telematics, Vehicle Sensors, & Big Data for waste vehicle manufacturer. Deposition.
- Date: 2018-2020 **Lawgivers (Trinidad and Tobago)**
Matter: A&V Oil and Gas
Project: Provided expert support, report, and testimony in arbitration matter involving government of T&T. Focused on (in)accuracies of GPS-based vehicle tracking system relative to a variety of key events. Testimony at trial.
- Date: 2019-2020 **Perkins Coie**
Matter: Zillow
Project: Provided expert support, report, and deposition for non-Infringement matter for major real estate services firm and associated subsidiaries involving a wide array of location determination technologies on smartphones.
- Date: 2019-2020 **Baker Botts**
Matter: Lyft
Project: Provided expert support, report, and deposition is support of Claim Construction brief associated with non-infringement matter.

- Date: 2016-2021 **Sterne Kessler Goldstein Fox**
Matters: Google (Multiple matters); Google (Nest, Multiple matters)
Projects: Providing expert support, reports, and deposition for several IPRs of location/context-related patents on behalf of leading Internet services company utilizing a wide variety of communications and location technologies.
- Date: 2013, **XYVerify (3)**
2019/2020 Patent Re-Submission and Approval; Patent Application Creation
Projects: (Re)wrote patent applications for LBS/financial verification system using multiple location determination methods including RFID, Bluetooth, WPS, and GPS. Efforts enabled patents to be approved after initial rejection by USPTO.
- Date: 2013-2023 **Civil and Criminal Forensics**
Matters: Various
Project: Provided/Providing cellphone, vehicle, specialty device, and computer-based location forensics expertise in over 50 criminal and civil matters involving numerous location determination technologies and associated applications and systems. Criminal matters include homicide, attempted murder, assault (multiple types), arson (building and field), armed robbery, breaking and entering, assault (various types), and property crime. Civil matters include trade secrets, product liability, accident liability, fraud, contract disputes, and employment matters.
- Applications/Platforms for criminal and civil forensics analysis include cellular records, 911 records, Facebook/Instagram/Messenger/social media apps, Google/search, Google tracking apps (e.g. Timeline, others), vehicle tracking systems, specialty GPS (e.g. GPS ankle bracelets, specialty devices) surveillance and safety systems, smart home systems, aviation, vehicle infotainment systems, and connected cars, Expert/knowledgeable in numerous forensic technologies, tools, and accident/incident reconstruction methods including CDR, NELOS, PCMD, RTT, EVDO, Cellebrite, Paraben, Google Earth/Timeline, and Hawk Analytics/CellHawk, as well as specialized knowledge on iOS and Android smartphone location determination techniques and data collection, analysis, and management of all types including KML/KMZ, (Geo)JSON, CSV, (E)WKT/WKB, Shapefile, ESRI, and other GIS vector/raster systems, technologies, formats, and models.
- Date: 2019 **Sterne Kessler Goldstein Fox**
Matter: Volkswagen
Project: Provided expert support for IPR involving Location-Based Messaging in automotive related use matter/environments.

Date: 2017-2018 **Finnegan & Henderson**
Matter: Fed Ex
Project: Provided expert support, consulting, reports, deposition, and trial testifying for infringement and district court invalidity proceedings on behalf of leading transportation/shipping company in The Eastern District Court of Texas. Deposition and Testimony.

Date: 2017-2018 **Polsinelli**
Matter: Uber
Project: Provided expert support and reports for Trade Secrets matter involving major shared transportation provider.

Date: 2017-2018 **Renner Otto**
Matters: Macropoint; Timekeeping Systems Inc.
Projects: Providing consulting, expert services, report and deposition in invalidity matters for transportation and employee tracking patents.

Date: 2016-2018 **Paul Hastings**
Matters: Samsung (2 matters)
Project: Provided expert services for Inter Partes Review (IPR) of multiple location, safety, and security patents on behalf of major telecommunications equipment and services provider.

Date: 2016-2017 **European Firm**
Matter: Patent Infringement/Claim Chart Analysis
Project: Provided consulting, market analysis, and claim chart development for patent holder involving RTLS-related repeater technologies, particularly using WPAN/Zigbee networks.

Date: 2016-2017 **Baker Botts**
Matter: Twilio
Project: Provided location/E911-related expert services, report, and deposition for IPR of mobile registration patent on behalf of Voice & Video, Messaging, and Authentication APIs provider.

Date: 2016 **Los Angeles District Attorney's Office**
Matter: People v. Dawud Abdulwali
Project: Provided expert services on location technologies used to identify and trace accused arsonist on behalf of L.A. District Attorney's (Prosecutors) office.

Date: 2016-2017 **Fitzpatrick, Cella, Harper & Scinto**
Matter: Geotab
Project: Providing expert support, reports, and deposition for infringement defense of multiple asserted patents on behalf of fleet management/telematics provider in EDTX.

Date:	2015-2016	The Ogg Law Firm PLLC
Matter:		City of Houston Police Department
Project:		Provided expert services/testimony regarding veracity of Automatic Vehicle Locator (AVL) systems in officer suspension matter.
Date:	2015-2016	Sterne Kessler Goldstein Fox
Matter:		VIVINT
Project:		Providing expert support, reports, and deposition for IPR involving several location-related patents for home security/energy company.
Date:	2015	Hogan Lovells
Matter:		Apple
Project:		Provided expert support for multiple location-related patent Inter Partes Review (IPR) and infringement proceedings for leading mobile platform, application and services provider.
Date:	2015	Thompson Hine LLP
Matters:		Macropoint
Project:		Provided expert support for patent litigation efforts involving fleet management devices, software, and services.
Date:	2013-2014	Williams & Connolly
Matter:		State of Maryland
Project:		Provided expert services in assessing validity of GPS tracking bracelet/system in parole violation matter.
Date:	2013-2014	Cravath, Swaine & Moore
Matter:		Qualcomm
Project:		Provided expert litigation support, technical consulting, and advisory services in Anti-Trust matter regarding location services technologies, platforms, and standards.
Date:	2014	Patterson Thuente Pedersen, P.A.
Matter:		Kaspersky Internet Security
Project:		Provided expert litigation support and technical consulting in patent countersuit involving internet security services.
Date:	2014	Sullivan & Cromwell LLP, others
Matter:		Peschke
Project:		Provided expert support and technical consulting in location services infringement patent dispute involving interactive mapping applications. Effort included providing deposition testimony.
Date:	2012-2013	Covington & Burling
Matter:		Samsung (ITC Court)
Project:		Provided expert litigation support and technical consulting and

advisory services in International Trade Commission matter.

Date:	2011-2013	Connolly Bove Lodge & Hutz
Matter:		Enovsys
Project:		Provided expert litigation support and technical consulting and advisory services for pursuit of LBS patent royalties and infringement settlements.
Date:	2011-2013	Voxson
Matters:		Various
Project:		Provided expert litigation support and technical consulting and advisory services for pursuit of E911 and LBS patent infringement royalties and settlements.
Date:	2010-2012	Morrison & Foerster LLP
Matter:		Cellco Partnership (dba Verizon Wireless)
Project:		Provided expert advisory and report services in support of IPR re-examination process of E911 and LBS patents.
Date:	2011-2012	Dovel & Luner
Matter:		TrackBeam
Project:		Provided market/technical consulting, expertise and research analysis of LBS patents to identify potential licensing candidates.
Date:	2011	SNR Denton
Matter:		Wavemarket
Project:		Provided market and technical consulting and advisory services for defense of LBS patent lawsuits.
Date:	2010	State of New Jersey
Project:		Provided wireless location consulting expertise in development of economic growth strategy for State of New Jersey.
Date:	2007-2008	General Electric
Project:		Provided consulting research and guidance on LBS and E911 technology, GE-owned patents, prior artwork, technology direction.

Education

<u>Year</u>	<u>College/University</u>	<u>Degree</u>
1987	The University of Texas at Austin (1 st in graduating class)	MBA, Information Systems Management
1983	Purdue University, West Lafayette, Indiana (Top honors; Tau Beta Pi, Eta Kappa Nu)	BSEE, Digital System Design emphasis

Patents

- "Method and apparatus for providing mobile social networking privacy." (U.S. Patent Number 8,613,109, issued on December 17, 2013).
- "Systems and methods of using wireless location, context, and/or one or more communication networks for monitoring for, preempting, and/or mitigating pre-identified behavior." (U.S. Patent Number 10,477,342, Issued November 12, 2019).
- "Systems and methods for monitoring for and preempting pre-identified restriction violation-related behavior(s) of persons under restriction." (U.S. Patent Number 10,497,242, Issued December 3, 2019).
- "Systems and methods for providing location-based security and/or privacy for restricting user access." (U.S. Patent Number 10,555,112, Issued February 4, 2020).
- "Systems and methods for developing, monitoring, and enforcing agreements, understandings, and/or contracts." (U.S. Patent Number 10,853,897, Issued 12/1/2020).
- "Systems and methods for monitoring for and preempting pre-identified restriction violation-related behavior(s) of persons under restriction." (U.S. Patent Number 10,861,307, Issued December 8, 2020).
- "Systems and methods for monitoring for and lowering the risk of addiction-related or restriction violation-related behavior(s)." (U.S. Patent Number 11,388,546, Issued July 12, 2022).
- "Systems and methods for monitoring for and preempting the risk of a future occurrence of a quarantine violation." (U.S. Patent Number 11,412,353, Issued August 9, 2022).
- "Dynamic and adaptive systems and methods for rewarding and/or disincentivizing behaviors" (U.S. Patent Number 11,636,941, Issued April 25, 2023).
- Numerous other patents pending.

Publications

Books:

1. The Definitive Guide to IoT Sensors (In development)
2. The Definitive Guide to IoT Use Cases (In development)
3. The Practical Guide to The Internet of Things (IoT): Use Matters and Enabling Technologies (In development)
4. The Definitive Guide to GPS, RFID, Wi-Fi, and Other Wireless Location-Based Services (2 versions, plus version in development)
5. The Definitive Guide to Wireless E911
6. The Definitive Guide to Mobile Positioning and Location Management (Co-authored)

Articles/Quotations:

1. Medium.com (Predict). January 31, 2023. "ChatGPT and Its Impact on Criminal Forensics (and Criminals)"
2. Medium.com. October 3, 2022. "What if GPS Fails?"
3. Location Data Privacy posts/blog. Ongoing at www.E911-LBS.com.
4. Linked In. March 3, 2020. "Facial Recognition: Good, Bad, or Ugly?"
5. The Columbus Dispatch. February 17, 2017. "Experts: GPS monitors couldn't save OSU student's life"
6. E911-LBS.com. May 2012. "The Pacifier Generation – How Wireless is Impacting Our Society"
7. Nbizmag.com. Summer 2008. "How Will the Convergence of LBS Technologies Affect Business?"
8. Directions Magazine. November 30, 2005. "The Deadline for the E911 Mandate Approaches...Where Do Things Stand?"
9. Computerworld. May 23, 2005. "Beyond The Supply Chain: The Impact of RFID on Business Operations and IT Infrastructure"
10. RFID Journal. June 12, 2005. "IT's Impact on RFID"
11. Directions Magazine. July 29, 2004. "The Strategic Implications of the Wal-Mart RFID Mandate"
12. Directions Magazine. February 25, 2004. "RFID-Hot Technology with Wide-Ranging Applications"
13. WirelessDevNet.com. 1/30/2003. "It's The (Location-Based) Applications – Stupid!"

Languages/Tools

- C/C++, Java, Basic, Cobol, Fortran, Pascal, APL, Assembly, Others
- CDR, NELOS, PCMD, RTT, EVDO, Cellebrite, Paraben, Google Earth/Timeline, Hawk Analytics/CellHawk, as well as specialized knowledge on iOS and Android smartphone location determination techniques.
- Data collection, analysis, and management of all types including KML/KMZ, (Geo)JSON, CSV, (E)WKT/WKB, Binary, Shapefile, ESRI, and other GIS vector/raster systems, technologies, formats, and models.

Associations and Achievements

- IEEE, NENA, APCO. Certified in Emergency Management Response (CERT)