UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

_____

TESLA, INC.,
Petitioner
v.

AUTONOMOUS DEVICES, LLC,
Patent Owner

_____

Case: IPR2023-01054
U.S. Patent No. 10,452,974

_____

DECLARATION OF DR. ELI SABER, PH.D.

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I, Dr. Eli Saber, declare as follows:

I. INTRODUCTION

1. I have been retained as an independent expert consultant on behalf of Autonomous Devices, LLC ("Patent Owner" or "Autonomous Devices") in this *Inter Partes* Review proceeding ("IPR") before the Patent Trial and Appeal Board ("Board" or PTAB") of the United States Patent and Trademark Office ("PTO") regarding U.S. Patent No. 10,452,974 ("the '974 patent" or "the Challenged Patent") (Ex. 1001).[1] I am being compensated for the time I spend on this matter, in addition to expenses. My compensation in this case is in no way contingent on the nature of my findings, the presentation of my findings in testimony, or the outcome of this or any other proceeding. I have no other interest in this proceeding.

2. In particular, I have been asked to consider, and provide my opinions regarding, whether the alleged prior art references cited in this proceeding disclose or suggest the features recited in certain claims of the '974 patent (claims 4, 5, 7, and 11), which I understand Tesla, Inc. ("Petitioner" or "Tesla") has challenged in this IPR. In my view, the alleged prior art references do neither. I

[1] In this Declaration, I reference documents by exhibit numbers that, as I understand, are attached to exhibits in this *Inter Partes* Review of the '974 patent.

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have also been asked to provide my opinion regarding whether certain proposed substitute claims are patentable, which in my opinion, they are. This declaration is based on the information currently available to me. To the extent that additional information becomes available, I reserve the right to continue my investigation and study, which may include review of documents and information that may be produced, as well as testimony from depositions that have not yet taken place. My opinions are set forth below.

II. BACKGROUND AND QUALIFICATIONS

3. I have summarized in this section my educational background, career history, publications, and other relevant qualifications. I understand my full *curriculum vitae* is submitted as Exhibit 2015.

4. I am a Professor in the Department of Electrical and Microelectronic Engineering (EME) and at the Chester F. Carlson Center for Imaging Science at the Rochester Institute of Technology (RIT) in Rochester, New York. I also serve as the Director of the Image, Video and Computer Vision Laboratory. I joined RIT's full-time faculty in 2004. I have over thirty-four (34) years of industry and academic experience, thirty (30) of which are in the fields of Computer Vision, Digital Image/Video Processing, Pattern Recognition and Machine Learning.

5. I received a Ph.D. in Electrical Engineering from the University of Rochester in 1996. My concentration was in Signal/Image/Video Processing,

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Pattern Recognition, and Computer Vision. I received a Master of Science Degree in Electrical Engineering from the University of Rochester in 1992 in the same concentration as listed above, and I received a Bachelor of Science Degree in Electrical and Computer Engineering, Summa Cum Laude, from the State University of New York at Buffalo in 1988.

6. Before becoming a full-time professor, I worked for Xerox Corporation from 1988 to 2004. During my 16 years at Xerox, I was – generally speaking – responsible for: a) delivering color management solutions, image processing innovations, architectures, and algorithms for high-end color printing systems, b) xerographic sub-systems for a variety of color products, and c) control systems for toner production facilities. Among other roles, as an Advanced Development Scientist and Manager, I established the Advanced Design Laboratory – an Imaging/Xerographics lab – and provided technical and managerial leadership for the Electrical, Imaging and Xerographics Department. As a Product Development Scientist and Manager, I led the research and development of color management algorithms and image quality metrics for various product platforms. I also led the Image Science, Analysis, and Evaluation area, with twelve to fifteen direct reports and a budget of approximately $2 million.

7. From 1997 until 2004, I was an adjunct faculty member at the

Electrical Engineering Department of the Rochester Institute of Technology and at the Electrical & Computer Engineering Department at the University of Rochester. I was responsible for teaching undergraduate and graduate coursework in signal, image, video processing, pattern recognition, and communications and performing research in multimedia applications, pattern recognition, image understanding and color engineering.

8. Since joining RIT full time, I have been responsible for teaching several undergraduate and graduate courses in Digital Signal Processing, Digital Image Processing, Digital Video Processing, Engineering Analysis, Random Signal & Noise, Advanced Engineering Mathematics, Matrix Methods, Pattern Recognition, Communications, Modern Control Theory, and Linear Systems.

9. I proposed, developed and introduced the Digital Video Processing course and reestablished the Pattern Recognition courses at the Electrical Engineering Department at RIT. These graduate courses were instrumental in providing MS/PhD students with the proper foundation and knowledge in all aspects of the subject areas in order to perform in-depth research in the field and continue to advance the state of the art.

10. The Digital Video Processing course is designed to provide a thorough and comprehensive coverage of the field. Topics covered include the mathematical representation of digital video including motion and time-varying

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image formation models, spatio-temporal sampling/reconstruction, sampling structure conversions, motion estimation using optical flow, block-based, pel-recursive, Bayesian and point correspondence type methodologies, segmentation, motion tracking, filtering, restoration, super-resolution and compression.

11. The Pattern Recognition course, on the other hand, covers pertinent concepts in Bayes decision theory, linear and nonlinear classifiers, artificial neural networks, feature selection/generation/extraction and clustering.

12. I am currently working to develop a graduate course titled: "Advanced Neural Networks and Deep Learning: Theory, Mathematics and Algorithms." The course is intended to provide an in-depth comprehensive study of the theory, mathematics and algorithms for advanced neural networks and their usage in deep learning. It is primarily targeted for upper graduate students that are planning to pursue advanced studies/research in the field. The course provides a thorough study of shallow and deep neural networks architectures and algorithms, activation functions, backpropagation, initialization, optimization strategies, etc. It then progresses to convolutional and recurrent style neural networks and, if time permits, will provide an overview of attention mechanisms/transformers and deep reinforcement learning. The course is being taught for the first time in Spring 2024.

13. My current research focuses on machine learning for object

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tracking/remote sensing applications; image/video processing for multimedia, military & biomedical applications; and computer vision and three-dimensional scene reconstruction As a principal investigator (PI) or co-principal investigator, I have acquired almost $6 million in research funding since joining RIT and have managed multiple government grants from the Department of Defense as well as several corporate grants from Hewlett-Packard, Lenel, and Data Physics. I am currently managing (as PI) a multiyear government grant from the Department of Defense titled "Target Detection/Tracking and Activity Recognition from Multimodal Data." In this project, we propose to develop operational target detection/tracking techniques and activity recognition/understanding methods that can leverage multimodal data in a fusion framework using deep learning algorithms while providing accurate and near real-time performance.

14. In 2012, I was awarded the Prestigious Trustees Scholarship, the highest award at RIT with regard to research recognition.

15. I am the author or co-author of thirty-eight (38) peer-reviewed journal publications.

16. I have also authored or co-authored 102 conference and workshop publications and a book entitled Advanced Linear Algebra for Engineers with MATLAB, published by CRC Press in February 2009, and am a named inventor on multiple U.S. and foreign patents.

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17. I am a senior member of the Institute of Electrical and Electronic Engineers and a member of the IEEE Signal Processing Society, the Electrical Engineering Honor Society, and Eta Kappa Nu.

18. A complete statement of my industrial and academic records including a listing of the above publications and patents is included with my curriculum vitae.

III. MATERIALS REVIEWED AND TIME OF ALLEGED INVENTION

19. The opinions contained in this declaration are based on the documents that I reviewed, my professional judgment, as well as my education, experience, and knowledge regarding technologies related to the '974 patent.

20. In forming my opinions expressed in this declaration, I reviewed:

- the '974 patent (Ex. 1001);
- the file history of the '974 patent (Ex. 1007);
- the declaration of Dr. Jason Janet (Ex. 1002);
- U.S. Patent No. 9,604,359 to Grotmol, et al. ("Grotmol" – Ex. 1004);
- U.S. Patent No. 8,639,644 to Hickman, et al. ("Hickman" – Ex. 1005);
- The Parties' papers and exhibits in this case (IPR2023-01054);

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- American Heritage Dictionary (1992) Excerpts (Ex. 2012);
- Webster's Third New International Dictionary (2002) Excerpts (Ex. 2013);
- Disclaimer of Claims 1-2 and 19-20 (previously submitted) (Ex. 2004); and
- any other materials that I refer to in this declaration in support of my opinions.

21. I have been asked to consider the time of the alleged invention to be around November 2, 2016, which I understand is the filing date of the '974 Patent. (Ex. 1001, Cover). My opinions reflect how a person of ordinary skill in the art (as I define in Section V below) would have understood the claims and the specification of the '974 patent, the prior art to the patent, and the state of the art, at the time of the alleged invention.

22. As I discuss in detail below, it is my opinion that the claims of the '974 patent that I discuss below in Section IX are not disclosed or suggested by the prior art references cited by Petitioner in this *Inter Partes* Review.

IV. LEGAL STANDARDS

1. Overview

23. I am not an attorney or a legal expert. The legal standards I applied in reaching the conclusions expressed throughout this declaration were provided

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to me by counsel. In preparing this declaration, I have endeavored to faithfully apply these legal standards. I do not intend to offer opinions on the law. Below, I describe the law I applied in considering whether the claims of the Challenged Patent are patentable.

24. I have been informed that an issued patent is presumed valid and that the challenger of the patent's validity bears the burden of proving invalidity of the patent.

2. Patent Claims

25. Patent claims describe the invention made by the inventors and describe what the patent owner owns and what the owner may prevent others from doing.

26. Claims may describe products, such as machines or chemical compounds, or processes for making or using a product. Claims are usually divided into parts or steps called limitations.

27. There are two types of claims: independent claims and dependent claims. An independent claim sets forth all the requirements that must be met in order to be covered by that claim. Thus, it is not necessary to look at any other claim to determine what an independent claim covers. A dependent claim does not itself recite all of the requirements of the claim, but refers to another claim for some of its requirements. In this way, the claim depends on another claim.

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The law considers a dependent claim to incorporate all of the requirements of the claims to which it refers.

28. The dependent claim then adds its own additional requirements. To determine what a dependent claim covers, it is necessary to look at both the dependent claim and any other claims to which it refers.

29. In that case, the dependent claims incorporate the limitations of the independent claim upon which they depend and, if a reference fails to disclose any of the limitations of an independent claim, the claims which depend on that claim cannot be made invalid by that reference. As a result, any of the references at issue in this proceeding that fail to disclose all of the limitations of an independent claim necessarily also fail to disclose all of the limitations of claims which depend on that claim.

3. Burden of Proof for Invalidity

30. I understand that the party challenging the validity of an issued U.S. patent in an IPR bears the burden of proving invalidity through facts supported by a preponderance of the evidence. I understand that a "preponderance of the evidence" means evidence sufficient to prove that a fact is more likely true than it is not.

4. Claim Construction

31. I understand that the first step in determining validity is to properly

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construe the claims. I further understand that, in this proceeding, the Board must determine the scope of the claims by using the same claim construction standard that United States District Courts use. Under this standard, words of a claim are given their "ordinary" and "customary" meaning as understood by a person of skill in the art at the time of the invention. I understand that such a person looks to the claims, specification, and file history in understanding the meaning of the claim terms. I have applied this understanding in this declaration.

5. Person of Ordinary Skill in the Art

32. I understand that a person having ordinary skill in the art may be defined by factors such as: (a) the levels of education and experience of the inventor and other persons actively involved in the field; (b) the types of problems encountered in the field; (c) prior art solutions to those problems; (d) rapidity with which innovations are made; and (e) the sophistication of the technology.

6. Prior Art

33. I understand that a patent cannot be invalidated based on one person's testimony alone without corroborating evidence, particularly documentary evidence. Moreover, I understand that corroboration is required of any witness whose testimony alone is asserted to invalidate a patent, regardless of his or her level of interest in relation to that patent. Accordingly, even if the testifying individual has no interest in the litigation, I understand that that corroboration is still required.

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34. In this declaration, I may use the phrase "prior art" when describing specific references. However, my use of this phrase should not be interpreted as agreement that the item(s) described qualify as prior art under the patent laws. I merely use this phrase to address the items labeled as "prior art" by Petitioner and its expert.

7. Anticipation

35. I understand that a patent claim can be found invalid as anticipated if each and every element of the claim, as properly construed, is found either explicitly or inherently in a single prior art reference. If the single prior art reference does not disclose any one claim limitation, then that claim is not anticipated. I further understand that the single prior art reference cannot merely disclose each element; rather, it must disclose all of the elements as arranged in the claim. I have been informed that for a prior art reference to "inherently" disclose something, the reference must necessarily function in accordance with, or include the claimed limitations, to anticipate. The missing descriptive matter cannot merely probably or possibly include the claimed limitations. I further understand that, with respect to an anticipation analysis, it is improper to combine separate, distinct embodiments of a single prior art reference.

36. I understand that for a claim to be anticipated, each claim limitation must be disclosed in a single prior art reference, and the claimed arrangement or

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combination of those limitations must also be disclosed in that same prior art reference. I understand that for a reference to be anticipatory, the reference must contain an enabling disclosure. I understand that merely naming or describing the subject matter is insufficient if it cannot be produced without undue experimentation.

8. Obviousness

37. I understand that a patent claim can be found invalid as obvious if the differences between the claim and the prior art references would have been obvious to a person of ordinary skill in the art at the time of the invention, taking into account (1) the scope and content of the prior art, (2) the differences between the prior art and the claims, (3) the level of ordinary skill in the art, and (4) any objective indicia of non-obviousness. I further understand that a claim can be found to be obvious in light of either a single prior art reference or multiple prior art references. I understand that references qualify as prior art for an obviousness determination only when they are analogous to the claimed invention. Two separate tests define the scope of analogous prior art: (1) whether the art is from the same field of endeavor, regardless of the problem addressed; and (2) if the reference is not within the field of the inventor's endeavor, whether the reference still is reasonably pertinent to the particular problem with which the inventor is involved.

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38. To be obvious in light of a single prior art reference or multiple prior art references, there must be a reason either to modify either the single prior art reference or to combine the two or more prior art references to achieve the claimed invention. I understand that this reason may come from a teaching, suggestion, or motivation to combine or may come from the reference or references themselves, the knowledge or "common sense" of one skilled in the art, or from the nature of the problem to be solved, and may be explicit or implicit from the prior art as a whole.

39. The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.

40. I further understand that there is no suggestion to combine, however, if a reference teaches away from its combination with another source. A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant, or if it suggests that the line of development flowing from the reference's disclosure is unlikely to be productive of the result sought by the applicant. If when combined, the references would produce a seemingly inoperative device, then they teach away from their combination. I understand that it is improper to combine references where the references teach away from

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their combination.

41. I understand that the degree of teaching away will depend on the particular facts; in general, a reference will teach away if it suggests that the line of development flowing from the reference's disclosure is unlikely to be productive of the result sought by the applicant. I understand that a reference teaches away, for example, if (1) the combination would produce a seemingly inoperative device, or (2) the references leave the impression that the product would not have the property sought by the applicant.

42. I understand that if the teachings of a prior art reference would lead one skilled in the art to make a modification that would render another prior art device inoperable, then such a modification would generally not be obvious. I understand that if a proposed modification would render the prior art device unsatisfactory for its intended purpose, then the proposed modification would generally not be obvious.

43. I understand that it is improper to use hindsight in making the obviousness determination.

44. I understand that some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness must be made. For example, I understand that there may be no rational underpinning to support the legal conclusion of obviousness where systems are already complete and the party

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challenging validity seeks to mix and match components, which each exist in the separate systems, from these complete systems.

V. PERSON OF ORDINARY SKILL IN THE ART (POSA)

45. Based on my review of the '974 patent, the types of problems encountered in the art at and prior to the time of the alleged invention, prior solutions to those problems, the pace with which innovations were made during the relevant time period, the sophistication of the technology, and the educational level of active professionals in the field, I believe that a person of ordinary skill in the art (POSA), at the time of the alleged invention, would have had at least a Bachelor's degree in electrical engineering, computer engineering, computer science, systems engineering, or a similar technical field, with at least three years of experience in the field of computer vision, image/video processing, and/or machine learning. Alternatively, a POSA, at the time of the alleged invention, could have had a Master's degree in electrical engineering, computer engineering, computer science, systems engineering, or equivalent course work with a focus in computer vision, image/video processing, and/or machine learning.

46. All of my opinions in this declaration are from the perspective of a person of ordinary skill in the art, as I have defined it above and during the relevant time frame (e.g., late 2016, including November 2, 2016). During this time frame, I possessed at least the qualifications of a POSA, as defined above.

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VI. THE ’974 PATENT

47. The ’974 patent is directed to artificially intelligent systems, devices and methods for learning and using a device’s circumstances for autonomous device operation, and more particularly, for autonomous driving Ex. 1001, Abstract. The invention discloses autonomous driving by teaching learning and using a device’s circumstances including detecting objects with various properties and instructions for operating the device in various circumstances. The various circumstances and instructions for operating the device in such circumstances are stored together in a knowledgebase. *Id.* at 57:49-57. This information is then used to operate the device autonomously. *Id.*

1. Existing Technology

48. Around 2016 at the time of invention, conventional methods of device or system operation “lack[ed] a way to learn [the] operation of a device or system and enable autonomous operation of a device or system.” *Id.*, 1:32-35. In other words, in the mid 2010’s, devices could not use machine learning technologies for autonomous vehicle operation as described in the ‘974 patent. The ’974 patent addressed this by introducing a system designed to learn the various scenarios encountered by a device, and condense them into a set of circumstances along with corresponding instructions, thus enabling autonomous device operation. *Id.* at 57:49-57. This invention allowed for autonomous vehicle operation based on learning about the scenarios a specific device encountered.

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2. Advantages Provided by the ’974 Patent

49. The ’974 addressed these deficiencies by introducing system that enables autonomous device operation. Specifically, the system disclosed by the ’974 Patent (1) stores a knowledgebase which correlates device operating instruction sets with encountered objects, (2) obtains new object representations using device sensors, (3) matches new objects with objects already existing in the knowledgebase, and (4) causes a device (which detected the new objects with the device sensors) to autonomously execute an instruction set correlating to the newly matched objects. *Id.*, 1:39-2:9. This operation is autonomously performed based at least in part on a correlation learned as part of a process which includes user operation of the device. *Id.* Figure 38 of the ’974 patent, reproduced below, demonstrates some of the novel aspects in a particular embodiment.

50. As shown below, the vehicle (98a) includes device sensors (92). In on example, the sensors may comprise a camera (92a) used to capture the vehicle’s surroundings. *Id.* at 162:39-163:63, Fig. 38, claim 1. The vehicle’s computer(s) process the output of the device sensors in order to form a circumstance representation, including object representations (625). In Figure 38 below, the object representations represent objects 615aa-ad in the vehicle’s surrounding. For example, the object representation may be of a person (615ac) or another vehicle (615ad).

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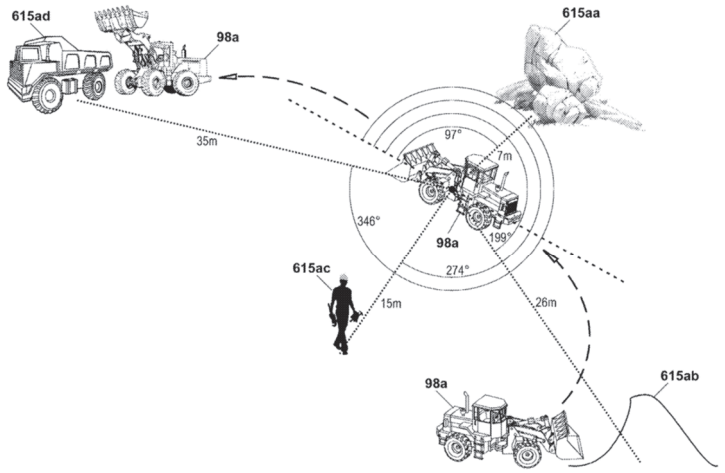


FIG. 38

Ex. 1001, Figure 38.

51. After obtaining the object representations using the device sensors, the system matches the new objects with those already existing in the knowledgeable. If the computer(s) detect a match with a previously learned circumstance representation for the new objects, the vehicle performs autonomous operating using the instructions correlated with the previously learned circumstance representation. *Id.* at 162:39-163:63, Fig. 38, claim 1.

52. The ’974 Patent discloses methods and systems for implementing the autonomous operation described. For example, Claim 1 is directed to a system which uses a knowledgebase that stores circumstance representations to implement autonomous operation. The dependent claims provide additional detail and functionality to the autonomous operation disclosed by the ’974 Patent. As an

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example, dependent claim 4 provides multiple learning processes that enable autonomous operation for multiple devices.

53. Specifically, claim 4 recites "[t]he method of claim 1, wherein the learning process includes: generating or receiving the first circumstance representation, and generating or receiving the second circumstance representation; and obtaining or receiving the first one or more instruction sets for operating the first device, and obtaining or receiving the second one or more instruction sets for operating the first device, and wherein the knowledgebase further includes a fourth correlation including a fourth circumstance representation correlated with a fourth one or more instruction sets for operating the second device, and wherein the fourth circumstance representation represents a fourth circumstance detected at least in part by the one or more sensors of the second device, and wherein at least a portion of the fourth correlation is learned in another learning process that includes: generating or receiving the fourth circumstance representation; and obtaining or receiving the fourth one or more instruction sets for operating the second device."

54. This claim, and other claims that I discuss below in Section IX, introduce limitations that the Petition has not established are disclosed, suggested or rendered obvious by any of the cited prior art references, as explained in more detail below. The '974 patent provides novel and innovative techniques for autonomous device operations.

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VII. CLAIM CONSTRUCTION

55. I understand that claim terms are typically given their ordinary and customary meaning, as would have been understood by a person of ordinary skill in the art at the time of the alleged invention. In considering the meaning of the claims, I also understand that one must consider the claim language, specification, prosecution history, and the knowledge of a person of ordinary skill in the art at the relevant time. I believe construction for the term "connections" as recited in claim 16 requires construction, as explained in more detail below. I understand that Petitioner has proposed claim terms for claim construction. I also understand that those terms have been disclaimed, and therefore do not need construction.

1. "connection" (Claim 7)

56. I understand that claim 7 recites a "first connection" and a "second connection" in describing relationships that include links. Claim 7 recites in part:

> wherein a first **connection** is generated to connect the first correlation with the second correlation, and wherein a second **connection** is generated to connect the second correlation with the fourth correlation.

Ex. 1001, Claim 7 (emphasis added).

57. In my opinion, in the context of claim 7 of the '974 patent, including in light of the claims, specification, and drawings, a "connection" should be construed as a "relationship that includes a link." In my opinion, this construction is supported by the claims, specification, drawings, and intrinsic record as a

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whole. Figure 17 of the ’974 patent makes clear that a connection is a relationship that includes a link:

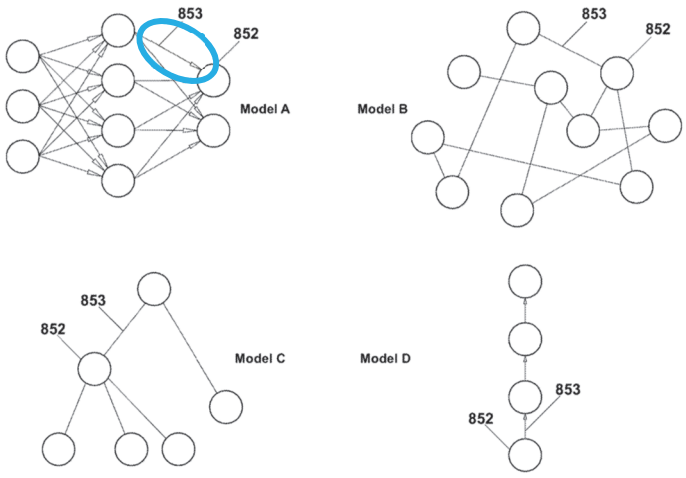


FIG. 17

Ex. 1001, Figure 17 (annotated to show Connection 853 in blue).

58. In describing Figure 17, in this particular use of connections, the ’974 patent states that “machine learning, knowledge structuring or representation, decision making, pattern recognition, and/or other artificial intelligence functionalities may include a network of Nodes 852 (also referred to as neurons, etc.) and Connections 853 similar to that of a brain. Node 852 can store any data, object, data structure, and/or other item, or reference thereto.” Ex. 1001, 103:46-52. For example, a node may include at least a portion of a circumstance representation or at least a portion of an object representation while another node may include at least a portion of an instruction set, and the two

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nodes may be in a relationship that includes a connection or link. As shown for example in Model A in Figure 17 in this particular use, Connections 853 are included in connecting or linking Nodes 852. *Id.*, 103:42-66. Connections are included as some of the elements connecting those nodes and showing relationships between those nodes. Further, "Connection 853 may include or be associated with a value such as a symbolic label or numeric attribute (i.e. weight, cost, capacity, length, etc.)." *Id.*, 103:63-66.

59. In this particular use of connections, Figure 18A of the '974 patent also makes clear that a connection is a relationship that includes a link:

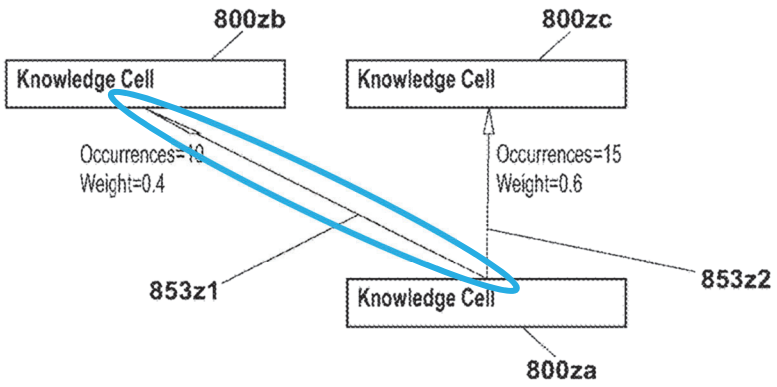


FIG. 18A

Ex. 1001, Figure 18A (annotated to show Connection 853 in blue).

60. The specification further explains that, in this particular use, connections between correlations (each knowledge cell depicted in Fig. 18A includes a correlation, *see id.*, Figs. 13-16) "may include or be associated with at

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least one of: an occurrence count, a weight, a parameter, or a data." Ex. 1001, 15:59-60. In addition, Figure 18A discloses "that Knowledge Cell 800za is connected to Knowledge Cell 800zb and Knowledge Cell 800zc by Connection 853zl and Connection 853z2, respectively. Each of Connection 853zl and Connection 853z2 may include or be associated with occurrence count, weight, and/or other parameter or data." *Id.*, 106:9-14. This also supports Patent Owner's construction, as the connections are relationships that include links.

61. The '974 patent further provides that "[k]nowledge cells [including correlations] may be connected, interrelated, or interlinked into knowledge structures using statistical, artificial intelligence, machine learning, and/or other models or techniques." Ex. 1001, 153:66-154:2. In this particular use, connections are used to indicate and track relationships including links to enable more efficient autonomous device operation. *Id.*, 106:6-57; 108:31-35. Further, connections are used to create paths through the knowledgebase for efficient storage and autonomous operation (*see* Fig. 22 for example). This disclosure confirms that, with respect to claim 7, connections are relationships that include links.

62. I confirm that a POSA would understand the claimed connection as a "relationship that includes a link" based on my review of the specification, claims, and other relevant materials. In addition, several dictionaries confirm that

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"connection" can be defined as a "relationship that includes a link." *See* Ex. 2012; Ex. 2013. One dictionary defines the term connection as "the state of being connected or linked." Ex. 2013. Another dictionary defines "connection" as "a link." Ex. 2012. All of this supports my opinion that a connection is a "relationship that includes a link."

2. "means for generating or receiving;" "means for anticipating;" and "means for executing" (Claim 19)

63. I understand that Petitioner has proposed a construction for the terms "means for generating or receiving," "means for anticipating" and "means for executing" as they appear in Claim 19 of the '974 Patent. I also understand that Patent Owner has disclaimed claim 19 of the '974 Patent. *See* Ex. 2004. Therefore, I understand that no construction of this term is necessary.

VIII. OVERVIEW OF ALLEGED PRIOR ART REFERENCES

64. In its Petition (Paper No. 1), Tesla presents three grounds challenging claims 4-5, 7, 11 and 14-15 using various combinations of Grotmol and Hickman. These references are described briefly below.

1. Grotmol

65. Grotmol discloses a method for training and operating a robotic device to follow a trajectory. Ex. 1004, Abstract. The robotic device follows a simple trajectory based on a simple sequence (i.e., an ordered buffer). The robotic device functions based on training, and should the robotic device of Grotmol

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encounter an object or scenario it had not been trained for, it would result in a collision as there's no way to account for new scenarios.

66. Grotmol discloses using a camera to store a sequence of images of a scene, and then following a trajectory during training in an ordered buffer. Ex. 1004, Abstract. The specification provides detail on the training, including that a train issues motor commands which correspond to "time instances when the images are acquired may be stored." *Id.* at 39:17-19. Then, during operation, the robot compares newly acquired images with those from the training buffer in order to "determine the most likely match." *Id.* at Abstract. Once matched, the best matched can be used to predict a motor command for the robot operation. *Id.* at 27:57-58.

67. The robot of Grotmol is shown in Figure 1, reproduced below. As depicted, the robot (160) includes a sensor (166). *Id.* at Figure 1, 8:57-61. The sensor provides "information associated with objects within the field-of view." *Id.* at 8:64-68.

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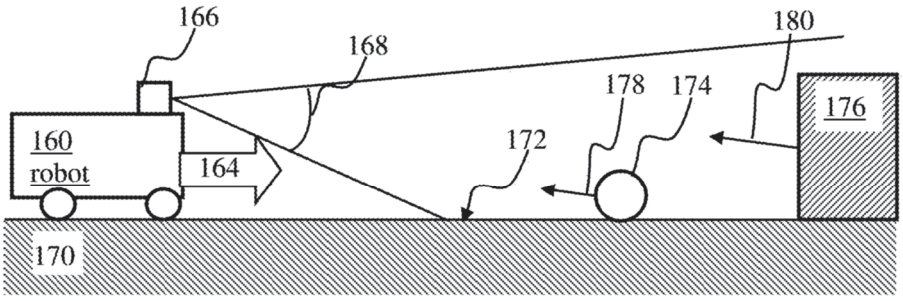


FIG. 1

Ex. 1004, Fig. 1.

68. Grotmol further discloses that "the memory component may be configured to store training sets," which it explains "may comprise an instance of the video frame, an instance of the binary signal, and an instance of a motor control indication configured to cause the robot to execute an action." *Id.* at 3:35-39. Grotmol does not reference nor describe specific data structures anywhere in the reference. Grotmol also fails to teach *how* data is processed in the robot. Grotmol discloses a robot which follows a simple trajectory based on a simple sequence, wherein the encountered objects have been trained for. A POSA would understand that in instances where the robot is not trained on an object, no command is issued and the robot would either fail to continue on the trajectory or possibly collide with the new object.

2. **Hickman**

69. Hickman is directed to "shared robot knowledge bases for use with

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cloud computing systems." Ex. 1005, Abstract. The "cloud computing system collects data from a robot about an object the robot has encountered in its environment, and stores the received data in the shared robot knowledge base. In another embodiment, the cloud computing system sends instructions for interacting with an object to a robot, receives feedback from the robot based on its interaction with the object, and updates data in the shared robot knowledge base based on the feedback. In yet another embodiment, the cloud computing system sends instructions to a robot for executing an application based on information stored in the shared robot knowledge base. In the disclosed embodiments, information in the shared robot knowledge bases is updated based on robot experiences so that any particular robot may benefit from prior experiences of other robots." *Id.* In other words, Hickman discloses a basic method for storing and sharing information associated with an object.

70. Figure 4 of Hickman, reproduced below, shows a message flow diagram between multiple robots and a cloud computing system having a shared robot knowledge base. Robot 404 may obtain single object information via one or more sensors. Ex. 1005, 25:14-19. That single object information is transmitted to cloud computing system 401, where it is stored and can be used by second robot 413. *Id.,* 25:24-27:26. Unlike the claims of the '344 patent that provide circumstance representations, Hickman only provides information about a single

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object and operates on a single object, and does not use any correlations of circumstance representations and instructions sets. In operation, "the robot 404 obtains identification information associated with an object 405 via one or more sensors associated with the robot 404." Ex. 1005, 25:14-16. The "cloud processing engine 401 may query an object knowledge base component of the shared robot knowledge base 403 similar to the general object knowledge base 308 or the unique object knowledge base 307." *Id.* at 25:41-46. In other words, as shown in Figure 4, the identification information (once transmitted to the cloud computing system) is stored and can be acquired/used by a second robot.

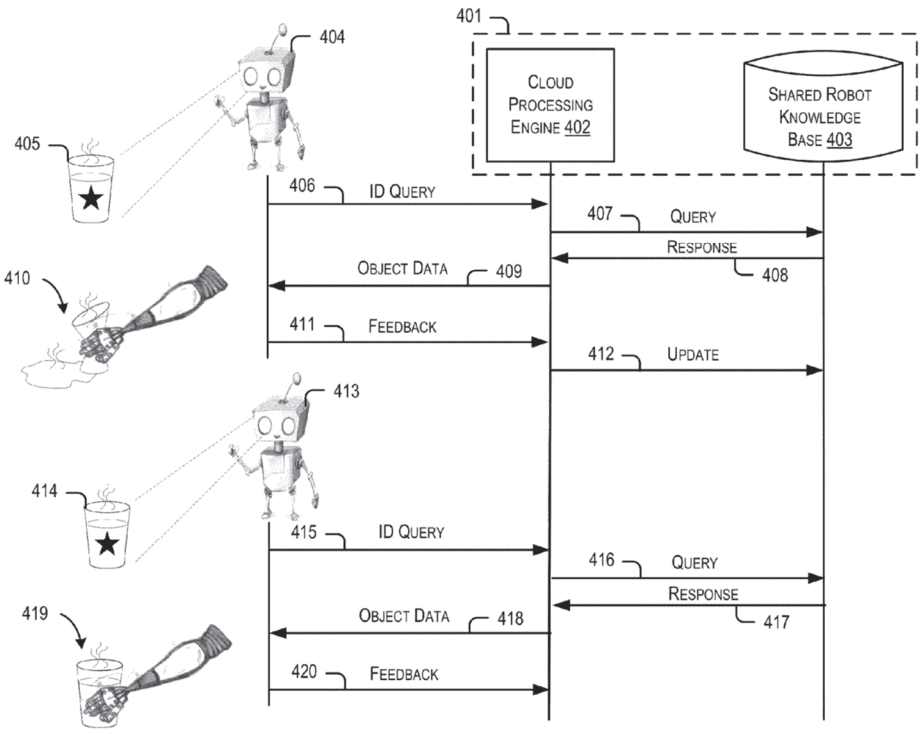


FIGURE 4

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Ex. 1005, Fig. 4.

71. Other than this disclosure, Hickman does not teach how this information is stored together. For example, as shown in Figure 3, reproduced below, Hickman discloses separate knowledge bases for unique objects (307), general objects (308), and tasks (309). *See also* Ex. 1005 at 10:57-58 ("The shared robot knowledge base 306 may include multiple component and/or sub-component knowledge bases.") The information disclosed by Hickman is not stored together in a single knowledgebase, but in multiple component knowledge bases. A POSA would understand that Hickman merely discloses obtaining object data from a sensor of a robot, storing it in a specific component knowledge base, and providing the information to a second robot when queried.

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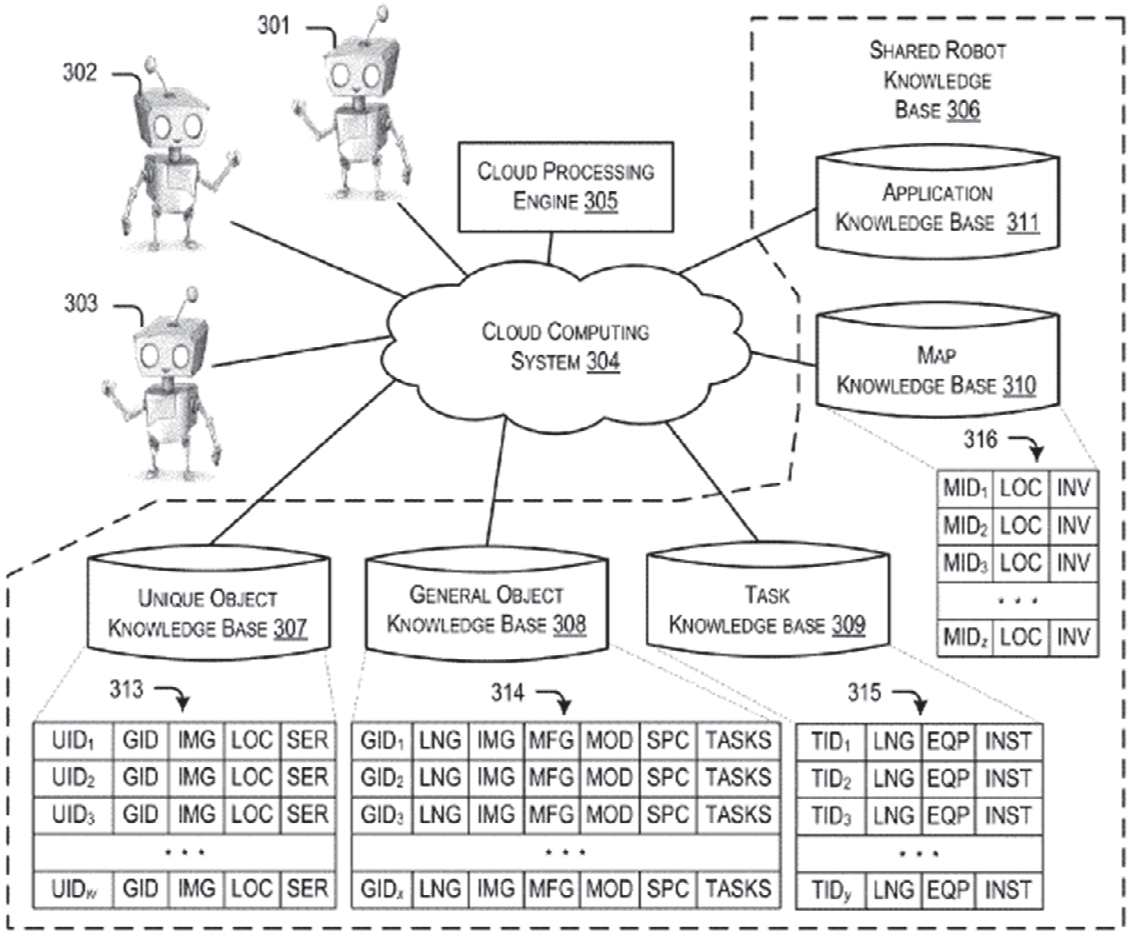


FIGURE 3

Ex. 1005, Figure 3.

IX. THE ALLEGED PRIOR ART DOES NOT DISCLOSE OR SUGGEST THE CLAIMS OF THE '974 PATENT

72. In my opinion, the alleged prior art fails to disclose or suggest to a POSA all of the elements of claims 4, 5, 7 and 11 of the '974 Patent under the 3

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grounds presented in the Petition. Each ground is addressed individually below.

1. Ground 1: Grotmol does not disclose the limitations of Claims 4, 5 and 7

73. In my opinion, Grotmol does not disclose the limitations of claims 4, 5 and 7 of the '974 Patent. Specifically, Grotmol fails to disclose numerous limitations present in these claims, including the "second device" of claim 4, the specific "matching" of claim 5, and the "connection" as properly construed of claim 7.

A. Claim 4: Grotmol Does Not Disclose a Knowledgebase that is Trained By Operating First and Second Devices in the Claimed Manner

74. Grotmol fails to disclose that the knowledgebase includes the claimed fourth correlation learned in another learning process involving the second device in my opinion. Claim 4 depends from claim 1 and requires:

> wherein the knowledgebase further includes a fourth correlation including a fourth circumstance representation correlated with a fourth one or more instruction sets for operating the second device, and wherein the fourth circumstance representation represents a fourth circumstance detected at least in part by the one or more sensors of the second device, and wherein at least a portion of the fourth correlation is learned in ***another learning process*** that includes: generating or receiving the fourth circumstance representation; and obtaining or receiving the fourth one or more instruction sets for operating ***the second***

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device.

Ex. 1001, Claim 4 (emphasis added).

75. Based on my analysis, Grotmol only discloses ***one*** user operating ***one*** device in ***one*** learning process. The knowledge gained from this process in Grotmol, when loaded into a second device, ***is still knowledge of one user operating one device in one learning process***. Grotmol does not disclose a knowledgebase that includes mixed knowledge of a first correlation including a first circumstance representation correlated with a first one or more instruction sets for operating a first device and a second correlation including a second circumstance representation correlated with a second one or more instruction sets for operating the first device learned in one learning process ***and integrated with*** a fourth correlation including a fourth circumstance representation correlated with a fourth one or more instruction sets for operating ***the second device***. Grotmol fails to disclose learning at least portions of multiple correlations in ***different (i.e. one and another) learning processes***, the first and second of such multiple correlations including circumstance representations detected by one (i.e. first) device and instructions sets for operating the one (*i.e.*, first) device, and the fourth of such multiple correlations including a circumstance representation ***detected by another device*** and instructions sets of operating the ***another device***.

76. I understand that, the Board noted problems with Petitioner's

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argument regarding the claimed fourth correlation and "question[ed] whether Petitioner has sufficiently shown that Grotmol discloses more than loading a trained configuration from a first robot to a second robot." Decision, 35. The Board also questioned whether Petitioner had sufficiently shown that "Grotmol discloses a fourth correlation learned in another learning process by a second robot that is included as part of the knowledgebase along with the first and second correlations learned by the first robot." Decision, 35-36. I agree with the Board's analysis.

77. Petitioner's analysis regarding Grotmol for this limitation is wrong in my opinion. Petitioner points to Grotmol's disclosure that a "trained configuration may be loaded to one or more other robots in order to provide learned behaviors," Petition, 28 (quoting Ex. 1004, 33:30-32), as disclosing the elements of claim 4, but as the Board noted in its institution decision, that portion of Grotmol only discloses that a trained configuration may be loaded from a first robot to a second robot. Decision, 35. Grotmol never discloses, either at the foregoing passage or elsewhere, that the second robot detects a circumstance that is later included in a fourth circumstance representation that is correlated with a fourth one or more instruction sets for operating the second device in a fourth correlation in the knowledgebase, as required by claim 4.

78. In addition, Grotmol does not disclose that "at least a portion of the

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fourth correlation is learned in another learning process," as required by claim 4. Petitioner stated that "Grotmol discloses that the memory component of a first robot can store the claimed first and second correlations as well as a fourth correlation learned in another learning process involving the operation of a second robot—i.e., a circumstance detected by the sensor of a second robot correlated with instructions for operating that second robot." Petition, 28. Petitioner describes a situation involving two trained configurations each stored and learned on a different robot. Petitioner is incorrect because Grotmol never discloses that the second robot provides a fourth correlation including a circumstance detected by ***the second robot*** to be included in the knowledgebase. Grotmol merely discloses that a "trained configuration may be loaded to one or more other robots in order to provide learned behaviors." Ex. 1004, 33:30-32. Grotmol fails to disclose learning at least portions of multiple correlations in ***different (i.e. one and another) learning processes***, the first and second of such multiple correlations including circumstance representations detected by one (i.e. first) device and instructions sets for operating the one (*i.e.*, first) device, and the fourth of such multiple correlations including a circumstance representation ***detected by another device*** and instructions sets of operating the ***another device***.

B. Claim 5: Grotmol Does Not Disclose the Claimed Matching

79. Grotmol does not disclose all the elements of claim 5. Claim 5 depends

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from claim 1 and requires:

> determining that a ***number*** of at least ***partially matching portions*** of the third circumstance representation and portions of the first circumstance representation exceeds a ***threshold number***, or determining that a ***percentage*** of at least ***partially matching portions*** of the third circumstance representation and portions of the first circumstance representation exceeds a threshold ***percentage***.

Ex. 1001, Claim 5.

80. I understand that the Board noted in its institution decision that Petitioner points to Grotmol's disclosure regarding computing a similarity measure (how similar images are to one another) and comparing that similarity measure against a threshold, "but Petitioner does not specifically explain how Grotmol discloses determining a number (or percentage) of at least partially matching portions of two training sets." Decision, 38. In my opinion, Grotmol's disclosure is distinct from the foregoing language of claim 5, which requires determining that a ***number*** of partially matching portions exceeds a threshold ***number*** or ***percentage*** (of portions).

81. Based on my review, Grotmol's comparison based on a similarity measure, which Petitioner relies on, does not disclose the elements of claim 5. Petition, 29. Using the number of at least partially matching portions in the matching process involves counting the portions and determining whether this counted number of portions exceeds a numerical threshold, and Grotmol does not

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disclose any such counting of portions and the corresponding numerical threshold. Further, using the percentage of at least partially matching portions in the matching process involves counting the portions to compute the percentage and determining whether this computed percentage of portions exceeds a percentage threshold, and Grotmol does not disclose any such counting of portions, computation, and percentage threshold, either. Grotmol also fails to disclose using partially matching portions at all.

82. Petitioner states that Grotmol discloses "that determining a control signal for operation of the robot may involve computing a similarity measure for a given training set and another training set, and determining ***whether that similarity measure exceeds a threshold***." Petition, 29 (emphasis added). Grotmol discloses comparing a subset of features with a training set, with "the similarity measure characterizing similarity between features of the subset, and features of the given training set," not the number or percentage of the similar features. Ex. 1004, 3:50-52. A similarity measure is for measuring similarity of elements, not for counting their number or computing their percentage. In my opinion, a similarity measure is clearly different than the number or percentage of the similar elements after the similarity measure of those elements is determined.

83. Grotmol's disclosure regarding using the similarity measure does not meet either prong of the foregoing claim language of claim 5. Grotmol does not

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disclose that its use of the similarity measure discloses determining whether a number ***of at least partially matching portions*** exceeds a threshold number (of matching portions), as recited in the first disjunctive prong of claim 5. Grotmol also does not disclose that its use of the similarity measure discloses determining that a ***percentage of at least partially matching portions*** of the third circumstance representation and portions of the first circumstance representation exceeds a ***threshold percentage*** for similar reasons. Grotmol does not disclose a count of at least partially matching portions that would enable a determination of whether the count exceeds a number threshold or a percentage of at least partially matching portions that would enable a determination of whether the percentage exceeds a percentage threshold in its matching process at all. And Petitioner has not pointed to any disclosure in Grotmol disclosing these elements. Petition, 29.

C. Claim 7: Grotmol Does Not Disclose the Claimed Connections

84. In my opinion Grotmol fails to disclose the claimed "first connection" and "second connection" of claim 7 under the construction of "connection," which is discussed above in Section VII.1. Claim 7 depends from claim 1 and requires:

> wherein the knowledgebase further includes a fourth correlation including a fourth circumstance representation correlated with a fourth one or more instruction sets for operating: the first device, the second device, or a third device, and wherein ***a first connection*** is generated to connect the first correlation with the second correlation, and wherein ***a second connection*** is

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generated to connect the second correlation with the fourth correlation.

Ex. 1001, Claim 7 (emphasis added).

85. When properly construed, each claimed connection is a relationship that includes a link in my opinion. Grotmol does not disclose correlations connected via such connections. Grotmol's disclosure of simply storing training data in sequence fails to disclose the claimed connections under the proper construction of that claim term.

86. As discussed above, in the context of the '974 patent, including in light of the claims, specification, and drawings, a "connection" should be construed as a "relationship that includes a link." Petitioner's analysis that "[t]he training data stored in memory in an order or sequence" disclosed in Grotmol "corresponds to the claimed first and second 'connections' between the first and second correlations, and the second and fourth correlations," Petition, 32, is wrong in my opinion. The connections disclosed in the '974 patent are relationships that include links. In contrast, Grotmol merely discloses storing information in a sequence and fails to disclose links among certain elements.

87. The '974 patent explains that the knowledgebase uses connections as links to enhance autonomous operation. Unlike the simple storage in a sequence disclosed by Grotmol, knowledge cells are created and structured in a specific way to store object representations correlated with instructions sets (i.e. correlations),

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Ex. 1001, 98:54-99:10, and are connected in the knowledgebase using connections that can be weighted. *Id.*, 131:64-132:26. This creates paths through the knowledgebase. *Id.* The connections are used in the comparison process to enhance autonomous operation as correlations which include collections of object representations that are connected by connections and may be compared to find similar collections of object representations. This disclosure confirms that connections are relationships that include links.

88. Moreover, claim 7 additionally requires generating the first and second connections. Ex. 1001, Claim 7; *see also* Exhibit 1001, Fig. 17; 103:26-106:5. Grotmol does not disclose generation of connections as properly construed, and Petitioner has failed to point to any portions of Grotmol that disclose this generation.

89. Petitioner states that simply "storing sequences of images with their corresponding instruction sets," as in Grotmol, discloses the claimed connections. Petition, 32. I disagree. A sequence of elements inherently does not need any connections since the sequence is an ordered group of elements of a single path (i.e. sequence), hence, Grotmol never discloses connections because Grotmol does not need them. On the other hand, as previously mentioned, the '974 patent makes clear that connections link specific correlations to create multiple paths (unlike a single path in Grotmol's sequence) through the knowledgebase to enable multiple options

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in the decision making for autonomous operation. Grotmol's disclosure of "an ordered buffer in a non-volatile memory," Ex. 1004, 38:39-42, does not constitute disclosure of the claimed connections or relationships including links.

90. Petitioner also cites to Grotmol's disclosure that the images may be ordered in the training buffer either temporally or in some other fashion, Petition, 32-33, but regardless of the order of the training buffer, Grotmol does not disclose connections or relationships that include links. As a result, Grotmol's disclosure of basic memory storing ordered images and instruction sets does not disclose the claimed connections of claim 7.

2. Ground 2: Grotmol Does Not Disclose the Limitations of Claim 11

91. In my opinion, Grotmol in view of the knowledge of a POSA does not render obvious the limitations of claim 11 of the '974 Patent. Grotmol does not disclose the limitations of claim 11, and Petitioner's attempt to rely on the knowledge of a POSA to fill the gaps is insufficient.

A. Claim 11: Grotmol in View of a POSA Does Not Disclose or Suggest the Claimed Fourth Correlation Learning in Another Learning Process Involving a Second Device and Another User

92. Claim 11, which depends from claim 1, provides for multiple users and a second device and recites:

> wherein the knowledgebase further includes a fourth correlation

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including a fourth circumstance representation correlated with a fourth one or more instruction sets for operating ***the second device***, and wherein the fourth circumstance representation represents a fourth circumstance detected at least in part by the one or more sensors ***of the second device***, and wherein ***at least a portion of the fourth correlation is learned in another learning process that includes operating the second device at least partially by another user***.

Ex. 1001, Claim 11 (emphasis added).

93. Grotmol fails to disclose "another user" as required by claim 11 in my opinion. Further, Grotmol fails to disclose that the knowledgebase includes the claimed fourth correlation learned in another learning process involving the second device and another user. As discussed above regarding claim 4, Grotmol discloses only ***one*** user operating ***one*** device in only ***one*** learning process. The knowledge gained from this process in Grotmol, when loaded into a second device, ***is still knowledge of one user operating one device in one learning process***. Grotmol fails to disclose learning at least portions of multiple correlations in ***different (i.e. one and another) learning processes***, the first and second of such multiple correlations including circumstance representations detected by one (i.e. first) device and instructions sets for operating the one (*i.e.*, first) device, and the fourth of such multiple correlations including a circumstance representation ***detected by the second device*** and instructions sets of operating

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the ***second device***.

94. Petitioner's analysis regarding Grotmol is not correct in my opinion, as Petitioner has failed to show that Grotmol discloses all the elements of claim 11.

95. Petitioner invokes obviousness in stating that "it would be obvious to a POSITA that the training process involving operation of the first robot (resulting in the first trained configuration), and the training process involving operation of the second robot (resulting in another trained configuration) could be done by different users." Petition, 57-58. Petitioner's analysis is incorrect in my opinion for various reasons. The claim language states that "wherein at least a portion of the fourth correlation is learned in another learning process that includes operating the second device at least partially by another user." Learning portions of correlations by devices that are operated partially by multiple users and integrating these correlations into the knowledgebase in a seamless manner requires an in-depth knowledge of these processes that is not obvious to a POSA. To this effect, this would require the proper integration of the partial correlations that are acquired in separate training situations in order to create a smooth operation of the robot that does not create discontinuous behaviors or inconsistencies in its operations. It would need to properly match the connectivity between the multiple instruction sets to ensure proper and smooth transitioning

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between the multiple correlations.

96. The ’974 patent discloses:

> [M]ultiple operators (i.e. Users 50, etc.) may operate their Devices 98 where the Devices 98 may be configured to transmit their operations in circumstances including objects with various properties to a remote DCADO Unit 100. Such remote DCADO Unit 100 enables learning of the operators’ 35 collective knowledge of operating Device 98 in circumstances including objects with various properties.

Ex. 1001, 95:31-36. Thus, the ’974 Patent discloses multiple users operating multiple devices. Claim 11 recites that “at least a portion of the fourth correlation is learned in another learning process that includes operating the second device at least partially by another user.” Claim 11’s recitation of a second device and another user is not taught by Grotmol based on my review.

97. Petitioner points to Grotmol’s disclosure that “trained configuration may be loaded to one or more other robots in order to provide learned behaviors,” Pet., 58, as disclosing the claimed “another user” of claim 11, but that portion of Grotmol only discloses that a trained configuration may be loaded from a first robot to a second robot. Ex. 1004, 33:30-32. Grotmol never discloses that the second robot detects a fourth circumstance that is later included in a fourth circumstance representation as a part of a fourth correlation in the knowledgebase where this process involves another user.

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98. Further, Grotmol fails to disclose that "at least a portion of the fourth correlation is learned in another learning process" involving another user, as required by claim 11. Petitioner argues:

> Grotmol discloses that the memory component of a first robot can store the claimed first and second correlations as well as a fourth correlation learned in another learning process involving the operation of a second robot—i.e., a circumstance detected by the sensor of a second robot correlated with instructions for operating that second robot.

Petition, 62. However, Petitioner is wrong in my opinion. Grotmol never discloses that the second robot provides a fourth correlation including a circumstance detected by the second robot to be included in the knowledgebase. Petitioner is improperly stretching Grotmol's disclosure, as Grotmol merely discloses that "trained configuration may be loaded to one or more other robots in order to provide learned behaviors," Ex. 1004, 33:30-32, which is about loading the previously learned knowledge into another robot and not what claim 11 requires: a fourth circumstance detected at least in part by the one or more sensors of the second device, and learning the fourth correlation in another learning process that includes operating the second device at least partially by another user. Grotmol fails to disclose learning at least portions of multiple correlations in ***different (i.e. one and another) learning processes***, the first and second of such multiple correlations including circumstance representations detected by one (i.e. first) device and instructions sets for operating

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the one (*i.e.*, first) device, and the fourth of such multiple correlations including a circumstance representation ***detected by another device*** and instructions sets of operating the ***another device***. *Id.*

99. Petitioner states that "it would be obvious that the multiple learning processes could be done by different users operating the robot." Petition, 57. But this is an unjustified leap that goes outside of Grotmol's disclosure in my opinion. Further, claim 11 requires another user operating a second device, not the same device, as Petitioner contends and potentially a portion of a fourth correlation is learned in another learning process that includes operating a second device at least partially by another user.

100. Petitioner also states that "it would be obvious to a POSITA that the training process involving operation of the first robot (resulting in the first trained configuration), and the training process involving operation of the second robot (resulting in another trained configuration) could be done by different users." Petition, 58. But Petitioner describes a situation involving two trained configurations each stored and learned on a different robot, while claim 11 recites learning at least portions of multiple correlations in ***different (i.e. one and another) learning processes***, the first and second of such multiple correlations including circumstance representations detected by one (i.e. first) device and instructions sets for operating the one (*i.e.*, first) device, and the fourth of such

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multiple correlations including a circumstance representation ***detected by another device*** and instructions sets of operating the ***another device***.

101. In addition, the limitation at issue here, which involves having different users operate different devices in different learning processes to learn mixed knowledge into a single knowledgebase, is complex. Using different users with different devices in different learning processes to learn mixed knowledge into a single knowledgebase would not have been straightforward or unusually simple to a POSA due to the complexities of combining the mixed knowledge into a single knowledgebase.

102. Enabling a system to learn mixed autonomous operation knowledge and integrate and/or partially integrate such knowledge into a single knowledgebase from different devices in different learning processes with different users is an approach not disclosed or suggested in Grotmol and definitely not obvious to a POSA. For example, this approach may involve combining the learned knowledge from multiple devices into a coherent knowledge structure, identifying each user to store particular learned operations and preferences in portions of the knowledgebase for user-specific autonomous operations, combining the learned knowledge form specific devices and/or users with other devices' and users' learned knowledge, and/or other issues not found in Grotmol and not obvious to a POSA.

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103. Grotmol fails to disclose learning at least portions of multiple correlations in ***different (i.e. one and another) learning processes***, the first and second of such multiple correlations including circumstance representations detected by one (i.e. first) device and instructions sets for operating the one (*i.e.*, first) device, and the fourth of such multiple correlations including a circumstance representation ***detected by another device*** and instructions sets of operating the ***another device***.

3. Ground 3 Does Not Render Claims 4 and 11 Obvious

104. Regarding Ground 3, Grotmol in view of Hickman does not render claims 4 and 11 obvious in my opinion. Petitioner has failed to show that Grotmol's training sets and Hickman's shared robot knowledgebase would have been predictably combined by a POSA and/or portions of correlations would have been combined by a POSA to arrive at the claimed inventions, as discussed below.

105. ***First***, combining Hickman's shared knowledgebase with Grotmol's training sets would not have been predictable or obvious because Hickman specifically teaches away from or discourages using the claimed "fourth correlation . . ." (with all of its features as recited in claims 4 and 11 and shown below). Hickman discloses storing instruction sets and images ***separately in separate knowledgebases*** (*see* Ex. 1005, Fig. 3), which a POSA would have

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found to be incompatible with Grotmol's disclosure of training sets or correlations with images and instruction sets correlated and stored ***together***. Further, Hickman teaches away from the claimed "fourth circumstance representation" because Hickman focuses on manipulating a single object and single object information and such information is not a circumstance representation. In addition, instances of single object information (where each row of the Unique Object Knowledge Base 307 disclosed in Hickman is single object information) are learned from separate circumstances, further proving that single object information is not a circumstance representation.

106. ***Second***, Petitioner has not explained how the correlations and circumstance representations allegedly disclosed by Grotmol would have been combined and/or partially combined with the knowledgebase in Hickman to arrive at the claimed invention of these claims. Since circumstance representations and correlations of circumstance representations and instruction sets are fundamental to the operation of the system in Grotmol in my opinion, Hickman must disclose the circumstance representations and correlations in order to be combinable with Grotmol. However, Hickman teaches away from or discourages the claimed "fourth correlation . . ." (with all of its associated features as claimed in claims 4 and 11) by disclosing images and instructions in separate knowledgebases that are not correlated. Petitioner is using improper hindsight

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analysis and speculation to pick and choose high level concepts from each reference without sufficiently mapping each reference to each claim element to arrive at the claimed invention and explaining why a POSA would have found the combination of these references to be predictable and operable with a reasonable expectation of success.

107. ***Third***, Petitioner fails to show that Grotmol in view of Hickman discloses or suggests all the specifically claimed elements of each of these claims. Both Grotmol and Hickman fail to disclose "***a fourth correlation*** including ***a fourth circumstance representation*** correlated with a fourth one or more instruction sets ***for operating the second device***," "a fourth circumstance detected at least in part by the one or more sensors ***of the second device***," and "a portion of ***the fourth correlation*** is learned ***in another learning process*** that includes . . . obtaining or receiving the fourth one or more instruction sets ***for operating the second device***," as required by claim 4, and "***a fourth correlation*** including ***a fourth circumstance representation*** correlated with a fourth one or more instruction sets for operating ***the second device***," "a fourth circumstance detected at least in part by the one or more sensors ***of the second device***," and "a portion ***of the fourth correlation is learned in another learning process*** that includes operating ***the second device*** at least partially ***by another user***," as required by claim 11.

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A. It Would Not Have Been Obvious to Combine Grotmol and Hickman to Arrive at the Claimed Invention

108. Petitioner's argument that it would have been obvious to combine Grotmol's training sets with Hickman's simplistic cloud storage approach uses impermissible hindsight to arrive at the claimed invention in my opinion. Grotmol discloses one user operating one device in one learning process. The knowledge gained from this process in Grotmol, when loaded into a second device, is still knowledge of one user operating one device in one learning process. Further, Hickman's simple cloud storage of object information does not contemplate using correlations, circumstance representations, portions of correlations and other data structures to learn knowledge for autonomous operation as required by claims 4 and 11. Petitioner's obviousness analysis is also deficient because it fails to explain what specific claim limitation is missing from Grotmol and how Hickman discloses the missing claim limitation.

109. Petitioner's use of impermissible hindsight to arrive at the claimed invention is highlighted in its statement that "[i]n the combination of Grotmol and Hickman, the shared knowledge base[] would include multiple training sets (i.e., circumstance representations correlated with instruction set) learned during the operation of multiple devices," Petition, 63. This statement is repeated almost verbatim in Dr. Janet's declaration and lacks support. Petitioner is using the

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claimed use of correlations, multiple users, and multiple devices as a roadmap for its obviousness combination. This is impermissible hindsight, as neither Grotmol nor Hickman, alone or in combination, discloses or suggests the claimed invention. And it would not have been obvious to one skilled in the art to use Hickman's simple cloud storage method with Grotmol's single-device training sets, as both references fail to contemplate the use of data structures including correlations to enable autonomous operation.

110. Petitioner's proposed combination would also not have been obvious because Hickman teaches away from the claimed invention. Specifically, as shown in Figure 3 from Hickman below, Hickman teaches that images are stored in one database 313 while instruction sets are stored separately in another database 315. Ex. 1005, 13:64-21:39. In light of this storage structure, and the fact that Grotmol discloses that training sets stored in memory include correlated images and instruction sets that are stored together, Ex. 1004, 3:35-49, Hickman teaches away from the claimed "fourth correlation" as claimed in claims 4 and 11, and a POSA would not have been motivated to combine Grotmol and Hickman in the manner proposed by Petitioner. Further, Hickman also teaches away from the fourth circumstance representation since a single object information stored in each row of Unique Object Knowledge Base 307 in Hickman is not a circumstance representation as discussed.

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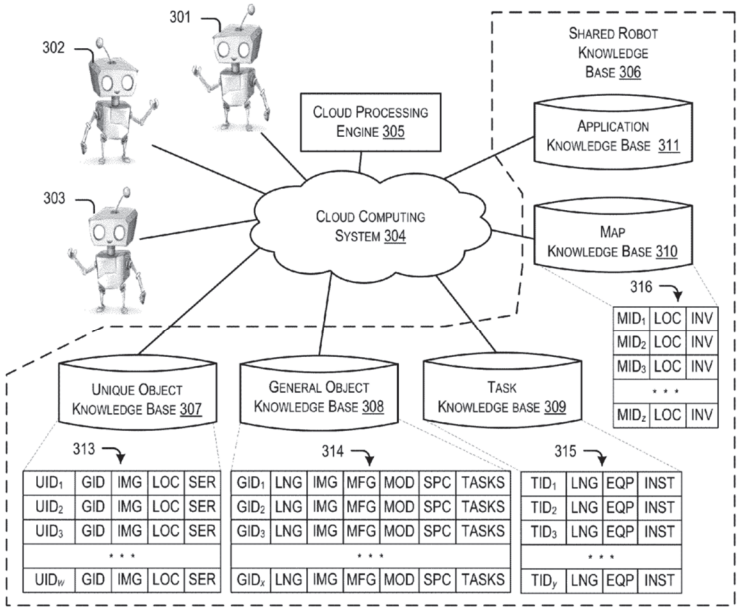


FIGURE 3

Ex. 1005, Fig. 3.

B. Claim 4: Grotmol and Hickman Do Not Disclose or Suggest the Claimed Fourth Correlation and Second Device

111. Claim 4 depends from claim 1 and requires, among other things:

> wherein the knowledgebase further includes ***a fourth correlation*** including ***a fourth circumstance representation*** correlated with a fourth one or more instruction sets ***for operating the second device***, and wherein the fourth circumstance representation represents a fourth circumstance detected at least in part by the one or more sensors ***of the second device***, and wherein at least a portion of the fourth correlation is learned ***in another learning process*** that includes: generating or receiving the fourth circumstance representation; and obtaining or receiving the

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fourth one or more instruction sets ***for operating the second device***.

Ex. 1001, Claim 4.

112. In my opinion, Hickman's failure to disclose fundamental elements including the claimed fourth circumstance representation as well as the claimed fourth correlation of the fourth circumstance representation with the claimed fourth instruction set confirms that Hickman cannot be used to provide any missing elements from Grotmol.

113. In addition, Grotmol and Hickman fail to disclose "***a fourth correlation*** including ***a fourth*** circumstance ***representation*** correlated with a fourth one or more instruction sets ***for operating the second device***." Petitioner argues that "Grotmol discloses that the memory component of a first robot can store the claimed first and second correlations as well as a fourth correlation learned from operating a second robot—i.e., a circumstance detected by the sensor of a second robot correlated with instructions for operating that second robot." Petition, 62. As discussed above with respect to claim 4 in Ground 1, Grotmol discloses one user operating one device in one learning process and even when loaded into a second device, this is still knowledge of one user operating one device in one learning process that does not disclose the claimed fourth correlation including a fourth circumstance representation correlated with a fourth instruction set for operating the second device. Hickman also does not

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disclose or suggest correlations or circumstance representations at all, as discussed above and as required by claim 4. Hickman discloses storing images and instructions separately in separate knowledgebases (*see* Ex. 1005, Fig. 3) that is not a correlation as well as a single object information that is not a circumstance representation. Hence, Hickman does not disclose or suggest ***any*** correlations including ***any*** circumstance representations correlated with any instruction sets, let alone the fourth correlation here.

114. Grotmol and Hickman also fail to disclose that the fourth circumstance representation must represent "a fourth circumstance detected at least in part by the one or more sensors ***of the second device***." Petitioner argues that "Grotmol discloses . . . a circumstance detected by the sensor of a second robot correlated with instructions for operating that second robot." Petition, 62. But Grotmol discloses one user operating one device in one learning process and even when loaded into a second device, this is still knowledge of one user operating one device in one learning process that does not disclose detecting a circumstance with a sensor of a second device. And Hickman discloses a single object information that is not a circumstance or circumstance representation. Hence, Hickman does not disclose or suggest detecting any circumstances, let alone detecting a circumstance with a sensor of a second device.

115. Further, Grotmol and Hickman do not disclose that the fourth

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correlation must be learned "in another ***learning process***" that includes "obtaining or receiving the fourth one or more instruction sets ***for operating the second device***." Grotmol discloses one user operating one device in one learning process and even when loaded into a second device, this is still knowledge of one user operating one device in one learning process that does not disclose the claimed another learning process involving a second device. And although Hickman discloses a cloud system that can generally learn from multiple devices, Hickman still discloses only a single object information and does not disclose correlations. Hence, Hickman does not disclose or suggest ***any*** circumstance representations or correlations, let alone the claimed correlation, and let alone that it is specifically learned in another learning process that includes operating another device.

116. Petitioner's attempt to stitch together high level concepts from Grotmol and Hickman to arrive at the claimed invention fails to adequately and properly explain how each specifically claimed element of claim 4 is disclosed by either reference. Petitioner's claim that Grotmol's training sets could be combined with Hickman to arrive at the claimed fourth correlation is not correct. Petition, 61-63. The claimed fourth correlation must include "one or more instruction sets for operating the second device," a "fourth circumstance representation" that represents "a fourth circumstance detected at least in part by

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the one or more sensors of the second device," and "must be learned in another learning process that includes . . . obtaining or receiving the fourth one or more instruction sets for operating the second device." As the Board has recognized, Grotmol does not disclose these features and discloses nothing "more than loading a trained configuration from a first robot to a second robot." Decision, 35. And the simple knowledgebase in Hickman never discloses or suggests anything like a correlation with a circumstance representation and instruction set for operating a second device or the other specifically claimed elements of the fourth correlation. Further, both references fail to disclose learning portions of correlations in different learning processes and integrating them in a seamless manner.

117. Claim 4 encompasses more than simply the combination of an additional correlation in a shared knowledgebase. The specific limitations of claim 4 provide that the fourth correlation must include one or more instruction sets "for operating the second device," a "fourth circumstance representation" that represents "a fourth circumstance detected at least in part by the one or more sensors of the second device," and "must be learned in another learning process that includes obtaining or receiving the fourth one or more instruction sets for operating the second device." The claim requires instruction sets for operating a second device and a circumstance detected by that second device in another

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learning process for the second device. While Hickman discloses additional devices performing certain functions and Grotmol discloses training sets, neither reference discloses any of these specifically claimed limitations.

118. Hickman provides a simplistic method for storing and sharing single object information (not circumstance representations). Ex. 1005, Abstract. As shown below in Figure 4 from Hickman, robot 404 may obtain single object information via one or more sensors. *Id.*, 25:14-19. That information is transmitted to cloud computing system 401, where it is stored and can be used by second robot 413. *Id.*, 25:24-27:26.

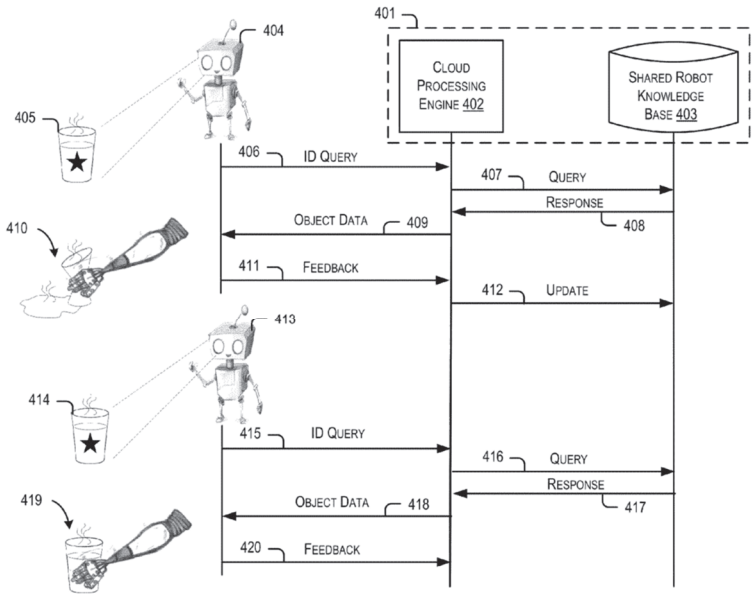


FIGURE 4

Ex. 1005, Figure 4.

119. Hickman does not disclose the claimed correlations at all, much less

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as they are specifically claimed in claim 4, including how those correlations are used in a knowledgebase to autonomously operate a device, as required by claim 4. Hickman does not teach correlations of circumstance representations with instruction sets, let alone correlations specifically claimed in claims 4 and 11 such as correlated circumstance representations detected by a particular (i.e. second) device, correlated instruction sets for operating a specific (i.e. second) device, and at least portions of the correlations learned in another learning process that involves a second device.

120. Further, Hickman fails to disclose circumstance representations at all, as the single objects in Hickman do not represent a circumstance and are not included in a circumstance representation but in separate single object rows (including single object information learned from separate circumstances) of the Unique Object Knowledgebase 307 as shown in Figure 3 of Hickman. Given that Hickman fails to disclose circumstance representations, Hickman also fails to disclose a correlation of a circumstance representation and an instruction set. As a result, Grotmol in view of Hickman does not disclose or suggest all the features of claim 4 in my opinion.

C. Claim 11: Grotmol and Hickman Do Not Disclose or Suggest the Claimed Fourth Correlation, Second Device, and Another User

121. Claim 11, which depends from claim 1, provides for multiple users

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and a second device and recites:

> wherein the knowledgebase further includes ***a fourth correlation*** including ***a fourth circumstance representation*** correlated with a fourth one or more instruction sets for operating ***the second device***, and wherein the fourth circumstance representation represents a fourth circumstance detected at least in part by the one or more sensors ***of the second device***, and wherein at least a portion of ***the fourth correlation is learned in another learning process*** that includes operating ***the second device*** at least partially ***by another user***.

Ex. 1001, Claim 11 (emphasis added).

122. As I previously mentioned, given Hickman's failure to disclose (i) the claimed fourth circumstance representation and (ii) the claimed fourth correlation of the claimed fourth circumstance representation and the claimed fourth instruction set as discussed above, Hickman is not combinable with Grotmol and cannot be used to provide missing elements from Grotmol.

123. In addition, Grotmol and Hickman fail to disclose "***a fourth correlation*** including ***a fourth*** circumstance ***representation*** correlated with a fourth one or more instruction sets for operating ***the second device***." As discussed above with respect to claim 4 in Ground 3, Grotmol discloses one user operating one device in one learning process and even when loaded into a second device, this is still knowledge of one user operating one device in one learning process

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that does not disclose the claimed fourth correlation including a fourth circumstance representation correlated with a fourth instruction set for operating the second device. The knowledge gained from this process in Grotmol, when loaded into a second device, is still knowledge of one user operating one device in one learning process. Hickman discloses storing images and instructions ***separately in separate knowledgebases*** (*see* Ex. 1005, Fig. 3) that is not a correlation as well as a single object information that is not a circumstance representation. Hence, Hickman does not disclose or suggest ***any*** correlations including ***any*** circumstance representations correlated with ***any*** instruction sets, let alone the claimed fourth correlation.

124. Grotmol and Hickman also fail to disclose "wherein the fourth circumstance representation represents a fourth circumstance detected at least in part by the one or more sensors ***of the second device***." Petitioner argues that Grotmol discloses a circumstance detected by the sensor of a second robot correlated with instructions for operating that second robot. Petition, 64. But Grotmol discloses one user operating one device in one learning process and even when loaded into a second device, this is still knowledge of one user operating one device in one learning process that does not disclose detecting a circumstance with a sensor of a second device. And Hickman discloses a single object information that is not a circumstance or circumstance representation. Hence,

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Hickman does not disclose or suggest detecting any circumstances, let alone detecting a circumstance with a sensor of a second device.

125. Grotmol and Hickman fail to disclose that "a portion of ***the fourth correlation is learned in another learning process*** that includes operating ***the second device*** at least partially ***by*** another ***user***." Grotmol discloses one user operating one device in one learning process and even when loaded into a second device, this is still knowledge of one user operating one device in one learning process that does not disclose the claimed another learning process involving a second device and another user. And although Hickman discloses a cloud system that can generally learn from multiple devices, Hickman still discloses only a single object information and does not disclose correlations. Hence, Hickman does not disclose or suggest ***any*** circumstance representations or correlations, let alone the claimed correlation, and let alone that it is specifically learned in another learning process that includes operating another device involving another user.

126. Petitioner contends that Grotmol discloses the claimed "fourth correlation," "second device," and "another user" of claim 11, Petition, 64, but as discussed above regarding claim 11 in Ground 1 and claim 4 in Ground 3, Grotmol does not disclose or suggest the claimed "fourth correlation," "another user" and the "second device" recited in claim 11. Grotmol does not disclose or suggest that the knowledgebase includes the claimed fourth correlation learned

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in another learning process involving the second device and another user.

127. As I discussed above regarding claim 4, Grotmol discloses one user operating one device in one learning process. The knowledge gained from this process in Grotmol, when loaded into a second device, is still knowledge of one user operating one device in one learning process. Grotmol does not disclose or suggest a knowledgebase that includes mixed knowledge of a first correlation and second correlation learned on one device in one learning process with one user and a fourth correlation learned on a second device in another learning process with another user.

128. Hickman also does not disclose or suggest the claimed circumstance representations or correlations including the fourth correlation learned in another learning process involving the second device and another user, as required by claim 11. Hickman discloses a cloud system that can generally learn from multiple devices, but it does not disclose the claimed first and second correlations learned on one device in one learning process with one user and the fourth correlation learned on a second device in a second learning process with another user. Further, Hickman fails to disclose circumstance representations at all, as the objects in Hickman do not represent a circumstance and are not included in a circumstance representation but in Unique Object Knowledgebase 307 as shown in Figure 3 of Hickman.

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129. Like claim 4, claim 11 specifically requires a fourth correlation with specific elements. These elements include a fourth circumstance representation and a fourth one or more instruction sets ***for operating the second device***. In addition, the fourth circumstance representation must represent a fourth circumstance ***detected at least in part by the one or more sensors of the second device***. Further, the fourth correlation must be learned in ***another learning process*** that includes operating ***the second device at least partially by another user***. None of these elements are disclosed by Grotmol or Hickman for the same reasons discussed above with respect to claim 4. Further, Hickman does not disclose or suggest the specifically claimed circumstance representations and correlations and how those correlations are used in a knowledgebase to autonomously operate a device, as discussed above and as required by claim 11. Thus Grotmol in view of Hickman does not disclose or suggest the features of claim 11.

X. PATENT OWNER'S SUBSTITUTE CLAIMS

130. I understand that Patent Owner has proposed the potential substitute claims below. The proposed substitute claims do not broaden the claim scope or introduce new subject matter. The proposed claim amendments rewrite dependent claims 4, 5, 7, 11, 14 and 15 in independent form and further limit the method of each of these claims by adding additional functionalities. These amendments

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further distinguish the claims over the prior art, narrowing the claim scope. The substitute claims are also patentable over art from original prosecution. Further, as I discuss below, a POSA would have understood that the inventor possessed the substitute claims as of the priority date, and would have been sufficiently enabled in how to make and use the invention recited in the Substitute Claims.

1. Proposed Substitute Claims

131. According to Patent Owner's proposal, I understand that some independent claims in the '974 Patent may be canceled and replaced with the proposed substitute claims. I have been asked to evaluate these proposed substitute claims. I understand that these are not currently claims in the '974 Patent. I am informed by Counsel that text that is underlined is proposed to be added to the original claims, and text that is struck through is proposed to be removed from the original claims.

Claim 21 (Proposed Substitute for Claim 4, if Found Unpatentable)

A method implemented using a computing system that includes one or more processor circuits, the method comprising:

accessing a memory that stores at least a knowledgebase that includes: a first correlation including a first circumstance representation correlated with a first one or more instruction sets for operating a first device and a second correlation including a second circumstance representation correlated with a second one or more

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instruction sets for operating the first device, wherein the first circumstance representation represents a first circumstance detected at least in part by one or more sensors of the first device and the second circumstance representation represents a second circumstance detected at least in part by the one or more sensors of the first device, and wherein at least a portion of the first correlation and at least a portion of the second correlation are learned in a learning process that includes operating the first device at least partially by a user;

generating or receiving a third circumstance representation, wherein the third circumstance representation represents a third circumstance detected at least in part by the one or more sensors of the first device or at least in part by one or more sensors of a second device;

anticipating the first one or more instruction sets for operating the first device learned in the learning process based on at least partial match between the third circumstance representation and the first circumstance representation; and

at least in response to the anticipating, executing the first one or more instruction sets for operating the first device learned in the learning process, wherein the first device or the second device autonomously performs one or more operations defined by the first one or more instruction sets for operating the first device learned in the learning process;

wherein the learning process includes:

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generating or receiving the first circumstance representation, and

generating or receiving the second circumstance representation; and

obtaining or receiving the first one or more instruction sets for operating the first device, and

obtaining or receiving the second one or more instruction sets for operating the first device, and

wherein the knowledgebase further includes a fourth correlation including a fourth circumstance representation correlated with a fourth one or more instruction sets for operating the second device, and wherein the fourth circumstance representation represents a fourth circumstance detected at least in part by the one or more sensors of the second device, and wherein at least a portion of the fourth correlation is learned in another learning process that includes:

generating or receiving the fourth circumstance representation; and

obtaining or receiving the fourth one or more instruction sets for operating the second device;

wherein the first circumstance representation includes a first collection of object representations, and the second circumstance representation includes a second collection of object representations;

wherein the first collection of object representations represents multiple objects detected at a first time or during a first time period, and comprises a first data

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structure that includes: labels indicating types of the multiple objects, and coordinates indicating locations of the multiple objects;

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

wherein the first data structure is correlated with the first one or more instruction sets for operating the first device; and

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

Claim 22 (Proposed Substitute for Claim 5, if Found Unpatentable)

A method implemented using a computing system that includes one or more processor circuits, the method comprising:

accessing a memory that stores at least a knowledgebase that includes: a first correlation including a first circumstance representation correlated with a first one or more instruction sets for operating a first device and a second correlation including a second circumstance representation correlated with a second one or more instruction sets for operating the first device, wherein the first circumstance representation represents a first circumstance detected at least in part by one or more sensors of the first device and the second circumstance representation represents a

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second circumstance detected at least in part by the one or more sensors of the first device, and wherein at least a portion of the first correlation and at least a portion of the second correlation are learned in a learning process that includes operating the first device at least partially by a user;

generating or receiving a third circumstance representation, wherein the third circumstance representation represents a third circumstance detected at least in part by the one or more sensors of the first device or at least in part by one or more sensors of a second device;

anticipating the first one or more instruction sets for operating the first device learned in the learning process based on at least partial match between the third circumstance representation and the first circumstance representation; and

at least in response to the anticipating, executing the first one or more instruction sets for operating the first device learned in the learning process, wherein the first device or the second device autonomously performs one or more operations defined by the first one or more instruction sets for operating the first device learned in the learning process;

wherein the anticipating the first one or more instruction sets for operating the first device learned in the learning process based on the at least partial match between the third circumstance representation and the first circumstance representation includes: determining that a number of at least partially matching

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portions of the third circumstance representation and portions of the first circumstance representation exceeds a threshold number, or determining that a percentage of at least partially matching portions of the third circumstance representation and portions of the first circumstance representation exceeds a threshold percentage;

wherein the first circumstance representation includes a first collection of object representations, and the second circumstance representation includes a second collection of object representations;

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

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

wherein the first data structure is correlated with the first one or more instruction sets for operating the first device; and

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

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Claim 23 (Proposed Substitute for Claim 7, if Found Unpatentable)

A method implemented using a computing system that includes one or more processor circuits, the method comprising:

accessing a memory that stores at least a knowledgebase that includes: a first correlation including a first circumstance representation correlated with a first one or more instruction sets for operating a first device and a second correlation including a second circumstance representation correlated with a second one or more instruction sets for operating the first device, wherein the first circumstance representation represents a first circumstance detected at least in part by one or more sensors of the first device and the second circumstance representation represents a second circumstance detected at least in part by the one or more sensors of the first device, and wherein at least a portion of the first correlation and at least a portion of the second correlation are learned in a learning process that includes operating the first device at least partially by a user;

generating or receiving a third circumstance representation, wherein the third circumstance representation represents a third circumstance detected at least in part by the one or more sensors of the first device or at least in part by one or more sensors of a second device;

anticipating the first one or more instruction sets for operating the first device learned in the learning process based on at least partial match between the third

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circumstance representation and the first circumstance representation; and

at least in response to the anticipating, executing the first one or more instruction sets for operating the first device learned in the learning process, wherein the first device or the second device autonomously performs one or more operations defined by the first one or more instruction sets for operating the first device learned in the learning process;

wherein the knowledgebase further includes a fourth correlation including a fourth circumstance representation correlated with a fourth one or more instruction sets for operating: the first device, the second device, or a third device, and wherein a first connection is generated to connect the first correlation with the second correlation, and wherein a second connection is generated to connect the second correlation with the fourth correlation;

wherein the first circumstance representation includes a first collection of object representations, and the second circumstance representation includes a second collection of object representations;

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

wherein the second collection of object representations represents the multiple

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objects detected at a second time or during a second time period, and comprises a second data structure that includes: labels indicating types of the multiple objects, and coordinates indicating locations of the multiple objects;

wherein the first data structure is correlated with the first one or more instruction sets for operating the first device; and

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

Claim 24 (Proposed Substitute for Claim 11, if Found Unpatentable)

A method implemented using a computing system that includes one or more processor circuits, the method comprising:

accessing a memory that stores at least a knowledgebase that includes: a first correlation including a first circumstance representation correlated with a first one or more instruction sets for operating a first device and a second correlation including a second circumstance representation correlated with a second one or more instruction sets for operating the first device, wherein the first circumstance representation represents a first circumstance detected at least in part by one or more sensors of the first device and the second circumstance representation represents a second circumstance detected at least in part by the one or more sensors of the first device, and wherein at least a portion of the first correlation and at least a portion of the second correlation are learned in a learning process that includes operating the

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first device at least partially by a user;

generating or receiving a third circumstance representation, wherein the third circumstance representation represents a third circumstance detected at least in part by the one or more sensors of the first device or at least in part by one or more sensors of a second device;

anticipating the first one or more instruction sets for operating the first device learned in the learning process based on at least partial match between the third circumstance representation and the first circumstance representation; and

at least in response to the anticipating, executing the first one or more instruction sets for operating the first device learned in the learning process, wherein the first device or the second device autonomously performs one or more operations defined by the first one or more instruction sets for operating the first device learned in the learning process;

wherein the knowledgebase further includes a fourth correlation including a fourth circumstance representation correlated with a fourth one or more instruction sets for operating the second device, and wherein the fourth circumstance representation represents a fourth circumstance detected at least in part by the one or more sensors of the second device, and wherein at least a portion of the fourth correlation is learned in another learning process that includes operating the second device at least partially by another user;

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wherein the first circumstance representation includes a first collection of object representations, and the second circumstance representation includes a second collection of object representations;

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

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

wherein the first data structure is correlated with the first one or more instruction sets for operating the first device; and

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

Claim 25 (Proposed Substitute for Claim 14)

A method implemented using a computing system that includes one or more processor circuits, the method comprising:

accessing a memory that stores at least a knowledgebase that includes: a first correlation including a first circumstance representation correlated with a first one

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or more instruction sets for operating a first device and a second correlation including a second circumstance representation correlated with a second one or more instruction sets for operating the first device, wherein the first circumstance representation represents a first circumstance detected at least in part by one or more sensors of the first device and the second circumstance representation represents a second circumstance detected at least in part by the one or more sensors of the first device, and wherein at least a portion of the first correlation and at least a portion of the second correlation are learned in a learning process that includes operating the first device at least partially by a user;

generating or receiving a third circumstance representation, wherein the third circumstance representation represents a third circumstance detected at least in part by the one or more sensors of the first device or at least in part by one or more sensors of a second device;

anticipating the first one or more instruction sets for operating the first device learned in the learning process based on at least partial match between the third circumstance representation and the first circumstance representation; and

at least in response to the anticipating, executing the first one or more instruction sets for operating the first device learned in the learning process, wherein the first device or the second device autonomously performs one or more operations defined by the first one or more instruction sets for operating the first

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device learned in the learning process;

wherein the first circumstance representation ~~includes: one or more object representations, or one or more~~ includes a first collection[[s]] of object representations, and wherein the second circumstance representation ~~includes: one or more object representations, or one or more~~ includes a second collection[[s]] of object representations, and wherein the third circumstance representation includes: one or more object representations, or one or more collections of object representations;

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

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

wherein the first data structure is correlated with the first one or more instruction sets for operating the first device; and

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

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Claim 26 (Proposed Substitute for Claim 15)

A method implemented using a computing system that includes one or more processor circuits, the method comprising:

accessing a memory that stores at least a knowledgebase that includes: a first correlation including a first circumstance representation correlated with a first one or more instruction sets for operating a first device and a second correlation including a second circumstance representation correlated with a second one or more instruction sets for operating the first device, wherein the first circumstance representation represents a first circumstance detected at least in part by one or more sensors of the first device and the second circumstance representation represents a second circumstance detected at least in part by the one or more sensors of the first device, and wherein at least a portion of the first correlation and at least a portion of the second correlation are learned in a learning process that includes operating the first device at least partially by a user;

generating or receiving a third circumstance representation, wherein the third circumstance representation represents a third circumstance detected at least in part by the one or more sensors of the first device or at least in part by one or more sensors of a second device;

anticipating the first one or more instruction sets for operating the first device learned in the learning process based on at least partial match between the

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third circumstance representation and the first circumstance representation; and

at least in response to the anticipating, executing the first one or more instruction sets for operating the first device learned in the learning process, wherein the first device or the second device autonomously performs one or more operations defined by the first one or more instruction sets for operating the first device learned in the learning process;

wherein, to correlate the first circumstance representation with the first one or more instruction sets for operating the first device, a determination is made that the first one or more instruction sets for operating the first device temporally correspond to the first circumstance representation, and wherein the first circumstance representation ~~includes: one or more object representations, or one or more~~ includes a first collection[[s]] of object representations, and wherein the second circumstance representation includes a second collection of object representations;

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

wherein the second collection of object representations represents the multiple objects detected at a second time or during a second time period, and comprises a

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second data structure that includes: labels indicating types of the multiple objects, and coordinates indicating locations of the multiple objects;

wherein the first data structure is correlated with the first one or more instruction sets for operating the first device; and

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

2. The Original Application for the '974 Patent Includes Support for the Proposed Substitute Claims

132. I have been asked to provide my opinions regarding whether the proposed substitute claims are supported by the original application for the '974 Patent. In performing this analysis, I have applied the plain and ordinary meaning of the terms other than the claim term discussed above in Section VII.1 (for which I applied the construction mentioned in that section). I include exemplary citations to the original application for both the existing limitations of the claims and the limitations added by each proposed substitute claim. The '974 patent issued from U.S. Patent Application No. 15/340,991 ("the '991 Application"), which is found at pages 5-205 of Exhibit 1007.[2]

133. As noted above, the Substitute Claims rewrite claims 4, 5, 7, 11, 14

[2] Citations to the '991 Application are to pages of the originally-filed specification or figures—e.g., '991 Application at [1:25-26] refers to Ex. 1007, 46:25-26.

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and 15 in independent form with additional limitations. Because the following features are in each Substitute Claim and also in independent Claim 1, the base claim from which claims 4, 5, 7, 11, 14 and 15 depend, the substitute claims were supported by the ’991 Application. A POSA would have found that the inventor was in the possession of the features (and each claim as a whole) at the time of filing the ’991 Application.

Claim Limitation	Support from Original U.S. Application for the ’974 Patent
Original Claim 1	
A method implemented using a computing system that includes one or more processor circuits, the method comprising	The ’991 Application supports a method implemented using a computing system that includes one or more processor circuits, the method comprising. For example: ARTIFICIALLY INTELLIGENT SYSTEMS, DEVICES, AND METHODS FOR LEARNING AND/OR USING A DEVICE'S CIRCUMSTANCES FOR AUTONOMOUS DEVICE OPERATION ’991 Application at [Title]. Aspects of the disclosure generally relate to computing enabled devices and/or systems, and may be generally directed to devices, systems, methods, and/or applications for !earning a device's operation in various circumstances, storing this knowledge in a knowledgebase (i.e. neural network, graph, sequences, etc.), and enabling autonomous operation of the device. ’991 Application at [Abstract].

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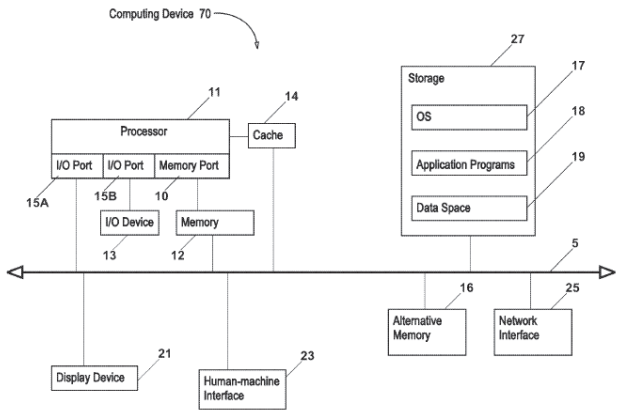


FIG. 1

’991 Application at [Fig. 1].

Referring now to Fig. 1, an embodiment is illustrated of Computing Device 70 {also referred to simply as computing device, computing system, or other suitable name or reference, etc. that can provide processing capabilities used in some embodiments of the forthcoming disclosure.

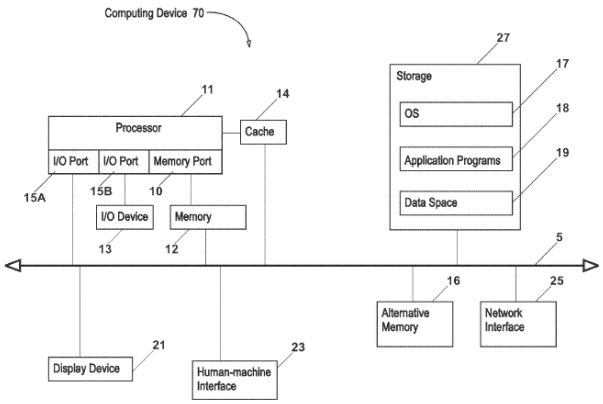
’991 Application at [52:30-32].

Computing Device 70 includes one or more central processing units, which may also be referred to as processors 11.

’991 Application at [53:3-4].

Processor 11 includes one or more circuits or devices that can execute instructions fetched from memory 12 and/or other element Processor 11 may include any combination of hardware and/or processing techniques or capabilities for executing or implementing logic functions or programs. Processor 11 may include a single core or a multi core processor. Processor 11 includes the functionality for loading operating system 17 and operating any application programs 18 thereon. In some embodiments, Processor 11 can be provided in a

	microprocessing or a processing unit, such as, for example, Snapdragon processor produced by Qualcomm Inc., processor by Intel Corporation of Mountain View, California, processor manufactured by Motorola Corporation of Schaumburg, Ill.; processor manufactured by Transmeta Corporation of Santa Clara, Calif.; processor manufactured by International Business Machines of White Plains, I\J.Y.; processor manufactured by Advanced Micro Devices of Sunnyvale, California, or any computing circuit or device for performing similar functions. In other embodiments, processor 11 can be provided in a graphics processing unit (GPU), visual processing unit (VPU), or other highly parallel processing circuit or device such as, for example, nVidia GeForce line of GPUs, AMD Radeon line of GPUs, and/or others. Such GPUs or other highly parallel processing circuits or devices may provide superior performance in processing operations on neural networks, graphs, and/or other data structures. In further embodiments, processor 11 can be provided in a micro controller such as, for example, Texas instruments, Atmel, Microchip Technology, ARM, Silicon Labs, Intel, and/or other lines of micro controllers. In further embodiments, processor 11 can be provided in a quantum processor such as, for example, D-Wave Systems, Microsoft, Intel, IBM, Google, Toshiba, and/or other lines of quantum processors. In further embodiments, processor 11 can be provided in a biocomputer such as DNA-based computer, protein-based computer, molecule-based computer, and/or others. In further embodiments, processor 11 includes any circuit or device for performing logic operations. Processor 11 can be based on any of the aforementioned or other available processors capable of operating as described herein. Computing Device 70 may include one or more of the aforementioned or other processors. In some designs, processor 11 can communicate with memory 12 via a system bus 5. In other designs, processor 11 can communicate directly with memory 12 via a memory port 10. ’991 Application at [53:22-54:6].

	In some embodiments, the system comprises a processor circuit configured to execute instruction sets for operating a device. '991 Application at [1:25-26]. the program including instructions that when executed by one or more processor circuits cause the one or more processor circuits to perform operations '991 Application at [15:18-19].
accessing a memory that stores at least a knowledgebase that includes:	The '991 Application supports accessing a memory that stores at least a knowledgebase. For example:  FIG. 1 '991 Application at [Fig. 1].

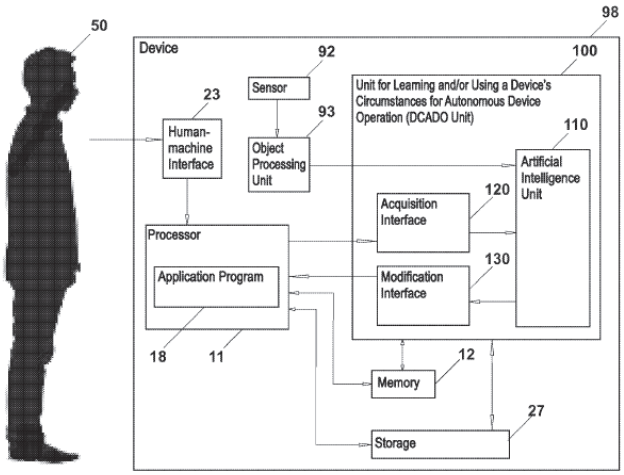


FIG. 2

'991 Application at [Fig. 2].

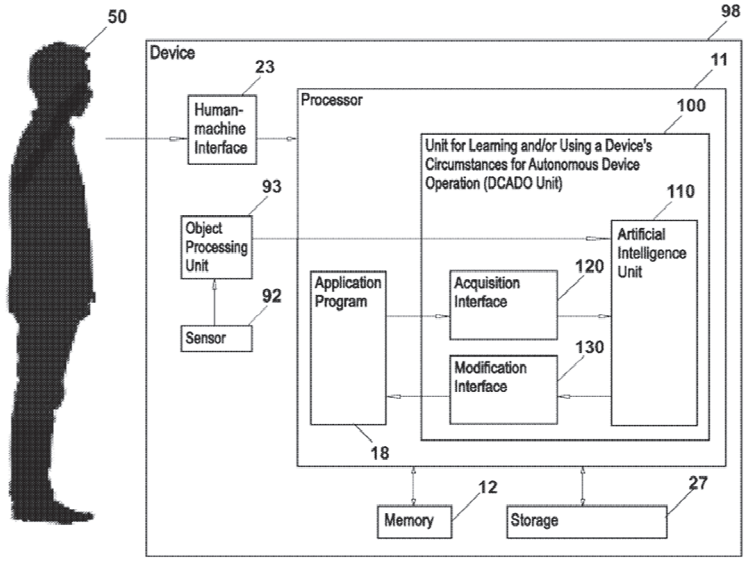


FIG. 9

'991 Application at [Fig. 9].

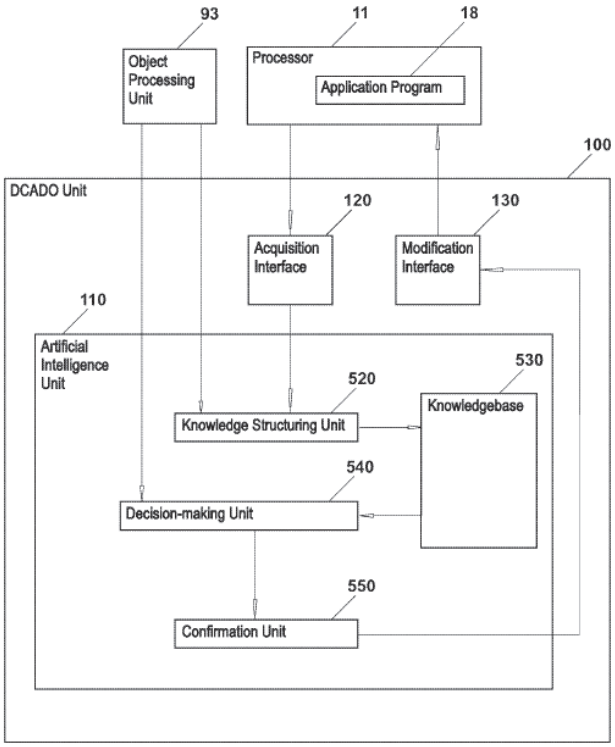


FIG. 12

’991 Application at [Fig. 12].

Computing Device 70 may further include memory 12.

’991 Application at [53:6].

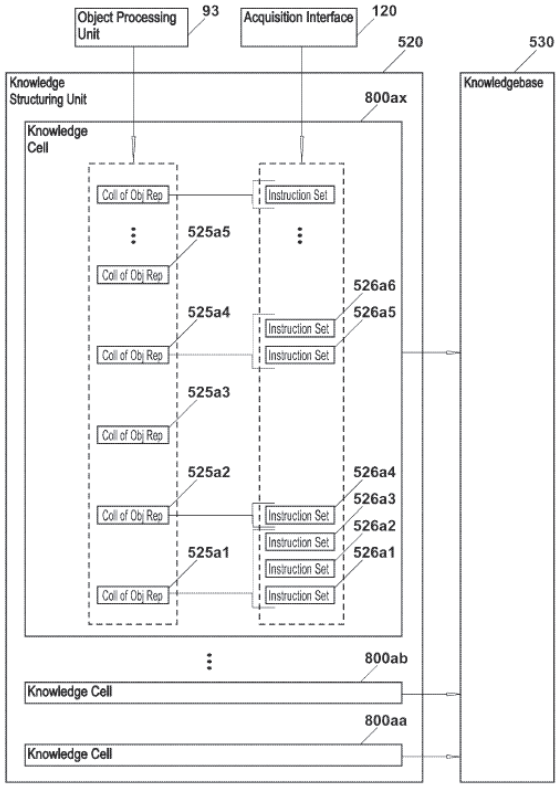


FIG. 13

’991 Application at [Fig. 13].

Processor 11 may include or be interfaced with cache memory 14. Storage 27 may include memory, which provides an operating system 17 (i.e. also referred to as OS 17, etc.), additional application programs 18, and/or data space 19 in which additional data or information can be stored. Alternative memory device 16 can be connected to the remaining components of Computing Device 70 via bus 5.

’991 Application at [53:13-15].

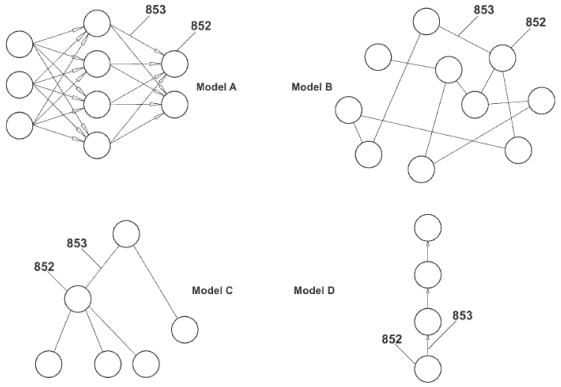
Memory 12 includes one or more circuits or devices capable of storing data. In some embodiments, Memory 12 can be provided in a semiconductor or electronic memory chip such as static random access memory (SRAM), Flash memory, Burst SRAM or

	SynchBurst SRAM (BSRAM), Dynamic random access memory (DRAM), Fast Page Mode DRAM (FPM DRAM), Enhanced DRAM (ED RAM), Extended Data Output RAM (EDO RAM), Extended Data Output DRAM (EDO DRAM), Burst Extended Data Output DRAM (BEDO DRAM), Enhanced DRAM (EDRAM), synchronous DRAM (SDRAM), JEDEC SRAM, PC100 SDRAM, Double Data Rate SDRAM (DOR SDRAM), Enhanced SDRAM (ESDRAM), Synclink DRAM (SLDRAM), Direct Rambus DRAM (DRDRAM), Ferroelectric RAM (FRAM), and/or others. In other embodiments, Memory 12 includes any volatile memory. In general, Memory 12 can be based on any of the aforementioned or other available memories capable of operating as described herein. ’991 Application at [54:7-16]. Storage 27 includes one or more devices or mediums capable of storing data. In some embodiments, Storage 27 can be provided in a device or medium such as a hard drive, flash drive, optical disk, andior others. In other embodiments, Storage 27 can be provided in a biological storage device such as DNA-based storage device, protein-based storage device, molecule-based storage device, and/or others. In further embodiments, Storage 27 can be provided in an optical storage device such as holographic storage, and/or others. In further embodiments, Storage 27 may include any non-volatile memorf. In general, Storage 27 can be based on any of the aforementioned or other available storage devices or mediums capable of operating as described herein. In some aspects, Storage 27 may include any features, functionalities, and embodiments of Memory 12, and vice versa, as applicable. ’991 Application at [54:17-25]. Referring to Fig. 12, an embodiment of Artificial Intelligence Unit 110 is illustrated. Artificial Intelligence

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	Unit 110 comprises interconnected Knowledge Structuring Unit 520, Knowledgebase 530, Decision-making Unit 540, and Confirmation Unit 550. ’991 Application at [87:11]. Knowledgebase 530 comprises the functionality for storing the knowledge of a device's operation in circumstances including objects with various properties, and/or other functionalities. Knowledgebase 530 comprises the functionality for storing one or more Collections of Object Representations 525 correlated with any Instruction Sets 526 and/or Extra Info 527. Knowledgebase 530 comprises the functionality for storing one or more Knowledge Cells 800 each including one or more Collections of Object Representations 525 correlated with any Instruction Sets 526 and/or Extra Info 527. In some aspects, Collections of Object Representations 525 correlated with Instruction Sets 526 and/or Extra Info 527 can be stored directly within Knowledgebase 530 without using Knowledge Cells 800 as the intermediary data structures. In some embodiments, Knowledgebase 530 may be or include Neural Network 530a (later described). In other embodiments, Knowledgebase 530 may be or include Graph 530b (later described). In further embodiments, Knowledgebase 530 may be or include Collection of Sequences 530c (later described). In further embodiments, Knowledgebase 530 may be or include Sequence 533 (later described). In further embodiments, Knowledgebase 530 may be or include Collection of Knowledge Cells 530d (later described). In general, Knowledgebase 530 may be or include any data structure or arrangement capable of storing the knowledge of a device's operation in circumstances including objects with various properties. Knowledgebase 530 may reside locally on Device 98, or remotely (i.e. remote Knowledgebase 530, etc.) on a remote computing device (i.e. server, cloud, etc.) accessible over a network or an interface.

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	’991 Application at [92:7-22].  FIG. 17 ’991 Application at [Fig. 17].
a first correlation including a first circumstance representation correlated with a first one or more instruction sets for operating a first device	The ’991 Application supports a first correlation including a first circumstance representation correlated with a first one or more instruction sets for operating a first device. For example:

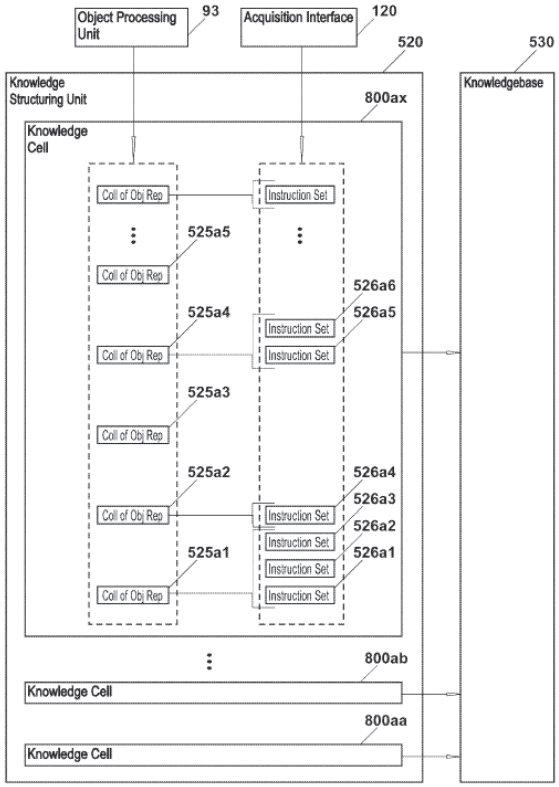
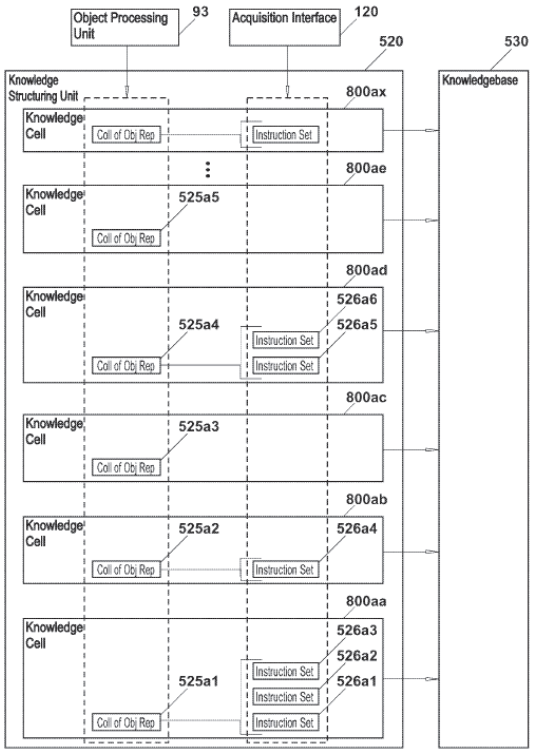


FIG. 13

’991 Application at [Fig. 13].

For example, Knowledge Structuring Unit 520 may create Knowledge Cell 800ax and structure within it Collection of Object Representations 525a1 correlated with Instruction Sets 526a1-526a3 and/or any Extra Info 527 (not shown). Knowledge Structuring Unit 520 may further structure within Knowledge Cell 800ax a Collection of Object Representations 525a2 correlated with Instruction Set 526a4 and/or any Extra Info 527 (not shown). Knowledge Structuring Unit 520 may further structure within Knowledge Cell 800ax a Collection of Object Representations 525a3 without a correlated Instruction Set 526 and/or Extra Info 527. Knowledge Structuring Unit 520 may further structure within Knowledge Cell 800ax a Collection of Object Representations 525a4 correlated with Instruction Sets 526a5-526a6 and/or any Extra Info 527 (not shown). Knowledge Structuring Unit 520 may further structure within Knowledge Cell 800ax a

	Collection of Object Representations 525a5 without a correlated Instruction Set 526 and/or Extra Info 527. Knowledge Structuring Unit 520 may structure within Knowledge Cell 800ax additional Collections of Object Representations 525 correlated with any number {including zero [i.e. uncorrelated]) of Instruction Sets 526 and/or Extra Info 527 by following similar logic as described above. '991 Application at [89:20-32].  FIG. 14

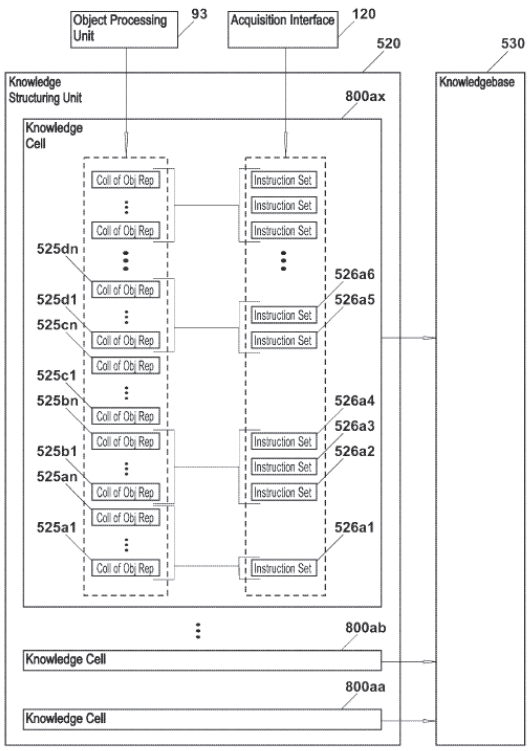


FIG. 15

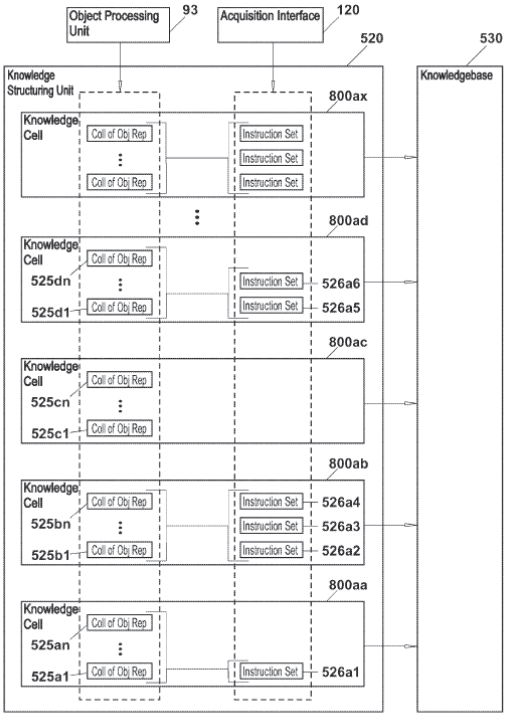


FIG. 16

’991 Application at [Figs. 14-16].

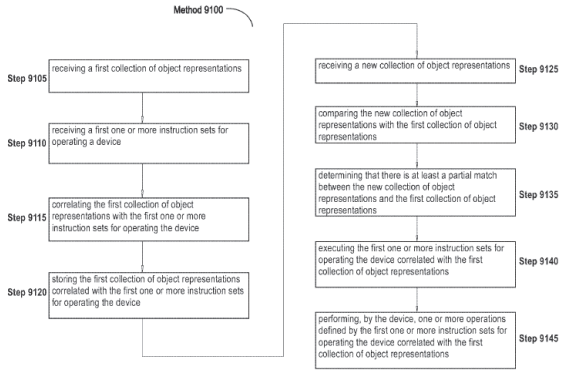


FIG. 32

’991 Application at [Fig. 32].

At step 9120, the first collection of object representations correlated with the first one or more instruction sets for operating the device are stored.

’991 Application at [138:24-25].

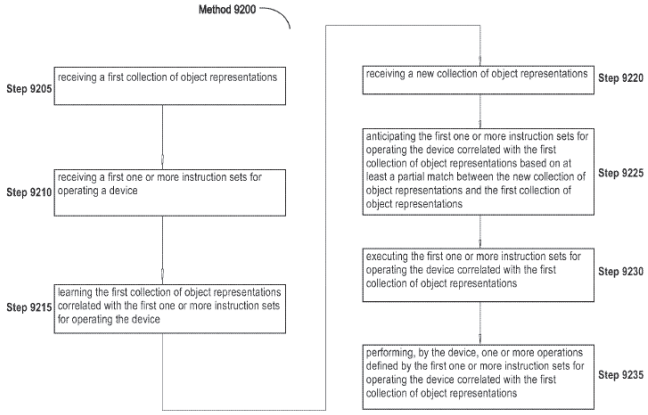


FIG. 33

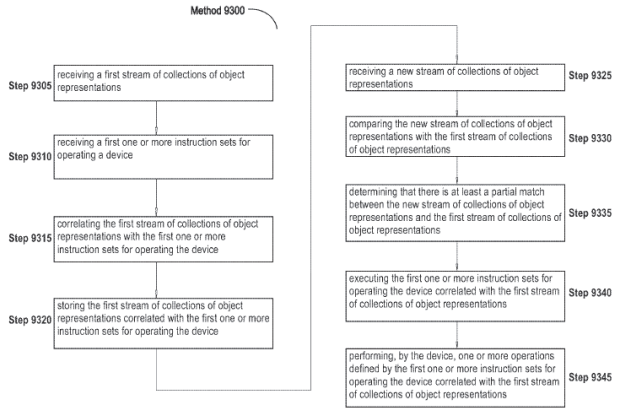


FIG. 34

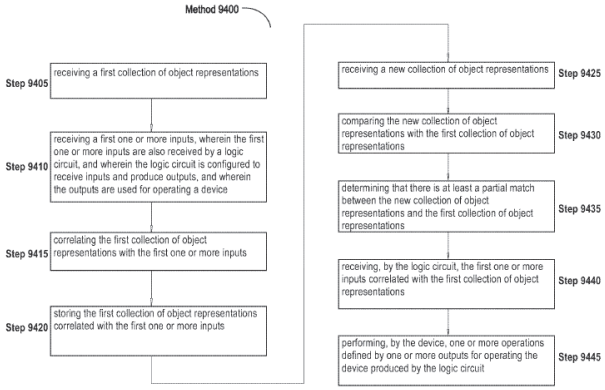


FIG. 35

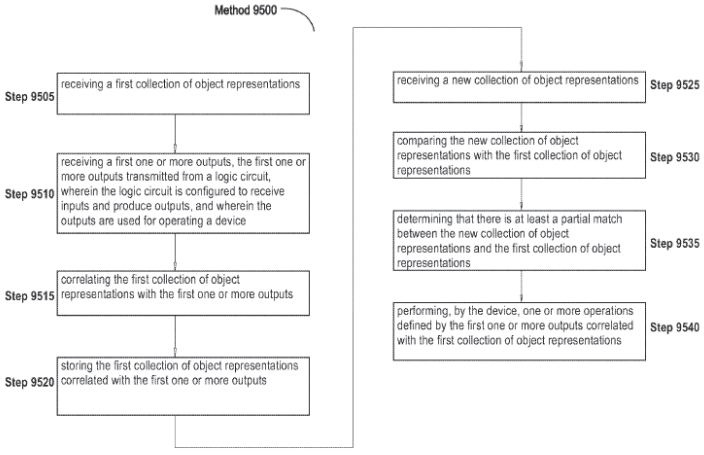
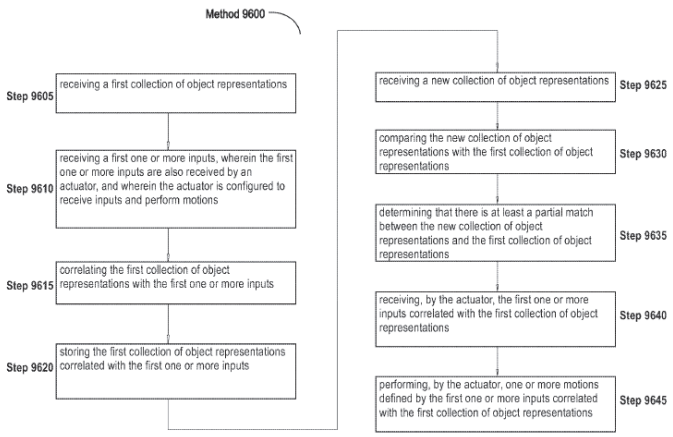
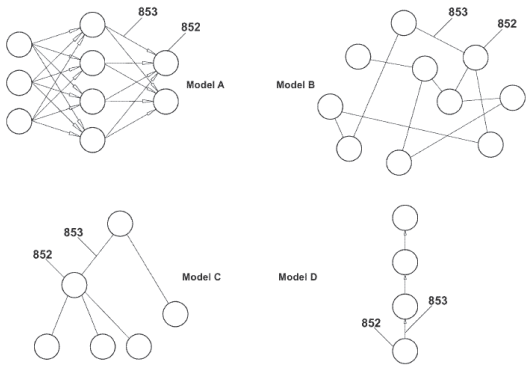


FIG. 36

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	 FIG. 37 ’991 Application at [Figs. 33-37].  FIG. 17 ’991 Application at [Fig. 17].
and a second correlation including a second circumstance representation correlated with a second one or more instruction sets for operating the first device	The ’991 Application supports a second correlation including a second circumstance representation correlated with a second one or more instruction sets for operating the first device. For example:

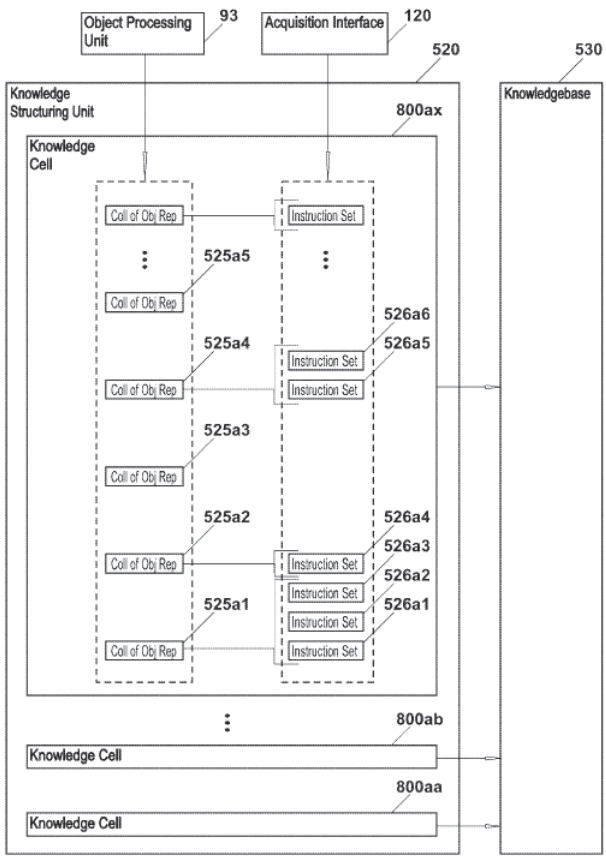
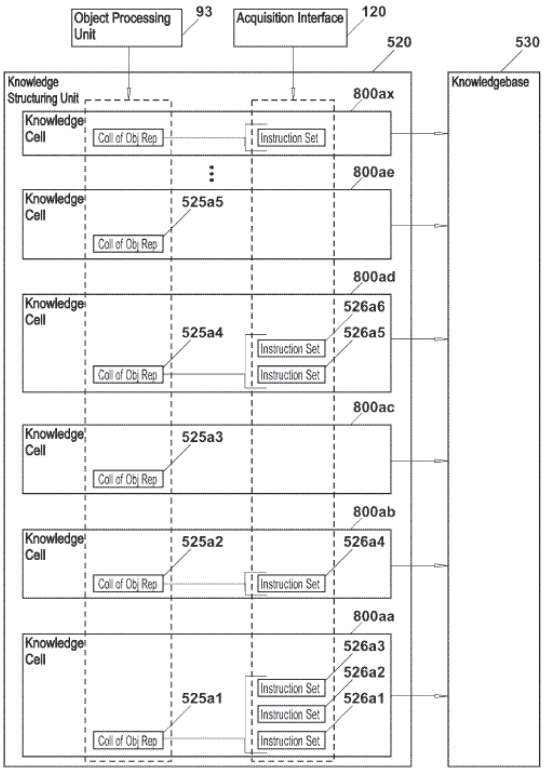


FIG. 13

’991 Application at [Fig. 13].

For example, Knowledge Structuring Unit 520 may create Knowledge Cell 800ax and structure within it Collection of Object Representations 525a1 correlated with Instruction Sets 526a1-526a3 and/or any Extra Info 527 (not shown). Knowledge Structuring Unit 520 may further structure within Knowledge Cell 800ax a Collection of Object Representations 525a2 correlated with Instruction Set 526a4 and/or any Extra Info 527 (not shown). Knowledge Structuring Unit 520 may further structure within Knowledge Cell 800ax a Collection of Object Representations 525a3 without a correlated Instruction Set 526 and/or Extra Info 527. Knowledge Structuring Unit 520 may further structure within Knowledge Cell 800ax a Collection of Object Representations 525a4 correlated with Instruction Sets 526a5-526a6 and/or any Extra Info

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	527 (not shown). Knowledge Structuring Unit 520 may further structure within Knowledge Cell 800ax a Collection of Object Representations 525a5 without a correlated Instruction Set 526 and/or Extra Info 527. Knowledge Structuring Unit 520 may structure within Knowledge Cell 800ax additional Collections of Object Representations 525 correlated with any number {including zero [i.e. uncorrelated]) of Instruction Sets 526 and/or Extra Info 527 by following similar logic as described above. '991 Application at [89:20-32].  FIG. 14

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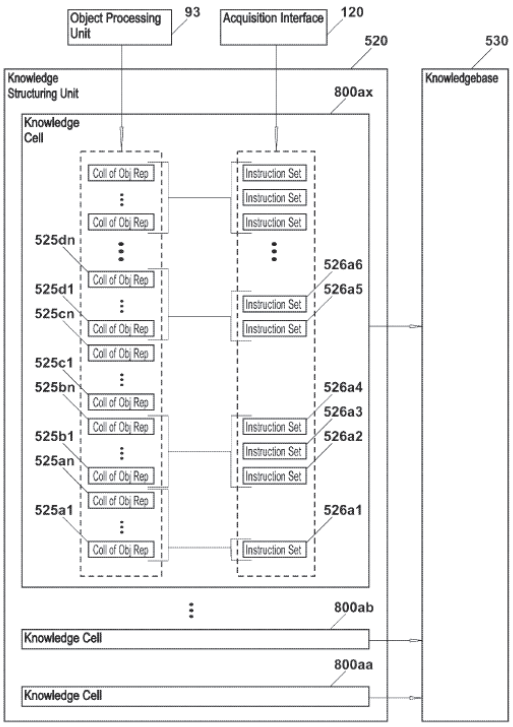


FIG. 15

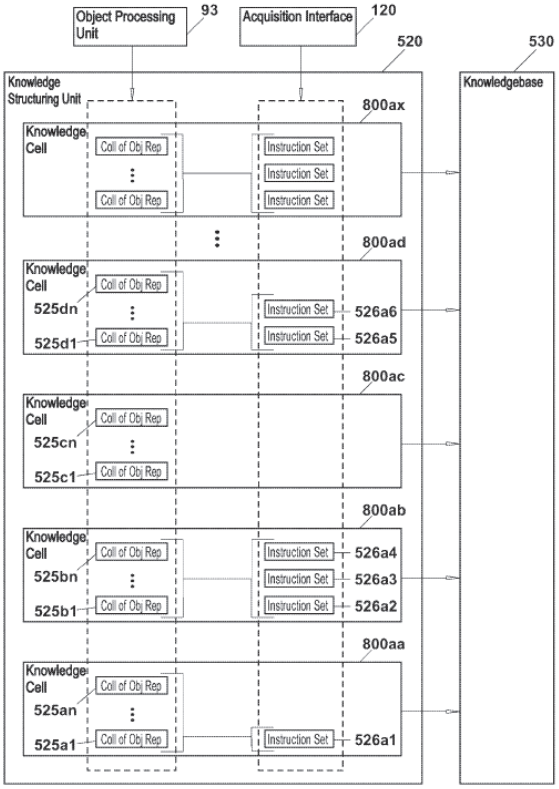
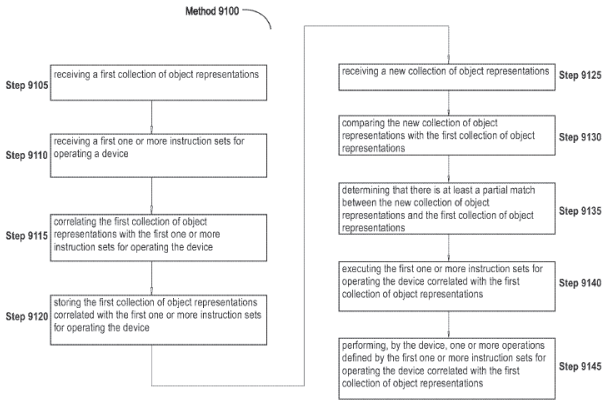


FIG. 16

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	’991 Application at [Figs. 14-16]. In certain embodiments, the artificial intelligence unit is further configured to: receive a second collection of object representations, the second collection of object representations including one or more representations of objects detected by the sensor; receive a second one or more instruction sets for operating the device; and learn the second collection of object representations correlated with the second one or more instruction sets for operating the device. ’991 Application at [14:6-10].  FIG. 32 ’991 Application at [Fig. 32]. A collection of object representations correlated with one or more instruction sets may be part of a stored plurality of collections of object representations correlated with one or more instruction sets. ’991 Application at [138:25-27].

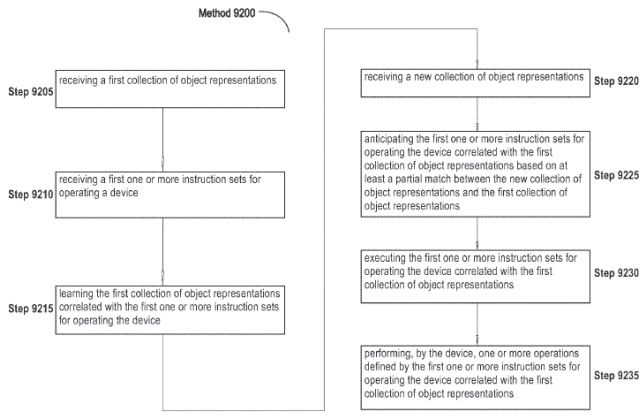


FIG. 33

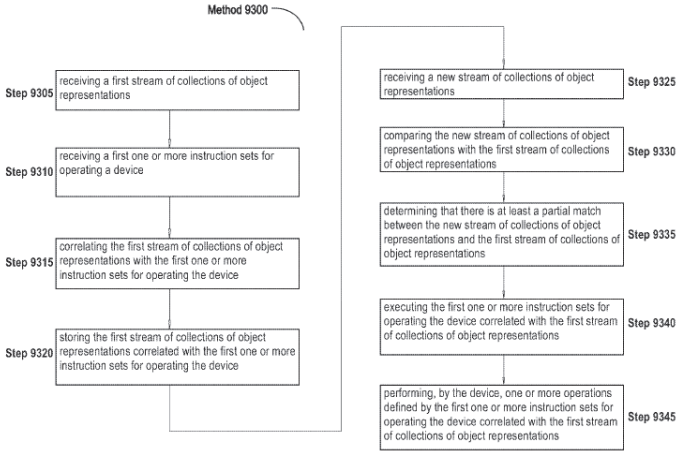


FIG. 34

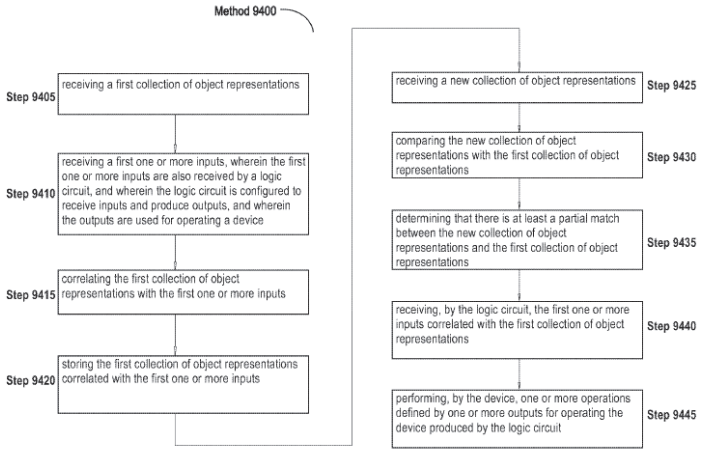


FIG. 35

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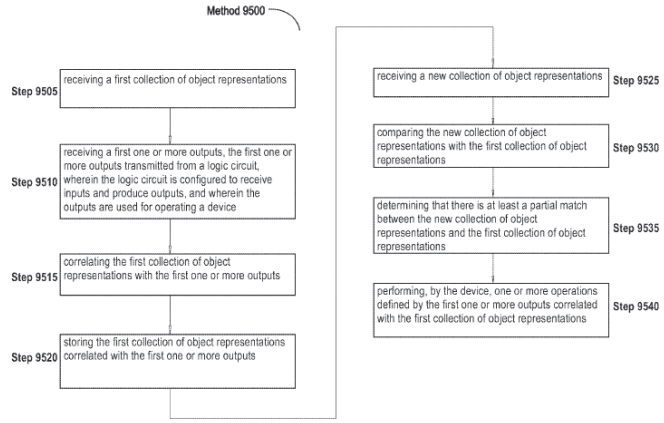


FIG. 36

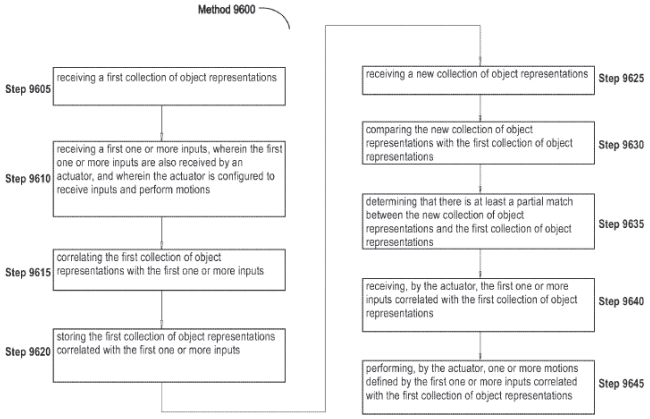
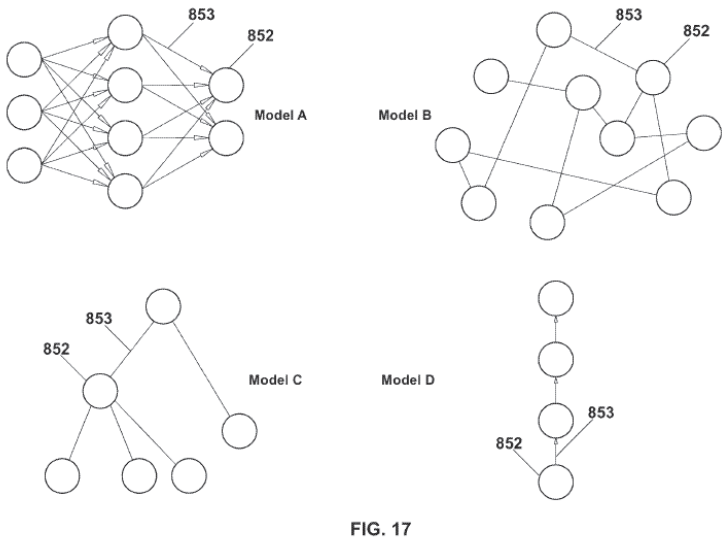
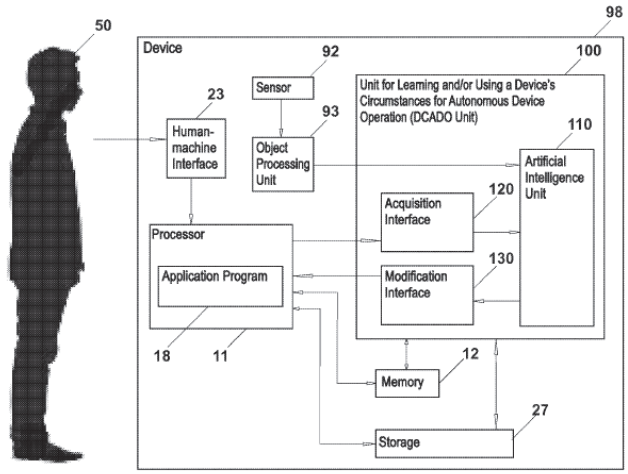


FIG. 37

’991 Application at [Figs. 33-37].

	 FIG. 17 ’991 Application at [Fig. 17].
wherein the first circumstance representation represents a first circumstance detected at least in part by one or more sensors of the first device	The ’991 Application supports wherein the first circumstance representation represents a first circumstance detected at least in part by one or more sensors of the first device. For example: In some embodiments; the first collection of object representations correlated with the first one or more instruction sets for operating the device include a knowledge of how the device operated in a circumstance. ’991 Application at [6:16-17]. Referring to Fig. 32, the illustration shows an embodiment of a method 9100 for learning and/or using a device's circumstances for autonomous device operation. in some aspects, the method can be used on a computing enabled device or system to enable learning of a device's operation in circumstances including objects with various properties and enable autonomous device operation in similar circumstances. ’991 Application at [135:14-17]. A collection of object representations may, therefore, include knowledge (i.e. unit of knowledge, etc.) of a

	device's circumstances including objects with various properties at a particular time. ’991 Application at [135:27-28]. DCADO Unit 100 comprises the functionality for learning the operation of Device 98 in circumstances including objects with various properties. DCADO Unit 100 comprises the functionality for structuring and/or storing this knowledge in a knowledgebase (i.e. neural network, graph, sequences, other repository, etc.). DCADO Unit 100 comprises the functionality for enabling autonomous operation of Device 98 in circumstances including objects with various properties. ’991 Application at [73:10-14].  FIG. 2 ’991 Application at [Fig. 2].

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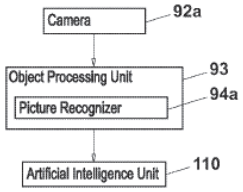


FIG. 3A

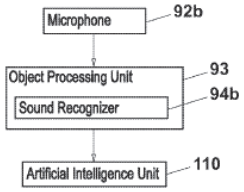


FIG. 3B

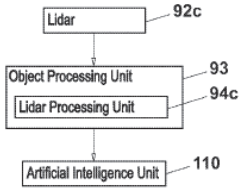


FIG. 3C

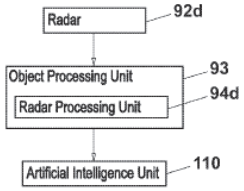


FIG. 3D

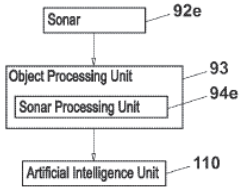


FIG. 3E

’991 Application at [Figs. 3A-3E].

Sensor 92 (also referred to simply as sensor or other suitable name or reference) comprises the functionality for obtaining or detecting information about its environment, and/or other functionalities. As such, one or more Sensors 92 can be used to detect objects and/or their properties in Device's 98 surrounding. In some aspects, Device's 98 surrounding may include exterior of Device 98. In other aspects, Device's 98 surrounding may include interior of Device 98 in case of hollow Device 98, Device 98 comprising compartments or openings, and/or other variously shaped Device 98. Examples of aspects of an environment that Sensor 92 can measure or be sensitive to include light {i.e. camera, lidar, etc.), electromagnetism/electromagnetic field {i.e. radar, etc.), sound (i.e. microphone, sonar, etc.), physical contact (i.e. tactile sensor, etc.), magnetism/magnetic field (Le.

	compass, etc.), electricity/electric field, temperature, gravity, vibration, pressure, and/or others. In some aspects, a passive sensor (i.e. camera, microphone, etc.) measures signals or radiation emitted or reflected by an object. in other aspects, an active sensor (i.e. lidar, radar, sonar, etc.) emits signals or radiation and measures the signals or radiation reflected or backscattered from an object. A reference to a Sensor 92 herein includes a reference to one or more Sensors 92 as applicable. In some designs, a plurality of Sensors 92 may be used to detect objects and/or their properties from different angles or sides of Device 98. For example, four Cameras 92a can be placed on four comers of Device 98 to cover 360 degrees of view of Device's 98 surrounding. In other designs, a plurality of different types of Sensors 92 may be used to detect different types of objects and/or their properties. For example, one or more Cameras 92a can be used to detect and identify an object, whereas, Radar 92d can be used to determine distance and bearing/angle of the object relative to Device 98. In further designs, a signal-emitting element can be placed within or onto an object and Sensor 92 can detect the signal from the signal-emitting element, thereby detecting the object and/or its properties. For example, a radio-frequency identification (RFID) emitter may be placed within an object to help Sensor 92 detect, identify, and/or obtain other information about the object. ’991 Application at [62:33-63:14]. In some embodiments, Sensor 92 may be or include Camera 92a as shown in Fig. 3A. Camera 92a comprises the functionality for capturing one or more pictures, and/or other functionalities. As such, Camera 92a can be used to capture pictures of Device's 98 surrounding. Camera 92a may be useful in detecting existence of an object, type of an object, identity of an object, distance of an object, bearing/angle of an object, location of an object, shape/size of an object, activity of an object, and/or other properties of an object. In some aspects, Camera 92a may be or comprises a motion picture camera that can capture

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	streams of pictures (i.e. motion pictures, videos, etc.). in other aspects, Camera 92a may be or comprises a still picture camera that can capture still pictures (i.e. photographs, etc.). In further aspects, Camera 92a may be or comprises a stereo camera (i.e. camera with multiple lenses, etc.) that can capture stereoscopic or range pictures. In further aspects, Camera 92a may be or comprises any other Camera 92a. In general, Camera 92a may capture any light (i.e. visible light, infrared light, ultraviolet light, x-ray light, etc.) across the electromagnetic spectrum onto a light-sensitive material. Any other technique known in art can be utilized to facilitate Camera 92a functionalities. In one example, a digital Camera 92a can utilize a charge coupled device (CCD), a complementary metal-oxide-semiconductor (CMOS) sensor, andior other electronic image sensor to capture digital pictures that can then be stored in a memory or storage, or transmitted to any of the disclosed or other elements for further processing. In another example, analog Camera 92a can utilize an analog-to-digital converter to produce digital pictures. In some embodiments, Camera 92a can be built, embedded, or integrated in Device 98 and/or other disclosed element. In other embodiments, Camera 92a can be an external Camera 92a connected with Device 98 and/or other disclosed element. In further embodiments, Camera 92a comprises Computing Device 70 or elements thereof. In general, Camera 92a can be implemented in any suitable configuration to provide its functionalities. Camera 92a may capture one or more digital pictures. A digital picture may include a collection of color encoded pixels or dots. Examples of file formats that can be utilized to store a digital picture include ,IPEG, GIF, TIFF, PNG, PDF, and/or other digitally encoded picture formats. A stream of digital pictures (i.e. motion picture, video, etc.) may include one or more digital pictures. Examples of file formats that can be utilized to store a stream of digital pictures include MPEG, AVI, FLV, MOV, RM, SWF, WMV, DivX, and/or other digitally encoded motion picture formats. In other embodiments, Sensor 92 may be or include Microphone 92b as shown in Fig. 3B.

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	Microphone 92b comprises the functionality for capturing one or more sounds, and/or other functionalities. As such, Microphone 92b can be used to capture sounds from Device's 98 surrounding. Microphone 92b may be useful in detecting existence of an object, type of an object, identity of an object, bearing/angle of an object, activity (i.e. motion, sounding, etc.) of an object, and/or other properties of an object. In some aspects, Microphone 92b may be omnidirectional microphone that enables capturing sounds from any direction. In other aspects, Microphone 92b may be a directional (i.e. unidirectional, bidirectional, etc.) microphone that enables capturing sounds from one or more directions while ignoring or being insensitive to sounds from other directions. In general, Microphone 92b may utilize a membrane sensitive to air pressure and may produce electrical signal from air pressure variations. Samples of the electrical signal can then be read to produce a stream of digital sound samples. Any other technique known in art can be utilized to facilitate Microphone 92b functionalities. In one example, a digital Microphone 92b may include an integrated analog-to-digital converter to capture a stream of digital sound samples that can then be stored in a memory or storage, or transmitted to any of the disclosed or other elements for further processing. In another example, analog Microphone 92b may utilize an external analog-to-digital converter to produce a stream of digital sound samples. In some embodiments, Microphone 92b can be built, embedded, or integrated in Device 98. In other embodiments, Microphone 92b can be an external Microphone 92b connected with Device 98. In further embodiments where used in water, Microphone 92b may be or include a hydrophone. in further embodiments, Microphone 92b comprises Computing Device 70 or elements thereof. in general, Microphone 92b can be implemented in any suitable configuration to provide its functionalities. Examples of file formats that can be utilized to store a stream of digital sound samples include WAV, WMA, AIFF, MP3, RA, OGG, and/or other digitally encoded sound formats. In further embodiments,

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	Sensor 92 may be or include Lidar 92c as shown in Fig. 3C. Lidar 92c may be useful in detecting existence of an object, type of an object identity of an object, distance of an object bearing/angle of an object, location of an object, shape/size of an object, activity of an object, and/or other properties of an object. In some aspects, Lidar 92c may emit a light signal (i.e. laser beam, etc.) and listen for a signal that is reflected or backscattered from an object. Any other technique known in art can be utilized to facilitate Lidar 92c functionalities. In further embodiments, Sensor 92 may be or include a Radar 92d as shown in Fig. 3D. Radar 92d may be useful in detecting existence of an object, type of an object, distance of an object, bearing/ angle of an object, location of an object, shape/size of an object, activity of an object, and/or other properties of an object. in some aspects, Radar 92d may emit a radio signal (i.e. radio wave, etc.) and listen for a signal that is reflected or backscattered from an object. Any other technique known in art can be utilized to facilitate Radar 92d functionalities. In further embodiments, Sensor 92 may be or include Sonar 92e as shown in Fig. 3E. Sonar 92e may be useful in detecting existence of an object, type of an object, distance of an object, bearing/angle of an object, location of an object, shape/size of an object, activity of an object, and/or other properties of an object. In some aspects, Sonar 92e may emit a sound signal (i.e. sound pulse, etc.) and listen for a signal that is reflected or backscattered from an object Any other technique known in art can be utilized to facilitate Sonar 92e functionalities. ’991 Application at [63:15-64:36]. Object Processing Unit 93 comprises the functionality for processing output from Sensor 92 to obtain information of interest, and/or other functionalities. As such, Object Processing Unit 93 can be used to process output from Sensor 92 to detect objects and/or their properties in Device's 98 surrounding. In some embodiments, Object Processing Unit 93 comprises the functionality for creating

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	or generating Collection of Object Representations 525 (also referred to as Coll of Obj Rep or other suitable name or reference) and storing one or more Object Representations 625 (also referred to simply as object representations, representations of objects, or other suitable name or reference), Object Properties 630 (also referred to simply as object properties or other suitable name or reference), and/or other elements or information into the Collection of Object Representations 525. As such, Collection of Object Representations 525 comprises the functionality for storing one or more Object Representations 625, Object Properties 630, and/or other elements or information. Object Representation 625 may include an electronic representation of an object (i.e. Object 615 [later described], etc.) detected in Device's 98 surrounding. In some aspects, Collection of Object Representations 525 includes one or more Object Representations 625, Object Properties 630, and/or other elements or information related to objects detected in Device's 98 surrounding at a particular time. Collection of Object Representations 525 may, therefore, include knowledge (i.e. unit of knowledge, etc.) of Device's 98 circumstances including objects with various properties at a particular time. in some designs, a Collection of Object Representations 525 may include or be associated with a time stamp (not shown), order (not shown), or other time related information. For example, one Collection of Object Representations 525 may be associated with time stamp t1, another Collection of Object Representations 525 may be associated with time stamp t2, and so on. Time stamps t1, t2, etc. may indicate the times of generating Collections of Object Representations 525, for instance. In other embodiments, Object Processing Unit 93 comprises the functionality for creating or generating a stream of Collections of Object Representations 525. A stream of Collections of Object Representations 525 may include one Collection of Object Representations 525 or a group, sequence, or other plurality of Collections of Object Representations 525. In some aspects, a stream of Collections of Object Representations 525 includes one or

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	more Collections of Object Representations 525, and/or other elements or information related to objects detected in Device's 98 surrounding over time. A stream of Collections of Object Representations 525 may, therefore, include knowledge (i.e. unit of knowledge, etc.) of Device's 98 circumstances including objects with various properties over time. As circumstances including objects with various properties in Device's 98 surrounding change (i.e. objects and/or their properties change, move, act, transform, etc.) over time, this change may be captured in a stream of Collections of Object Representations 525. In some designs, each Collection of Object Representations 525 in a stream may include or be associated with the aforementioned time stamp, order, or other time related information. For example, one Collection of Object Representations 525 in a stream may be associated with order 1, a next Collection of Object Representations 525 in 35 the stream may be associated with order 2, and so on. Orders 1, 2, etc. may indicate the orders or places of Collections of Object Representations 525 within a stream (Le. sequence, etc.), for instance. Examples of objects include biological objects (i.e. persons, animals, vegetation, etc.), nature objects (i.e. rocks, bodies of water, etc.), manmade objects (i.e. buildings, streets, ground/aerial/aquatic vehicles, etc.), and/or others. In some aspects, any part of an object may be detected as an object itself. For instance, instead of or in addition to detecting a vehicle as an object, a wheel and/or other parts of the vehicle may be detected as objects. In general, object may include any object or part thereof that can be detected. Examples of object properties include existence of an object, type of an object (i.e. person, cat, vehicle, building, street, tree, rock, etc.), identity of an object (i.e. name, identifier, etc.), distance of an object, bearing/angle of an object, location of an object (i.e. distance and bearing/angle from a known point. coordinates, etc.), shape/size of an object (i.e. height, width, depth, computer model, point cloud, etc.), activity of an object (i.e. motion, gestures, etc.), and/or other properties of an object. Type of an object, for example, may include any classification

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	of objects ranging from detailed such as person, cat, vehicle, building, street, tree, rock, etc. to generalized such as biological object, nature object, manmade object, etc., and/or others including their subtypes. Location of an object, for example, can include a relative location such as one defined by distance and bearing/angle from a known point or location (i.e. Device 98 location, etc.). Location of an object, for example, can also include absolute location such as one defined by object coordinates. In general, an object property may include any attribute of an object (i.e. existence of an object, type of an object, identity of an object, shape/size of an object, etc.), any relationship of an object with Device 98, other objects, or the environment (i.e. distance of an object, bearing/angle of an object, friend/foe relationship, etc.), and/or other information related to an object. In some implementations, Object Processing Unit 93 and/or any of its elements or functionalities can be included in Sensor 92. In other implementations, Object Processing Unit 93 and/or any of its elements or functionalities can be embedded into or operate on Processor 11. In further implementations, Object Processing Unit 93 and/or any of its elements or functionalities can be embedded into or operate in DCADO Unit 100, and/or other disclosed elements. Object Processing Unit 93 may be provided in any suitable configuration. Object Processing Unit 93 may include any signal processing techniques or elements known in art as applicable. '991 Application at [65:3-66:20].

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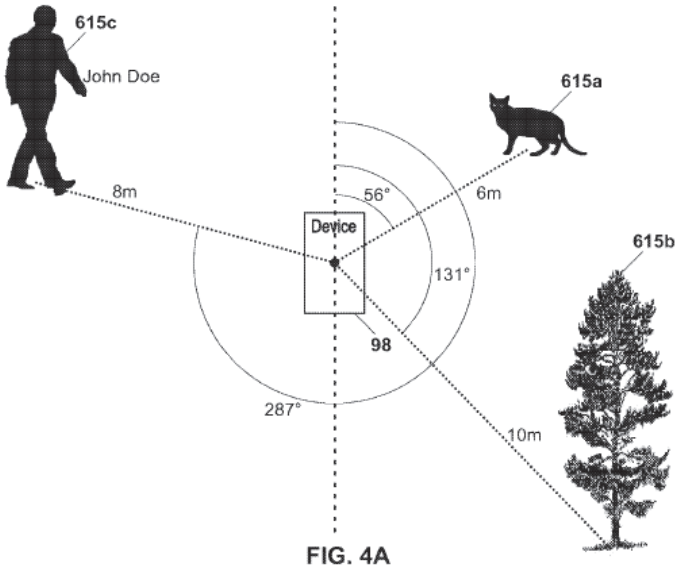


FIG. 4A

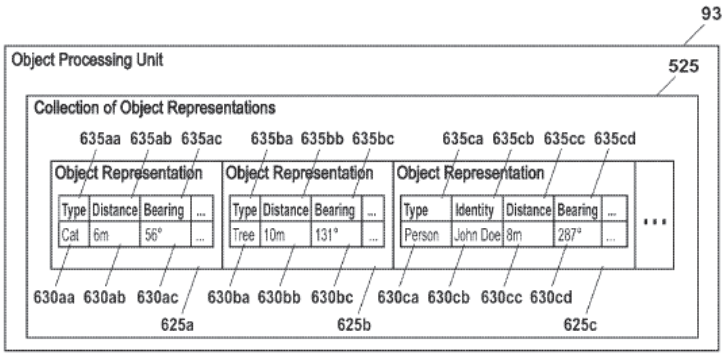


FIG. 4B

’991 Application at [Figs. 4A-4B].

Referring to Figs. 4A-4B, an exemplary embodiment of Objects 615 (also referred to simply as objects or other suitable name or reference) detected in Device's 98 surrounding, and resulting Collection of Object Representations 525 are illustrated. As shown for example in Fig. 4A, Object 615a is detected. Object 615a may be recognized as a cat. Object 615a may be detected at a distance of 6m from Device 98. Object 615a may be detected at a bearing/angle of 56° from Device's 98 centerline. Furthermore, Object 615b is also detected. Object 615b may be recognized as a tree. Object 615b may be detected at a distance of 1 Om from Device 98. Object 615b may be detected at a bearing/angle of 131 ° from

	Device's 98 centerline. Furthermore, Object 615c is also detected. Object 615c may be recognized as a person. Object 615c may be identified as John Doe. Object 615c may be detected at a distance of 8m from Device 98. Object 615c may be detected at a bearing/angle of 287° from Device's 98 centerline. Any other Objects 615 instead of or in addition to Object 615a, Object 615b, and Object 615c may be detected. In some aspects, any features, functionalities, and embodiments of Camera 92a/Picture Recognizer 94a, Microphone 92b/Sound Recognizer 94b, and/or other sensors or techniques can be utilized for recognizing and/or identifying a person, a cat, a tree, and/or other Objects 615. In further aspects, any features, functionalities, and embodiments of Camera 92a/Picture Recognizer 94a, Microphone 92b/Sound Recognizer 94b, Lidar 92cilidar Processing Unit 94c, Radar 92d/Radar Processing Unit 94d, Sonar 92e/Sonar Processing Unit 94e, and/or other sensors or techniques can be utilized for detecting distance, bearing/angle, and/or other object properties. As shown for example in Fig. 4B, Object Processing Unit 93 may create or generate Collection of Object Representations 525 including Object Representation 625a representing Object 615a, Object Representation 625b representing Object 615b, Object Representation 625c representing Object 615c, etc. For instance, Object Representation 625a may include Object Property 630aa "Cat" in Category 635aa "Type", Object Property 630ab "6m" in Category 635ab "Distance", Object Property 630ac "56°" in Category 635ac "Bearing", etc. Also, Object Representation 625b may include Object Property 630ba "Tree" in Category 635ba "Type", Object Property 630bb "1 Om" in Category 635bb "Distance", Object Property 630bc "131 °" in Category 635bc "Bearing", etc. Also, Object Representation 625c may include Object Property 630ca "Person" in Category 635ca "Type", Object Property 630cb "John Doe" in Category 635cb "Identity", Object Property 630cc "Sm" in Category 635cc "Distance", Object Property 630cd "287°;' in Category 635cd "Bearing"; etc. Any number of Object Representations 625, and/or other elements or information

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	can be included in Collection of Object Representations 525. Any number of Object Properties 630 (also referred to simply as object properties or other suitable name or reference), and/or other elements or information can be included in an Object Representation 625. In some aspects, a reference to Collection of Object Representations 525 comprises a reference to a collection of Object Properties 630 and/or other elements or information related to one or more Objects 615. Other additional Object Representations 625, Object Properties 630, elements, and/or information can be included as needed, or some of the disclosed ones can be excluded, or a combination thereof can be utilized in alternate embodiments of Collection of Object Representations 525. '991 Application at [72:14-73:8].
and the second circumstance representation represents a second circumstance detected at least in part by the one or more sensors of the first device	The '991 Application supports wherein the second circumstance representation represents a second circumstance detected at least in part by the one or more sensors of the first device. For example: In some embodiments; the first collection of object representations correlated with the first one or more instruction sets for operating the device include a knowledge of how the device operated in a circumstance. '991 Application at [6:16-17]. Referring to Fig. 32, the illustration shows an embodiment of a method 9100 for learning and/or using a device's circumstances for autonomous device operation. in some aspects, the method can be used on a computing enabled device or system to enable learning of a device's operation in circumstances including objects with various properties and enable autonomous device operation in similar circumstances. '991 Application at [135:14-17]. A collection of object representations may, therefore,

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include knowledge (i.e. unit of knowledge, etc.) of a device's circumstances including objects with various properties at a particular time.

’991 Application at [135:27-28].

DCADO Unit 100 comprises the functionality for learning the operation of Device 98 in circumstances including objects with various properties. DCADO Unit 100 comprises the functionality for structuring and/or storing this knowledge in a knowledgebase (i.e. neural network, graph, sequences, other repository, etc.). DCADO Unit 100 comprises the functionality for enabling autonomous operation of Device 98 in circumstances including objects with various properties.

’991 Application at [73:10-14].

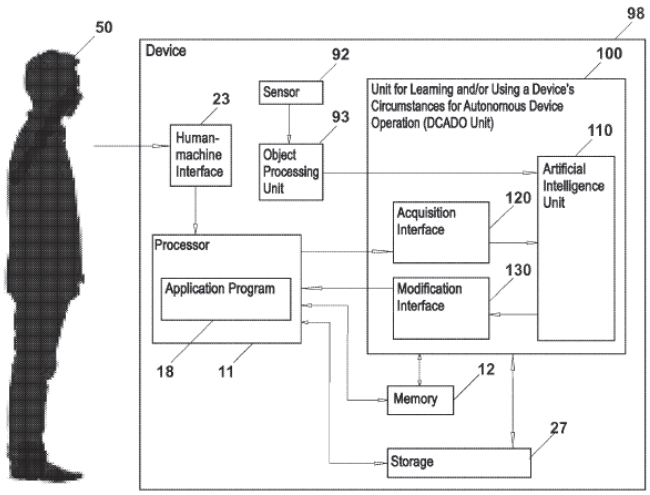


FIG. 2

’991 Application at [Fig. 2].

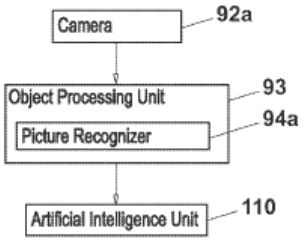


FIG. 3A

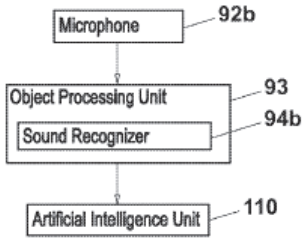


FIG. 3B

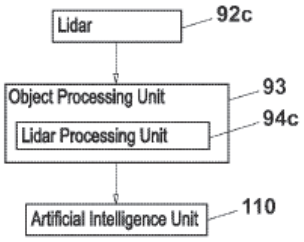


FIG. 3C

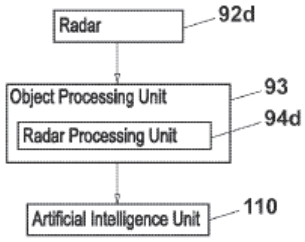


FIG. 3D

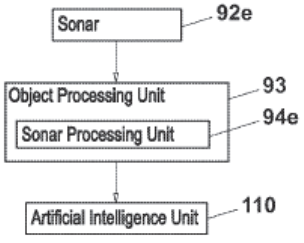


FIG. 3E

’991 Application at [Figs. 3A-3E].

Sensor 92 (also referred to simply as sensor or other suitable name or reference) comprises the functionality for obtaining or detecting information about its environment, and/or other functionalities. As such, one or more Sensors 92 can be used to detect objects and/or their properties in Device's 98 surrounding. In some aspects, Device's 98 surrounding may include exterior of Device 98. In other aspects, Device's 98 surrounding may include interior of Device 98 in case of hollow Device 98, Device 98 comprising compartments or openings, and/or other variously shaped Device 98. Examples of aspects of an environment that Sensor 92 can measure or be sensitive

	to include light {i.e. camera, lidar, etc.), electromagnetism/electromagnetic field {i.e. radar, etc.), sound (i.e. microphone, sonar, etc.), physical contact (i.e. tactile sensor, etc.), magnetism/magnetic field (Le. compass, etc.), electricity/electric field, temperature, gravity, vibration, pressure, and/or others. In some aspects, a passive sensor (i.e. camera, microphone, etc.) measures signals or radiation emitted or reflected by an object. in other aspects, an active sensor (i.e. lidar, radar, sonar, etc.) emits signals or radiation and measures the signals or radiation reflected or backscattered from an object. A reference to a Sensor 92 herein includes a reference to one or more Sensors 92 as applicable. In some designs, a plurality of Sensors 92 may be used to detect objects and/or their properties from different angles or sides of Device 98. For example, four Cameras 92a can be placed on four comers of Device 98 to cover 360 degrees of view of Device's 98 surrounding. In other designs, a plurality of different types of Sensors 92 may be used to detect different types of objects and/or their properties. For example, one or more Cameras 92a can be used to detect and identify an object, whereas, Radar 92d can be used to determine distance and bearing/angle of the object relative to Device 98. In further designs, a signal-emitting element can be placed within or onto an object and Sensor 92 can detect the signal from the signal-emitting element, thereby detecting the object and/or its properties. For example, a radio-frequency identification (RFID) emitter may be placed within an object to help Sensor 92 detect, identify, and/or obtain other information about the object. ’991 Application at [62:33-63:14]. In some embodiments, Sensor 92 may be or include Camera 92a as shown in Fig. 3A. Camera 92a comprises the functionality for capturing one or more pictures, and/or other functionalities. As such, Camera 92a can be used to capture pictures of Device's 98 surrounding. Camera 92a may be useful in detecting existence of an object, type of an object, identity of an object, distance of an object,

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	bearing/angle of an object, location of an object, shape/size of an object, activity of an object, and/or other properties of an object. In some aspects, Camera 92a may be or comprises a motion picture camera that can capture streams of pictures (i.e. motion pictures, videos, etc.). in other aspects, Camera 92a may be or comprises a still picture camera that can capture still pictures (i.e. photographs, etc.). In further aspects, Camera 92a may be or comprises a stereo camera (i.e. camera with multiple lenses, etc.) that can capture stereoscopic or range pictures. In further aspects, Camera 92a may be or comprises any other Camera 92a. In general, Camera 92a may capture any light (i.e. visible light, infrared light, ultraviolet light, x-ray light, etc.) across the electromagnetic spectrum onto a light-sensitive material. Any other technique known in art can be utilized to facilitate Camera 92a functionalities. In one example, a digital Camera 92a can utilize a charge coupled device (CCD), a complementary metal-oxide-semiconductor (CMOS) sensor, andior other electronic image sensor to capture digital pictures that can then be stored in a memory or storage, or transmitted to any of the disclosed or other elements for further processing. In another example, analog Camera 92a can utilize an analog-to-digital converter to produce digital pictures. In some embodiments, Camera 92a can be built, embedded, or integrated in Device 98 and/or other disclosed element. In other embodiments, Camera 92a can be an external Camera 92a connected with Device 98 and/or other disclosed element. In further embodiments, Camera 92a comprises Computing Device 70 or elements thereof. In general, Camera 92a can be implemented in any suitable configuration to provide its functionalities. Camera 92a may capture one or more digital pictures. A digital picture may include a collection of color encoded pixels or dots. Examples of file formats that can be utilized to store a digital picture include ,IPEG, GIF, TIFF, PNG, PDF, and/or other digitally encoded picture formats. A stream of digital pictures (i.e. motion picture, video, etc.) may include one or more digital pictures. Examples of file formats that can be utilized to store a stream of digital

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	pictures include MPEG, AVI, FLV, MOV, RM, SWF, WMV, DivX, and/or other digitally encoded motion picture formats. In other embodiments, Sensor 92 may be or include Microphone 92b as shown in Fig. 3B. Microphone 92b comprises the functionality for capturing one or more sounds, and/or other functionalities. As such, Microphone 92b can be used to capture sounds from Device's 98 surrounding. Microphone 92b may be useful in detecting existence of an object, type of an object, identity of an object, bearing/angle of an object, activity (i.e. motion, sounding, etc.) of an object, and/or other properties of an object. In some aspects, Microphone 92b may be omnidirectional microphone that enables capturing sounds from any direction. In other aspects, Microphone 92b may be a directional (i.e. unidirectional, bidirectional, etc.) microphone that enables capturing sounds from one or more directions while ignoring or being insensitive to sounds from other directions. In general, Microphone 92b may utilize a membrane sensitive to air pressure and may produce electrical signal from air pressure variations. Samples of the electrical signal can then be read to produce a stream of digital sound samples. Any other technique known in art can be utilized to facilitate Microphone 92b functionalities. In one example, a digital Microphone 92b may include an integrated analog-to-digital converter to capture a stream of digital sound samples that can then be stored in a memory or storage, or transmitted to any of the disclosed or other elements for further processing. In another example, analog Microphone 92b may utilize an external analog-to-digital converter to produce a stream of digital sound samples. In some embodiments, Microphone 92b can be built, embedded, or integrated in Device 98. In other embodiments, Microphone 92b can be an external Microphone 92b connected with Device 98. In further embodiments where used in water, Microphone 92b may be or include a hydrophone. in further embodiments, Microphone 92b comprises Computing Device 70 or elements thereof. in general, Microphone 92b can be implemented in any suitable configuration to provide its

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	functionalities. Examples of file formats that can be utilized to store a stream of digital sound samples include WAV, WMA, AIFF, MP3, RA, OGG, and/or other digitally encoded sound formats. In further embodiments, Sensor 92 may be or include Lidar 92c as shown in Fig. 3C. Lidar 92c may be useful in detecting existence of an object, type of an object identity of an object, distance of an object bearing/angle of an object, location of an object, shape/size of an object, activity of an object, and/or other properties of an object. In some aspects, Lidar 92c may emit a light signal (i.e. laser beam, etc.) and listen for a signal that is reflected or backscattered from an object. Any other technique known in art can be utilized to facilitate Lidar 92c functionalities. In further embodiments, Sensor 92 may be or include a Radar 92d as shown in Fig. 3D. Radar 92d may be useful in detecting existence of an object, type of an object, distance of an object, bearing/ angle of an object, location of an object, shape/size of an object, activity of an object, and/or other properties of an object. in some aspects, Radar 92d may emit a radio signal (i.e. radio wave, etc.) and listen for a signal that is reflected or backscattered from an object. Any other technique known in art can be utilized to facilitate Radar 92d functionalities. In further embodiments, Sensor 92 may be or include Sonar 92e as shown in Fig. 3E. Sonar 92e may be useful in detecting existence of an object, type of an object, distance of an object, bearing/angle of an object, location of an object, shape/size of an object, activity of an object, and/or other properties of an object. In some aspects, Sonar 92e may emit a sound signal (i.e. sound pulse, etc.) and listen for a signal that is reflected or backscattered from an object Any other technique known in art can be utilized to facilitate Sonar 92e functionalities. ’991 Application at [63:15-64:36]. Object Processing Unit 93 comprises the functionality for processing output from Sensor 92 to obtain information of interest, and/or other functionalities. As such, Object

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	Processing Unit 93 can be used to process output from Sensor 92 to detect objects and/or their properties in Device's 98 surrounding. In some embodiments, Object Processing Unit 93 comprises the functionality for creating or generating Collection of Object Representations 525 (also referred to as Coll of Obj Rep or other suitable name or reference) and storing one or more Object Representations 625 (also referred to simply as object representations, representations of objects, or other suitable name or reference), Object Properties 630 (also referred to simply as object properties or other suitable name or reference), and/or other elements or information into the Collection of Object Representations 525. As such, Collection of Object Representations 525 comprises the functionality for storing one or more Object Representations 625, Object Properties 630, and/or other elements or information. Object Representation 625 may include an electronic representation of an object (i.e. Object 615 [later described], etc.) detected in Device's 98 surrounding. In some aspects, Collection of Object Representations 525 includes one or more Object Representations 625, Object Properties 630, and/or other elements or information related to objects detected in Device's 98 surrounding at a particular time. Collection of Object Representations 525 may, therefore, include knowledge (i.e. unit of knowledge, etc.) of Device's 98 circumstances including objects with various properties at a particular time. in some designs, a Collection of Object Representations 525 may include or be associated with a time stamp (not shown), order (not shown), or other time related information. For example, one Collection of Object Representations 525 may be associated with time stamp t1, another Collection of Object Representations 525 may be associated with time stamp t2, and so on. Time stamps t1, t2, etc. may indicate the times of generating Collections of Object Representations 525, for instance. In other embodiments, Object Processing Unit 93 comprises the functionality for creating or generating a stream of Collections of Object Representations 525. A stream of Collections of Object Representations 525 may include

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	one Collection of Object Representations 525 or a group, sequence, or other plurality of Collections of Object Representations 525. In some aspects, a stream of Collections of Object Representations 525 includes one or more Collections of Object Representations 525, and/or other elements or information related to objects detected in Device's 98 surrounding over time. A stream of Collections of Object Representations 525 may, therefore, include knowledge (i.e. unit of knowledge, etc.) of Device's 98 circumstances including objects with various properties over time. As circumstances including objects with various properties in Device's 98 surrounding change (i.e. objects and/or their properties change, move, act, transform, etc.) over time, this change may be captured in a stream of Collections of Object Representations 525. In some designs, each Collection of Object Representations 525 in a stream may include or be associated with the aforementioned time stamp, order, or other time related information. For example, one Collection of Object Representations 525 in a stream may be associated with order 1, a next Collection of Object Representations 525 in 35 the stream may be associated with order 2, and so on. Orders 1, 2, etc. may indicate the orders or places of Collections of Object Representations 525 within a stream (Le. sequence, etc.), for instance. Examples of objects include biological objects (i.e. persons, animals, vegetation, etc.), nature objects (i.e. rocks, bodies of water, etc.), manmade objects (i.e. buildings, streets, ground/aerial/aquatic vehicles, etc.), and/or others. In some aspects, any part of an object may be detected as an object itself. For instance, instead of or in addition to detecting a vehicle as an object, a wheel and/or other parts of the vehicle may be detected as objects. In general, object may include any object or part thereof that can be detected. Examples of object properties include existence of an object, type of an object (i.e. person, cat, vehicle, building, street, tree, rock, etc.), identity of an object (i.e. name, identifier, etc.), distance of an object, bearing/angle of an object, location of an object (i.e. distance and bearing/angle from a known point. coordinates, etc.),

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	shape/size of an object (i.e. height, width, depth, computer model, point cloud, etc.), activity of an object (i.e. motion, gestures, etc.), and/or other properties of an object. Type of an object, for example, may include any classification of objects ranging from detailed such as person, cat, vehicle, building, street, tree, rock, etc. to generalized such as biological object, nature object, manmade object, etc., and/or others including their subtypes. Location of an object, for example, can include a relative location such as one defined by distance and bearing/angle from a known point or location (i.e. Device 98 location, etc.). Location of an object, for example, can also include absolute location such as one defined by object coordinates. In general, an object property may include any attribute of an object (i.e. existence of an object, type of an object, identity of an object, shape/size of an object, etc.), any relationship of an object with Device 98, other objects, or the environment (i.e. distance of an object, bearing/angle of an object, friend/foe relationship, etc.), and/or other information related to an object. In some implementations, Object Processing Unit 93 and/or any of its elements or functionalities can be included in Sensor 92. In other implementations, Object Processing Unit 93 and/or any of its elements or functionalities can be embedded into or operate on Processor 11. In further implementations, Object Processing Unit 93 and/or any of its elements or functionalities can be embedded into or operate in DCADO Unit 100, and/or other disclosed elements. Object Processing Unit 93 may be provided in any suitable configuration. Object Processing Unit 93 may include any signal processing techniques or elements known in art as applicable. ’991 Application at [65:3-66:20].

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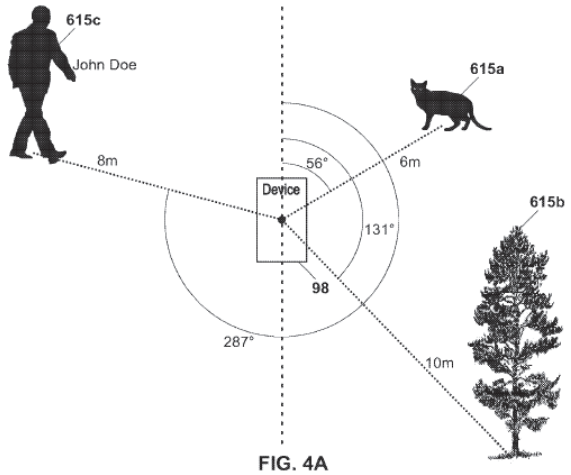


FIG. 4A

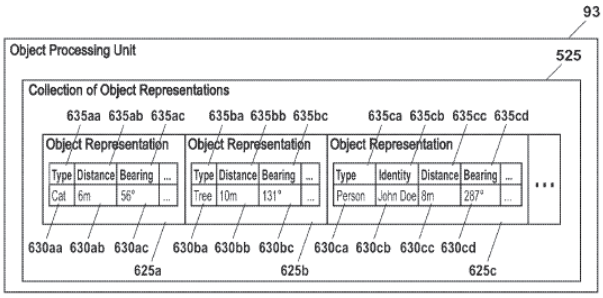


FIG. 4B

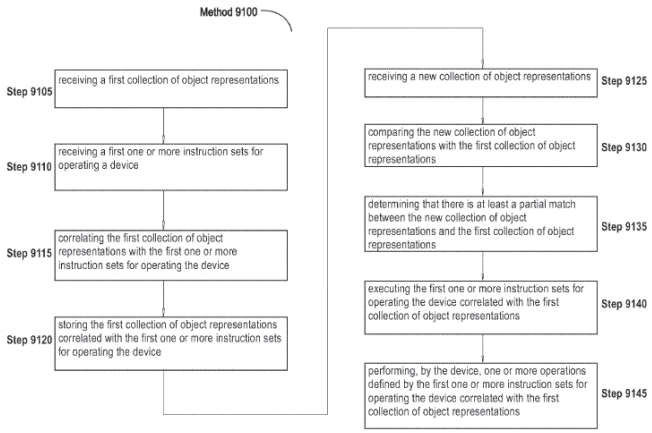
’991 Application at [Figs. 4A-4B].

Referring to Figs. 4A-4B, an exemplary embodiment of Objects 615 (also referred to simply as objects or other suitable name or reference) detected in Device's 98 surrounding, and resulting Collection of Object Representations 525 are illustrated. As shown for example in Fig. 4A, Object 615a is detected. Object 615a may be recognized as a cat. Object 615a may be detected at a distance of 6m from Device 98. Object 615a may be detected at a bearing/angle of 56° from Device's 98 centerline. Furthermore, Object 615b is also detected. Object 615b may be recognized as a tree. Object 615b may be detected at a distance of 1 Om from Device 98. Object 615b may be detected at a bearing/angle of 131 ° from Device's 98 centerline. Furthermore, Object 615c is also detected. Object 615c may be recognized as a person. Object 615c may be identified as John Doe. Object 615c may be detected at a distance of 8m from

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	Device 98. Object 615c may be detected at a bearing/angle of 287° from Device's 98 centerline. Any other Objects 615 instead of or in addition to Object 615a, Object 615b, and Object 615c may be detected. In some aspects, any features, functionalities, and embodiments of Camera 92a/Picture Recognizer 94a, Microphone 92b/Sound Recognizer 94b, and/or other sensors or techniques can be utilized for recognizing and/or identifying a person, a cat, a tree, and/or other Objects 615. In further aspects, any features, functionalities, and embodiments of Camera 92a/Picture Recognizer 94a, Microphone 92b/Sound Recognizer 94b, Lidar 92cilidar Processing Unit 94c, Radar 92d/Radar Processing Unit 94d, Sonar 92e/Sonar Processing Unit 94e, and/or other sensors or techniques can be utilized for detecting distance, bearing/angle, and/or other object properties. As shown for example in Fig. 4B, Object Processing Unit 93 may create or generate Collection of Object Representations 525 including Object Representation 625a representing Object 615a, Object Representation 625b representing Object 615b, Object Representation 625c representing Object 615c, etc. For instance, Object Representation 625a may include Object Property 630aa "Cat" in Category 635aa "Type", Object Property 630ab "6m" in Category 635ab "Distance", Object Property 630ac "56°" in Category 635ac "Bearing", etc. Also, Object Representation 625b may include Object Property 630ba "Tree" in Category 635ba "Type", Object Property 630bb "1 Om" in Category 635bb "Distance", Object Property 630bc "131 °" in Category 635bc "Bearing", etc. Also, Object Representation 625c may include Object Property 630ca "Person" in Category 635ca "Type", Object Property 630cb "John Doe" in Category 635cb "Identity", Object Property 630cc "Sm" in Category 635cc "Distance", Object Property 630cd "287°;' in Category 635cd "Bearing"; etc. Any number of Object Representations 625, and/or other elements or information can be included in Collection of Object Representations 525. Any number of Object Properties 630 (also referred to simply as object properties or other suitable name or reference), and/or other elements or information can be

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	included in an Object Representation 625. In some aspects, a reference to Collection of Object Representations 525 comprises a reference to a collection of Object Properties 630 and/or other elements or information related to one or more Objects 615. Other additional Object Representations 625, Object Properties 630, elements, and/or information can be included as needed, or some of the disclosed ones can be excluded, or a combination thereof can be utilized in alternate embodiments of Collection of Object Representations 525. '991 Application at [72:14-73:8].
and wherein at least a portion of the first correlation and at least a portion of the second correlation are learned in a learning process that includes operating the first device at least partially by a user	The '991 Application supports wherein at least a portion of the first correlation and at least a portion of the second correlation are learned in a learning process that includes operating the first device at least partially by a user. For example:  FIG. 32 '991 Application at [Fig. 32]. Referring to Fig. 32, the illustration shows an embodiment of a method 9100 for learning and/or using a device's circumstances for autonomous device operation. in some aspects, the method can be used on a computing enabled device or system to enable learning of a device's operation in circumstances including objects with various properties and enable autonomous device operation in similar circumstances.

’991 Application at [135:14-17].

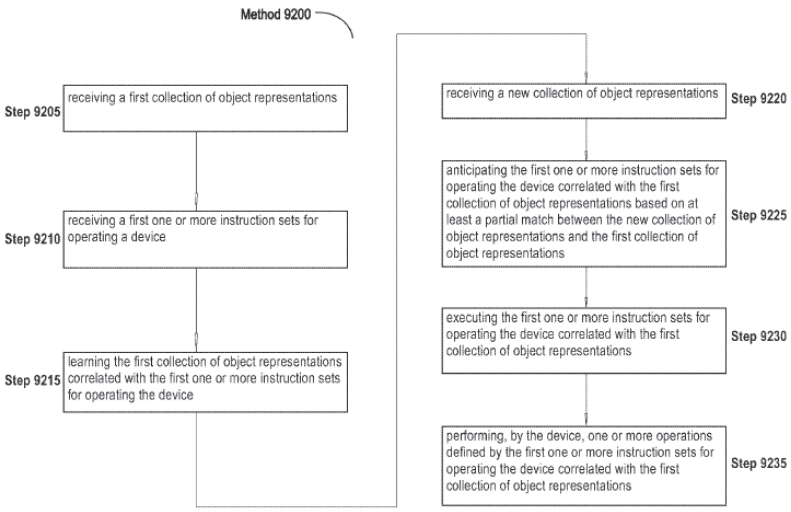


FIG. 33

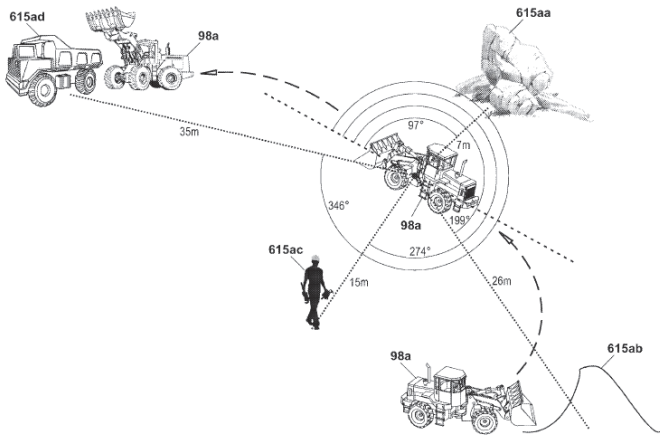
’991 Application at [Fig. 33].

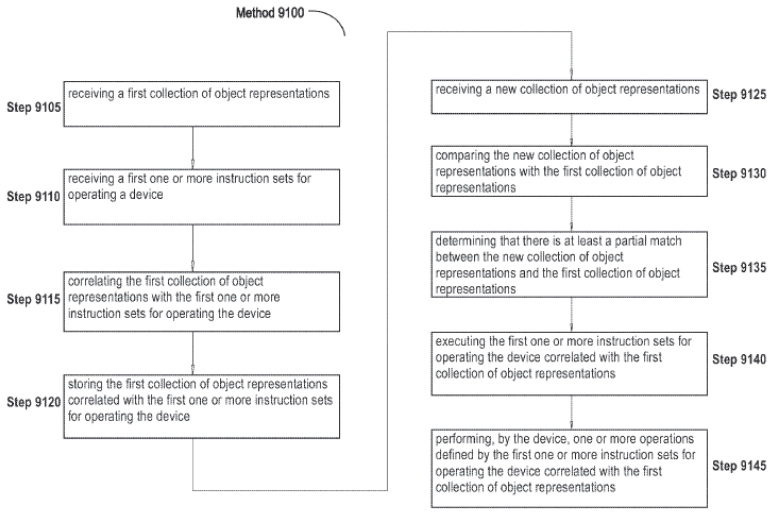
Referring to Fig. 33, the illustration shows an embodiment of a method 9200 for learning and/or using a device's circumstances for autonomous device operation. in some aspects, the method can be used on a computing enabled device or system to enable learning of a device's operation in circumstances including objects with various properties and enable autonomous device operation in similar circumstances.

’991 Application at [142:37-143:1].

At step 9215, the first collection of object representations correlated with the first one or more instruction sets for operating the device are learned.

’991 Application at [143:9-10].

	 FIG. 38 ’991 Application at [Fig. 38]. As User 50 operates Loader 98a in circumstances including objects with various properties as shown, DCADO Unit 100 may learn Loader's 98a operations in these circumstances by correlating Collections of Object Representations 525 representing Objects 615 detected in Loader's 98a surrounding with one or more Instruction Sets 526 used or executed by Logic Circuit 250, Processor 11, Application Program 18, and/or other processing element. ’991 Application at [147:19-22].
generating or receiving a third circumstance representation, wherein the third circumstance representation represents a third circumstance detected at least in part by the one or	The ’991 Application supports generating or receiving a third circumstance representation, wherein the third circumstance representation represents a third circumstance detected at least in part by the one or more sensors of the first device or at least in part by one or more sensors of a second device. For example: In some embodiments, Object Processing Unit 93 comprises the functionality for creating or generating Collection of Object Representations 525 (also referred to as Coll of Obj Rep or other suitable name or reference) ’991 Application at [65:5-7]. Object Processing Unit 93 may create or generate one or

more sensors of the first device or at least in part by one or more sensors of a second device	more (i.e. stream, etc.) Collections of Object Representations 525 comprising Object Representations 625, Object Properties 630, and/or other elements or information representing Objects 615 detected in Loader's 98a surrounding. '991 Application at [146:35-37]. In the future, DCADO Unit 110 may compare incoming Collections of Object Representations 525 representing Objects 615 detected in Loader's 98a surrounding with previously learned Collections of Object Representations 525 including optionally using any Extra Info 527 for enhanced decision making. '991 Application at [147:25-26].  FIG. 32 '991 Application at [Fig. 32]. At step 9125, a new collection of object representations is received. Step 9125 may include any action or operation described in Step 9105 as applicable. '991 Application at [139:13-14].

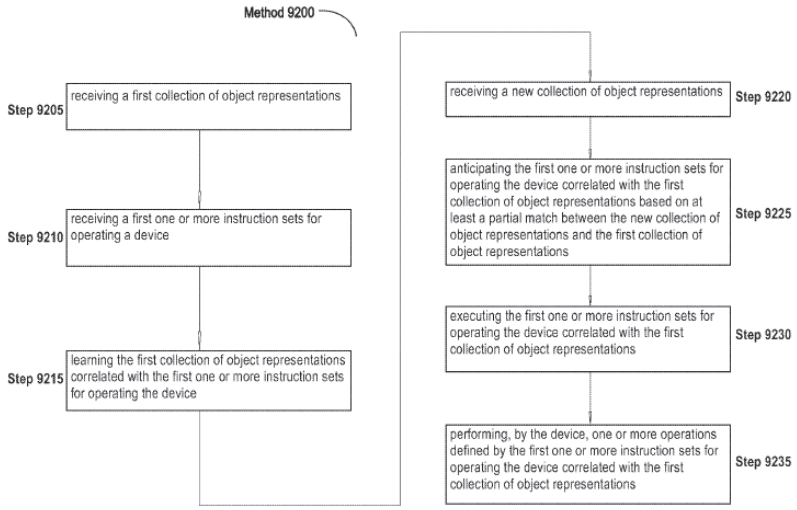


FIG. 33

’991 Application at [Fig. 33].

At step 9220, a new collection of object representations is received. Step 9220 may include any action or operation described in Step 9125 of method 9100 as applicable.

’991 Application at [143:12-13].

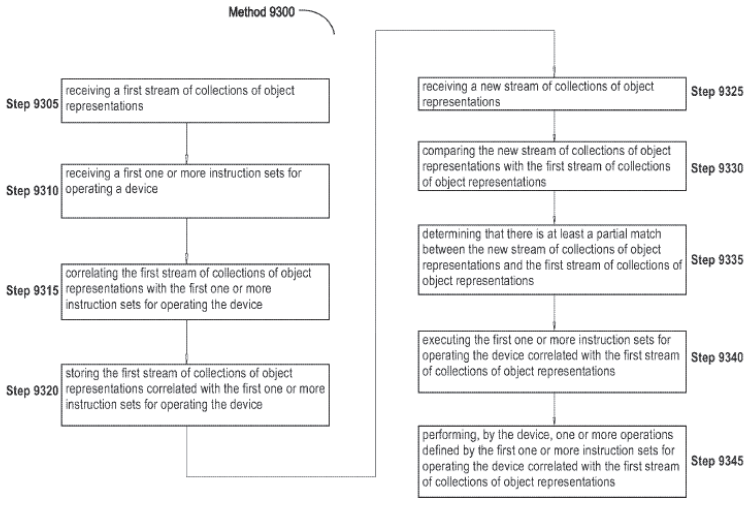


FIG. 34

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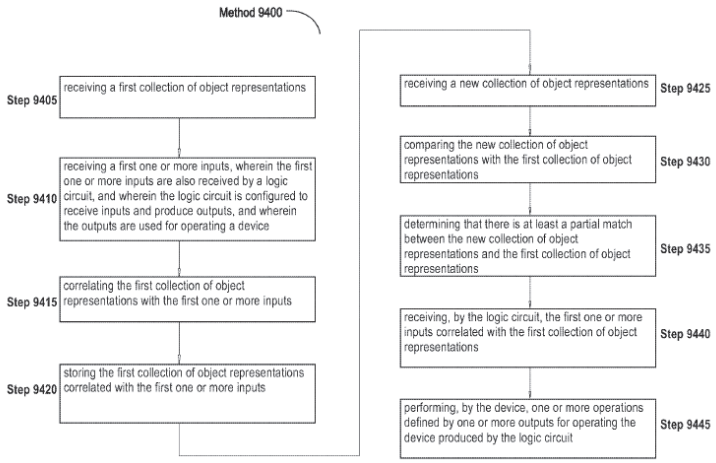


FIG. 35

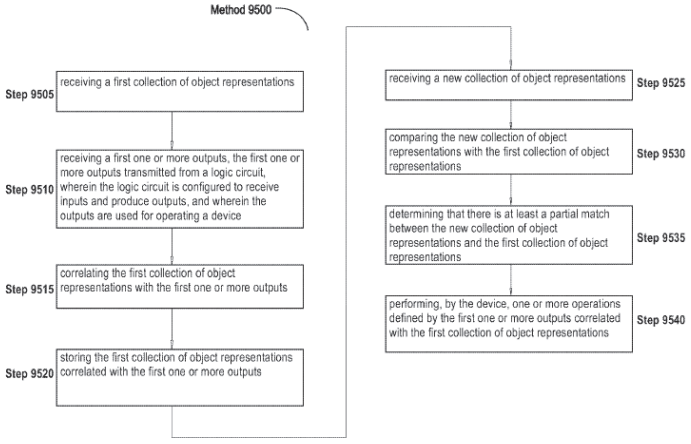


FIG. 36

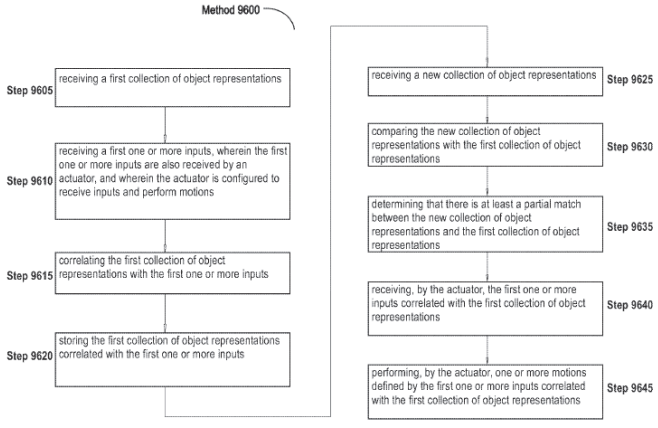


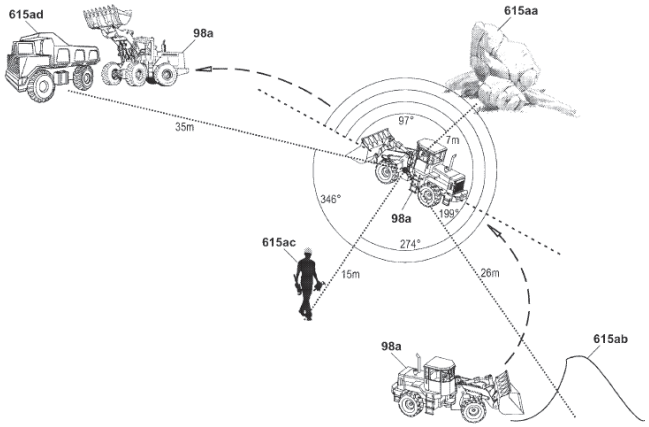
FIG. 37

’991 Application at [Figs. 34-37].

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	Objects and/or their properties can be detected by one or more sensors {Le. Sensors 92, etc.) and/or an object processing unit {Le. Object Processing Unit 93, etc.). A sensor may obtain or detect information about its environment. As such, one or more sensors can be used to detect objects and/or their properties in a device's surrounding. In some designs, a sensor may be part of a device whose circumstances are being used for DCADO functionalities. In other designs, a sensor may be part of a remote device whose circumstances are being used for DCADO functionalities. Examples of a sensor include a camera (i.e. Camera 92a, etc.), a microphone (i.e. Microphone 92b, etc.), a lidar (i.e. Lidar 92c, etc.), a radar (i.e. Radar 92d, etc.), a sonar (i.e. Sonar 92e, etc.), and/or others. An object processing unit may process output from a sensor to obtain information of interest. As such, an object processing unit can be used to process output from a sensor to detect objects and/or their properties in a device's surrounding. '991 Application at [136:15-24]. In some aspects, an object processing unit may create or generate a collection of object representations. In other aspects, an object processing unit may create or generate a stream of collections of object representations. '991 Application at [136:24-26]. For example, one Collection of Object Representations 525 may be associated with time stamp t1, another Collection of Object Representations 525 may be associated with time stamp t2, and so on. Time stamps t1, t2, etc. may indicate the times of generating Collections of Object Representations 525, for instance. '991 Application at [65:19-22].
anticipating the first one or more	The '991 Application supports anticipating the first one or more instruction sets for operating the first device learned in the learning process based on at least partial match

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instruction sets for operating the first device learned in the learning process based on at least partial match between the third circumstance representation and the first circumstance representation	between the third circumstance representation and the first circumstance representation. For example: The artificial intelligence unit may be further configured to: anticipate the first one or more instruction sets for operating the device correlated with the first collection of object representations based on at least a partial match between the new collection of object representations and the first collection of object representations. '991 Application at [1:34-37].  FIG. 38 '991 Application at [Fig. 38]. In the future, DCADO Unit 110 may compare incoming Collections of Object Representations 525 representing Objects 615 detected in Loader's 98a surrounding with previously learned Collections of Object Representations 525 including optionally using any Extra Info 527 for enhanced decision making. If substantially similar or at least a partial match is found or determined, the Instruction Sets 526 correlated with the previously learned Collections of Object Representations 525 can be autonomously executed by Logic Circuit 250, Processor 11; Application Program 18, and/or other processing element, thereby enabling autonomous operation of Loader 98a in similar circumstances as in previously learned ones. For instance, Loader 98a comprising DCADO Unit 100 may learn User

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50-directed collecting, moving, maneuvering, lifting, unloading, and/or other operations in a circumstance that includes Rock 615aa, Pile of Material 615ab, Person 615ac, Truck 615ad, and/or other Objects 615 among which Loader 98a may need to maneuver and/or with which Loader 98a may need to interact. In the future, when a circumstance that includes Objects 615 with similar Object Properties 630 is encountered, Loader 98a may implement collecting, moving, maneuvering, lifting, and/or unloading operations autonomously.

’991 Application at [147:25-37].

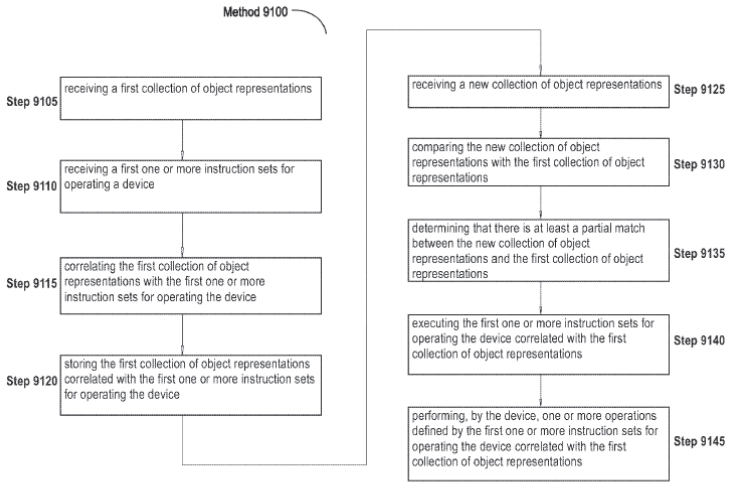


FIG. 32

’991 Application at [Fig. 32].

In some aspects, instruction sets (i.e. the one or more instruction sets for operating the device correlated with the first collection of object representations, etc.) anticipated or determined to be used or executed in a device's autonomous operation may be referred to as anticipatory instruction sets, alternate instruction sets, and/or other suitable name or reference. Therefore, these terms can be used interchangeably herein depending on context.

’991 Application at [141:24-27].

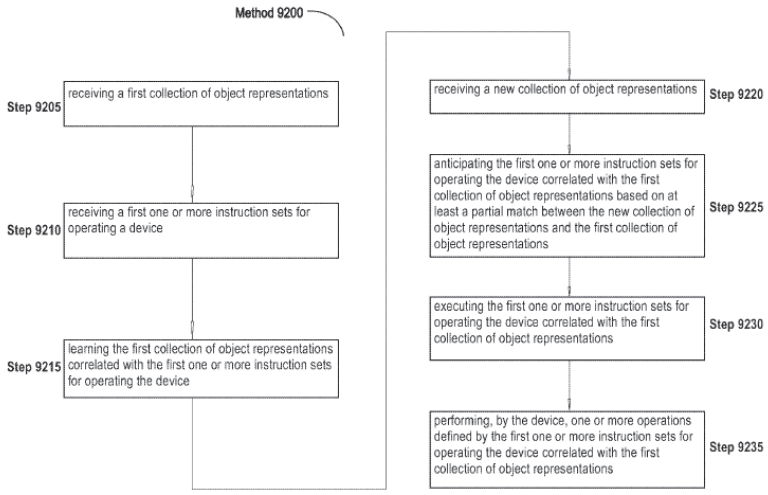


FIG. 33

’991 Application at [Fig. 33].

At step 9225, the first one or more instruction sets for operating the device correlated with the first collection of object representations are anticipated based on at least a partial match between the new collection of object representations and the first collection of object representations.

’991 Application at [143:14-16].

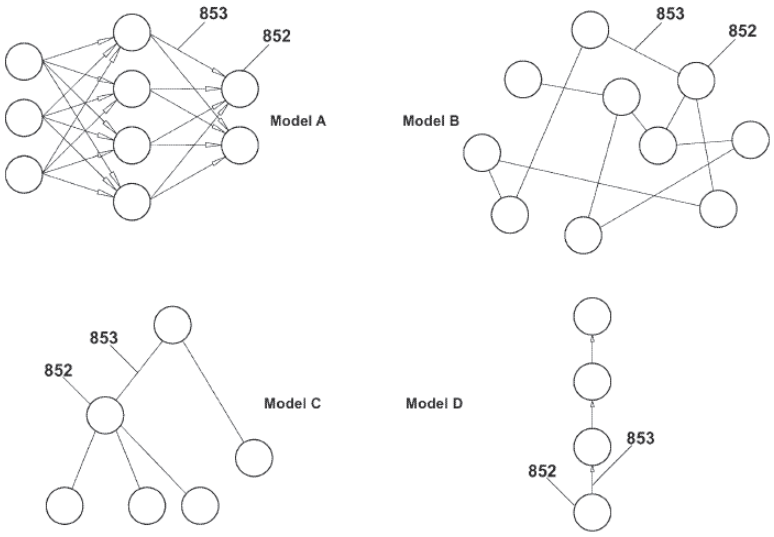
Decision-making Unit 540 comprises the functionality for anticipating or determining a device's operation in circumstances including objects with various properties. Decision-making Unit 540 comprises the functionality for anticipating or determining Instruction Sets 526 to be used or executed in Device's 98 autonomous operation, In some aspects,

’991 Application at [113:29-32].

In some aspects, Decision-making Unit 540 may anticipate or determine Instruction Sets 526 {i.e, anticipator Instruction Sets 526, etc.) for autonomous

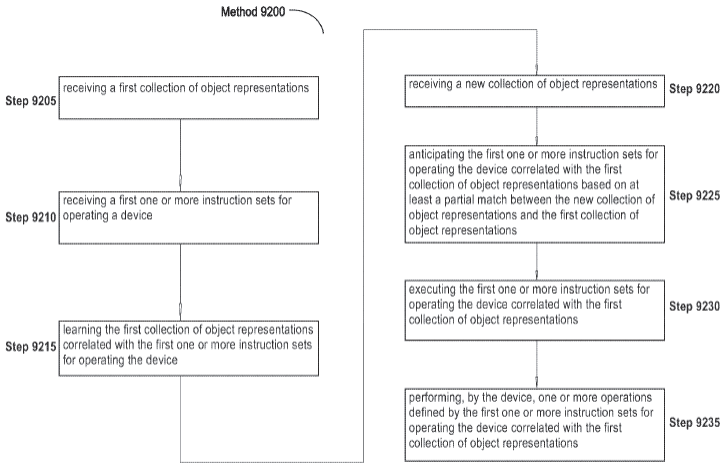
	Device 98 operation by performing Similarity Comparisons 125 of incoming Collections of Object Representations 525 or portions thereof from Object Processing Unit 93 with Collections of Object Representations 525 or portions thereof from Knowledge Cells 800 in Knowledgebase 530 (i.e. Neural Network 530a, Graph 530b, Collection of Sequences 530c, Sequence 533, Collection of Knowledge Cells 530d, etc.). '991 Application at [113:36-114:2]. In some embodiments, the anticipating the first one or more instruction sets for operating the device correlated with the first collection of object representations based on at least a partial match between the new collection of object representations and the first collection of object representations includes comparing at least one portion of the new collection of object representations with at least one portion of the first collection of object representations. '991 Application at [7:26-30]. The operations may further include: anticipating the first one or more instruction sets for operating the device correlated with the first collection of object representations based on at least a partial match between the new collection of object representations and the first collection of object representations. '991 Application at [15:25-28]. The method may further include: (e) anticipating the first one or more instruction sets for operating the device correlated with the first collection of object representations based on at least a partial match between the new collection of object representations and the first collection of object representations, the anticipating of {e) performed by the processor circuit. '991 Application at [16:8-11].

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	Similarity Comparison 125 may include functions, rules, and/or logic for performing matching or comparisons and for determining that while a perfect match is not found, a partial or similar match has been found. '991 Application at [99:33-35]. Similarity Comparison 125 enables comparing circumstances including objects with various properties and determining their similarity or match. '991 Application at [100:11-12].  FIG. 17 '991 Application at [Fig. 17].
at least in response to the anticipating, executing the first one or more instruction sets for operating the first device	The '991 Application supports at least in response to the anticipating, executing the first one or more instruction sets for operating the first device learned in the learning process, wherein the first device or the second device autonomously performs one or more operations defined by the first one or more instruction sets for operating the first device learned in the learning process. For example:

learned in the learning process, wherein the first device or the second device autonomously performs one or more operations defined by the first one or more instruction sets for operating the first device learned in the learning process	The artificial intelligence unit may be further configured to: cause the processor circuit to execute the first one or more instruction sets for operating the device correlated with the first collection of object representations, the causing performed in response to the anticipating of the artificial intelligence unit, wherein the device performs one or more operations defined by the first one or more instruction sets for operating the device correlated with the first collection of object representations, the one or more operations performed in response to the executing by the processor circuit '991 Application at [1:37-2:2]. The operations may further include: causing an execution of the first one or more instruction sets for operating the device correlated with the first collection of object representations, the causing performed in response to the anticipating the first one or more instruction sets for operating the device correlated with the first collection of object representations based on at least a partial match between the new collection of object representations and the first collection of object representations, wherein the device performs one or more operations defined by the first one or more instruction sets for operating the device correlated with the first collection of object representations, the one or more operations by the device performed in response to the execution. '991 Application at [15:28-34]. The method may further include: (f) executing the first one or more instruction sets for operating the device correlated with the first collection of object representations, the executing of (f) performed in response to the anticipating of (e). The method may further include: (g) performing, by the device, one or more operations defined by the first one or more instruction sets for operating the device correlated with the first collection

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	of object representations, the one or more operations by the device performed in response to the executing of (f). ’991 Application at [16:11-15].  FIG. 33 ’991 Application at [Fig. 33]. At step 9230, the first one or more instruction sets for operating the device correlated with the first collection of object representations are executed. Step 9230 may include any action or operation described in Step 9140 of method 9100 as applicable. At step 9235, one or more operations defined by the first one or more instruction sets for operating the device correlated with the first collection of object representations are performed by the device. Step 9235 may include any action or operation described in Step 9145 of method 9100 as applicable. ’991 Application at [143:18-23].
Limitations Common to Each Substitute Claim	
wherein the first circumstance representation includes a first collection of	The ’991 Application supports wherein the first circumstance representation includes a first collection of object representations. For example: In some embodiments; the first collection of object representations correlated with the first one or more

object representations	instruction sets for operating the device include a knowledge of how the device operated in a circumstance. ’991 Application at [6:16-17]. Referring to Fig. 32, the illustration shows an embodiment of a method 9100 for learning and/or using a device's circumstances for autonomous device operation. in some aspects, the method can be used on a computing enabled device or system to enable learning of a device's operation in circumstances including objects with various properties and enable autonomous device operation in similar circumstances. ’991 Application at [135:14-17]. A collection of object representations may, therefore, include knowledge (i.e. unit of knowledge, etc.) of a device's circumstances including objects with various properties at a particular time. ’991 Application at [135:27-28]. DCADO Unit 100 comprises the functionality for learning the operation of Device 98 in circumstances including objects with various properties. DCADO Unit 100 comprises the functionality for structuring and/or storing this knowledge in a knowledgebase (i.e. neural network, graph, sequences, other repository, etc.). DCADO Unit 100 comprises the functionality for enabling autonomous operation of Device 98 in circumstances including objects with various properties. ’991 Application at [73:10-14]. Object Processing Unit 93 comprises the functionality for processing output from Sensor 92 to obtain information of interest, and/or other functionalities. As such, Object Processing Unit 93 can be used to process output from Sensor 92 to detect objects and/or their properties in

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	Device's 98 surrounding. In some embodiments, Object Processing Unit 93 comprises the functionality for creating or generating Collection of Object Representations 525 (also referred to as Coll of Obj Rep or other suitable name or reference) and storing one or more Object Representations 625 (also referred to simply as object representations, representations of objects, or other suitable name or reference), Object Properties 630 (also referred to simply as object properties or other suitable name or reference), and/or other elements or information into the Collection of Object Representations 525. As such, Collection of Object Representations 525 comprises the functionality for storing one or more Object Representations 625, Object Properties 630, and/or other elements or information. Object Representation 625 may include an electronic representation of an object (i.e. Object 615 [later described], etc.) detected in Device's 98 surrounding. In some aspects, Collection of Object Representations 525 includes one or more Object Representations 625, Object Properties 630, and/or other elements or information related to objects detected in Device's 98 surrounding at a particular time. Collection of Object Representations 525 may, therefore, include knowledge (i.e. unit of knowledge, etc.) of Device's 98 circumstances including objects with various properties at a particular time. in some designs, a Collection of Object Representations 525 may include or be associated with a time stamp (not shown), order (not shown), or other time related information. For example, one Collection of Object Representations 525 may be associated with time stamp t1, another Collection of Object Representations 525 may be associated with time stamp t2, and so on. Time stamps t1, t2, etc. may indicate the times of generating Collections of Object Representations 525, for instance. In other embodiments, Object Processing Unit 93 comprises the functionality for creating or generating a stream of Collections of Object Representations 525. A stream of Collections of Object Representations 525 may include one Collection of Object Representations 525 or a group, sequence, or other plurality of Collections of

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	Object Representations 525. In some aspects, a stream of Collections of Object Representations 525 includes one or more Collections of Object Representations 525, and/or other elements or information related to objects detected in Device's 98 surrounding over time. A stream of Collections of Object Representations 525 may, therefore, include knowledge (i.e. unit of knowledge, etc.) of Device's 98 circumstances including objects with various properties over time. As circumstances including objects with various properties in Device's 98 surrounding change (i.e. objects and/or their properties change, move, act, transform, etc.) over time, this change may be captured in a stream of Collections of Object Representations 525. In some designs, each Collection of Object Representations 525 in a stream may include or be associated with the aforementioned time stamp, order, or other time related information. For example, one Collection of Object Representations 525 in a stream may be associated with order 1, a next Collection of Object Representations 525 in 35 the stream may be associated with order 2, and so on. Orders 1, 2, etc. may indicate the orders or places of Collections of Object Representations 525 within a stream (Le. sequence, etc.), for instance. Examples of objects include biological objects (i.e. persons, animals, vegetation, etc.), nature objects (i.e. rocks, bodies of water, etc.), manmade objects (i.e. buildings, streets, ground/aerial/aquatic vehicles, etc.), and/or others. In some aspects, any part of an object may be detected as an object itself. For instance, instead of or in addition to detecting a vehicle as an object, a wheel and/or other parts of the vehicle may be detected as objects. In general, object may include any object or part thereof that can be detected. Examples of object properties include existence of an object, type of an object (i.e. person, cat, vehicle, building, street, tree, rock, etc.), identity of an object (i.e. name, identifier, etc.), distance of an object, bearing/angle of an object, location of an object (i.e. distance and bearing/angle from a known point. coordinates, etc.), shape/size of an object (i.e. height, width, depth, computer model, point cloud, etc.), activity of an object (i.e. motion,

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	gestures, etc.), and/or other properties of an object. Type of an object, for example, may include any classification of objects ranging from detailed such as person, cat, vehicle, building, street, tree, rock, etc. to generalized such as biological object, nature object, manmade object, etc., and/or others including their subtypes. Location of an object, for example, can include a relative location such as one defined by distance and bearing/angle from a known point or location (i.e. Device 98 location, etc.). Location of an object, for example, can also include absolute location such as one defined by object coordinates. In general, an object property may include any attribute of an object (i.e. existence of an object, type of an object, identity of an object, shape/size of an object, etc.), any relationship of an object with Device 98, other objects, or the environment (i.e. distance of an object, bearing/angle of an object, friend/foe relationship, etc.), and/or other information related to an object. In some implementations, Object Processing Unit 93 and/or any of its elements or functionalities can be included in Sensor 92. In other implementations, Object Processing Unit 93 and/or any of its elements or functionalities can be embedded into or operate on Processor 11. In further implementations, Object Processing Unit 93 and/or any of its elements or functionalities can be embedded into or operate in DCADO Unit 100, and/or other disclosed elements. Object Processing Unit 93 may be provided in any suitable configuration. Object Processing Unit 93 may include any signal processing techniques or elements known in art as applicable. ’991 Application at [65:3-66:20].

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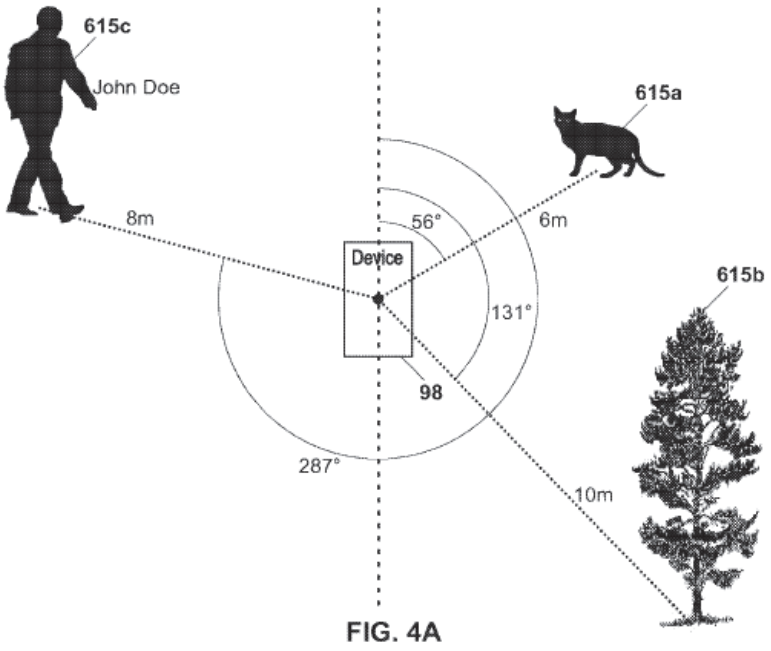


FIG. 4A

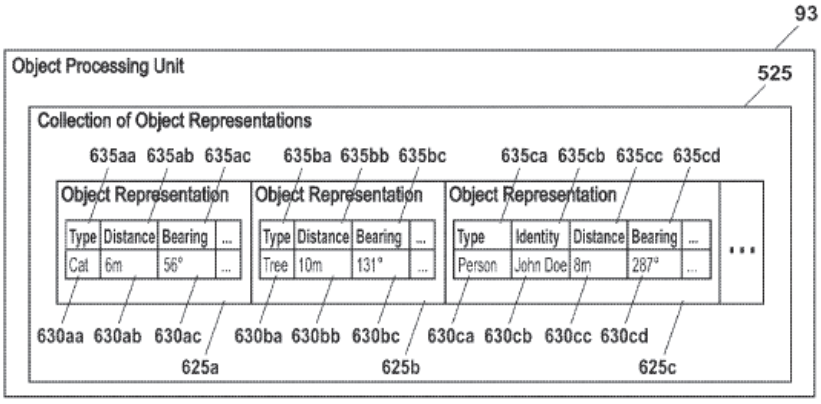


FIG. 4B

’991 Application at [Figs. 4A-4B].

Referring to Figs. 4A-4B, an exemplary embodiment of Objects 615 (also referred to simply as objects or other suitable name or reference) detected in Device's 98 surrounding, and resulting Collection of Object Representations 525 are illustrated. As shown for example in Fig. 4A, Object 615a is detected. Object 615a may be recognized as a cat. Object 615a may be detected at a distance of 6m from Device 98. Object 615a may be detected at a bearing/angle of 56° from Device's 98

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	centerline. Furthermore, Object 615b is also detected. Object 615b may be recognized as a tree. Object 615b may be detected at a distance of 1 Om from Device 98. Object 615b may be detected at a bearing/angle of 131 ° from Device's 98 centerline. Furthermore, Object 615c is also detected. Object 615c may be recognized as a person. Object 615c may be identified as John Doe. Object 615c may be detected at a distance of 8m from Device 98. Object 615c may be detected at a bearing/angle of 287° from Device's 98 centerline. Any other Objects 615 instead of or in addition to Object 615a, Object 615b, and Object 615c may be detected. In some aspects, any features, functionalities, and embodiments of Camera 92a/Picture Recognizer 94a, Microphone 92b/Sound Recognizer 94b, and/or other sensors or techniques can be utilized for recognizing and/or identifying a person, a cat, a tree, and/or other Objects 615. In further aspects, any features, functionalities, and embodiments of Camera 92a/Picture Recognizer 94a, Microphone 92b/Sound Recognizer 94b, Lidar 92cilidar Processing Unit 94c, Radar 92d/Radar Processing Unit 94d, Sonar 92e/Sonar Processing Unit 94e, and/or other sensors or techniques can be utilized for detecting distance, bearing/angle, and/or other object properties. As shown for example in Fig. 4B, Object Processing Unit 93 may create or generate Collection of Object Representations 525 including Object Representation 625a representing Object 615a, Object Representation 625b representing Object 615b, Object Representation 625c representing Object 615c, etc. For instance, Object Representation 625a may include Object Property 630aa "Cat" in Category 635aa "Type", Object Property 630ab "6m" in Category 635ab "Distance", Object Property 630ac "56°" in Category 635ac "Bearing", etc. Also, Object Representation 625b may include Object Property 630ba "Tree" in Category 635ba "Type", Object Property 630bb "1 Om" in Category 635bb "Distance", Object Property 630bc "131 °" in Category 635bc "Bearing", etc. Also, Object Representation 625c may include Object Property 630ca "Person" in Category 635ca "Type", Object Property 630cb "John Doe" in Category

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	635cb "Identity", Object Property 630cc "Sm" in Category 635cc "Distance", Object Property 630cd "287°;' in Category 635cd "Bearing"; etc. Any number of Object Representations 625, and/or other elements or information can be included in Collection of Object Representations 525. Any number of Object Properties 630 (also referred to simply as object properties or other suitable name or reference), and/or other elements or information can be included in an Object Representation 625. In some aspects, a reference to Collection of Object Representations 525 comprises a reference to a collection of Object Properties 630 and/or other elements or information related to one or more Objects 615. Other additional Object Representations 625, Object Properties 630, elements, and/or information can be included as needed, or some of the disclosed ones can be excluded, or a combination thereof can be utilized in alternate embodiments of Collection of Object Representations 525. '991 Application at [72:14-73:8].
and wherein the second circumstance representation includes a second collection of object representations	The '991 Application supports and wherein the second circumstance representation includes a second collection of object representations. For example: In some embodiments; the first collection of object representations correlated with the first one or more instruction sets for operating the device include a knowledge of how the device operated in a circumstance. '991 Application at [6:16-17]. Referring to Fig. 32, the illustration shows an embodiment of a method 9100 for learning and/or using a device's circumstances for autonomous device operation. in some aspects, the method can be used on a computing enabled device or system to enable learning of a device's operation in circumstances including objects with various properties and enable autonomous device operation in similar circumstances.

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	’991 Application at [135:14-17]. ’ A collection of object representations may, therefore, include knowledge (i.e. unit of knowledge, etc.) of a device's circumstances including objects with various properties at a particular time. ’991 Application at [135:27-28]. DCADO Unit 100 comprises the functionality for learning the operation of Device 98 in circumstances including objects with various properties. DCADO Unit 100 comprises the functionality for structuring and/or storing this knowledge in a knowledgebase (i.e. neural network, graph, sequences, other repository, etc.). DCADO Unit 100 comprises the functionality for enabling autonomous operation of Device 98 in circumstances including objects with various properties. ’991 Application at [73:10-14]. Object Processing Unit 93 comprises the functionality for processing output from Sensor 92 to obtain information of interest, and/or other functionalities. As such, Object Processing Unit 93 can be used to process output from Sensor 92 to detect objects and/or their properties in Device's 98 surrounding. In some embodiments, Object Processing Unit 93 comprises the functionality for creating or generating Collection of Object Representations 525 (also referred to as Coll of Obj Rep or other suitable name or reference) and storing one or more Object Representations 625 (also referred to simply as object representations, representations of objects, or other suitable name or reference), Object Properties 630 (also referred to simply as object properties or other suitable name or reference), and/or other elements or information into the Collection of Object Representations 525. As such, Collection of Object Representations 525 comprises the functionality for storing one or more Object

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	Representations 625, Object Properties 630, and/or other elements or information. Object Representation 625 may include an electronic representation of an object (i.e. Object 615 [later described], etc.) detected in Device's 98 surrounding. In some aspects, Collection of Object Representations 525 includes one or more Object Representations 625, Object Properties 630, and/or other elements or information related to objects detected in Device's 98 surrounding at a particular time. Collection of Object Representations 525 may, therefore, include knowledge (i.e. unit of knowledge, etc.) of Device's 98 circumstances including objects with various properties at a particular time. in some designs, a Collection of Object Representations 525 may include or be associated with a time stamp (not shown), order (not shown), or other time related information. For example, one Collection of Object Representations 525 may be associated with time stamp t1, another Collection of Object Representations 525 may be associated with time stamp t2, and so on. Time stamps t1, t2, etc. may indicate the times of generating Collections of Object Representations 525, for instance. In other embodiments, Object Processing Unit 93 comprises the functionality for creating or generating a stream of Collections of Object Representations 525. A stream of Collections of Object Representations 525 may include one Collection of Object Representations 525 or a group, sequence, or other plurality of Collections of Object Representations 525. In some aspects, a stream of Collections of Object Representations 525 includes one or more Collections of Object Representations 525, and/or other elements or information related to objects detected in Device's 98 surrounding over time. A stream of Collections of Object Representations 525 may, therefore, include knowledge (i.e. unit of knowledge, etc.) of Device's 98 circumstances including objects with various properties over time. As circumstances including objects with various properties in Device's 98 surrounding change (i.e. objects and/or their properties change, move, act, transform, etc.) over time, this change may be captured in a stream of Collections of Object Representations 525. In

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	some designs, each Collection of Object Representations 525 in a stream may include or be associated with the aforementioned time stamp, order, or other time related information. For example, one Collection of Object Representations 525 in a stream may be associated with order 1, a next Collection of Object Representations 525 in 35 the stream may be associated with order 2, and so on. Orders 1, 2, etc. may indicate the orders or places of Collections of Object Representations 525 within a stream (Le. sequence, etc.), for instance. Examples of objects include biological objects (i.e. persons, animals, vegetation, etc.), nature objects (i.e. rocks, bodies of water, etc.), manmade objects (i.e. buildings, streets, ground/aerial/aquatic vehicles, etc.), and/or others. In some aspects, any part of an object may be detected as an object itself. For instance, instead of or in addition to detecting a vehicle as an object, a wheel and/or other parts of the vehicle may be detected as objects. In general, object may include any object or part thereof that can be detected. Examples of object properties include existence of an object, type of an object (i.e. person, cat, vehicle, building, street, tree, rock, etc.), identity of an object (i.e. name, identifier, etc.), distance of an object, bearing/angle of an object, location of an object (i.e. distance and bearing/angle from a known point. coordinates, etc.), shape/size of an object (i.e. height, width, depth, computer model, point cloud, etc.), activity of an object (i.e. motion, gestures, etc.), and/or other properties of an object. Type of an object, for example, may include any classification of objects ranging from detailed such as person, cat, vehicle, building, street, tree, rock, etc. to generalized such as biological object, nature object, manmade object, etc., and/or others including their subtypes. Location of an object, for example, can include a relative location such as one defined by distance and bearing/angle from a known point or location (i.e. Device 98 location, etc.). Location of an object, for example, can also include absolute location such as one defined by object coordinates. In general, an object property may include any attribute of an object (i.e. existence of an

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	object, type of an object, identity of an object, shape/size of an object, etc.), any relationship of an object with Device 98, other objects, or the environment (i.e. distance of an object, bearing/angle of an object, friend/foe relationship, etc.), and/or other information related to an object. In some implementations, Object Processing Unit 93 and/or any of its elements or functionalities can be included in Sensor 92. In other implementations, Object Processing Unit 93 and/or any of its elements or functionalities can be embedded into or operate on Processor 11. In further implementations, Object Processing Unit 93 and/or any of its elements or functionalities can be embedded into or operate in DCADO Unit 100, and/or other disclosed elements. Object Processing Unit 93 may be provided in any suitable configuration. Object Processing Unit 93 may include any signal processing techniques or elements known in art as applicable. ’991 Application at [65:3-66:20].

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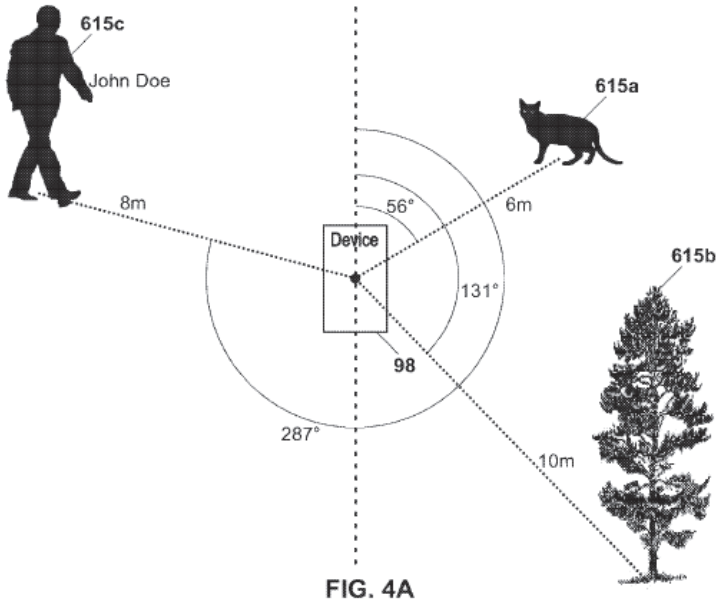


FIG. 4A

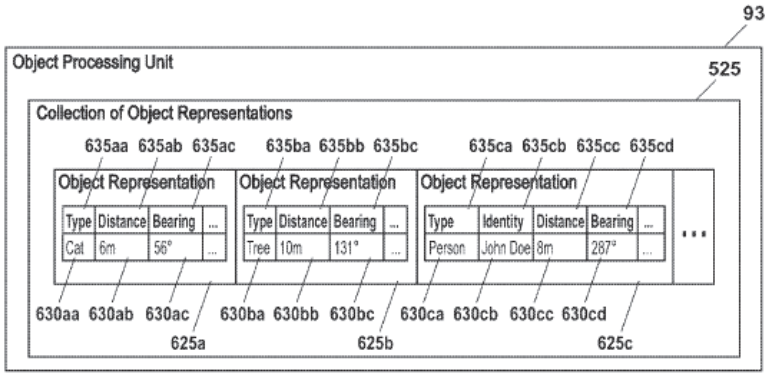


FIG. 4B

’991 Application at [Figs. 4A-4B].

Referring to Figs. 4A-4B, an exemplary embodiment of Objects 615 (also referred to simply as objects or other suitable name or reference) detected in Device's 98 surrounding, and resulting Collection of Object Representations 525 are illustrated. As shown for example in Fig. 4A, Object 615a is detected. Object 615a may be recognized as a cat. Object 615a may be detected at a distance of 6m from Device 98. Object 615a may be detected at a bearing/angle of 56° from Device's 98 centerline. Furthermore, Object 615b is also detected. Object 615b may be recognized as a tree. Object 615b may

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	be detected at a distance of 1 Om from Device 98. Object 615b may be detected at a bearing/angle of 131 ° from Device's 98 centerline. Furthermore, Object 615c is also detected. Object 615c may be recognized as a person. Object 615c may be identified as John Doe. Object 615c may be detected at a distance of 8m from Device 98. Object 615c may be detected at a bearing/angle of 287° from Device's 98 centerline. Any other Objects 615 instead of or in addition to Object 615a, Object 615b, and Object 615c may be detected. In some aspects, any features, functionalities, and embodiments of Camera 92a/Picture Recognizer 94a, Microphone 92b/Sound Recognizer 94b, and/or other sensors or techniques can be utilized for recognizing and/or identifying a person, a cat, a tree, and/or other Objects 615. In further aspects, any features, functionalities, and embodiments of Camera 92a/Picture Recognizer 94a, Microphone 92b/Sound Recognizer 94b, Lidar 92cilidar Processing Unit 94c, Radar 92d/Radar Processing Unit 94d, Sonar 92e/Sonar Processing Unit 94e, and/or other sensors or techniques can be utilized for detecting distance, bearing/angle, and/or other object properties. As shown for example in Fig. 4B, Object Processing Unit 93 may create or generate Collection of Object Representations 525 including Object Representation 625a representing Object 615a, Object Representation 625b representing Object 615b, Object Representation 625c representing Object 615c, etc. For instance, Object Representation 625a may include Object Property 630aa "Cat" in Category 635aa "Type", Object Property 630ab "6m" in Category 635ab "Distance", Object Property 630ac "56°" in Category 635ac "Bearing", etc. Also, Object Representation 625b may include Object Property 630ba "Tree" in Category 635ba "Type", Object Property 630bb "1 Om" in Category 635bb "Distance", Object Property 630bc "131 °" in Category 635bc "Bearing", etc. Also, Object Representation 625c may include Object Property 630ca "Person" in Category 635ca "Type", Object Property 630cb "John Doe" in Category 635cb "Identity", Object Property 630cc "Sm" in Category 635cc "Distance", Object Property 630cd "287°;' in

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	Category 635cd "Bearing"; etc. Any number of Object Representations 625, and/or other elements or information can be included in Collection of Object Representations 525. Any number of Object Properties 630 (also referred to simply as object properties or other suitable name or reference), and/or other elements or information can be included in an Object Representation 625. In some aspects, a reference to Collection of Object Representations 525 comprises a reference to a collection of Object Properties 630 and/or other elements or information related to one or more Objects 615. Other additional Object Representations 625, Object Properties 630, elements, and/or information can be included as needed, or some of the disclosed ones can be excluded, or a combination thereof can be utilized in alternate embodiments of Collection of Object Representations 525. ’991 Application at [72:14-73:8]. In certain embodiments, the artificial intelligence unit is further configured to: receive a second collection of object representations, the second collection of object representations including one or more representations of objects detected by the sensor; receive a second one or more instruction sets for operating the device; and learn the second collection of object representations correlated with the second one or more instruction sets for operating the device. ’991 Application at [14:6-10].

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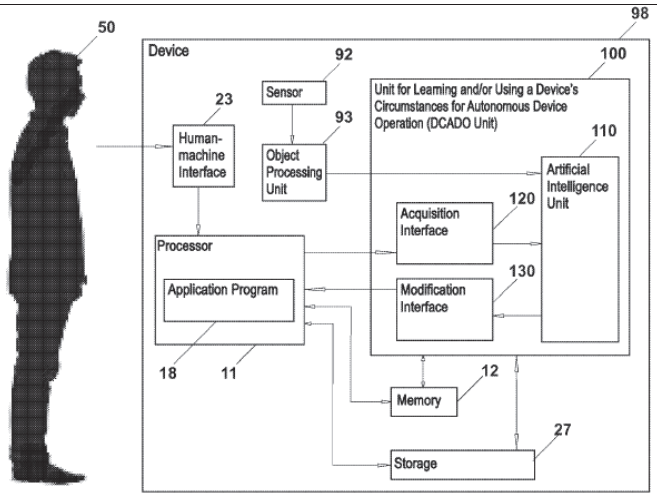


FIG. 2

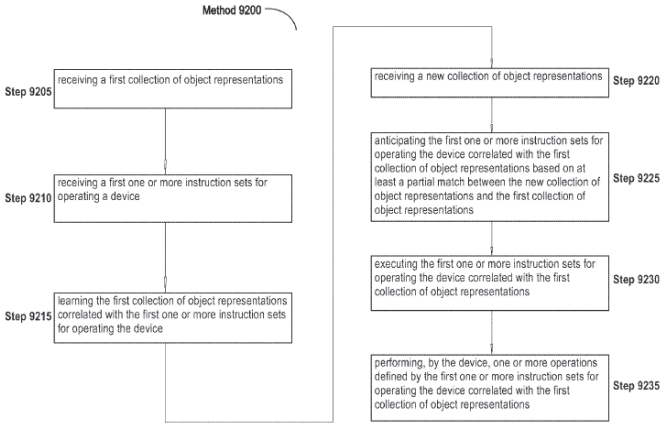


FIG. 33

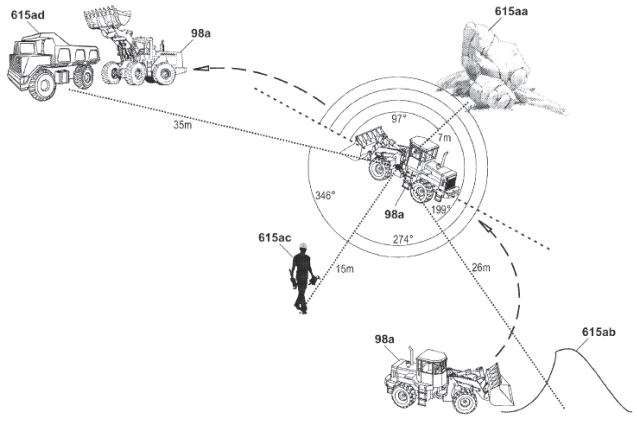


FIG. 38

’991 Application at [Figs. 2, 33, 38 – overall system].

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and wherein the first collection of object representations represents multiple objects detected at a first time or during a first time period	The ’991 Application supports and wherein the first collection of object representations represents multiple objects detected at a first time or during a first time period. For example: In some aspects, Collection of Object Representations 525 includes one or more Object Representations 625, Object Properties 630, and/or other elements or information related to objects detected in Device's 98 surrounding at a particular time. Collection of Object Representations 525 may, therefore, include knowledge (i.e. unit of knowledge, etc.) of Device's 98 circumstances including objects with various properties at a particular time. in some designs, a Collection of Object Representations 525 may include or be associated with a time stamp (not shown), order (not shown), or other time related information. For example, one Collection of Object Representations 525 may be associated with time stamp t1, another Collection of Object Representations 525 may be associated with time stamp t2, and so on. Time stamps t1, t2, etc. may indicate the times of generating Collections of Object Representations 525, for instance. In other embodiments, Object Processing Unit 93 comprises the functionality for creating or generating a stream of Collections of Object Representations 525. A stream of Collections of Object Representations 525 may include one Collection of Object Representations 525 or a group, sequence, or other plurality of Collections of Object Representations 525. In some aspects, a stream of Collections of Object Representations 525 includes one or more Collections of Object Representations 525, and/or other elements or information related to objects detected in Device's 98 surrounding over time. A stream of Collections of Object Representations 525 may, therefore, include knowledge (i.e. unit of knowledge, etc.) of Device's 98 circumstances including objects with various properties over time. As circumstances including objects with various properties in Device's 98 surrounding change (i.e. objects and/or their properties change, move, act, transform, etc.) over time, this change may be captured in a stream of Collections of

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	Object Representations 525. In some designs, each Collection of Object Representations 525 in a stream may include or be associated with the aforementioned time stamp, order, or other time related information. For example, one Collection of Object Representations 525 in a stream may be associated with order 1, a next Collection of Object Representations 525 in the stream may be associated with order 2, and so on. Orders 1, 2, etc. may indicate the orders or places of Collections of Object Representations 525 within a stream (Le. sequence, etc.), for instance. ’991 Application at [65:14-36]. In some aspects, a collection of object representations may include one or more object representations, object properties, and/or other elements or information detected in a device's (i.e. Device's 98, etc.) surrounding at a particular time. A collection of object representations may, therefore, include knowledge (i.e. unit of knowledge, etc.) of a device's circumstances including objects with various properties at a particular time. In some designs, a collection of object representations may include or be associated with a time stamp {not shown), order (not shown), or other time related information. ’991 Application at [135:25-30]. In some embodiments, a collection of object representations may include or be substituted with a stream of collections of object representations, and vice versa. Therefore, the terms collection of object representations and stream of collections of object representations may be used interchangeably herein depending on context. A stream of collections of object representations may include one collection of object representations or a group, sequence, or other plurality of collections of object representations. In some aspects, a stream of collections of object representations may include one or more collections of object representations, and/or

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	other elements or information detected in a device's surrounding over time. A stream of collections of object representations may, therefore, include knowledge (i.e. unit of knowledge, etc.) of a device's circumstances including objects with various properties over time. As circumstances including objects with various properties in a device's surrounding change {i.e, objects and/or their properties change, move, act, transform, etc,) over time, this change may be captured in a stream of collections of object representations. in some designs, each collection of object representations in a stream may include or be associated with the aforementioned time stamp, order, or other time related information. '991 Application at [135:30-136:3]. The artificial intelligence unit may be configured to: receive a first stream of collections of object representations, the first stream of collections of object representations including one or more collections of representations of objects detected by the sensor. '991 Application at [24:35-37]. In certain embodiments, each collection of object representations includes one or more representations of objects detected by the sensor at a time. in further embodiments, each collection of object representations includes one or more of object representations. In further embodiments, each collection of object representations includes or is associated with a time stamp, an order, or a time related information. In further embodiments, the first stream of collections of object representations includes one or more collections of representations of objects detected by the sensor over time. in further embodiments, the new stream of collections of object representations includes one or more collections of representations of objects detected by the sensor over time. In further embodiments, the first or the new stream of collections of object representations includes one or more collections of representations of

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	objects in the device's surrounding. In further embodiments, the first or the new stream of collections of object representations includes one or more collections of representations of objects in a remote device's surrounding. In further embodiments, an object representation of a stream of collections of object representations includes one or more object properties. in further embodiments, the first or the new stream of collections of object representations includes one or more object properties. In further embodiments, the first stream of collections of object representations includes a comparative stream of collections of object representations whose at least one portion can be used for comparisons with at least one portion of streams of collections of object representations subsequent to the first stream of collections of object representations, the streams of collections of object representations subsequent to the first stream of collections of object representations comprising the new stream of collections of object representations. in further embodiments, the first stream of collections of object representations includes a comparative stream of collections of object representations that can be used for comparisons with the new stream of collections of object representations. In further embodiments, the new stream of collections of object representations includes an anticipatory stream of collections of object representations whose correlated one or more instruction sets can be used for anticipation of one or more instruction sets to be executed by the processor circuit. ’991 Application at [25:12-17].

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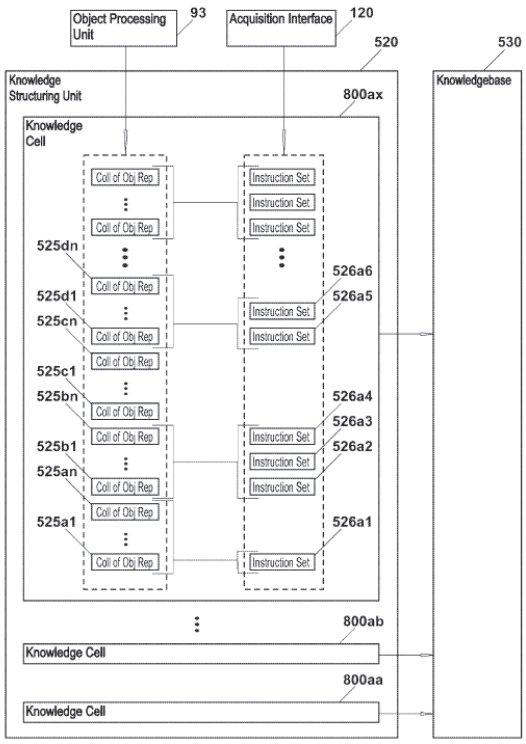


FIG. 15

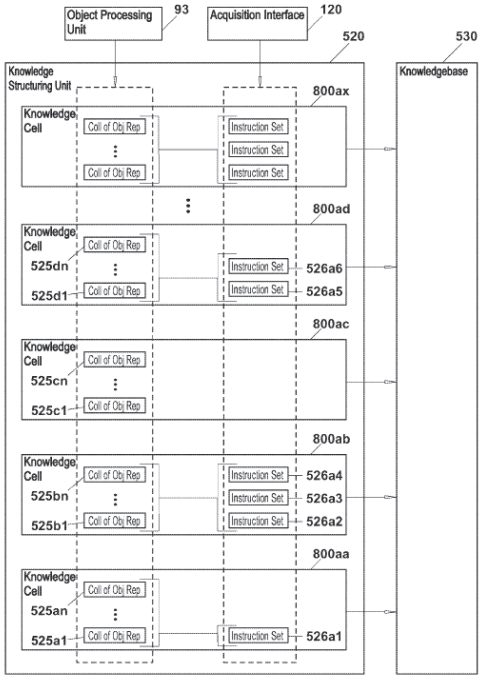
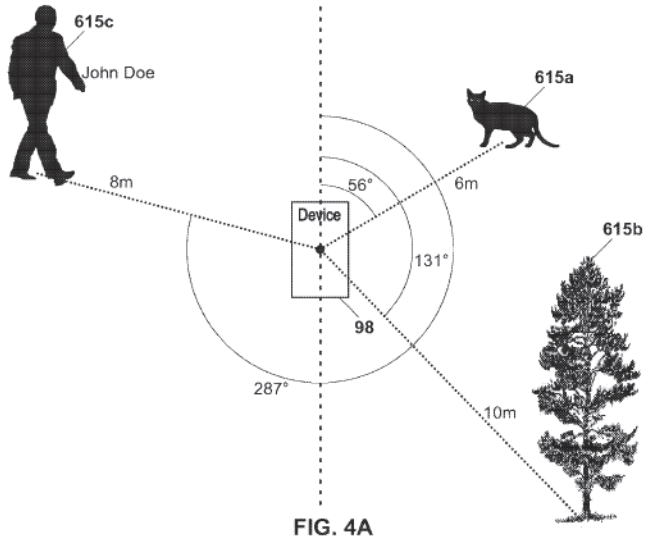
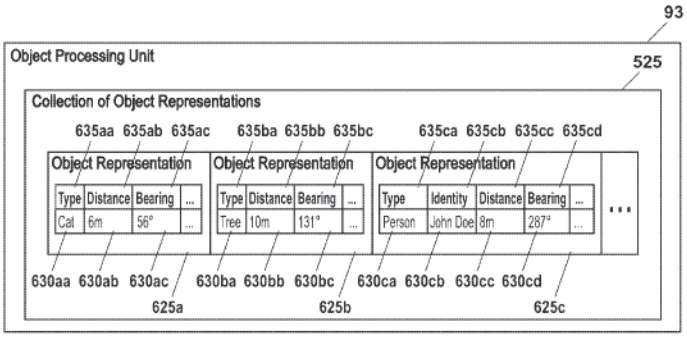


FIG. 16

’991 Application at [Figs. 15-16].

	Referring to Fig. 15, an embodiment of Knowledge Structuring Unit 520 correlating streams of Collections of Object Representations 525 with any Instruction Sets 526 and/or Extra Info 527 is illustrated. '991 Application at [91:25-26]. Referring to Fig. 16, another embodiment of Knowledge Structuring Unit 520 correlating streams of Collections of Object Representations 525 with any Instruction Sets 526 and/or Extra Info 527 is illustrated. '991 Application at [92:3-4].
and comprises a first data structure that includes: labels indicating types of the multiple objects	The '991 Application supports a first data structure that includes: labels indicating types of the multiple objects. For example:  FIG. 4A  FIG. 4B

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	’991 Application at [Figs. 4A-4B]. As shown for example in Fig. 4B, Object Processing Unit 93 may create or generate Collection of Object Representations 525 including Object Representation 625a representing Object 615a, Object Representation 625b representing Object 615b, Object Representation 625c representing Object 615c, etc. For instance, Object Representation 625a may include Object Property 630aa "Cat" in Category 635aa "Type", Object Property 630ab "6m" in Category 635ab "Distance", Object Property 630ac "56°" in Category 635ac "Bearing", etc. Also, Object Representation 625b may include Object Property 630ba "Tree" in Category 635ba "Type", Object Property 630bb "1 Om" in Category 635bb "Distance", Object Property 630bc "131 °" in Category 635bc "Bearing", etc. Also, Object Representation 625c may include Object Property 630ca "Person" in Category 635ca "Type", Object Property 630cb "John Doe" in Category 635cb "Identity", Object Property 630cc "Sm" in Category 635cc "Distance", Object Property 630cd "287°;' in Category 635cd "Bearing"; etc. Any number of Object Representations 625, and/or other elements or information can be included in Collection of Object Representations 525. Any number of Object Properties 630 (also referred to simply as object properties or other suitable name or reference), and/or other elements or information can be included in an Object Representation 625. In some aspects, a reference to Collection of Object Representations 525 comprises a reference to a collection of Object Properties 630 and/or other elements or information related to one or more Objects 615. Other additional Object Representations 625, Object Properties 630, elements, and/or information can be included as needed, or some of the disclosed ones can be excluded, or a combination thereof can be utilized in alternate embodiments of Collection of Object Representations 525. ’991 Application at [72:31-73:8].

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	For instance, instead of or in addition to detecting a vehicle as an object, a wheel and/or other parts of the vehicle may be detected as objects. In general, an object may include any object or part thereof that can be detected. Examples of object properties include existence of an object, type of an object (i.e. person, cat, vehicle, building, street, tree, rock, etc.), identity of an object (i.e. name, identifier, etc.), distance of an object, bearing/angle of an object, location of an object (i.e. distance and bearing/angle from a known point, object coordinates, etc.), shape/size of an object (i.e. height, width, depth, computer model, point cloud, etc.), activity of an object (i.e. motion, gestures, etc.), and/or other properties of an object. In general, an object property may include any attribute of an object '991 Application at [136:6-12]. Examples of object properties include existence of an object, type of an object (i.e. person, cat, vehicle, building, street, tree, rock, etc.), identity of an object (i.e. name, identifier, etc.), distance of an object, bearing/angle of an object, location of an object (i.e. distance and bearing/angle from a known point. coordinates, etc.), shape/size of an object (i.e. height, width, depth, computer model, point cloud, etc.), activity of an object (i.e. motion, gestures, etc.), and/or other properties of an object. '991 Application at [66:2-6]. Type of an object, for example, may include any classification of objects ranging from detailed such as person, cat, vehicle, building, street, tree, rock, etc. to generalized such as biological object, nature object, manmade object, etc., and/or others including their subtypes. '991 Application at [66:6-9].

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	Picture Recognizer 94a can be utilized in detecting or recognizing existence of an object, type of an object, identity of an object, distance of an object, bearing/angle of an object, location of an object, shape/size of an object, activity of an object, and/or other properties of an object. '991 Application at [66:27-29].
and coordinates indicating locations of the multiple objects	The '991 Application supports coordinates indicating locations of the multiple objects. For example: Examples of object properties include existence of an object, type of an object (i.e. person, cat, vehicle, building, street, tree, rock, etc.), identity of an object (i.e. name, identifier, etc.), distance of an object, bearing/angle of an object, location of an object (i.e. distance and bearing/angle from a known point. coordinates, etc.), shape/size of an object (i.e. height, width, depth, computer model, point cloud, etc.), activity of an object (i.e. motion, gestures, etc.), and/or other properties of an object. Type of an object, for example, may include any classification of objects ranging from detailed such as person, cat, vehicle, building, street, tree, rock, etc. to generalized such as biological object, nature object, manmade object, etc., and/or others including their sub- types. Location of an object, for example, can include a relative location such as one defined by distance and bearing/angle from a known point or location (i.e. Device 98 location, etc.). Location of an object, for example, also include absolute location such as one defined by object coordinates. '991 Application at [66:2-11]. In other aspects, location information {Le. coordinates, distance/angle from a known point, address, etc.) can be utilized and/or stored in Extra Info 527. '991 Application at [85:29-30]. In general, an object may include any object or part thereof

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	that can be detected. Examples of object properties include existence of an object, type of an object (i.e. person, cat, vehicle, building, street, tree, rock, etc.), identity of an object (i.e. name, identifier, etc.), distance of an object, bearing/angle of an object, location of an object (i.e. distance and bearing/angle from a known point, object coordinates, etc.), shape/size of an object (i.e. height, width, depth, computer model, point cloud, etc.), activity of an object (i.e. motion, gestures, etc.), and/or other properties of an object. '991 Application at [136:7-12].
and wherein the second collection of object representations represents the multiple objects detected at a second time or during a second time period	The '991 Application supports coordinates indicating locations of the multiple objects. For the second collection of object representations represents the multiple objects detected at a second time or during a second time period. For example: In some aspects, Collection of Object Representations 525 includes one or more Object Representations 625, Object Properties 630, and/or other elements or information related to objects detected in Device's 98 surrounding at a particular time. Collection of Object Representations 525 may, therefore, include knowledge (i.e. unit of knowledge, etc.) of Device's 98 circumstances including objects with various properties at a particular time. in some designs, a Collection of Object Representations 525 may include or be associated with a time stamp (not shown), order (not shown), or other time related information. For example, one Collection of Object Representations 525 may be associated with time stamp t1, another Collection of Object Representations 525 may be associated with time stamp t2, and so on. Time stamps t1, t2, etc. may indicate the times of generating Collections of Object Representations 525, for instance. In other embodiments, Object Processing Unit 93 comprises the functionality for creating or generating a stream of Collections of Object Representations 525. A stream of Collections of Object Representations 525 may include one Collection of Object Representations 525 or a group, sequence, or other

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	plurality of Collections of Object Representations 525. In some aspects, a stream of Collections of Object Representations 525 includes one or more Collections of Object Representations 525, and/or other elements or information related to objects detected in Device's 98 surrounding over time. A stream of Collections of Object Representations 525 may, therefore, include knowledge (i.e. unit of knowledge, etc.) of Device's 98 circumstances including objects with various properties over time. As circumstances including objects with various properties in Device's 98 surrounding change (i.e. objects and/or their properties change, move, act, transform, etc.) over time, this change may be captured in a stream of Collections of Object Representations 525. In some designs, each Collection of Object Representations 525 in a stream may include or be associated with the aforementioned time stamp, order, or other time related information. For example, one Collection of Object Representations 525 in a stream may be associated with order 1, a next Collection of Object Representations 525 in the stream may be associated with order 2, and so on. Orders 1, 2, etc. may indicate the orders or places of Collections of Object Representations 525 within a stream (Le. sequence, etc.), for instance. ’991 Application at [65:14-36]. As shown for example in Fig. 4B, Object Processing Unit 93 may create or generate Collection of Object Representations 525 including Object Representation 625a representing Object 615a, Object Representation 625b representing Object 615b, Object Representation 625c representing Object 615c, etc. For instance, Object Representation 625a may include Object Property 630aa "Cat" in Category 635aa "Type", Object Property 630ab "6m" in Category 635ab "Distance", Object Property 630ac "56°" in Category 635ac "Bearing", etc. Also, Object Representation 625b may include Object Property 630ba "Tree" in Category 635ba "Type", Object Property 630bb "1 Om" in Category 635bb "Distance", Object

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	Property 630bc "131 °" in Category 635bc "Bearing", etc. Also, Object Representation 625c may include Object Property 630ca "Person" in Category 635ca "Type", Object Property 630cb "John Doe" in Category 635cb "Identity", Object Property 630cc "Sm" in Category 635cc "Distance", Object Property 630cd "287°;' in Category 635cd "Bearing"; etc. Any number of Object Representations 625, and/or other elements or information can be included in Collection of Object Representations 525. Any number of Object Properties 630 (also referred to simply as object properties or other suitable name or reference), and/or other elements or information can be included in an Object Representation 625. In some aspects, a reference to Collection of Object Representations 525 comprises a reference to a collection of Object Properties 630 and/or other elements or information related to one or more Objects 615. Other additional Object Representations 625, Object Properties 630, elements, and/or information can be included as needed, or some of the disclosed ones can be excluded, or a combination thereof can be utilized in alternate embodiments of Collection of Object Representations 525. '991 Application at [72:31-73:8].

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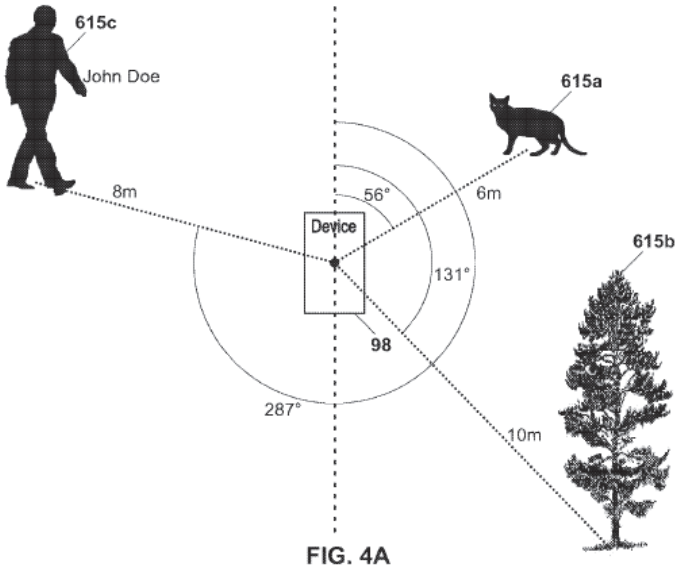


FIG. 4A

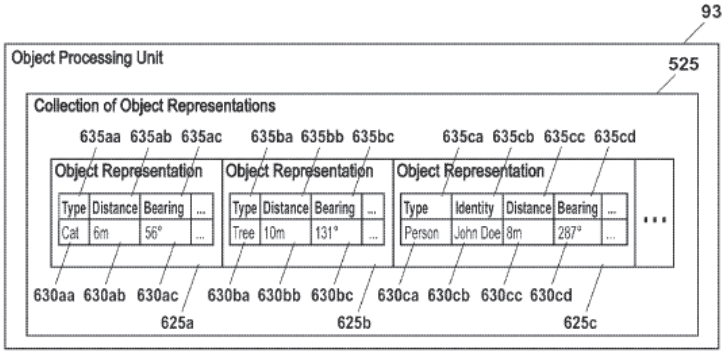


FIG. 4B

’991 Application at [Figs. 4A-4B].

In some aspects, a collection of object representations may include one or more object representations, object properties, and/or other elements or information detected in a device's (i.e. Device's 98, etc.) surrounding at a particular time. A collection of object representations may, therefore, include knowledge (i.e. unit of knowledge, etc.) of a device's circumstances including objects with various properties at a particular time. In some designs, a collection of object representations may include or be associated with a time stamp {not shown), order (not shown), or other time related information.

’991 Application at [135:25-30].

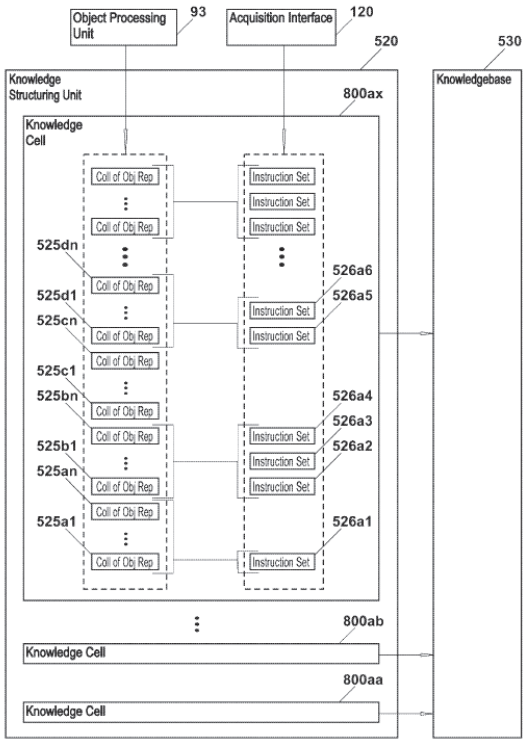
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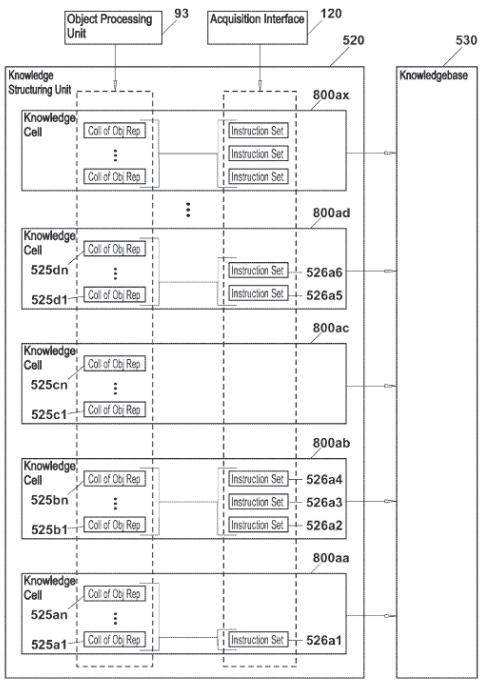
	In some embodiments, a collection of object representations may include or be substituted with a stream of collections of object representations, and vice versa. Therefore, the terms collection of object representations and stream of collections of object representations may be used interchangeably herein depending on context. A stream of collections of object representations may include one collection of object representations or a group, sequence, or other plurality of collections of object representations. In some aspects, a stream of collections of object representations may include one or more collections of object representations, and/or other elements or information detected in a device's surrounding over time. A stream of collections of object representations may, therefore, include knowledge (i.e. unit of knowledge, etc.) of a device's circumstances including objects with various properties over time. As circumstances including objects with various properties in a device's surrounding change {i.e, objects and/or their properties change, move, act, transform, etc,) over time, this change may be captured in a stream of collections of object representations. in some designs, each collection of object representations in a stream may include or be associated with the aforementioned time stamp, order, or other time related information. ’991 Application at [135:30-136:3]. The artificial intelligence unit may be configured to: receive a first stream of collections of object representations, the first stream of collections of object representations including one or more collections of representations of objects detected by the sensor. ’991 Application at [24:35-37]. In certain embodiments, each collection of object representations includes one or more representations of objects detected by the sensor at a time. in further

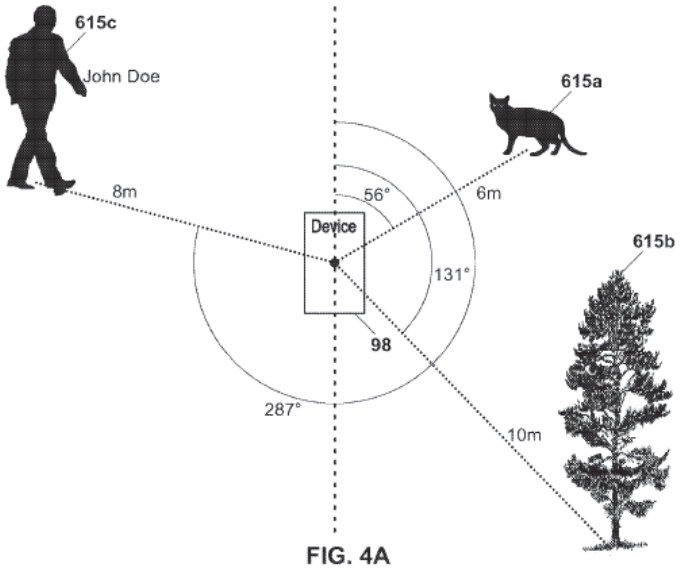
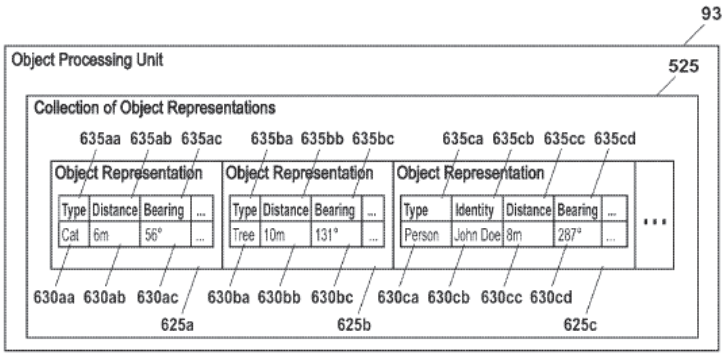
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	embodiments, each collection of object representations includes one or more of object representations. In further embodiments, each collection of object representations includes or is associated with a time stamp, an order, or a time related information. In further embodiments, the first stream of collections of object representations includes one or more collections of representations of objects detected by the sensor over time. in further embodiments, the new stream of collections of object representations includes one or more collections of representations of objects detected by the sensor over time. In further embodiments, the first or the new stream of collections of object representations includes one or more collections of representations of objects in the device's surrounding. In further embodiments, the first or the new stream of collections of object representations includes one or more collections of representations of objects in a remote device's surrounding. In further embodiments, an object representation of a stream of collections of object representations includes one or more object properties. in further embodiments, the first or the new stream of collections of object representations includes one or more object properties. In further embodiments, the first stream of collections of object representations includes a comparative stream of collections of object representations whose at least one portion can be used for comparisons with at least one portion of streams of collections of object representations subsequent to the first stream of collections of object representations, the streams of collections of object representations subsequent to the first stream of collections of object representations comprising the new stream of collections of object representations. in further embodiments, the first stream of collections of object representations includes a comparative stream of collections of object representations that can be used for comparisons with the new stream of collections of object representations. In further embodiments, the new stream of collections of object representations includes an anticipatory stream of collections of object representations whose correlated one or more instruction sets can be used

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	for anticipation of one or more instruction sets to be executed by the processor circuit. ’991 Application at [25:12-17].  FIG. 15

	 FIG. 16 ’991 Application at [Figs. 15-16]. Referring to Fig. 15, an embodiment of Knowledge Structuring Unit 520 correlating streams of Collections of Object Representations 525 with any Instruction Sets 526 and/or Extra Info 527 is illustrated. ’991 Application at [91:25-26]. Referring to Fig. 16, another embodiment of Knowledge Structuring Unit 520 correlating streams of Collections of Object Representations 525 with any Instruction Sets 526 and/or Extra Info 527 is illustrated. ’991 Application at [92:3-4].
and comprises a second data structure that includes: labels indicating	The ’991 Application supports a second data structure that includes: labels indicating types of the multiple objects. For example:

types of the multiple objects	 FIG. 4A  FIG. 4B ’991 Application at [Figs. 4A-4B]. As shown for example in Fig. 4B, Object Processing Unit 93 may create or generate Collection of Object Representations 525 including Object Representation 625a representing Object 615a, Object Representation 625b representing Object 615b, Object Representation 625c representing Object 615c, etc. For instance, Object Representation 625a may include Object Property 630aa "Cat" in Category 635aa "Type", Object Property 630ab "6m" in Category 635ab "Distance", Object Property 630ac "56°" in Category 635ac "Bearing", etc. Also, Object Representation 625b may include Object Property 630ba "Tree" in Category 635ba "Type", Object Property 630bb "1 Om" in Category 635bb "Distance", Object

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	Property 630bc "131 °" in Category 635bc "Bearing", etc. Also, Object Representation 625c may include Object Property 630ca "Person" in Category 635ca "Type", Object Property 630cb "John Doe" in Category 635cb "Identity", Object Property 630cc "Sm" in Category 635cc "Distance", Object Property 630cd "287°;' in Category 635cd "Bearing"; etc. Any number of Object Representations 625, and/or other elements or information can be included in Collection of Object Representations 525. Any number of Object Properties 630 (also referred to simply as object properties or other suitable name or reference), and/or other elements or information can be included in an Object Representation 625. In some aspects, a reference to Collection of Object Representations 525 comprises a reference to a collection of Object Properties 630 and/or other elements or information related to one or more Objects 615. Other additional Object Representations 625, Object Properties 630, elements, and/or information can be included as needed, or some of the disclosed ones can be excluded, or a combination thereof can be utilized in alternate embodiments of Collection of Object Representations 525. '991 Application at [72:31-73:8]. For instance, instead of or in addition to detecting a vehicle as an object, a wheel and/or other parts of the vehicle may be detected as objects. In general, an object may include any object or part thereof that can be detected. Examples of object properties include existence of an object, type of an object (i.e. person, cat, vehicle, building, street, tree, rock, etc.), identity of an object (i.e. name, identifier, etc.), distance of an object, bearing/angle of an object, location of an object (i.e. distance and bearing/angle from a known point, object coordinates, etc.), shape/size of an object (i.e. height, width, depth, computer model, point cloud, etc.), activity of an object (i.e. motion, gestures, etc.), and/or other properties of an object. In general, an object property may include any attribute of an object

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	’991 Application at [136:6-12]. Examples of object properties include existence of an object, type of an object (i.e. person, cat, vehicle, building, street, tree, rock, etc.), identity of an object (i.e. name, identifier, etc.), distance of an object, bearing/angle of an object, location of an object (i.e. distance and bearing/angle from a known point. coordinates, etc.), shape/size of an object (i.e. height, width, depth, computer model, point cloud, etc.), activity of an object (i.e. motion, gestures, etc.), and/or other properties of an object. ’991 Application at [66:2-6]. Type of an object, for example, may include any classification of objects ranging from detailed such as person, cat, vehicle, building, street, tree, rock, etc. to generalized such as biological object, nature object, manmade object, etc., and/or others including their subtypes. ’991 Application at [66:6-9]. Picture Recognizer 94a can be utilized in detecting or recognizing existence of an object, type of an object, identity of an object, distance of an object, bearing/angle of an object, location of an object, shape/size of an object, activity of an object, and/or other properties of an object. ’991 Application at [66:27-29].
coordinates indicating locations of the multiple objects	The ’991 Application supports coordinates indicating locations of the multiple objects. For example: Examples of object properties include existence of an object, type of an object (i.e. person, cat, vehicle, building, street, tree, rock, etc.), identity of an object (i.e. name, identifier, etc.), distance of an object, bearing/angle of an object, location of an object (i.e. distance and bearing/angle from a known point. coordinates, etc.),

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	shape/size of an object (i.e. height, width, depth, computer model, point cloud, etc.), activity of an object (i.e. motion, gestures, etc.), and/or other properties of an object. '991 Application at [66:2-6]. In other aspects, location information {Le. coordinates, distance/angle from a known point, address, etc.) can be utilized and/or stored in Extra Info 527. '991 Application at [85:29-30]. In general, an object may include any object or part thereof that can be detected. Examples of object properties include existence of an object, type of an object (i.e. person, cat, vehicle, building, street, tree, rock, etc.), identity of an object (i.e. name, identifier, etc.), distance of an object, bearing/angle of an object, location of an object (i.e. distance and bearing/angle from a known point, object coordinates, etc.), shape/size of an object (i.e. height, width, depth, computer model, point cloud, etc.), activity of an object (i.e. motion, gestures, etc.), and/or other properties of an object. '991 Application at [136:7-12].
the first data structure is correlated with the first one or more instruction sets for operating the first device	The '991 Application supports the first data structure is correlated with the first one or more instruction sets for operating the first device. For example:

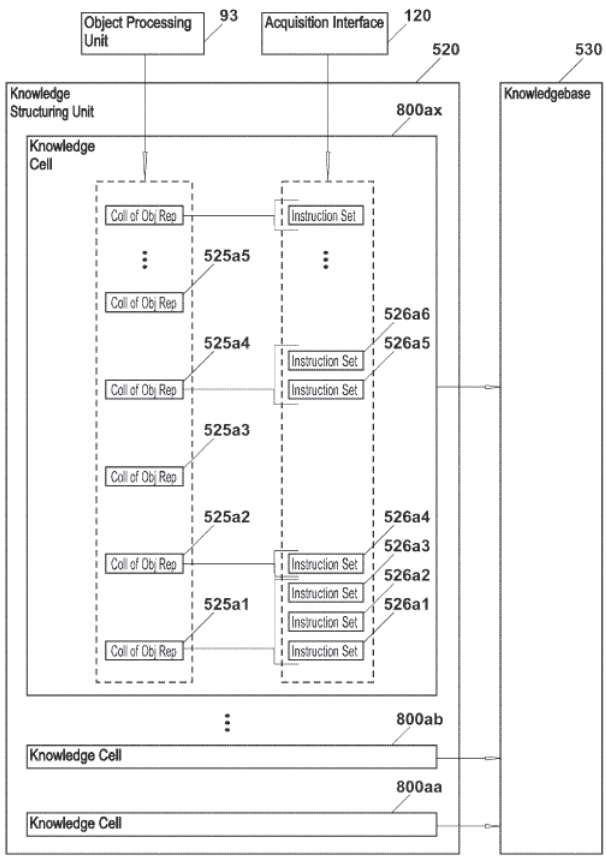
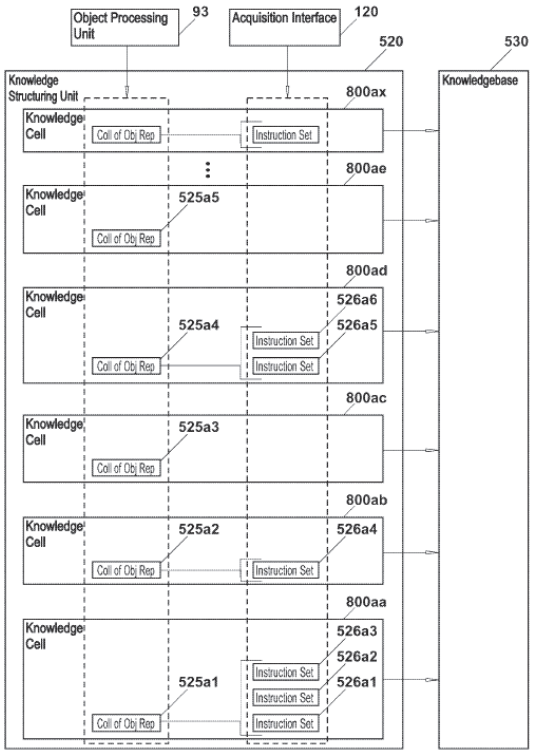


FIG. 13

’991 Application at [Fig. 13].

For example, Knowledge Structuring Unit 520 may create Knowledge Cell 800ax and structure within it Collection of Object Representations 525a1 correlated with Instruction Sets 526a1-526a3 and/or any Extra Info 527 (not shown). Knowledge Structuring Unit 520 may further structure within Knowledge Cell 800ax a Collection of Object Representations 525a2 correlated with Instruction Set 526a4 and/or any Extra Info 527 (not shown). Knowledge Structuring Unit 520 may further structure within Knowledge Cell 800ax a Collection of Object Representations 525a3 without a correlated Instruction Set 526 and/or Extra Info 527. Knowledge Structuring Unit 520 may further structure within Knowledge Cell 800ax a Collection of Object Representations 525a4 correlated with Instruction Sets 526a5-526a6 and/or any Extra Info

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	527 (not shown). Knowledge Structuring Unit 520 may further structure within Knowledge Cell 800ax a Collection of Object Representations 525a5 without a correlated Instruction Set 526 and/or Extra Info 527. Knowledge Structuring Unit 520 may structure within Knowledge Cell 800ax additional Collections of Object Representations 525 correlated with any number {including zero [i.e. uncorrelated]) of Instruction Sets 526 and/or Extra Info 527 by following similar logic as described above. '991 Application at [89:20-32].  FIG. 14

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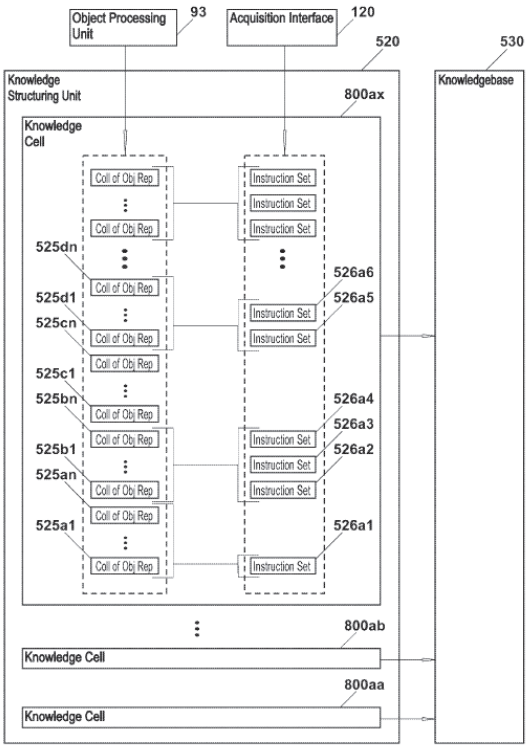


FIG. 15

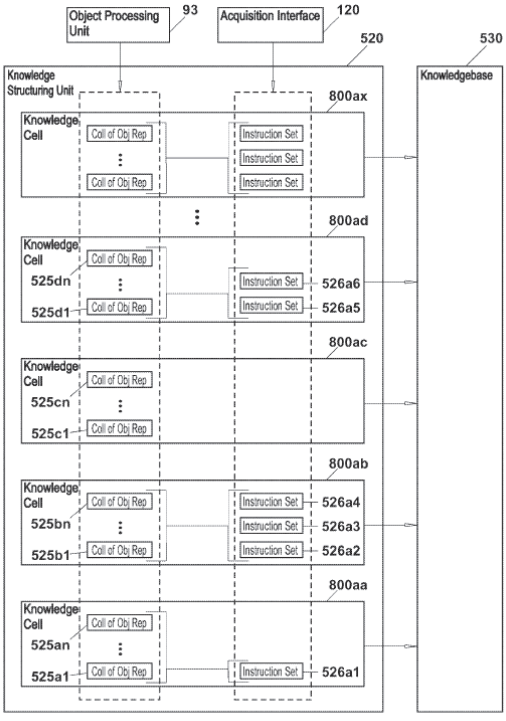


FIG. 16

’991 Application at [Figs. 14-16].

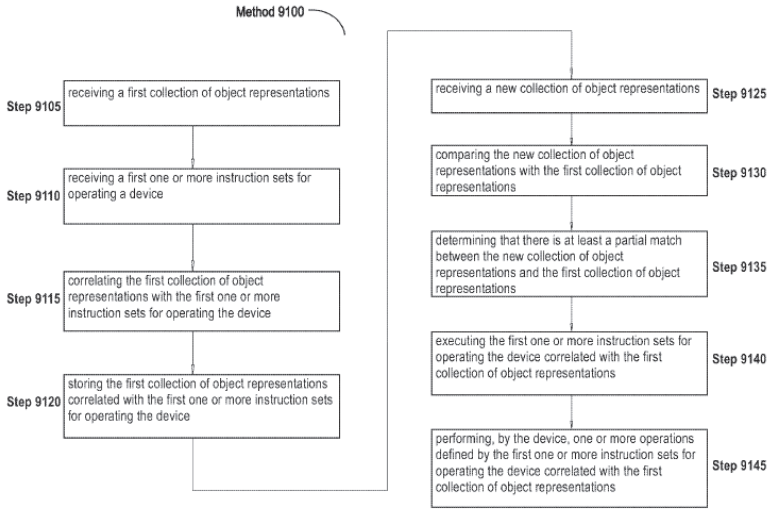


FIG. 32

’991 Application at [Fig. 32].

At step 9120, the first collection of object representations correlated with the first one or more instruction sets for operating the device are stored.

’991 Application at [138:24-25].

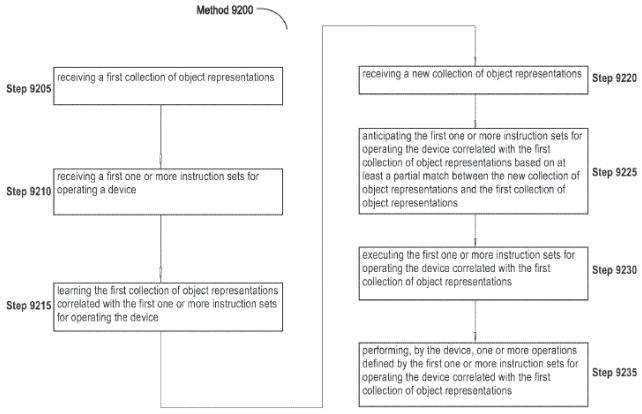


FIG. 33

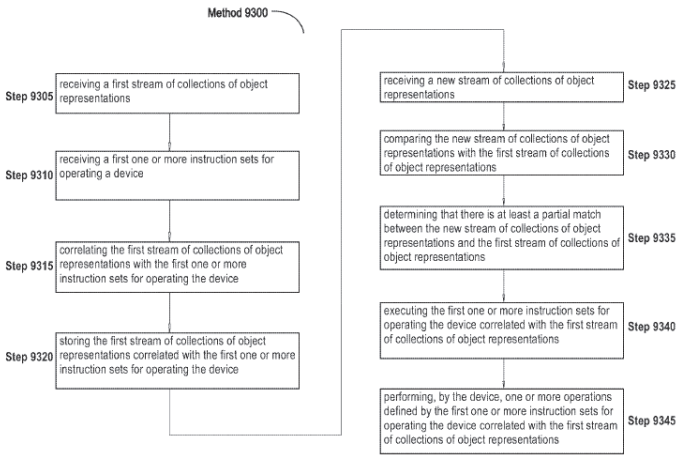


FIG. 34

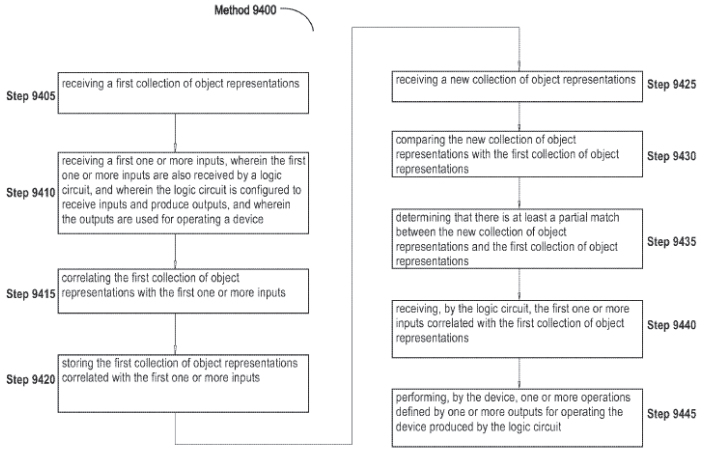


FIG. 35

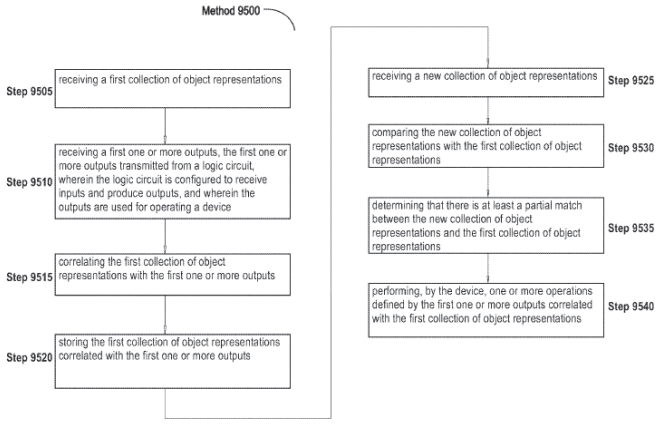
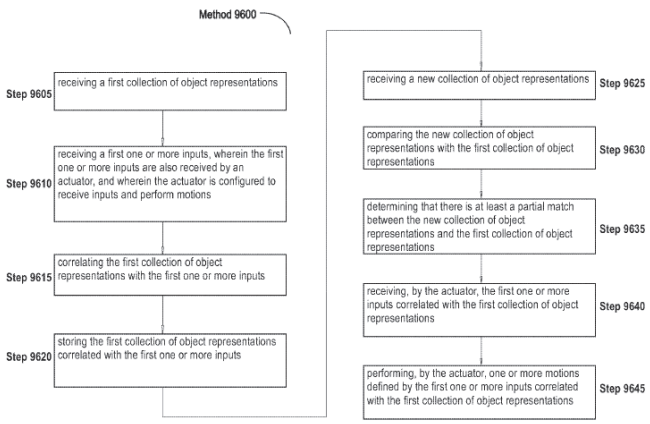
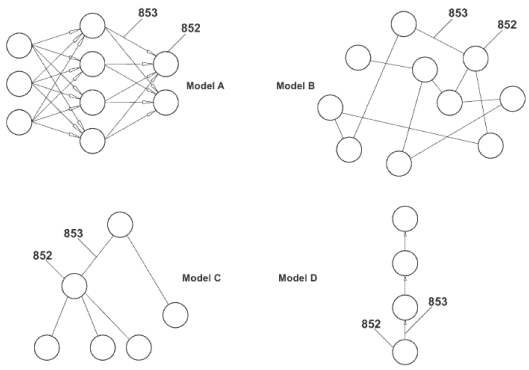


FIG. 36

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	 FIG. 37 ’991 Application at [Figs. 33-37].  FIG. 17 ’991 Application at [Fig. 17].
the second data structure is correlated with the second one or more instruction sets for operating the first device	The ’991 Application supports the second data structure is correlated with the second one or more instruction sets for operating the first device. For example:

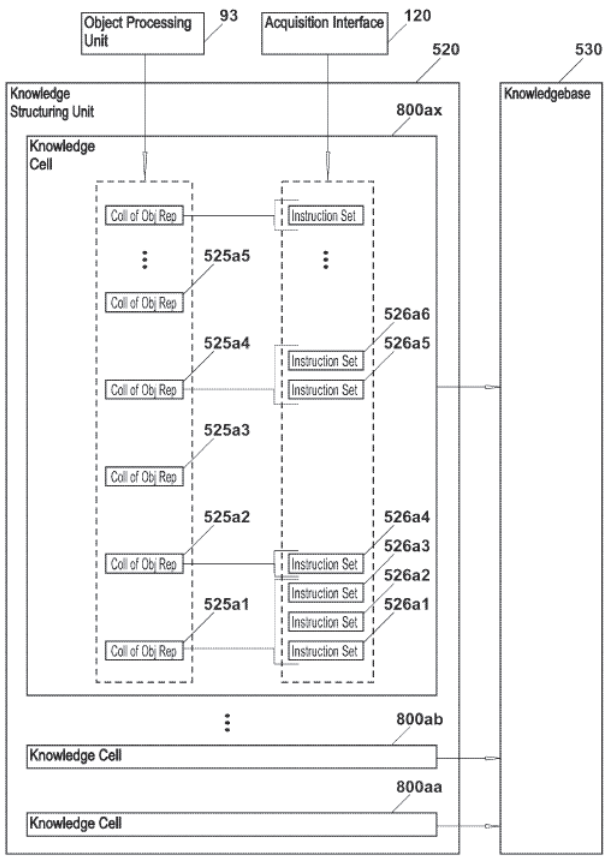
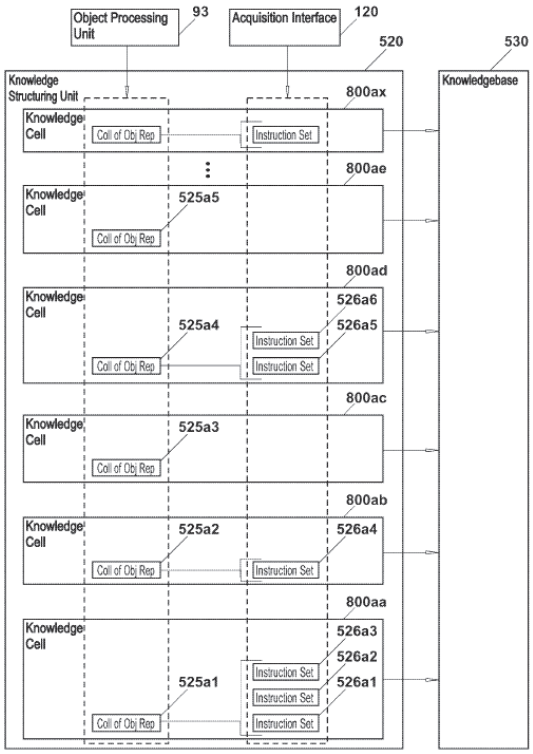


FIG. 13

’991 Application at [Fig. 13].

For example, Knowledge Structuring Unit 520 may create Knowledge Cell 800ax and structure within it Collection of Object Representations 525a1 correlated with Instruction Sets 526a1-526a3 and/or any Extra Info 527 (not shown). Knowledge Structuring Unit 520 may further structure within Knowledge Cell 800ax a Collection of Object Representations 525a2 correlated with Instruction Set 526a4 and/or any Extra Info 527 (not shown). Knowledge Structuring Unit 520 may further structure within Knowledge Cell 800ax a Collection of Object Representations 525a3 without a correlated Instruction Set 526 and/or Extra Info 527. Knowledge Structuring Unit 520 may further structure within Knowledge Cell 800ax a Collection of Object Representations 525a4 correlated with Instruction Sets 526a5-526a6 and/or any Extra Info

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	527 (not shown). Knowledge Structuring Unit 520 may further structure within Knowledge Cell 800ax a Collection of Object Representations 525a5 without a correlated Instruction Set 526 and/or Extra Info 527. Knowledge Structuring Unit 520 may structure within Knowledge Cell 800ax additional Collections of Object Representations 525 correlated with any number {including zero [i.e. uncorrelated]) of Instruction Sets 526 and/or Extra Info 527 by following similar logic as described above. '991 Application at [89:20-32].  FIG. 14

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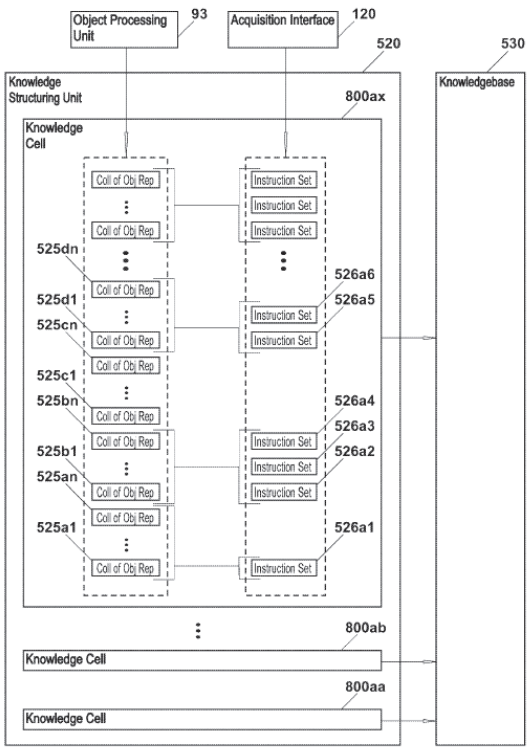


FIG. 15

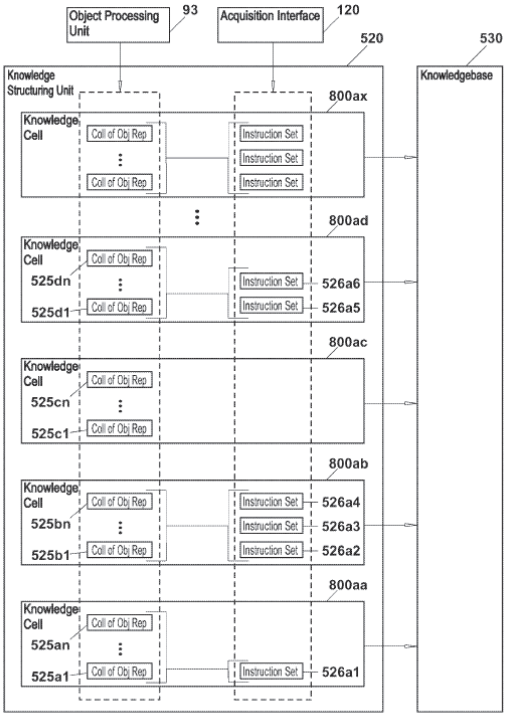


FIG. 16

’991 Application at [Figs. 14-16].

In certain embodiments, the artificial intelligence unit is further configured to: receive a second collection of object representations, the second collection of object representations including one or more representations of objects detected by the sensor; receive a second one or more instruction sets for operating the device; and learn the second collection of object representations correlated with the second one or more instruction sets for operating the device.

’991 Application at [14:6-10].

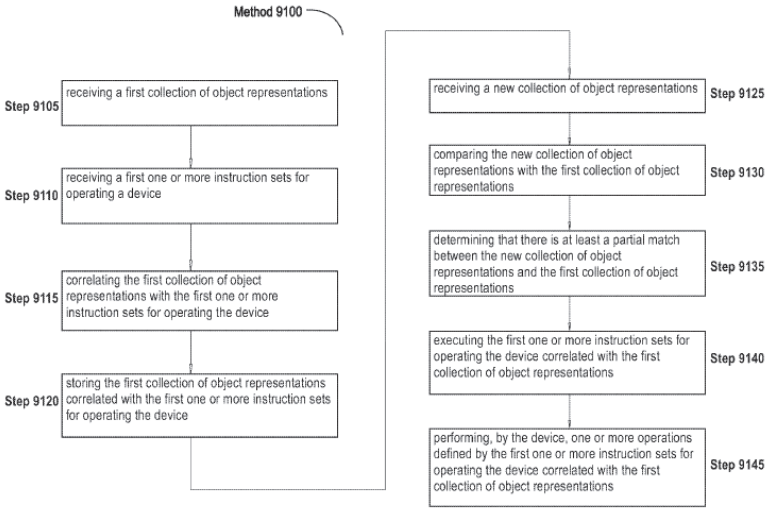


FIG. 32

’991 Application at [Fig. 32].

A collection of object representations correlated with one or more instruction sets may be part of a stored plurality of collections of object representations correlated with one or more instruction sets.

’991 Application at [138:25-27].

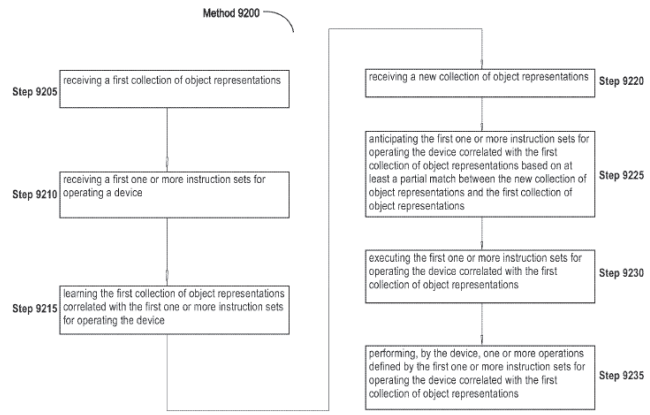


FIG. 33

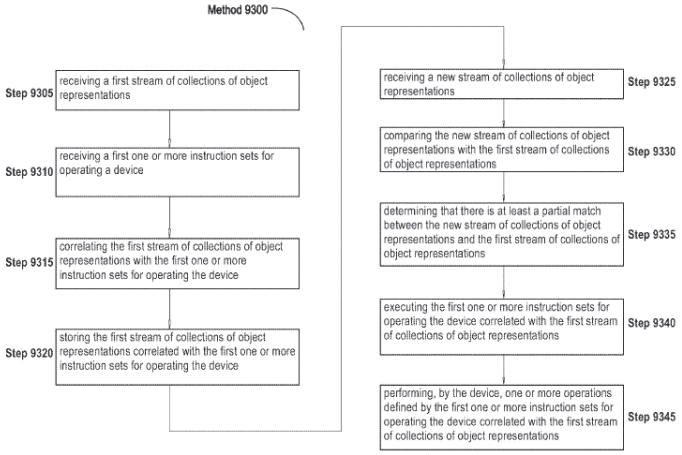


FIG. 34

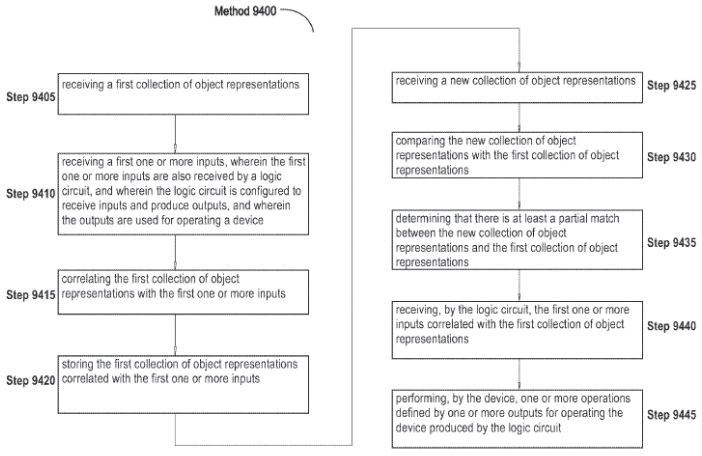


FIG. 35

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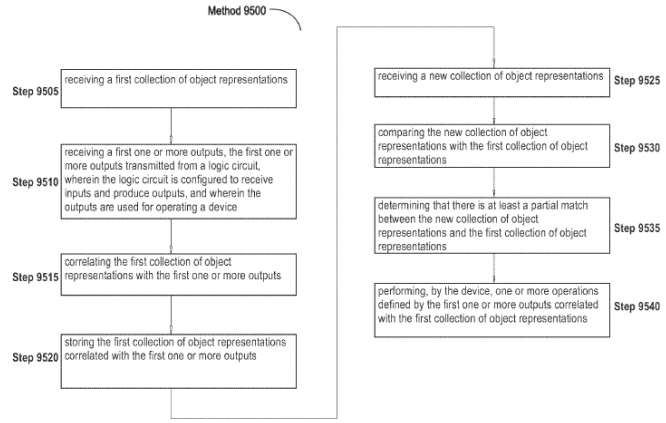


FIG. 36

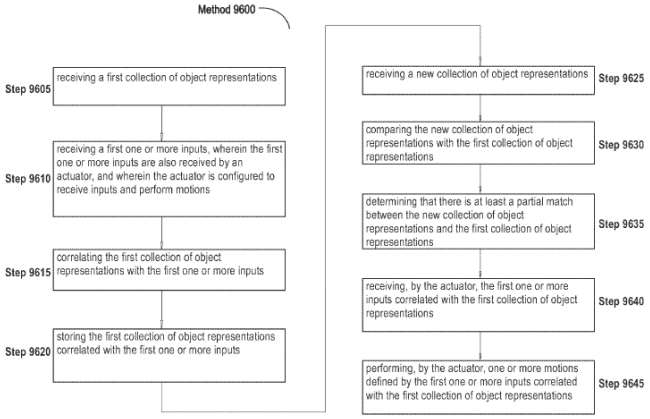


FIG. 37

’991 Application at [Figs. 33-37].

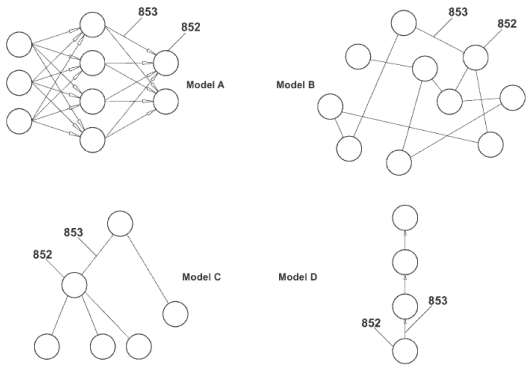


FIG. 17

’991 Application at [Fig. 17].

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Substitute Claim 21	
wherein the learning process includes: generating or receiving the first circumstance representation	The ’991 Application supports the learning process includes: generating or receiving the first circumstance representation. For example: In some embodiments; the first collection of object representations correlated with the first one or more instruction sets for operating the device include a knowledge of how the device operated in a circumstance. ’991 Application at [6:16-17]. Referring to Fig. 32, the illustration shows an embodiment of a method 9100 for learning and/or using a device's circumstances for autonomous device operation. in some aspects, the method can be used on a computing enabled device or system to enable learning of a device's operation in circumstances including objects with various properties and enable autonomous device operation in similar circumstances. ’991 Application at [135:14-17]. A collection of object representations may, therefore, include knowledge (i.e. unit of knowledge, etc.) of a device's circumstances including objects with various properties at a particular time. ’991 Application at [135:27-28]. DCADO Unit 100 comprises the functionality for learning the operation of Device 98 in circumstances including objects with various properties. DCADO Unit 100 comprises the functionality for structuring and/or storing this knowledge in a knowledgebase (i.e. neural network, graph, sequences, other repository, etc.). DCADO Unit 100 comprises the functionality for enabling autonomous operation of Device 98 in circumstances including objects with various properties.

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	’991 Application at [73:10-14]. Object Processing Unit 93 comprises the functionality for processing output from Sensor 92 to obtain information of interest, and/or other functionalities. As such, Object Processing Unit 93 can be used to process output from Sensor 92 to detect objects and/or their properties in Device's 98 surrounding. In some embodiments, Object Processing Unit 93 comprises the functionality for creating or generating Collection of Object Representations 525 (also referred to as Coll of Obj Rep or other suitable name or reference) and storing one or more Object Representations 625 (also referred to simply as object representations, representations of objects, or other suitable name or reference), Object Properties 630 (also referred to simply as object properties or other suitable name or reference), and/or other elements or information into the Collection of Object Representations 525. As such, Collection of Object Representations 525 comprises the functionality for storing one or more Object Representations 625, Object Properties 630, and/or other elements or information. Object Representation 625 may include an electronic representation of an object (i.e. Object 615 [later described], etc.) detected in Device's 98 surrounding. In some aspects, Collection of Object Representations 525 includes one or more Object Representations 625, Object Properties 630, and/or other elements or information related to objects detected in Device's 98 surrounding at a particular time. Collection of Object Representations 525 may, therefore, include knowledge (i.e. unit of knowledge, etc.) of Device's 98 circumstances including objects with various properties at a particular time. in some designs, a Collection of Object Representations 525 may include or be associated with a time stamp (not shown), order (not shown), or other time related information. For example, one Collection of Object Representations 525 may be associated with time stamp t1, another Collection of Object Representations 525 may be associated with time stamp t2, and so on. Time stamps t1, t2, etc. may indicate the times of generating Collections

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	of Object Representations 525, for instance. In other embodiments, Object Processing Unit 93 comprises the functionality for creating or generating a stream of Collections of Object Representations 525. A stream of Collections of Object Representations 525 may include one Collection of Object Representations 525 or a group, sequence, or other plurality of Collections of Object Representations 525. In some aspects, a stream of Collections of Object Representations 525 includes one or more Collections of Object Representations 525, and/or other elements or information related to objects detected in Device's 98 surrounding over time. A stream of Collections of Object Representations 525 may, therefore, include knowledge (i.e. unit of knowledge, etc.) of Device's 98 circumstances including objects with various properties over time. As circumstances including objects with various properties in Device's 98 surrounding change (i.e. objects and/or their properties change, move, act, transform, etc.) over time, this change may be captured in a stream of Collections of Object Representations 525. In some designs, each Collection of Object Representations 525 in a stream may include or be associated with the aforementioned time stamp, order, or other time related information. For example, one Collection of Object Representations 525 in a stream may be associated with order 1, a next Collection of Object Representations 525 in 35 the stream may be associated with order 2, and so on. Orders 1, 2, etc. may indicate the orders or places of Collections of Object Representations 525 within a stream (Le. sequence, etc.), for instance. Examples of objects include biological objects (i.e. persons, animals, vegetation, etc.), nature objects (i.e. rocks, bodies of water, etc.), manmade objects (i.e. buildings, streets, ground/aerial/aquatic vehicles, etc.), and/or others. In some aspects, any part of an object may be detected as an object itself. For instance, instead of or in addition to detecting a vehicle as an object, a wheel and/or other parts of the vehicle may be detected as objects. In general, object may include any object or part thereof that can be detected. Examples of object properties include existence

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	of an object, type of an object (i.e. person, cat, vehicle, building, street, tree, rock, etc.), identity of an object (i.e. name, identifier, etc.), distance of an object, bearing/angle of an object, location of an object (i.e. distance and bearing/angle from a known point. coordinates, etc.), shape/size of an object (i.e. height, width, depth, computer model, point cloud, etc.), activity of an object (i.e. motion, gestures, etc.), and/or other properties of an object. Type of an object, for example, may include any classification of objects ranging from detailed such as person, cat, vehicle, building, street, tree, rock, etc. to generalized such as biological object, nature object, manmade object, etc., and/or others including their subtypes. Location of an object, for example, can include a relative location such as one defined by distance and bearing/angle from a known point or location (i.e. Device 98 location, etc.). Location of an object, for example, can also include absolute location such as one defined by object coordinates. In general, an object property may include any attribute of an object (i.e. existence of an object, type of an object, identity of an object, shape/size of an object, etc.), any relationship of an object with Device 98, other objects, or the environment (i.e. distance of an object, bearing/angle of an object, friend/foe relationship, etc.), and/or other information related to an object. In some implementations, Object Processing Unit 93 and/or any of its elements or functionalities can be included in Sensor 92. In other implementations, Object Processing Unit 93 and/or any of its elements or functionalities can be embedded into or operate on Processor 11. In further implementations, Object Processing Unit 93 and/or any of its elements or functionalities can be embedded into or operate in DCADO Unit 100, and/or other disclosed elements. Object Processing Unit 93 may be provided in any suitable configuration. Object Processing Unit 93 may include any signal processing techniques or elements known in art as applicable. ’991 Application at [65:3-66:20].

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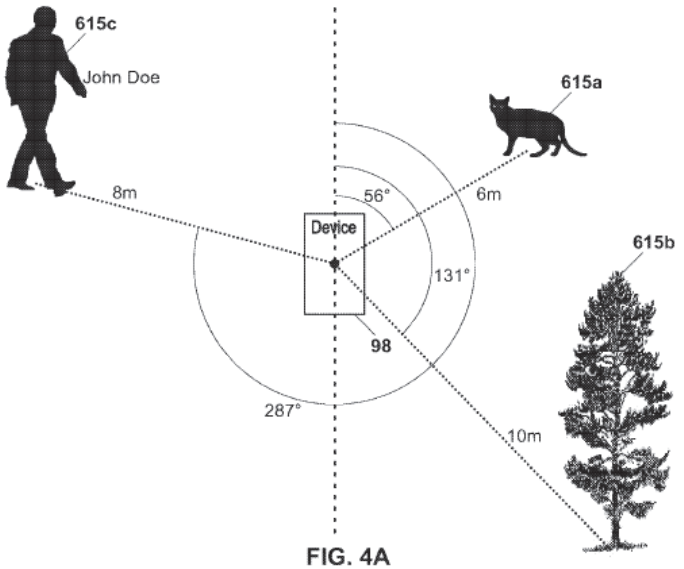


FIG. 4A

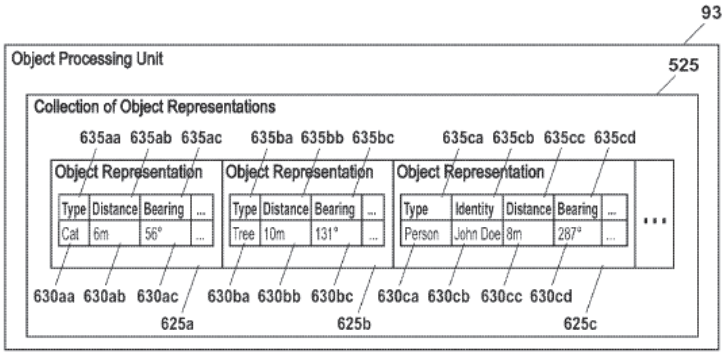


FIG. 4B

’991 Application at [Figs. 4A-4B].

Referring to Figs. 4A-4B, an exemplary embodiment of Objects 615 (also referred to simply as objects or other suitable name or reference) detected in Device's 98 surrounding, and resulting Collection of Object Representations 525 are illustrated. As shown for example in Fig. 4A, Object 615a is detected. Object 615a may be recognized as a cat. Object 615a may be detected at a distance of 6m from Device 98. Object 615a may be detected at a bearing/angle of 56° from Device's 98 centerline. Furthermore, Object 615b is also detected. Object 615b may be recognized as a tree. Object 615b may be detected at a distance of 1 Om from Device 98. Object

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	615b may be detected at a bearing/angle of 131 ° from Device's 98 centerline. Furthermore, Object 615c is also detected. Object 615c may be recognized as a person. Object 615c may be identified as John Doe. Object 615c may be detected at a distance of 8m from Device 98. Object 615c may be detected at a bearing/angle of 287° from Device's 98 centerline. Any other Objects 615 instead of or in addition to Object 615a, Object 615b, and Object 615c may be detected. In some aspects, any features, functionalities, and embodiments of Camera 92a/Picture Recognizer 94a, Microphone 92b/Sound Recognizer 94b, and/or other sensors or techniques can be utilized for recognizing and/or identifying a person, a cat, a tree, and/or other Objects 615. In further aspects, any features, functionalities, and embodiments of Camera 92a/Picture Recognizer 94a, Microphone 92b/Sound Recognizer 94b, Lidar 92cilidar Processing Unit 94c, Radar 92d/Radar Processing Unit 94d, Sonar 92e/Sonar Processing Unit 94e, and/or other sensors or techniques can be utilized for detecting distance, bearing/angle, and/or other object properties. As shown for example in Fig. 4B, Object Processing Unit 93 may create or generate Collection of Object Representations 525 including Object Representation 625a representing Object 615a, Object Representation 625b representing Object 615b, Object Representation 625c representing Object 615c, etc. For instance, Object Representation 625a may include Object Property 630aa "Cat" in Category 635aa "Type", Object Property 630ab "6m" in Category 635ab "Distance", Object Property 630ac "56°" in Category 635ac "Bearing", etc. Also, Object Representation 625b may include Object Property 630ba "Tree" in Category 635ba "Type", Object Property 630bb "1 Om" in Category 635bb "Distance", Object Property 630bc "131 °" in Category 635bc "Bearing", etc. Also, Object Representation 625c may include Object Property 630ca "Person" in Category 635ca "Type", Object Property 630cb "John Doe" in Category 635cb "Identity", Object Property 630cc "Sm" in Category 635cc "Distance", Object Property 630cd "287°;' in Category 635cd "Bearing"; etc. Any number of Object

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	Representations 625, and/or other elements or information can be included in Collection of Object Representations 525. Any number of Object Properties 630 (also referred to simply as object properties or other suitable name or reference), and/or other elements or information can be included in an Object Representation 625. In some aspects, a reference to Collection of Object Representations 525 comprises a reference to a collection of Object Properties 630 and/or other elements or information related to one or more Objects 615. Other additional Object Representations 625, Object Properties 630, elements, and/or information can be included as needed, or some of the disclosed ones can be excluded, or a combination thereof can be utilized in alternate embodiments of Collection of Object Representations 525. '991 Application at [72:14-73:8]. In some embodiments, Object Processing Unit 93 comprises the functionality for creating or generating Collection of Object Representations 525 (also referred to as Coll of Obj Rep or other suitable name or reference) '991 Application at [65:5-7]. Object Processing Unit 93 may create or generate one or more (i.e. stream, etc.) Collections of Object Representations 525 comprising Object Representations 625, Object Properties 630, and/or other elements or information representing Objects 615 detected in Loader's 98a surrounding. '991 Application at [146:35-37]. In the future, DCADO Unit 110 may compare incoming Collections of Object Representations 525 representing Objects 615 detected in Loader's 98a surrounding with previously learned Collections of Object Representations 525 including optionally using any Extra Info 527 for enhanced decision making.

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’991 Application at [147:25-26].

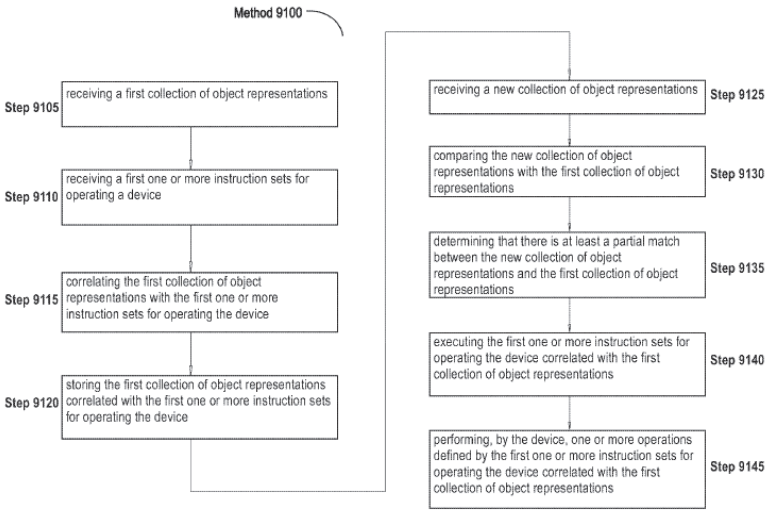


FIG. 32

’991 Application at [Fig. 32].

At step 9125, a new collection of object representations is received. Step 9125 may include any action or operation described in Step 9105 as applicable.

’991 Application at [139:13-14].

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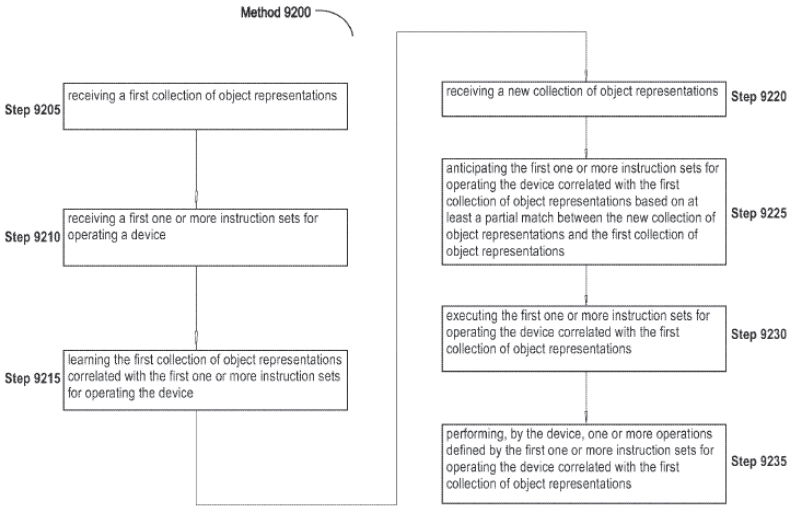


FIG. 33

’991 Application at [Fig. 33].

At step 9220, a new collection of object representations is received. Step 9220 may include any action or operation described in Step 9125 of method 9100 as applicable.

’991 Application at [143:12-13].

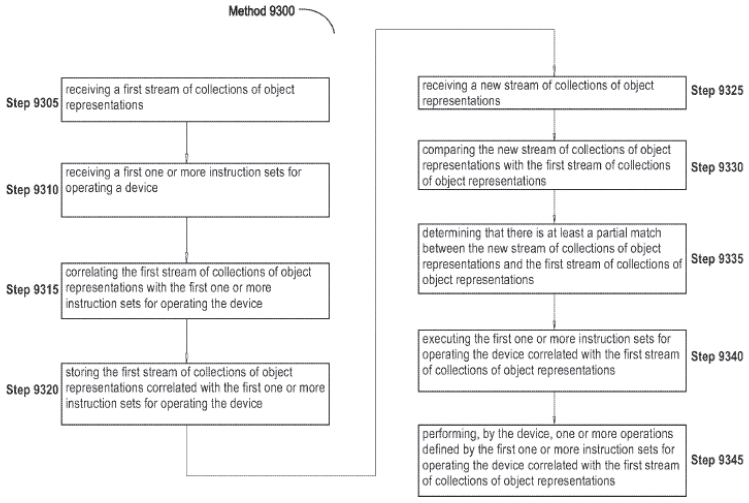


FIG. 34

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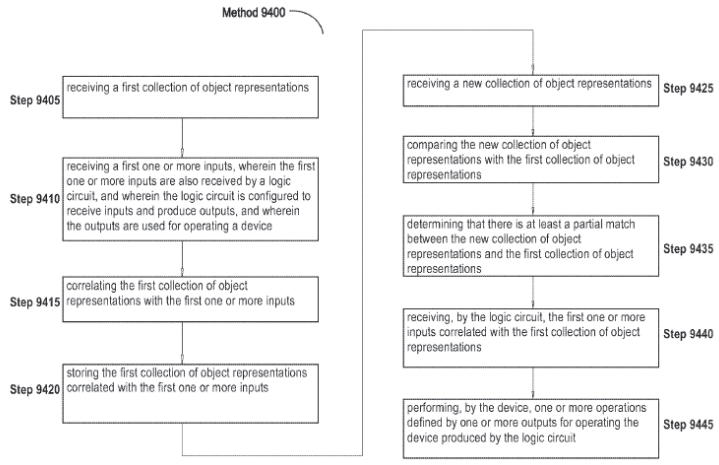


FIG. 35

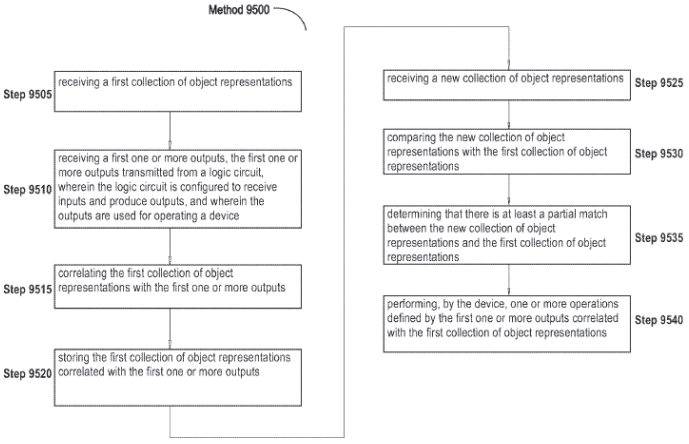


FIG. 36

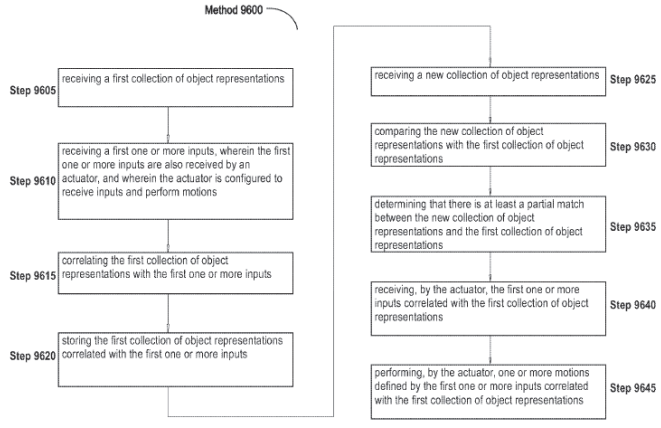


FIG. 37

’991 Application at [Figs. 34-37].

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	In some aspects, an object processing unit may create or generate a collection of object representations. In other aspects, an object processing unit may create or generate a stream of collections of object representations. ’991 Application at [136:24-26].
generating or receiving the second circumstance representation.	The ’991 Application supports generating or receiving the second circumstance representation. For example: In some embodiments; the first collection of object representations correlated with the first one or more instruction sets for operating the device include a knowledge of how the device operated in a circumstance. ’991 Application at [6:16-17]. Referring to Fig. 32, the illustration shows an embodiment of a method 9100 for learning and/or using a device's circumstances for autonomous device operation. in some aspects, the method can be used on a computing enabled device or system to enable learning of a device's operation in circumstances including objects with various properties and enable autonomous device operation in similar circumstances. ’991 Application at [135:14-17]. A collection of object representations may, therefore, include knowledge (i.e. unit of knowledge, etc.) of a device's circumstances including objects with various properties at a particular time. ’991 Application at [135:27-28]. DCADO Unit 100 comprises the functionality for learning the operation of Device 98 in circumstances including objects with various properties. DCADO Unit 100 comprises the functionality for structuring and/or storing

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	this knowledge in a knowledgebase (i.e. neural network, graph, sequences, other repository, etc.). DCADO Unit 100 comprises the functionality for enabling autonomous operation of Device 98 in circumstances including objects with various properties. ’991 Application at [73:10-14]. Object Processing Unit 93 comprises the functionality for processing output from Sensor 92 to obtain information of interest, and/or other functionalities. As such, Object Processing Unit 93 can be used to process output from Sensor 92 to detect objects and/or their properties in Device's 98 surrounding. In some embodiments, Object Processing Unit 93 comprises the functionality for creating or generating Collection of Object Representations 525 (also referred to as Coll of Obj Rep or other suitable name or reference) and storing one or more Object Representations 625 (also referred to simply as object representations, representations of objects, or other suitable name or reference), Object Properties 630 (also referred to simply as object properties or other suitable name or reference), and/or other elements or information into the Collection of Object Representations 525. As such, Collection of Object Representations 525 comprises the functionality for storing one or more Object Representations 625, Object Properties 630, and/or other elements or information. Object Representation 625 may include an electronic representation of an object (i.e. Object 615 [later described], etc.) detected in Device's 98 surrounding. In some aspects, Collection of Object Representations 525 includes one or more Object Representations 625, Object Properties 630, and/or other elements or information related to objects detected in Device's 98 surrounding at a particular time. Collection of Object Representations 525 may, therefore, include knowledge (i.e. unit of knowledge, etc.) of Device's 98 circumstances including objects with various properties at a particular time. in some designs, a Collection of Object Representations 525 may include or be associated with a

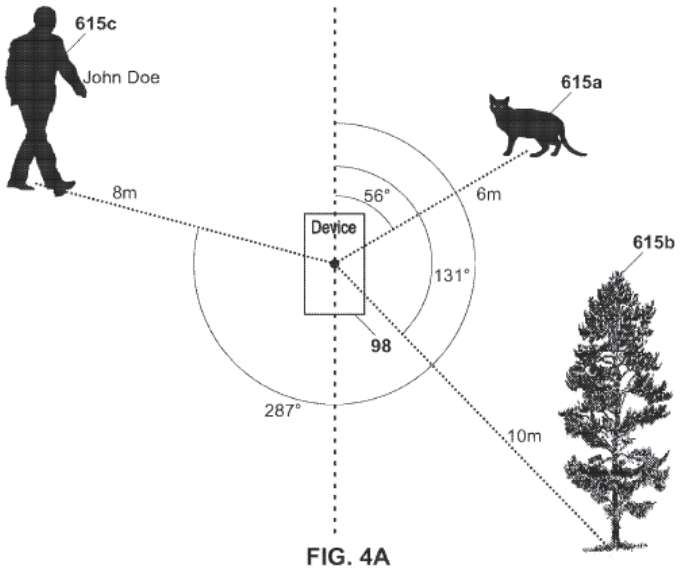
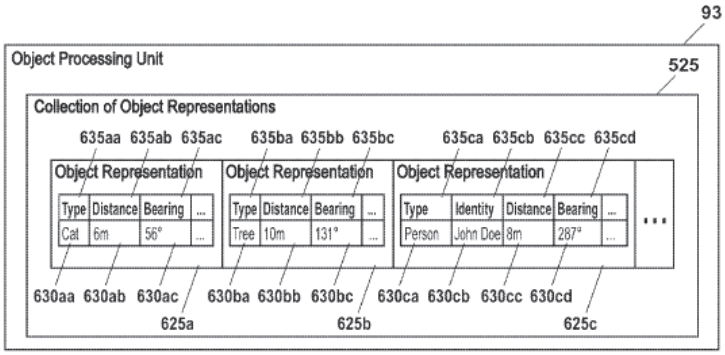
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	time stamp (not shown), order (not shown), or other time related information. For example, one Collection of Object Representations 525 may be associated with time stamp t1, another Collection of Object Representations 525 may be associated with time stamp t2, and so on. Time stamps t1, t2, etc. may indicate the times of generating Collections of Object Representations 525, for instance. In other embodiments, Object Processing Unit 93 comprises the functionality for creating or generating a stream of Collections of Object Representations 525. A stream of Collections of Object Representations 525 may include one Collection of Object Representations 525 or a group, sequence, or other plurality of Collections of Object Representations 525. In some aspects, a stream of Collections of Object Representations 525 includes one or more Collections of Object Representations 525, and/or other elements or information related to objects detected in Device's 98 surrounding over time. A stream of Collections of Object Representations 525 may, therefore, include knowledge (i.e. unit of knowledge, etc.) of Device's 98 circumstances including objects with various properties over time. As circumstances including objects with various properties in Device's 98 surrounding change (i.e. objects and/or their properties change, move, act, transform, etc.) over time, this change may be captured in a stream of Collections of Object Representations 525. In some designs, each Collection of Object Representations 525 in a stream may include or be associated with the aforementioned time stamp, order, or other time related information. For example, one Collection of Object Representations 525 in a stream may be associated with order 1, a next Collection of Object Representations 525 in 35 the stream may be associated with order 2, and so on. Orders 1, 2, etc. may indicate the orders or places of Collections of Object Representations 525 within a stream (Le. sequence, etc.), for instance. Examples of objects include biological objects (i.e. persons, animals, vegetation, etc.), nature objects (i.e. rocks, bodies of water, etc.), manmade objects (i.e. buildings, streets, ground/aerial/aquatic vehicles, etc.), and/or others. In

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	some aspects, any part of an object may be detected as an object itself. For instance, instead of or in addition to detecting a vehicle as an object, a wheel and/or other parts of the vehicle may be detected as objects. In general, object may include any object or part thereof that can be detected. Examples of object properties include existence of an object, type of an object (i.e. person, cat, vehicle, building, street, tree, rock, etc.), identity of an object (i.e. name, identifier, etc.), distance of an object, bearing/angle of an object, location of an object (i.e. distance and bearing/angle from a known point. coordinates, etc.), shape/size of an object (i.e. height, width, depth, computer model, point cloud, etc.), activity of an object (i.e. motion, gestures, etc.), and/or other properties of an object. Type of an object, for example, may include any classification of objects ranging from detailed such as person, cat, vehicle, building, street, tree, rock, etc. to generalized such as biological object, nature object, manmade object, etc., and/or others including their subtypes. Location of an object, for example, can include a relative location such as one defined by distance and bearing/angle from a known point or location (i.e. Device 98 location, etc.). Location of an object, for example, can also include absolute location such as one defined by object coordinates. In general, an object property may include any attribute of an object (i.e. existence of an object, type of an object, identity of an object, shape/size of an object, etc.), any relationship of an object with Device 98, other objects, or the environment (i.e. distance of an object, bearing/angle of an object, friend/foe relationship, etc.), and/or other information related to an object. In some implementations, Object Processing Unit 93 and/or any of its elements or functionalities can be included in Sensor 92. In other implementations, Object Processing Unit 93 and/or any of its elements or functionalities can be embedded into or operate on Processor 11. In further implementations, Object Processing Unit 93 and/or any of its elements or functionalities can be embedded into or operate in DCADO Unit 100, and/or other disclosed elements.

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	Object Processing Unit 93 may be provided in any suitable configuration. Object Processing Unit 93 may include any signal processing techniques or elements known in art as applicable. '991 Application at [65:3-66:20].  FIG. 4A  FIG. 4B '991 Application at [Figs. 4A-4B]. Referring to Figs. 4A-4B, an exemplary embodiment of Objects 615 (also referred to simply as objects or other suitable name or reference) detected in Device's 98 surrounding, and resulting Collection of Object Representations 525 are illustrated. As shown for example in Fig. 4A, Object 615a is detected. Object 615a may be

	recognized as a cat. Object 615a may be detected at a distance of 6m from Device 98. Object 615a may be detected at a bearing/angle of 56° from Device's 98 centerline. Furthermore, Object 615b is also detected. Object 615b may be recognized as a tree. Object 615b may be detected at a distance of 1 Om from Device 98. Object 615b may be detected at a bearing/angle of 131 ° from Device's 98 centerline. Furthermore, Object 615c is also detected. Object 615c may be recognized as a person. Object 615c may be identified as John Doe. Object 615c may be detected at a distance of 8m from Device 98. Object 615c may be detected at a bearing/angle of 287° from Device's 98 centerline. Any other Objects 615 instead of or in addition to Object 615a, Object 615b, and Object 615c may be detected. In some aspects, any features, functionalities, and embodiments of Camera 92a/Picture Recognizer 94a, Microphone 92b/Sound Recognizer 94b, and/or other sensors or techniques can be utilized for recognizing and/or identifying a person, a cat, a tree, and/or other Objects 615. In further aspects, any features, functionalities, and embodiments of Camera 92a/Picture Recognizer 94a, Microphone 92b/Sound Recognizer 94b, Lidar 92cilidar Processing Unit 94c, Radar 92d/Radar Processing Unit 94d, Sonar 92e/Sonar Processing Unit 94e, and/or other sensors or techniques can be utilized for detecting distance, bearing/angle, and/or other object properties. As shown for example in Fig. 4B, Object Processing Unit 93 may create or generate Collection of Object Representations 525 including Object Representation 625a representing Object 615a, Object Representation 625b representing Object 615b, Object Representation 625c representing Object 615c, etc. For instance, Object Representation 625a may include Object Property 630aa "Cat" in Category 635aa "Type", Object Property 630ab "6m" in Category 635ab "Distance", Object Property 630ac "56°" in Category 635ac "Bearing", etc. Also, Object Representation 625b may include Object Property 630ba "Tree" in Category 635ba "Type", Object Property 630bb "1 Om" in Category 635bb "Distance", Object Property 630bc "131 °" in Category 635bc

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	"Bearing", etc. Also, Object Representation 625c may include Object Property 630ca "Person" in Category 635ca "Type", Object Property 630cb "John Doe" in Category 635cb "Identity", Object Property 630cc "Sm" in Category 635cc "Distance", Object Property 630cd "287°;' in Category 635cd "Bearing"; etc. Any number of Object Representations 625, and/or other elements or information can be included in Collection of Object Representations 525. Any number of Object Properties 630 (also referred to simply as object properties or other suitable name or reference), and/or other elements or information can be included in an Object Representation 625. In some aspects, a reference to Collection of Object Representations 525 comprises a reference to a collection of Object Properties 630 and/or other elements or information related to one or more Objects 615. Other additional Object Representations 625, Object Properties 630, elements, and/or information can be included as needed, or some of the disclosed ones can be excluded, or a combination thereof can be utilized in alternate embodiments of Collection of Object Representations 525. '991 Application at [72:14-73:8]. In certain embodiments, the artificial intelligence unit is further configured to: receive a second collection of object representations, the second collection of object representations including one or more representations of objects detected by the sensor; receive a second one or more instruction sets for operating the device; and learn the second collection of object representations correlated with the second one or more instruction sets for operating the device. '991 Application at [14:6-10]. In some embodiments, Object Processing Unit 93 comprises the functionality for creating or generating Collection of Object Representations 525 (also referred to as Coll of Obj Rep or other suitable name or reference)

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’991 Application at [65:5-7].

Object Processing Unit 93 may create or generate one or more (i.e. stream, etc.) Collections of Object Representations 525 comprising Object Representations 625, Object Properties 630, and/or other elements or information representing Objects 615 detected in Loader's 98a surrounding.

’991 Application at [146:35-37].

In the future, DCADO Unit 110 may compare incoming Collections of Object Representations 525 representing Objects 615 detected in Loader's 98a surrounding with previously learned Collections of Object Representations 525 including optionally using any Extra Info 527 for enhanced decision making.

’991 Application at [147:25-26].

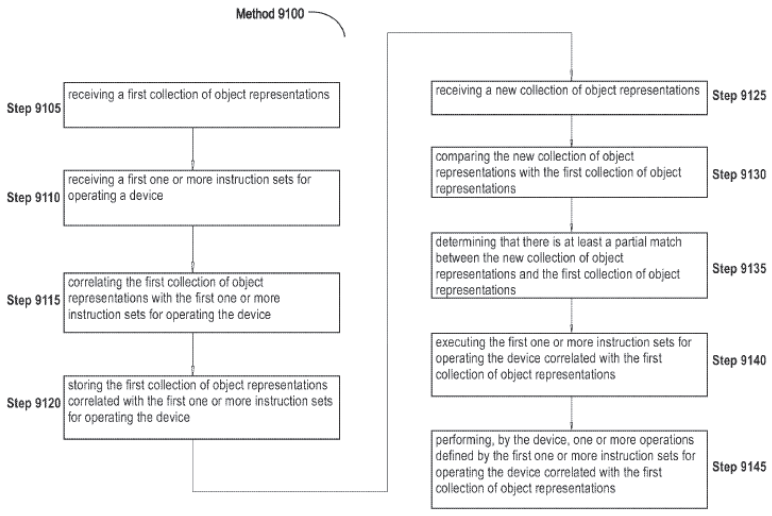


FIG. 32

’991 Application at [Fig. 32].

At step 9125, a new collection of object representations is received. Step 9125 may include any action or operation

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described in Step 9105 as applicable.

’991 Application at [139:13-14].

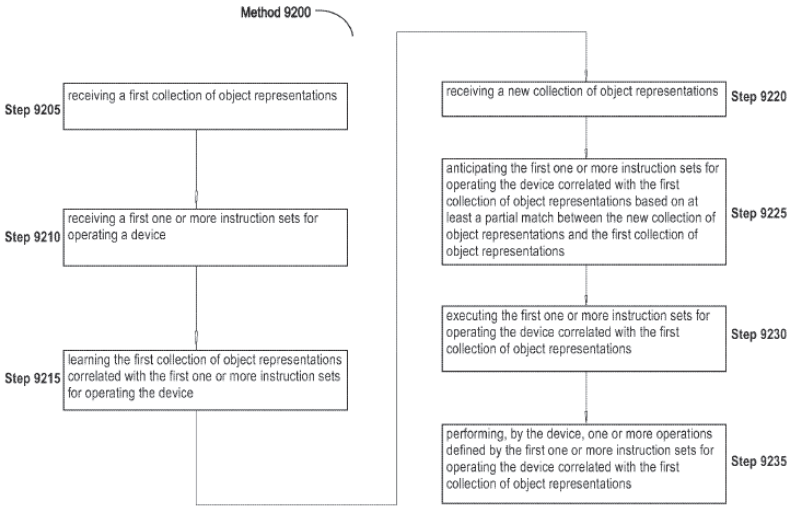


FIG. 33

’991 Application at [Fig. 33].

At step 9220, a new collection of object representations is received. Step 9220 may include any action or operation described in Step 9125 of method 9100 as applicable.

’991 Application at [143:12-13].

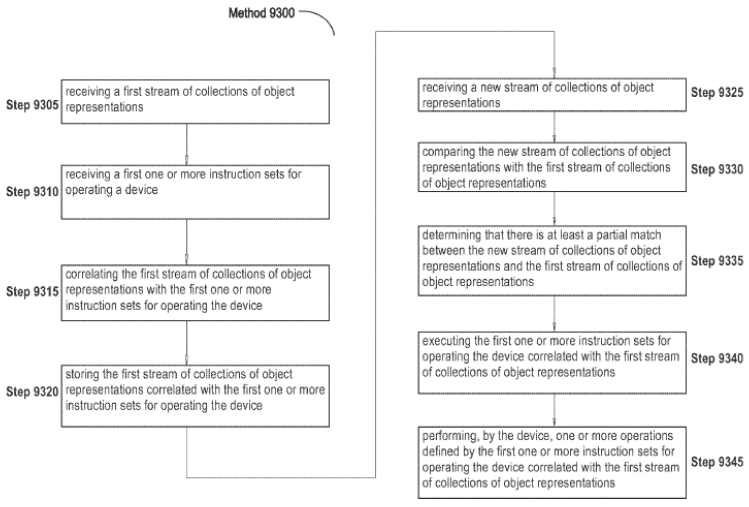


FIG. 34

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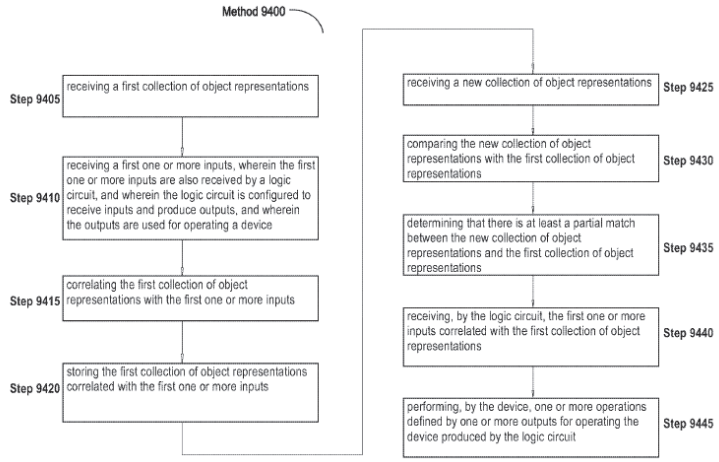


FIG. 35

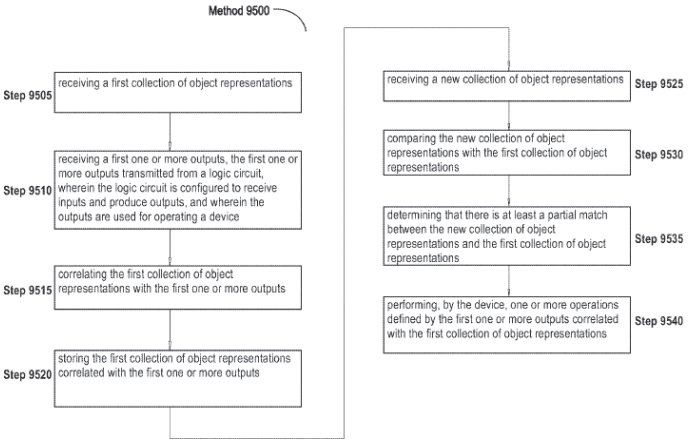


FIG. 36

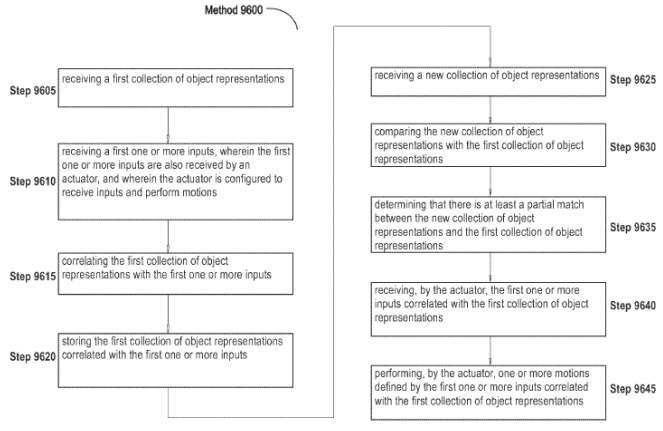


FIG. 37

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	’991 Application at [Figs. 34-37]. In some aspects, an object processing unit may create or generate a collection of object representations. In other aspects, an object processing unit may create or generate a stream of collections of object representations. ’991 Application at [136:24-26]. For example, one Collection of Object Representations 525 may be associated with time stamp t1, another Collection of Object Representations 525 may be associated with time stamp t2, and so on. Time stamps t1, t2, etc. may indicate the times of generating Collections of Object Representations 525, for instance. ’991 Application at [65:19-22].
obtaining or receiving the first one or more instruction sets for operating the first device	The ’991 Application supports obtaining or receiving the first one or more instruction sets for operating the first device. For example: The artificial intelligence unit may be further configured to: receive a first one or more instruction sets for operating the device. ’991 Application at [1:29-30].

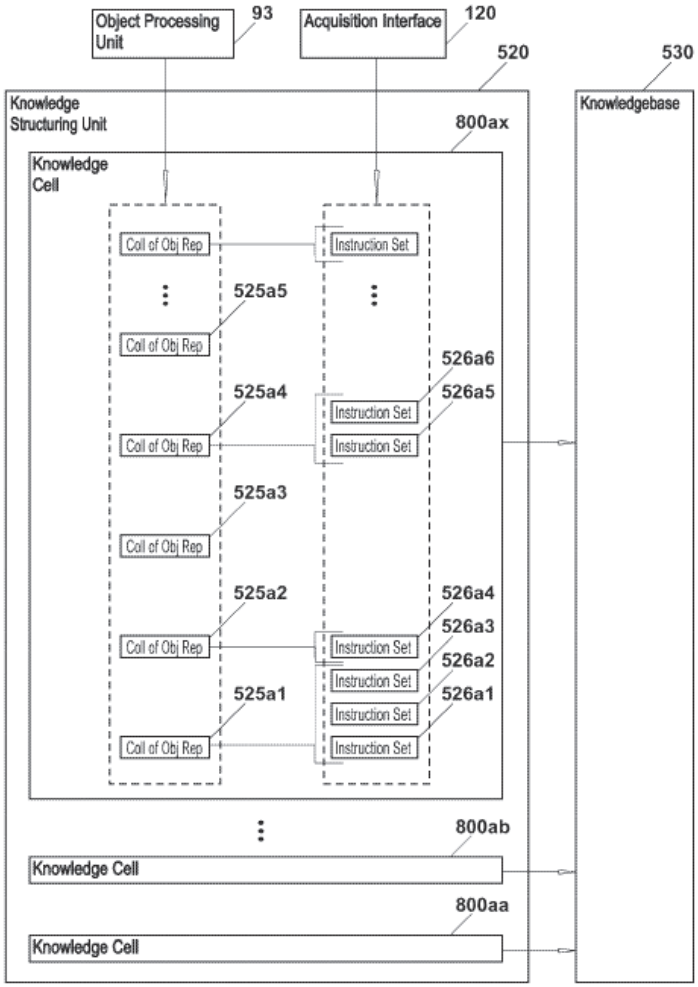


FIG. 13

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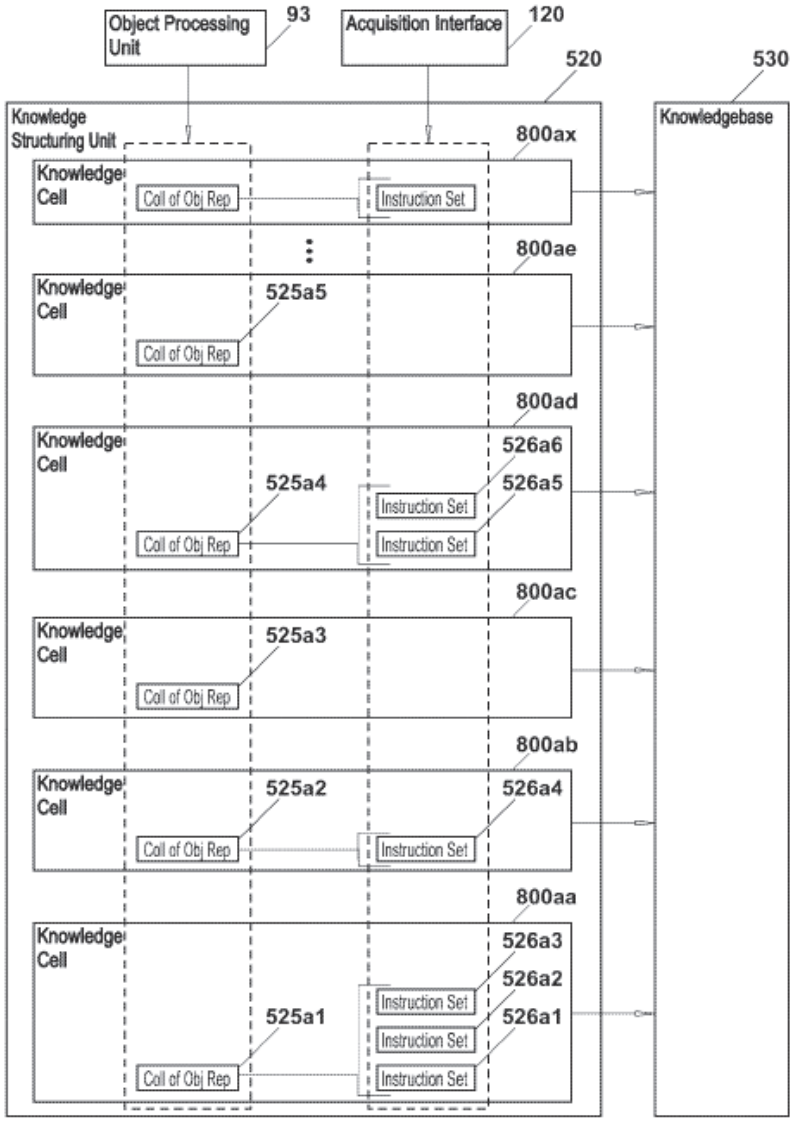


FIG. 14

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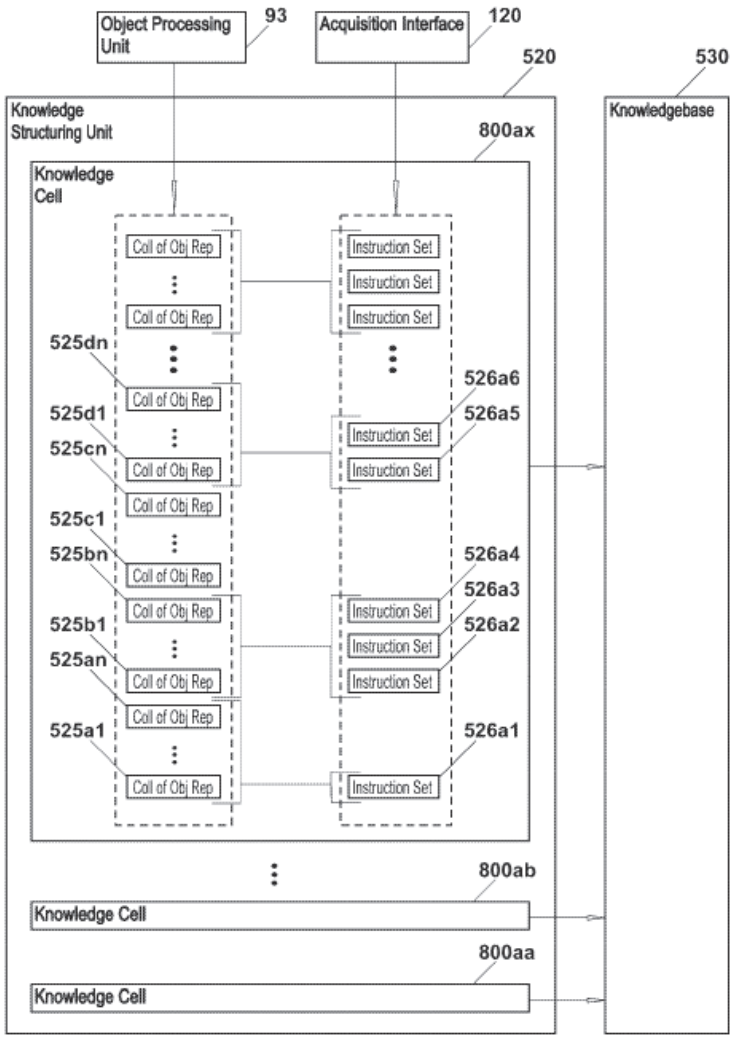


FIG. 15

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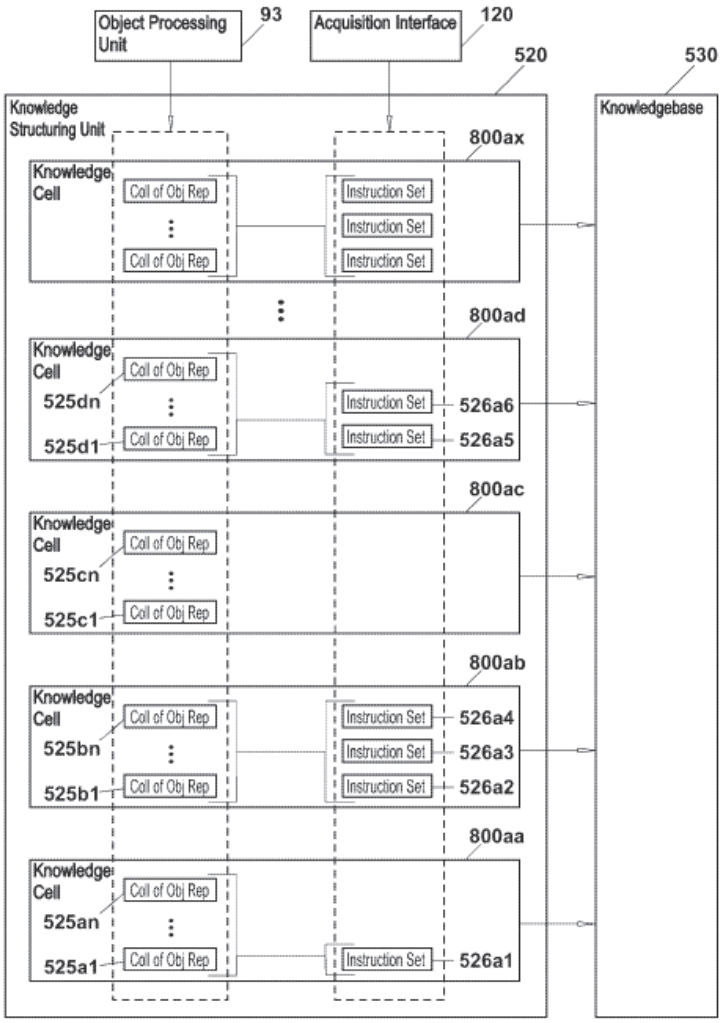


FIG. 16

’991 Application at [Figs. 13-16].

In some embodiments, Knowledge Structuring Unit 520 receives one or more Collections of Object Representations 525 from Object Processing Unit 93,

’991 Application at [89:12-13].

Referring now to Acquisition Interface 120, Acquisition Interface 120 comprises the functionality for obtaining and/or receiving instruction sets, data, and/or other

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information. Acquisition Interface 120 comprises the functionality for obtaining and/or receiving instruction sets, data, and/or other information from Processor 11, Application Program 18, Logic Circuit 250 (later described), and/or other processing element.

'991 Application at [75:4-7].

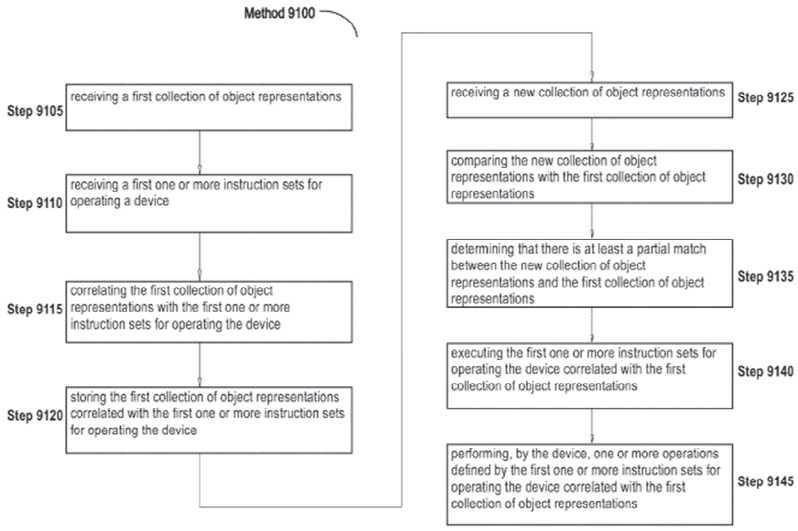


FIG. 32

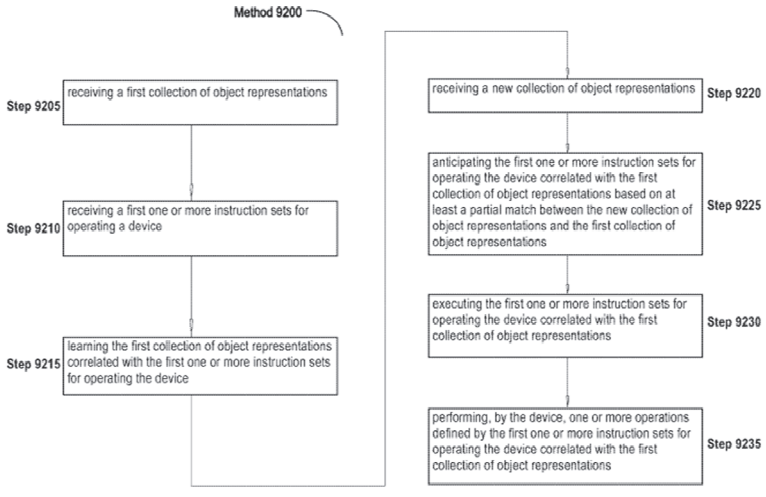
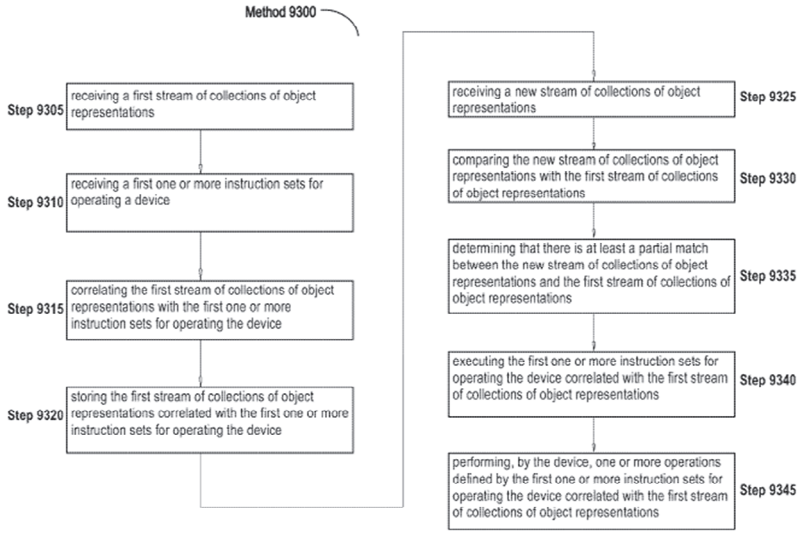


FIG. 33

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	 FIG. 34 ’991 Application at [Figs. 32-34]. At step 9110, a first one or more instruction sets for operating a device are received. In some embodiments, an instruction set (i.e. Instruction Set 526, etc.) may be used or executed by a processor (i.e. Processor 11, etc.) in operating a device. ’991 Application at [136:37-39].
obtaining or receiving the second one or more instruction sets for operating the first device	The ’991 Application supports obtaining or receiving the second one or more instruction sets for operating the first device. For example. In certain embodiments, the artificial intelligence unit is further configured to: receive a second collection of object representations, the second collection of object representations including one or more representations of objects detected by the sensor; receive a second one or more instruction sets for operating the device; and learn the second collection of object representations correlated with the second one or more instruction sets for operating the device. ’991 Application at [14:6-10].

receiving a second one or more instruction sets for operating the device

'991 Application at [21:18-19].

The artificial intelligence unit may be further configured to: receive a first one or more instruction sets for operating the device.

'991 Application at [1:29-30].

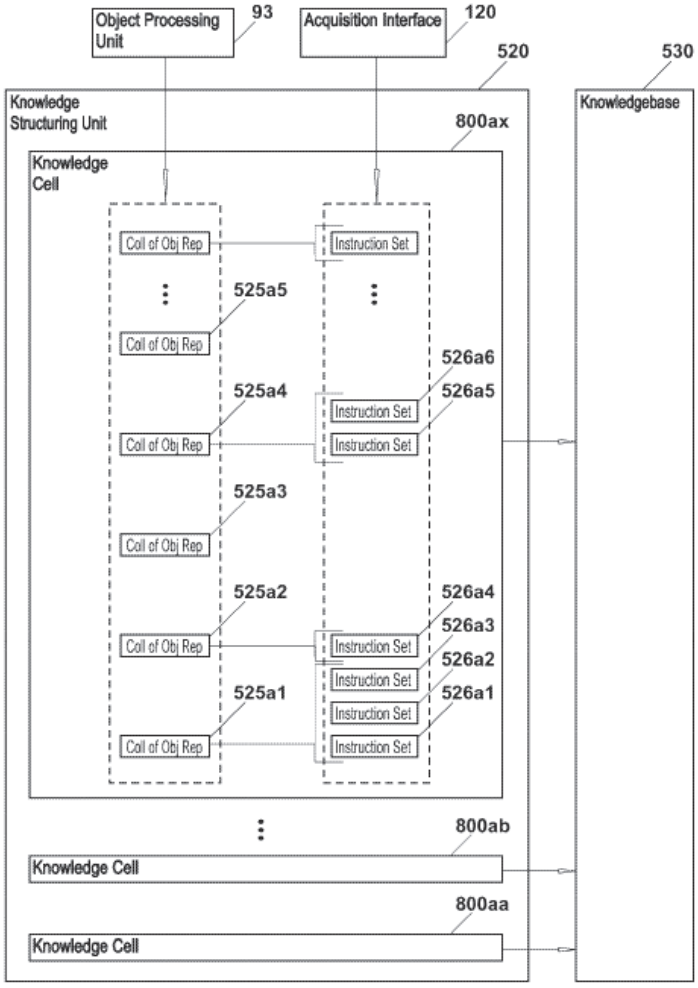


FIG. 13

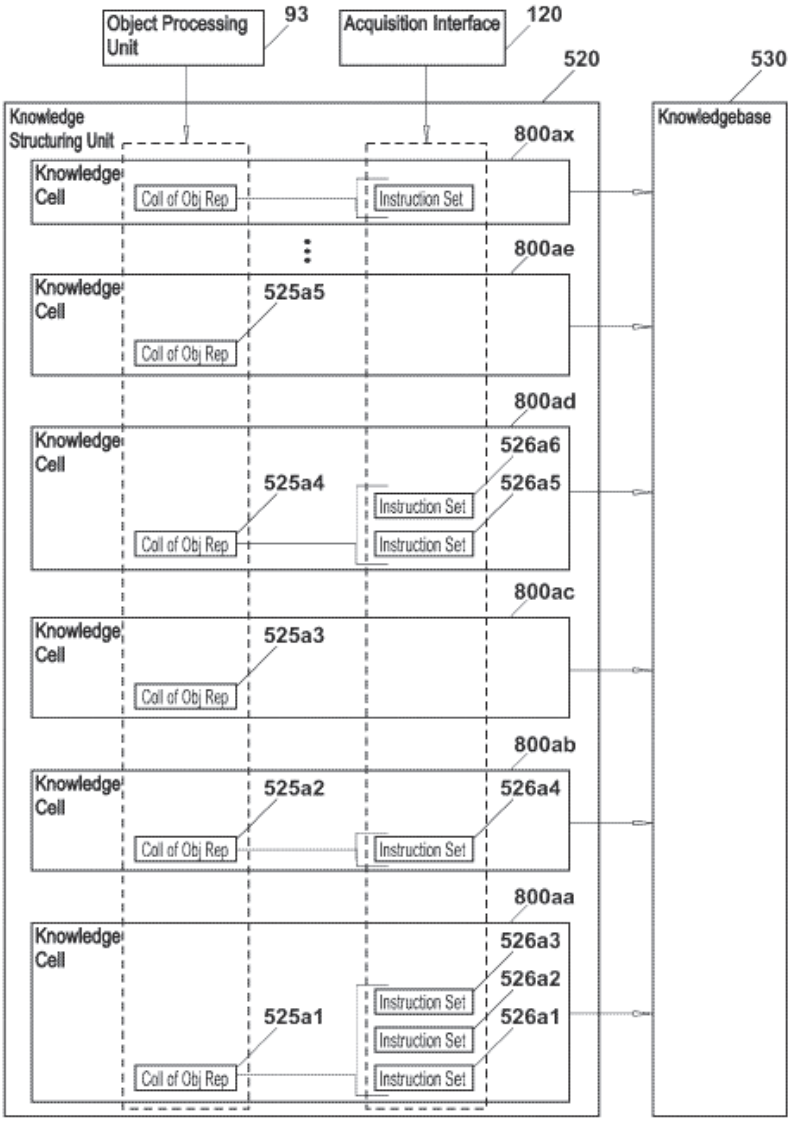


FIG. 14

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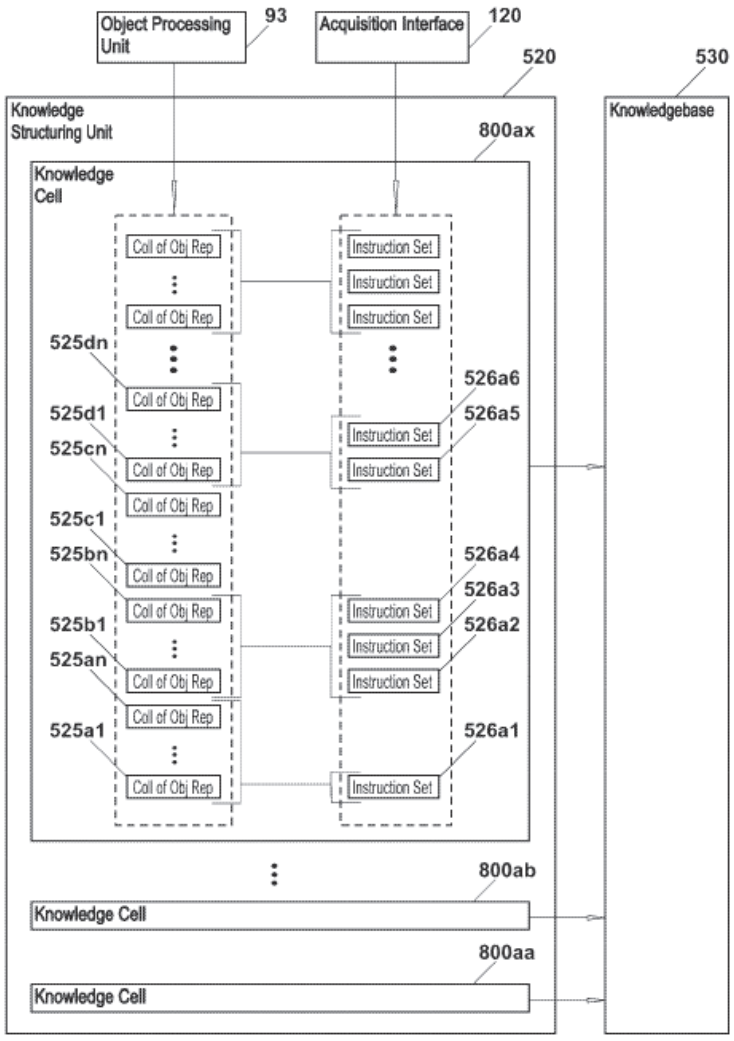


FIG. 15

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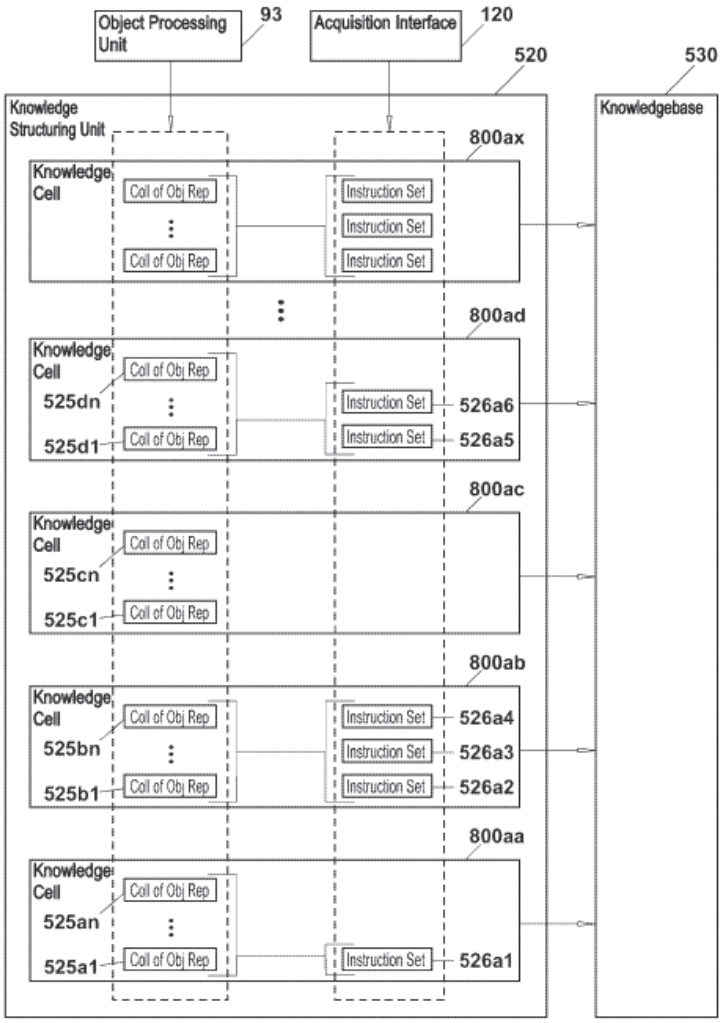


FIG. 16

’991 Application at [Figs. 13-16].

In some embodiments, Knowledge Structuring Unit 520 receives one or more Collections of Object Representations 525 from Object Processing Unit 93,

’991 Application at [89:12-13].

Referring now to Acquisition Interface 120, Acquisition Interface 120 comprises the functionality for obtaining and/or receiving instruction sets, data, and/or other

information. Acquisition Interface 120 comprises the functionality for obtaining and/or receiving instruction sets, data, and/or other information from Processor 11, Application Program 18, Logic Circuit 250 (later described), and/or other processing element.

'991 Application at [75:4-7].

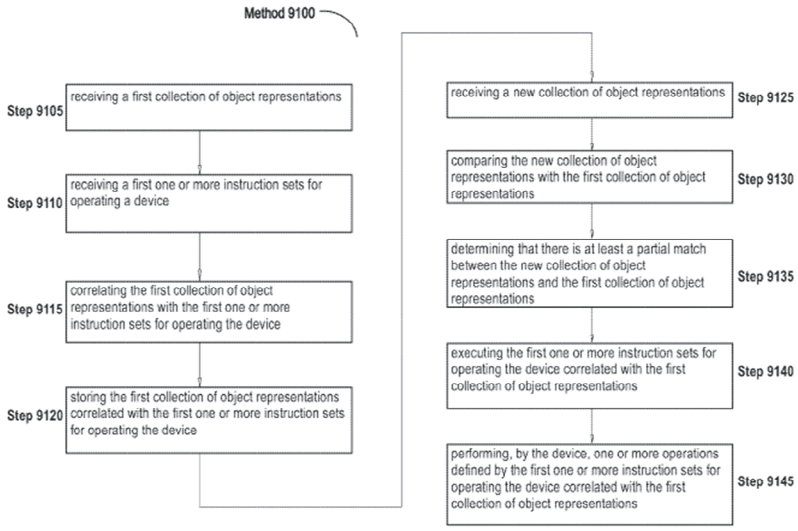


FIG. 32

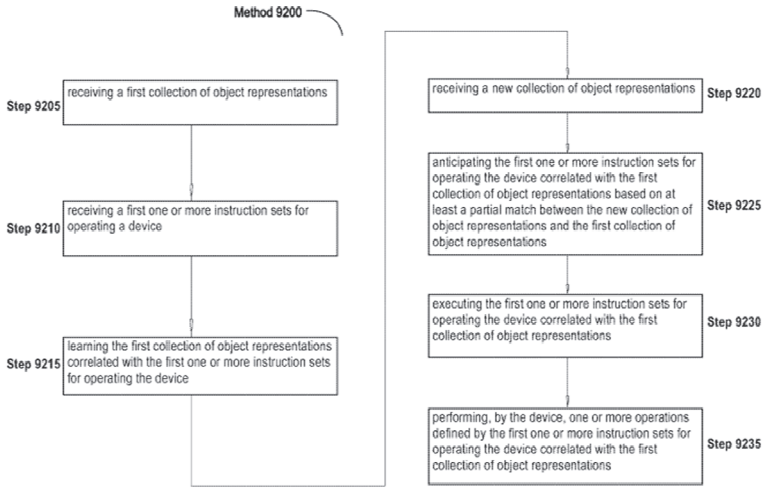
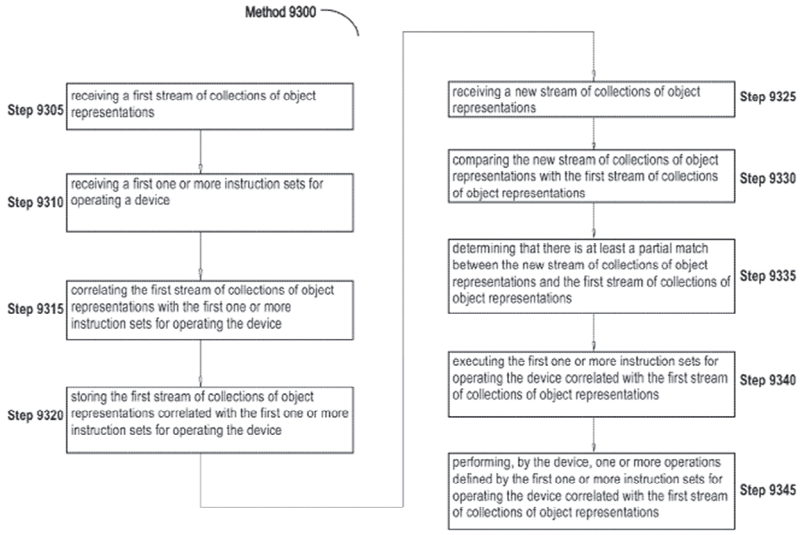
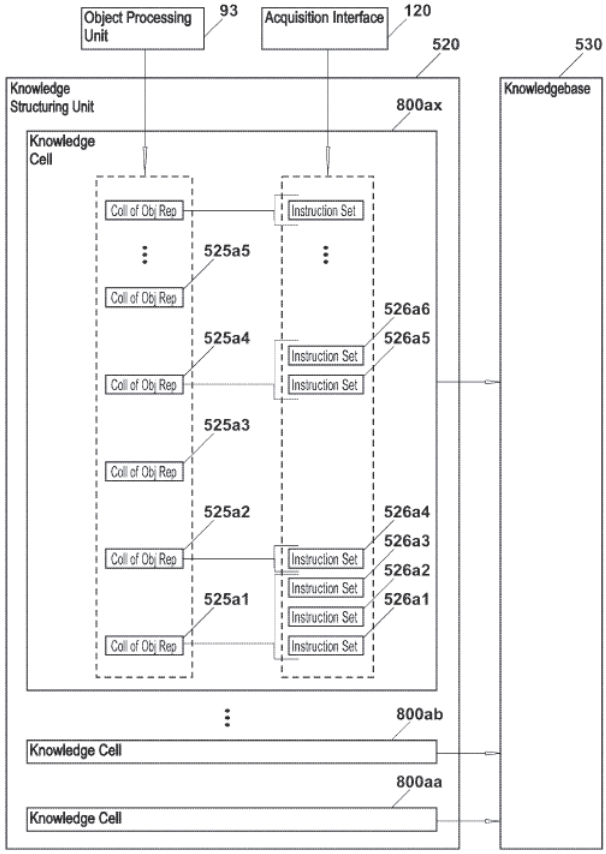
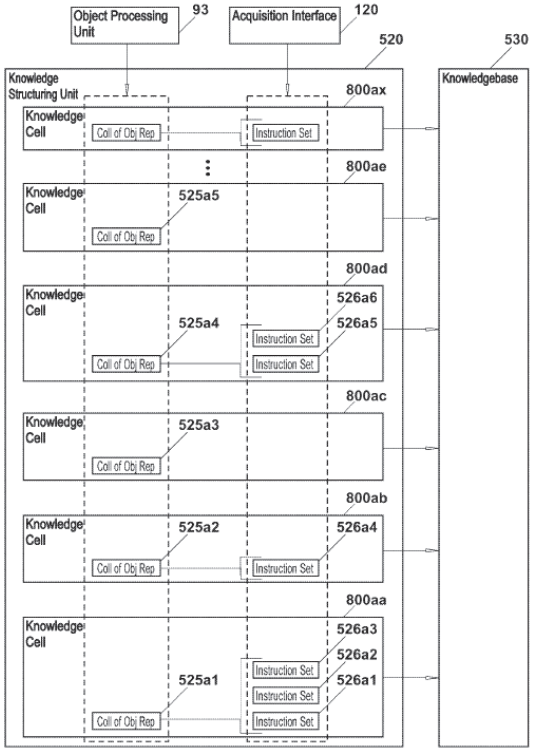


FIG. 33

	 FIG. 34 '991 Application at [Figs. 32-34]. At step 9110, a first one or more instruction sets for operating a device are received. In some embodiments, an instruction set (i.e. Instruction Set 526, etc.) may be used or executed by a processor (i.e. Processor 11, etc.) in operating a device. '991 Application at [136:37-39].
wherein the knowledgebase further includes a fourth correlation including a fourth circumstance representation correlated with a fourth one or more instruction sets for operating	The '991 Application supports wherein the knowledgebase further includes a fourth correlation including a fourth circumstance representation correlated with a fourth one or more instruction sets for operating the second device. For example:

the second device	 FIG. 13 ’991 Application at [Fig. 13]. For example, Knowledge Structuring Unit 520 may create Knowledge Cell 800ax and structure within it Collection of Object Representations 525a1 correlated with Instruction Sets 526a1-526a3 and/or any Extra Info 527 (not shown). Knowledge Structuring Unit 520 may further structure within Knowledge Cell 800ax a Collection of Object Representations 525a2 correlated with Instruction Set 526a4 and/or any Extra Info 527 (not shown). Knowledge Structuring Unit 520 may further structure within Knowledge Cell 800ax a Collection of Object Representations 525a3 without a correlated Instruction Set 526 and/or Extra Info 527. Knowledge Structuring Unit 520 may further structure within Knowledge Cell 800ax a Collection of Object Representations 525a4 correlated with Instruction Sets 526a5-526a6 and/or any Extra Info

	527 (not shown). Knowledge Structuring Unit 520 may further structure within Knowledge Cell 800ax a Collection of Object Representations 525a5 without a correlated Instruction Set 526 and/or Extra Info 527. Knowledge Structuring Unit 520 may structure within Knowledge Cell 800ax additional Collections of Object Representations 525 correlated with any number {including zero [i.e. uncorrelated]) of Instruction Sets 526 and/or Extra Info 527 by following similar logic as described above. '991 Application at [89:20-32].  FIG. 14

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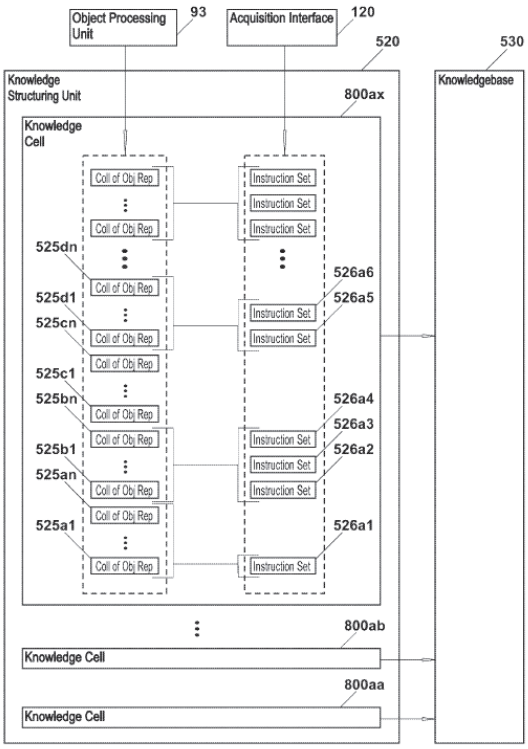


FIG. 15

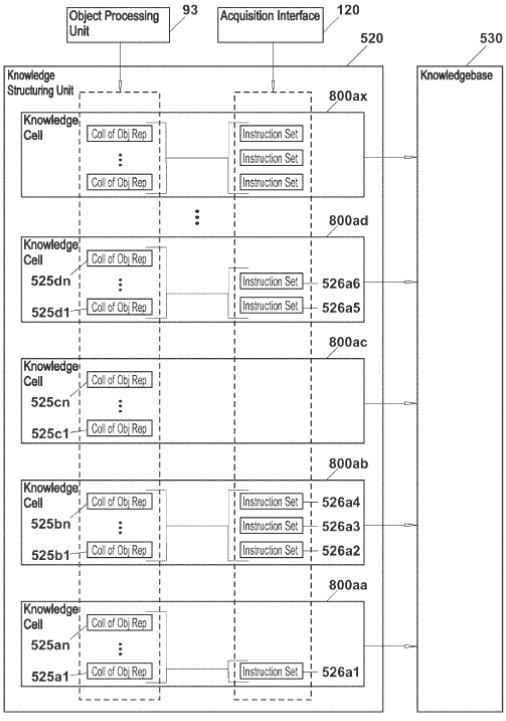
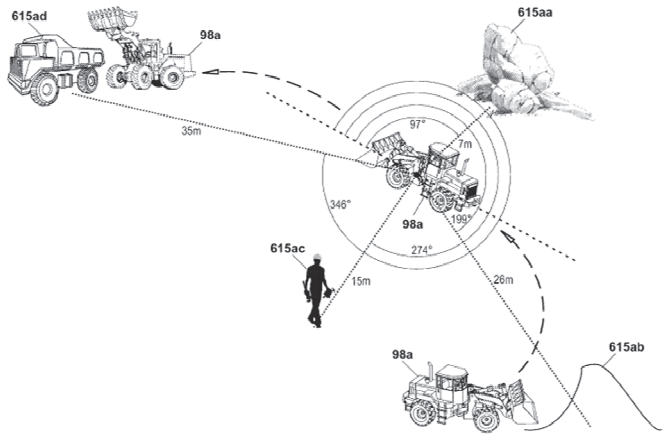


FIG. 16

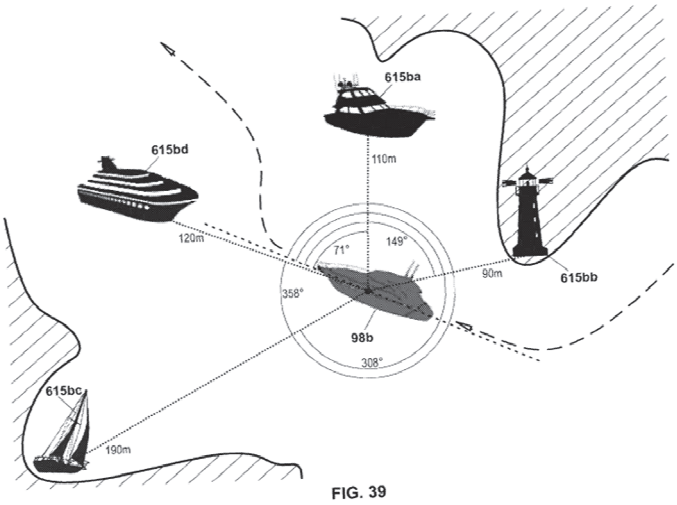
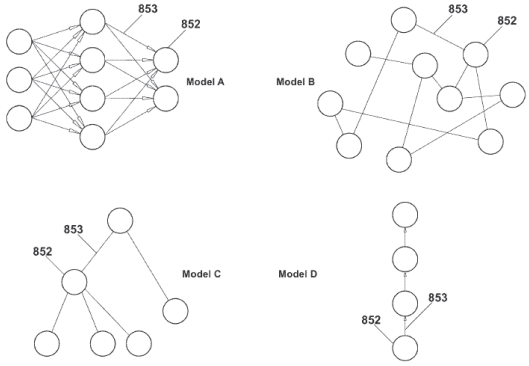
’991 Application at [Figs. 14-16].

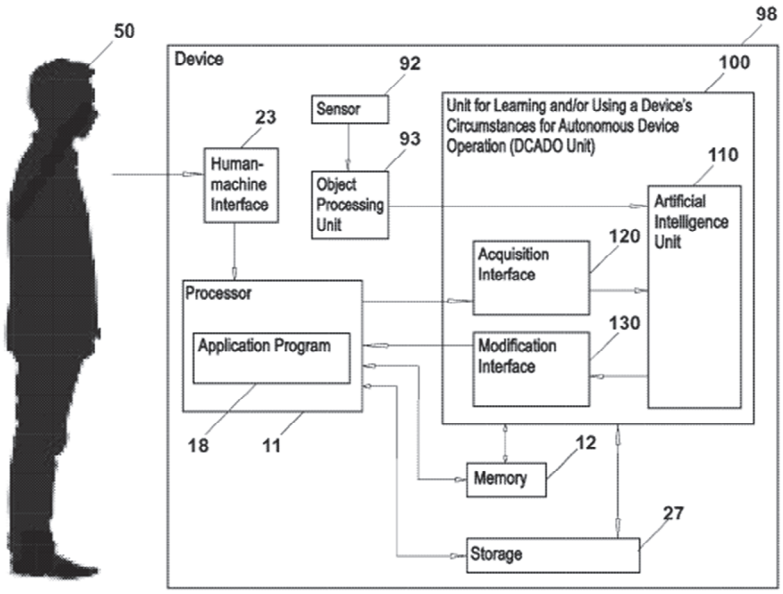
	A collection of object representations correlated with one or more instruction sets may be part of a stored plurality of collections of object representations correlated with one or more instruction sets. ’991 Application at [138:25-27]. For example, a Device 98 including or interfaced with DCADO Unit 100 having access to a combined Knowledgebase 530 can use the collective knowledge learned from multiple Devices 98 for the Device's 98 autonomous operation. ’991 Application at [93:21-23]. Any number of Devices 98 may connect to such remote DCADO Unit 100 and the remote DCADO Unit 100 may learn their operations in circumstances including objects with various properties. ’991 Application at [86:13-14]. For example, multiple operators {i.e. Users 50, etc.) may operate their Devices 98 where the Devices 98 may be configured to transmit their operations in circumstances including objects with various properties to a remote DCADO Unit 100. Such remote DCADO Unit 100 enables learning of the operators' collective knowledge of operating Device 98 in circumstances including objects with various properties. ’991 Application at [86:20-24]. In some embodiments, DCADO Unit 100 may reside on Server 96 accessible over Network 95 as previously described. In such embodiments, any number of Loaders 98a may connect to such remote DCADO Unit 100 and the remote DCADO Unit 100 may learn their operations in circumstances including objects with various properties. In turn, any number of Loaders 98a can utilize the remote

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	DCADO Unit 100 for autonomous operation in circumstances including objects with various properties. For example, multiple operators (i.e. Users 50, etc.) may operate their Loaders 98a that are configured to transmit their operations in circumstances including objects with various properties to a remote DCADO Unit 100. Such remote DCADO Unit 100 enables learning of the operators' collective knowledge of operating Loaders 98 in circumstances including objects with various properties. Any number of Loaders 98 can utilize such collective knowledge comprised in the remote DCADO Unit 100 for their autonomous operation. Any of the disclosed elements such as Artificial Intelligence Unit 110, Knowledgebase 530, and/or others may reside on Server 96, and any combination of local and remote elements can be implemented in alternate embodiments. '991 Application at [147:38-148:10].  FIG. 38 '991 Application at [Fig. 38 – "first device": Loader 98a].

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	 FIG. 39 ’991 Application at [Fig. 39 – “second device”: Boat 98b].  FIG. 17 ’991 Application at [Fig. 17].
and wherein the fourth circumstance representation represents a fourth circumstance detected at least in part by the one or more sensors	The ’991 Application supports wherein the fourth circumstance representation represents a fourth circumstance detected at least in part by the one or more sensors of the second device. For example:

of the second device.	 FIG. 2 '991 Application at [Fig. 2].

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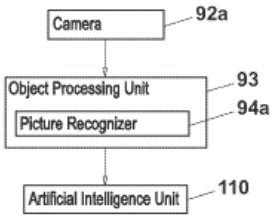


FIG. 3A

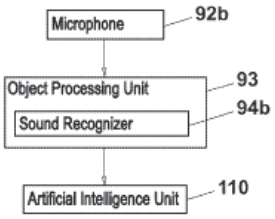


FIG. 3B

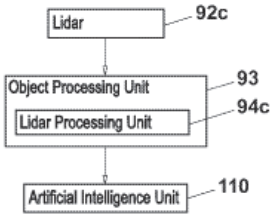


FIG. 3C

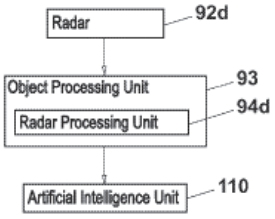


FIG. 3D

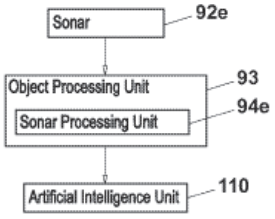


FIG. 3E

’991 Application at [Figs. 3A-3E].

Sensor 92 (also referred to simply as sensor or other suitable name or reference) comprises the functionality for obtaining or detecting information about its environment, and/or other functionalities. As such, one or more Sensors 92 can be used to detect objects and/or their properties in Device's 98 surrounding. In some aspects, Device's 98 surrounding may include exterior of Device 98. In other aspects, Device's 98 surrounding may include interior of Device 98 in case of hollow Device 98, Device 98 comprising compartments or openings, and/or other variously shaped Device 98. Examples of aspects of

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	an environment that Sensor 92 can measure or be sensitive to include light {i.e. camera, lidar, etc.), electromagnetism/electromagnetic field {i.e. radar, etc.), sound (i.e. microphone, sonar, etc.), physical contact (i.e. tactile sensor, etc.), magnetism/magnetic field (Le. compass, etc.), electricity/electric field, temperature, gravity, vibration, pressure, and/or others. In some aspects, a passive sensor (i.e. camera, microphone, etc.) measures signals or radiation emitted or reflected by an object. in other aspects, an active sensor (i.e. lidar, radar, sonar, etc.) emits signals or radiation and measures the signals or radiation reflected or backscattered from an object. A reference to a Sensor 92 herein includes a reference to one or more Sensors 92 as applicable. In some designs, a plurality of Sensors 92 may be used to detect objects and/or their properties from different angles or sides of Device 98. For example, four Cameras 92a can be placed on four comers of Device 98 to cover 360 degrees of view of Device's 98 surrounding. In other designs, a plurality of different types of Sensors 92 may be used to detect different types of objects and/or their properties. For example, one or more Cameras 92a can be used to detect and identify an object, whereas, Radar 92d can be used to determine distance and bearing/angle of the object relative to Device 98. In further designs, a signal-emitting element can be placed within or onto an object and Sensor 92 can detect the signal from the signal-emitting element, thereby detecting the object and/or its properties. For example, a radio-frequency identification (RFID) emitter may be placed within an object to help Sensor 92 detect, identify, and/or obtain other information about the object. ’991 Application at [62:33-63:14]. In some embodiments, Sensor 92 may be or include Camera 92a as shown in Fig. 3A. Camera 92a comprises the functionality for capturing one or more pictures, and/or other functionalities. As such, Camera 92a can be used to capture pictures of Device's 98 surrounding.

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	Camera 92a may be useful in detecting existence of an object, type of an object, identity of an object, distance of an object, bearing/angle of an object, location of an object, shape/size of an object, activity of an object, and/or other properties of an object. In some aspects, Camera 92a may be or comprises a motion picture camera that can capture streams of pictures (i.e. motion pictures, videos, etc.). in other aspects, Camera 92a may be or comprises a still picture camera that can capture still pictures (i.e. photographs, etc.). In further aspects, Camera 92a may be or comprises a stereo camera (i.e. camera with multiple lenses, etc.) that can capture stereoscopic or range pictures. In further aspects, Camera 92a may be or comprises any other Camera 92a. In general, Camera 92a may capture any light (i.e. visible light, infrared light, ultraviolet light, x-ray light, etc.) across the electromagnetic spectrum onto a light-sensitive material. Any other technique known in art can be utilized to facilitate Camera 92a functionalities. In one example, a digital Camera 92a can utilize a charge coupled device (CCD), a complementary metal-oxide-semiconductor (CMOS) sensor, and/or other electronic image sensor to capture digital pictures that can then be stored in a memory or storage, or transmitted to any of the disclosed or other elements for further processing. In another example, analog Camera 92a can utilize an analog-to digital converter to produce digital pictures. In some embodiments, Camera 92a can be built, embedded, or integrated in Device 98 and/or other disclosed element. In other embodiments, Camera 92a can be an external Camera 92a connected with Device 98 and/or other disclosed element. In further embodiments, Camera 92a comprises Computing Device 70 or elements thereof. In general, Camera 92a can be implemented in any suitable configuration to provide its functionalities. Camera 92a may capture one or more digital pictures. A digital picture may include a collection of color encoded pixels or dots. Examples of file formats that can be utilized to store a digital picture include ,IPEG, GIF, TIFF, PNG, PDF, and/or other digitally encoded picture formats. A stream of

	digital pictures (i.e. motion picture, video, etc.) may include one or more digital pictures. Examples of file formats that can be utilized to store a stream of digital pictures include MPEG, AVI, FLV, MOV, RM, SWF, WMV, DivX, and/or other digitally encoded motion picture formats. In other embodiments, Sensor 92 may be or include Microphone 92b as shown in Fig. 3B. Microphone 92b comprises the functionality for capturing one or more sounds, and/or other functionalities. As such, Microphone 92b can be used to capture sounds from Device's 98 surrounding. Microphone 92b may be useful in detecting existence of an object, type of an object, identity of an object, bearing/angle of an object, activity (i.e. motion, sounding, etc.) of an object, and/or other properties of an object. In some aspects, Microphone 92b may be omnidirectional microphone that enables capturing sounds from any direction. In other aspects, Microphone 92b may be a directional (i.e. unidirectional, bidirectional, etc.) microphone that enables capturing sounds from one or more directions while ignoring or being insensitive to sounds from other directions. In general, Microphone 92b may utilize a membrane sensitive to air pressure and may produce electrical signal from air pressure variations. Samples of the electrical signal can then be read to produce a stream of digital sound samples. Any other technique known in art can be utilized to facilitate Microphone 92b functionalities. In one example, a digital Microphone 92b may include an integrated analog-to-digital converter to capture a stream of digital sound samples that can then be stored in a memory or storage, or transmitted to any of the disclosed or other elements for further processing. In another example, analog Microphone 92b may utilize an external analog-to-digital converter to produce a stream of digital sound samples. In some embodiments, Microphone 92b can be built, embedded, or integrated in Device 98. In other embodiments, Microphone 92b can be an external Microphone 92b connected with Device 98. In further embodiments where used in water, Microphone 92b may be or include a hydrophone. in further embodiments,

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	Microphone 92b comprises Computing Device 70 or elements thereof. in general, Microphone 92b can be implemented in any suitable configuration to provide its functionalities. Examples of file formats that can be utilized to store a stream of digital sound samples include WAV, WMA, AIFF, MP3, RA, OGG, and/or other digitally encoded sound formats. In further embodiments, Sensor 92 may be or include Lidar 92c as shown in Fig. 3C. Lidar 92c may be useful in detecting existence of an object, type of an object identity of an object, distance of an object bearing/angle of an object, location of an object, shape/size of an object, activity of an object, and/or other properties of an object. In some aspects, Lidar 92c may emit a light signal (i.e. laser beam, etc.) and listen for a signal that is reflected or backscattered from an object. Any other technique known in art can be utilized to facilitate Lidar 92c functionalities. In further embodiments, Sensor 92 may be or include a Radar 92d as shown in Fig. 3D. Radar 92d may be useful in detecting existence of an object, type of an object, distance of an object, bearing/ angle of an object, location of an object, shape/size of an object, activity of an object, and/or other properties of an object. in some aspects, Radar 92d may emit a radio signal (i.e. radio wave, etc.) and listen for a signal that is reflected or backscattered from an object. Any other technique known in art can be utilized to facilitate Radar 92d functionalities. In further embodiments, Sensor 92 may be or include Sonar 92e as shown in Fig. 3E. Sonar 92e may be useful in detecting existence of an object, type of an object, distance of an object, bearing/angle of an object, location of an object, shape/size of an object, activity of an object, and/or other properties of an object. In some aspects, Sonar 92e may emit a sound signal (i.e. sound pulse, etc.) and listen for a signal that is reflected or backscattered from an object Any other technique known in art can be utilized to facilitate Sonar 92e functionalities. ’991 Application at [63:15-64:36].

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	Object Processing Unit 93 comprises the functionality for processing output from Sensor 92 to obtain information of interest, and/or other functionalities. As such, Object Processing Unit 93 can be used to process output from Sensor 92 to detect objects and/or their properties in Device's 98 surrounding. In some embodiments, Object Processing Unit 93 comprises the functionality for creating or generating Collection of Object Representations 525 (also referred to as Coll of Obj Rep or other suitable name or reference) and storing one or more Object Representations 625 (also referred to simply as object representations, representations of objects, or other suitable name or reference), Object Properties 630 (also referred to simply as object properties or other suitable name or reference), and/or other elements or information into the Collection of Object Representations 525. As such, Collection of Object Representations 525 comprises the functionality for storing one or more Object Representations 625, Object Properties 630, and/or other elements or information. Object Representation 625 may include an electronic representation of an object (i.e. Object 615 [later described], etc.) detected in Device's 98 surrounding. In some aspects, Collection of Object Representations 525 includes one or more Object Representations 625, Object Properties 630, and/or other elements or information related to objects detected in Device's 98 surrounding at a particular time. Collection of Object Representations 525 may, therefore, include knowledge (i.e. unit of knowledge, etc.) of Device's 98 circumstances including objects with various properties at a particular time. in some designs, a Collection of Object Representations 525 may include or be associated with a time stamp (not shown), order (not shown), or other time related information. For example, one Collection of Object Representations 525 may be associated with time stamp t1, another Collection of Object Representations 525 may be associated with time stamp t2, and so on. Time stamps t1, t2, etc. may indicate the times of generating Collections of Object Representations 525, for instance. In other embodiments, Object Processing Unit 93 comprises the

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	functionality for creating or generating a stream of Collections of Object Representations 525. A stream of Collections of Object Representations 525 may include one Collection of Object Representations 525 or a group, sequence, or other plurality of Collections of Object Representations 525. In some aspects, a stream of Collections of Object Representations 525 includes one or more Collections of Object Representations 525, and/or other elements or information related to objects detected in Device's 98 surrounding over time. A stream of Collections of Object Representations 525 may, therefore, include knowledge (i.e. unit of knowledge, etc.) of Device's 98 circumstances including objects with various properties over time. As circumstances including objects with various properties in Device's 98 surrounding change (i.e. objects and/or their properties change, move, act, transform, etc.) over time, this change may be captured in a stream of Collections of Object Representations 525. In some designs, each Collection of Object Representations 525 in a stream may include or be associated with the aforementioned time stamp, order, or other time related information. For example, one Collection of Object Representations 525 in a stream may be associated with order 1, a next Collection of Object Representations 525 in 35 the stream may be associated with order 2, and so on. Orders 1, 2, etc. may indicate the orders or places of Collections of Object Representations 525 within a stream (Le. sequence, etc.), for instance. Examples of objects include biological objects (i.e. persons, animals, vegetation, etc.), nature objects (i.e. rocks, bodies of water, etc.), manmade objects (i.e. buildings, streets, ground/aerial/aquatic vehicles, etc.), and/or others. In some aspects, any part of an object may be detected as an object itself. For instance, instead of or in addition to detecting a vehicle as an object, a wheel and/or other parts of the vehicle may be detected as objects. In general, object may include any object or part thereof that can be detected. Examples of object properties include existence of an object, type of an object (i.e. person, cat, vehicle, building, street, tree, rock, etc.), identity of an object (i.e.

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	name, identifier, etc.), distance of an object, bearing/angle of an object, location of an object (i.e. distance and bearing/angle from a known point. coordinates, etc.), shape/size of an object (i.e. height, width, depth, computer model, point cloud, etc.), activity of an object (i.e. motion, gestures, etc.), and/or other properties of an object. Type of an object, for example, may include any classification of objects ranging from detailed such as person, cat, vehicle, building, street, tree, rock, etc. to generalized such as biological object, nature object, manmade object, etc., and/or others including their subtypes. Location of an object, for example, can include a relative location such as one defined by distance and bearing/angle from a known point or location (i.e. Device 98 location, etc.). Location of an object, for example, can also include absolute location such as one defined by object coordinates. In general, an object property may include any attribute of an object (i.e. existence of an object, type of an object, identity of an object, shape/size of an object, etc.), any relationship of an object with Device 98, other objects, or the environment (i.e. distance of an object, bearing/angle of an object, friend/foe relationship, etc.), and/or other information related to an object. In some implementations, Object Processing Unit 93 and/or any of its elements or functionalities can be included in Sensor 92. In other implementations, Object Processing Unit 93 and/or any of its elements or functionalities can be embedded into or operate on Processor 11. In further implementations, Object Processing Unit 93 and/or any of its elements or functionalities can be embedded into or operate in DCADO Unit 100, and/or other disclosed elements. Object Processing Unit 93 may be provided in any suitable configuration. Object Processing Unit 93 may include any signal processing techniques or elements known in art as applicable. ’991 Application at [65:3-66:20].

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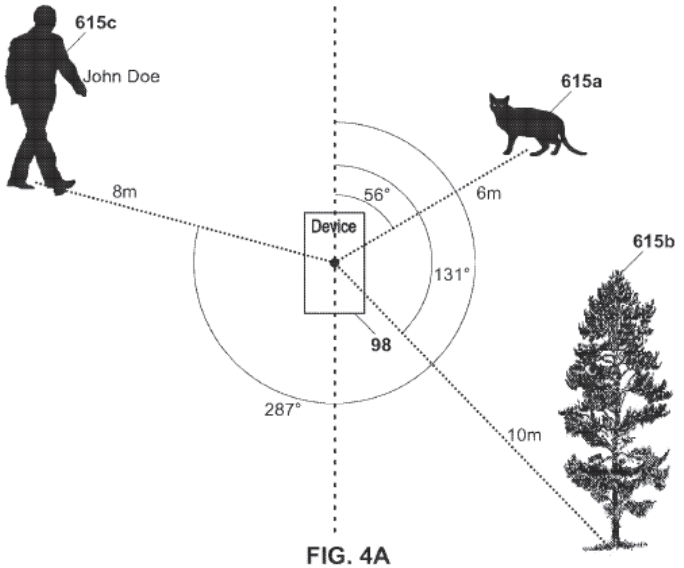


FIG. 4A

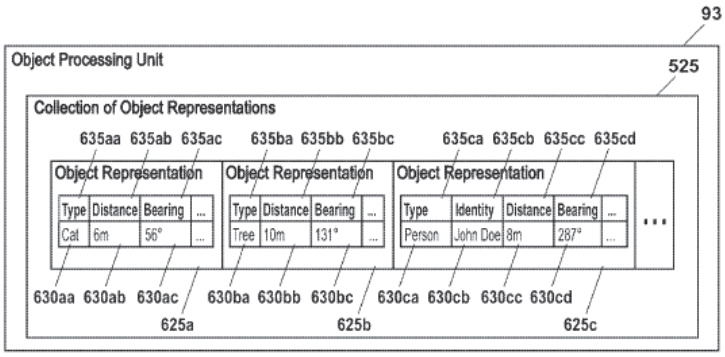


FIG. 4B

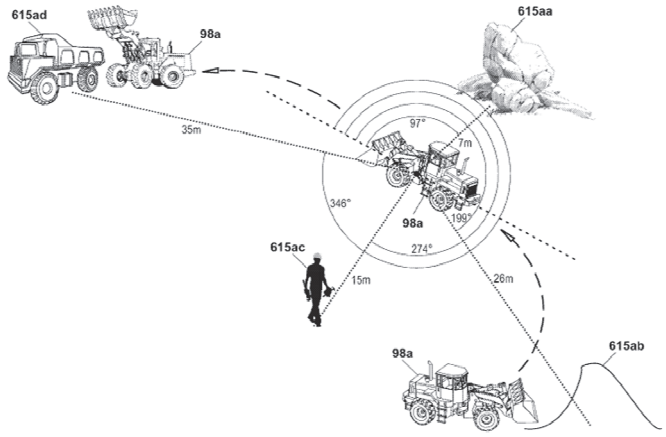
’991 Application at [Figs. 4A-4B].

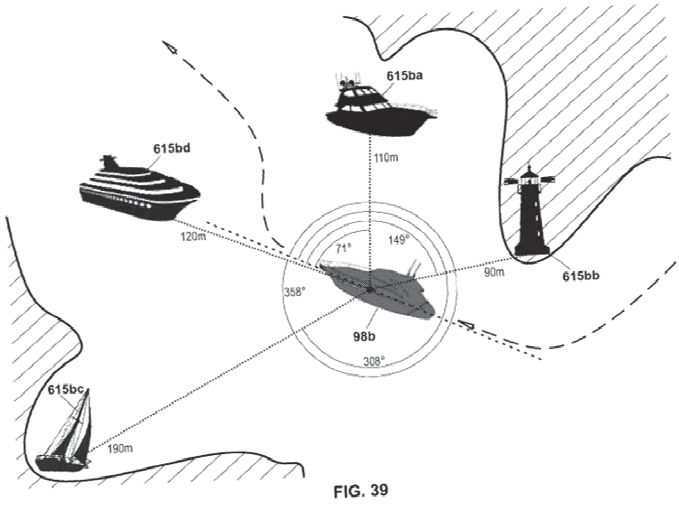
Referring to Figs. 4A-4B, an exemplary embodiment of Objects 615 (also referred to simply as objects or other suitable name or reference) detected in Device's 98 surrounding, and resulting Collection of Object Representations 525 are illustrated. As shown for example in Fig. 4A, Object 615a is detected. Object 615a may be recognized as a cat. Object 615a may be detected at a distance of 6m from Device 98. Object 615a may be detected at a bearing/angle of 56° from Device's 98 centerline. Furthermore, Object 615b is also detected. Object 615b may be recognized as a tree. Object 615b may be detected at a distance of 1 Om from Device 98. Object 615b may be detected at a bearing/angle of 131 ° from

	Device's 98 centerline. Furthermore, Object 615c is also detected. Object 615c may be recognized as a person. Object 615c may be identified as John Doe. Object 615c may be detected at a distance of 8m from Device 98. Object 615c may be detected at a bearing/angle of 287° from Device's 98 centerline. Any other Objects 615 instead of or in addition to Object 615a, Object 615b, and Object 615c may be detected. In some aspects, any features, functionalities, and embodiments of Camera 92a/Picture Recognizer 94a, Microphone 92b/Sound Recognizer 94b, and/or other sensors or techniques can be utilized for recognizing and/or identifying a person, a cat, a tree, and/or other Objects 615. In further aspects, any features, functionalities, and embodiments of Camera 92a/Picture Recognizer 94a, Microphone 92b/Sound Recognizer 94b, Lidar 92cilidar Processing Unit 94c, Radar 92d/Radar Processing Unit 94d, Sonar 92e/Sonar Processing Unit 94e, and/or other sensors or techniques can be utilized for detecting distance, bearing/angle, and/or other object properties. As shown for example in Fig. 4B, Object Processing Unit 93 may create or generate Collection of Object Representations 525 including Object Representation 625a representing Object 615a, Object Representation 625b representing Object 615b, Object Representation 625c representing Object 615c, etc. For instance, Object Representation 625a may include Object Property 630aa "Cat" in Category 635aa "Type", Object Property 630ab "6m" in Category 635ab "Distance", Object Property 630ac "56°" in Category 635ac "Bearing", etc. Also, Object Representation 625b may include Object Property 630ba "Tree" in Category 635ba "Type", Object Property 630bb "1 Om" in Category 635bb "Distance", Object Property 630bc "131 °" in Category 635bc "Bearing", etc. Also, Object Representation 625c may include Object Property 630ca "Person" in Category 635ca "Type", Object Property 630cb "John Doe" in Category 635cb "Identity", Object Property 630cc "Sm" in Category 635cc "Distance", Object Property 630cd "287°;' in Category 635cd "Bearing"; etc. Any number of Object Representations 625, and/or other elements or information

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	can be included in Collection of Object Representations 525. Any number of Object Properties 630 (also referred to simply as object properties or other suitable name or reference), and/or other elements or information can be included in an Object Representation 625. In some aspects, a reference to Collection of Object Representations 525 comprises a reference to a collection of Object Properties 630 and/or other elements or information related to one or more Objects 615. Other additional Object Representations 625, Object Properties 630, elements, and/or information can be included as needed, or some of the disclosed ones can be excluded, or a combination thereof can be utilized in alternate embodiments of Collection of Object Representations 525. '991 Application at [72:14-73:8]. Any number of Devices 98 may connect to such remote DCADO Unit 100 and the remote DCADO Unit 100 may learn their operations in circumstances including objects with various properties. '991 Application at [86:13-14]. For example, multiple operators {i.e. Users 50, etc.) may operate their Devices 98 where the Devices 98 may be configured to transmit their operations in circumstances including objects with various properties to a remote DCADO Unit 100. Such remote DCADO Unit 100 enables learning of the operators' collective knowledge of operating Device 98 in circumstances including objects with various properties. '991 Application at [86:20-24]. In some embodiments, DCADO Unit 100 may reside on Server 96 accessible over Network 95 as previously described. In such embodiments, any number of Loaders 98a may connect to such remote DCADO Unit 100 and the remote DCADO Unit 100 may learn their operations in

	circumstances including objects with various properties. In turn, any number of Loaders 98a can utilize the remote DCADO Unit 100 for autonomous operation in circumstances including objects with various properties. For example, multiple operators (i.e. Users 50, etc.) may operate their Loaders 98a that are configured to transmit their operations in circumstances including objects with various properties to a remote DCADO Unit 100. Such remote DCADO Unit 100 enables learning of the operators' collective knowledge of operating Loaders 98 in circumstances including objects with various properties. Any number of Loaders 98 can utilize such collective knowledge comprised in the remote DCADO Unit 100 for their autonomous operation. Any of the disclosed elements such as Artificial Intelligence Unit 110, Knowledgebase 530, and/or others may reside on Server 96, and any combination of local and remote elements can be implemented in alternate embodiments. ’991 Application at [147:38-148:10].  FIG. 38 ’991 Application at [Fig. 38 – “first device”: Loader 98a]. Loader 98a may include or be coupled to one or more Sensors 92 (i.e. collectively referred to as Sensor 92, etc.) such as Camera 92a, Microphone 92b, Lidar 92c, Radar

	92d, Sonar 92e, etc. and/or Object Processing Unit 93 that can detect Objects 615aa-615ad, and/or other elements or information in Loader's 98a surrounding. Object Processing Unit 93 may include Picture Recognizer 94a, Sound Recognizer 94b, Lidar Processing Unit 94c, Radar Processing Unit 94d, Sonar Processing Unit 94e, and/or other elements or functionalities as applicable. Object Processing Unit 93 may create or generate one or more (i.e. stream, etc.) Collections of Object Representations 525 comprising Object Representations 625, Object Properties 630, and/or other elements or information representing Objects 615 detected in Loader's 98a surrounding. '991 Application at [146:30-37].  FIG. 39 '991 Application at [Fig. 39 – "second device": Boat 98b]. Referring to Fig. 39, in some exemplary embodiments, Device 98 may be or include Boat 98b. Boat 98b may be operated by User 50 in person or remotely. Boat 98b may include or be coupled to one or more Sensors 92 (i.e. collectively referred to as Sensor 92, etc.) such as Camera 92a, Microphone 92b, Udar 92c, Radar 92d, Sonar 92e, etc. and/or Object Processing Unit 93 that can detect Objects 615ba-615bd, and/or other elements or

	information in Boat's 98b surrounding. Object Processing Unit 93 may include Picture Recognizer 94a, Sound Recognizer 94b, Lidar Processing Unit 94c, Radar Processing Unit 94d, Sonar Processing Unit 94e, and/or other elements or functionalities as applicable. Object Processing Unit 93 may create or generate one or more (i.e. stream, etc.) Collections of Object Representations 525 comprising Object Representations 625, Object Properties 630, and/or other elements or information representing Objects 615 detected in Boat's 98b surrounding. '991 Application at [149:38-150:7].
and wherein at least a portion of the fourth correlation is learned in another learning process that includes:	The '991 Application supports wherein at least a portion of the fourth correlation is learned in another learning process. For example: Any number of Devices 98 may connect to such remote DCADO Unit 100 and the remote DCADO Unit 100 may learn their operations in circumstances including objects with various properties. '991 Application at [86:13-14]. For example, multiple operators {i.e. Users 50, etc.) may operate their Devices 98 where the Devices 98 may be configured to transmit their operations in circumstances including objects with various properties to a remote DCADO Unit 100. Such remote DCADO Unit 100 enables learning of the operators' collective knowledge of operating Device 98 in circumstances including objects with various properties. '991 Application at [86:20-24]. In some embodiments, DCADO Unit 100 may reside on Server 96 accessible over Network 95 as previously described. In such embodiments, any number of Loaders 98a may connect to such remote DCADO Unit 100 and the remote DCADO Unit 100 may learn their operations in

	circumstances including objects with various properties. In turn, any number of Loaders 98a can utilize the remote DCADO Unit 100 for autonomous operation in circumstances including objects with various properties. For example, multiple operators (i.e. Users 50, etc.) may operate their Loaders 98a that are configured to transmit their operations in circumstances including objects with various properties to a remote DCADO Unit 100. Such remote DCADO Unit 100 enables learning of the operators' collective knowledge of operating Loaders 98 in circumstances including objects with various properties. Any number of Loaders 98 can utilize such collective knowledge comprised in the remote DCADO Unit 100 for their autonomous operation. Any of the disclosed elements such as Artificial Intelligence Unit 110, Knowledgebase 530, and/or others may reside on Server 96, and any combination of local and remote elements can be implemented in alternate embodiments. ’991 Application at [147:38-148:10]. In certain embodiments, the artificial intelligence unit is further configured to: receive a second collection of object representations, the second collection of object representations including one or more representations of objects detected by the sensor; receive a second one or more instruction sets for operating the device; and learn the second collection of object representations correlated with the second one or more instruction sets for operating the device. ’991 Application at [14:6-10].

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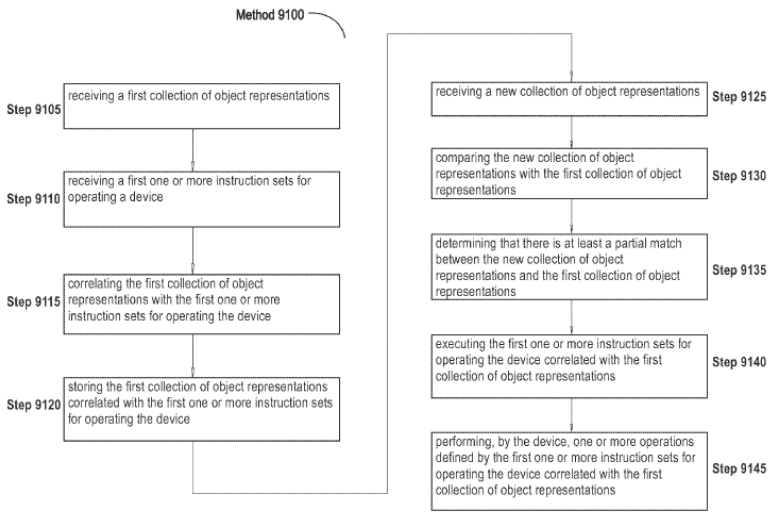


FIG. 32

’991 Application at [Fig. 32 – “learning process”].

Referring to Fig. 32, the illustration shows an embodiment of a method 9100 for learning and/or using a device's circumstances for autonomous device operation. in some aspects, the method can be used on a computing enabled device or system to enable learning of a device's operation in circumstances including objects with various properties and enable autonomous device operation in similar circumstances.

’991 Application at [135:14-17].

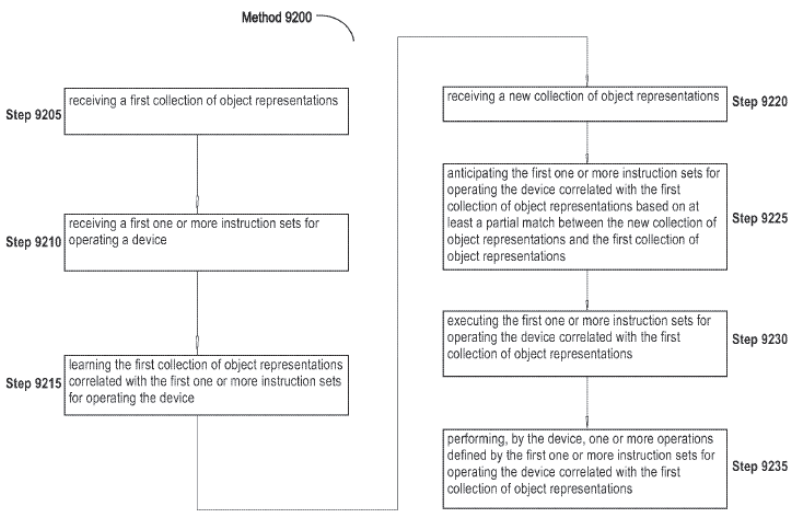


FIG. 33

’991 Application at [Fig. 33 – “another learning process”].

Referring to Fig. 33, the illustration shows an embodiment of a method 9200 for learning and/or using a device's circumstances for autonomous device operation. in some aspects, the method can be used on a computing enabled device or system to enable learning of a device's operation in circumstances including objects with various properties and enable autonomous device operation in similar circumstances.

’991 Application at [142:37-143:1].

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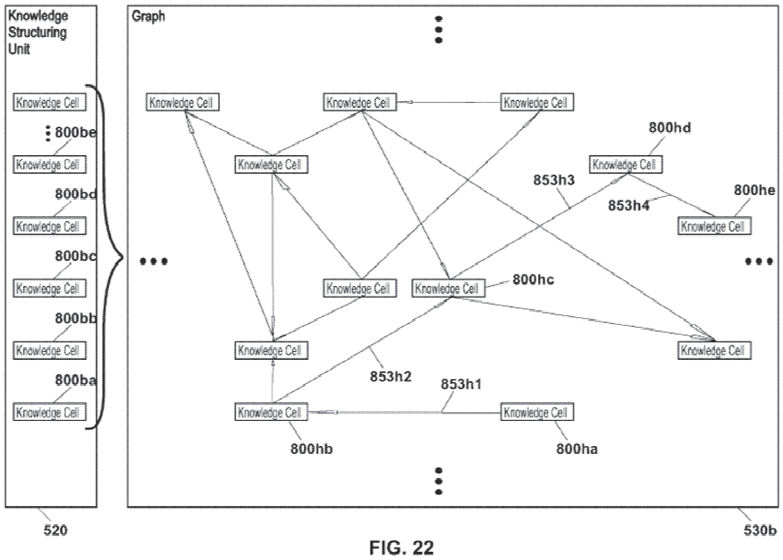


FIG. 22

’991 Application at [Fig. 22 – “learning process”].

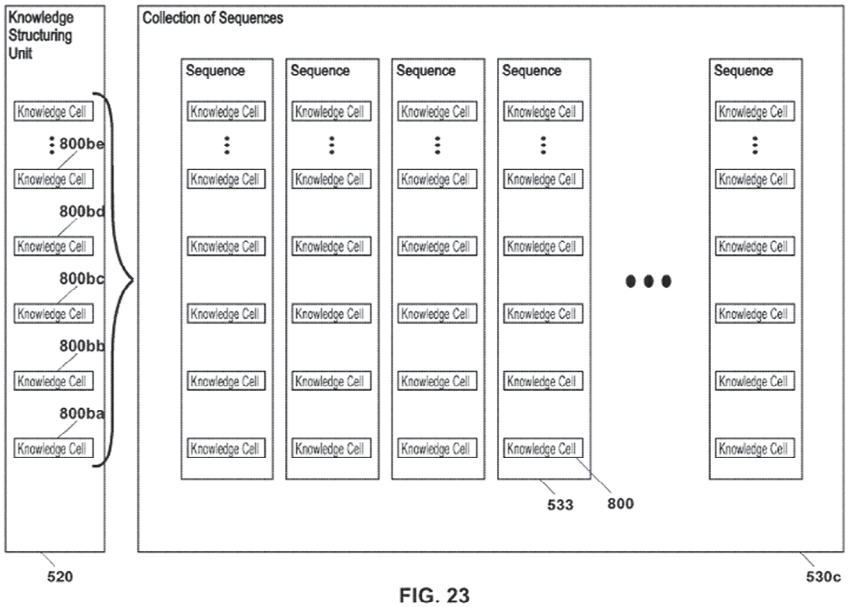


FIG. 23

’991 Application at [Fig. 23 – “another learning process”].

generating or receiving the	For example:

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fourth circumstance representation	In some embodiments; the first collection of object representations correlated with the first one or more instruction sets for operating the device include a knowledge of how the device operated in a circumstance. ’991 Application at [6:16-17]. Referring to Fig. 32, the illustration shows an embodiment of a method 9100 for learning and/or using a device's circumstances for autonomous device operation. in some aspects, the method can be used on a computing enabled device or system to enable learning of a device's operation in circumstances including objects with various properties and enable autonomous device operation in similar circumstances. ’991 Application at [135:14-17]. A collection of object representations may, therefore, include knowledge (i.e. unit of knowledge, etc.) of a device's circumstances including objects with various properties at a particular time. ’991 Application at [135:27-28]. DCADO Unit 100 comprises the functionality for learning the operation of Device 98 in circumstances including objects with various properties. DCADO Unit 100 comprises the functionality for structuring and/or storing this knowledge in a knowledgebase (i.e. neural network, graph, sequences, other repository, etc.). DCADO Unit 100 comprises the functionality for enabling autonomous operation of Device 98 in circumstances including objects with various properties. ’991 Application at [73:10-14]. Object Processing Unit 93 comprises the functionality for processing output from Sensor 92 to obtain information of interest, and/or other functionalities. As such, Object

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	Processing Unit 93 can be used to process output from Sensor 92 to detect objects and/or their properties in Device's 98 surrounding. In some embodiments, Object Processing Unit 93 comprises the functionality for creating or generating Collection of Object Representations 525 (also referred to as Coll of Obj Rep or other suitable name or reference) and storing one or more Object Representations 625 (also referred to simply as object representations, representations of objects, or other suitable name or reference), Object Properties 630 (also referred to simply as object properties or other suitable name or reference), and/or other elements or information into the Collection of Object Representations 525. As such, Collection of Object Representations 525 comprises the functionality for storing one or more Object Representations 625, Object Properties 630, and/or other elements or information. Object Representation 625 may include an electronic representation of an object (i.e. Object 615 [later described], etc.) detected in Device's 98 surrounding. In some aspects, Collection of Object Representations 525 includes one or more Object Representations 625, Object Properties 630, and/or other elements or information related to objects detected in Device's 98 surrounding at a particular time. Collection of Object Representations 525 may, therefore, include knowledge (i.e. unit of knowledge, etc.) of Device's 98 circumstances including objects with various properties at a particular time. in some designs, a Collection of Object Representations 525 may include or be associated with a time stamp (not shown), order (not shown), or other time related information. For example, one Collection of Object Representations 525 may be associated with time stamp t1, another Collection of Object Representations 525 may be associated with time stamp t2, and so on. Time stamps t1, t2, etc. may indicate the times of generating Collections of Object Representations 525, for instance. In other embodiments, Object Processing Unit 93 comprises the functionality for creating or generating a stream of Collections of Object Representations 525. A stream of Collections of Object Representations 525 may include

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	one Collection of Object Representations 525 or a group, sequence, or other plurality of Collections of Object Representations 525. In some aspects, a stream of Collections of Object Representations 525 includes one or more Collections of Object Representations 525, and/or other elements or information related to objects detected in Device's 98 surrounding over time. A stream of Collections of Object Representations 525 may, therefore, include knowledge (i.e. unit of knowledge, etc.) of Device's 98 circumstances including objects with various properties over time. As circumstances including objects with various properties in Device's 98 surrounding change (i.e. objects and/or their properties change, move, act, transform, etc.) over time, this change may be captured in a stream of Collections of Object Representations 525. In some designs, each Collection of Object Representations 525 in a stream may include or be associated with the aforementioned time stamp, order, or other time related information. For example, one Collection of Object Representations 525 in a stream may be associated with order 1, a next Collection of Object Representations 525 in 35 the stream may be associated with order 2, and so on. Orders 1, 2, etc. may indicate the orders or places of Collections of Object Representations 525 within a stream (Le. sequence, etc.), for instance. Examples of objects include biological objects (i.e. persons, animals, vegetation, etc.), nature objects (i.e. rocks, bodies of water, etc.), manmade objects (i.e. buildings, streets, ground/aerial/aquatic vehicles, etc.), and/or others. In some aspects, any part of an object may be detected as an object itself. For instance, instead of or in addition to detecting a vehicle as an object, a wheel and/or other parts of the vehicle may be detected as objects. In general, object may include any object or part thereof that can be detected. Examples of object properties include existence of an object, type of an object (i.e. person, cat, vehicle, building, street, tree, rock, etc.), identity of an object (i.e. name, identifier, etc.), distance of an object, bearing/angle of an object, location of an object (i.e. distance and bearing/angle from a known point. coordinates, etc.),

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	shape/size of an object (i.e. height, width, depth, computer model, point cloud, etc.), activity of an object (i.e. motion, gestures, etc.), and/or other properties of an object. Type of an object, for example, may include any classification of objects ranging from detailed such as person, cat, vehicle, building, street, tree, rock, etc. to generalized such as biological object, nature object, manmade object, etc., and/or others including their subtypes. Location of an object, for example, can include a relative location such as one defined by distance and bearing/angle from a known point or location (i.e. Device 98 location, etc.). Location of an object, for example, can also include absolute location such as one defined by object coordinates. In general, an object property may include any attribute of an object (i.e. existence of an object, type of an object, identity of an object, shape/size of an object, etc.), any relationship of an object with Device 98, other objects, or the environment (i.e. distance of an object, bearing/angle of an object, friend/foe relationship, etc.), and/or other information related to an object. In some implementations, Object Processing Unit 93 and/or any of its elements or functionalities can be included in Sensor 92. In other implementations, Object Processing Unit 93 and/or any of its elements or functionalities can be embedded into or operate on Processor 11. In further implementations, Object Processing Unit 93 and/or any of its elements or functionalities can be embedded into or operate in DCADO Unit 100, and/or other disclosed elements. Object Processing Unit 93 may be provided in any suitable configuration. Object Processing Unit 93 may include any signal processing techniques or elements known in art as applicable. ’991 Application at [65:3-66:20].

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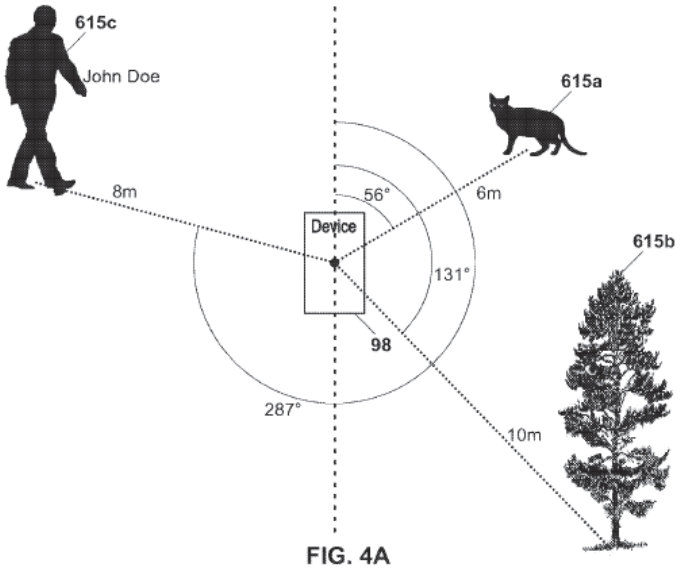


FIG. 4A

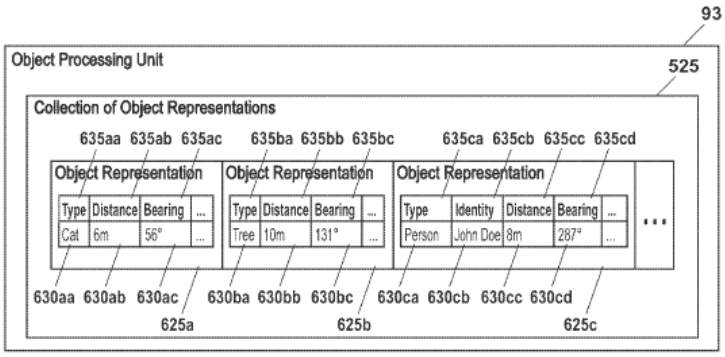


FIG. 4B

’991 Application at [Figs. 4A-4B].

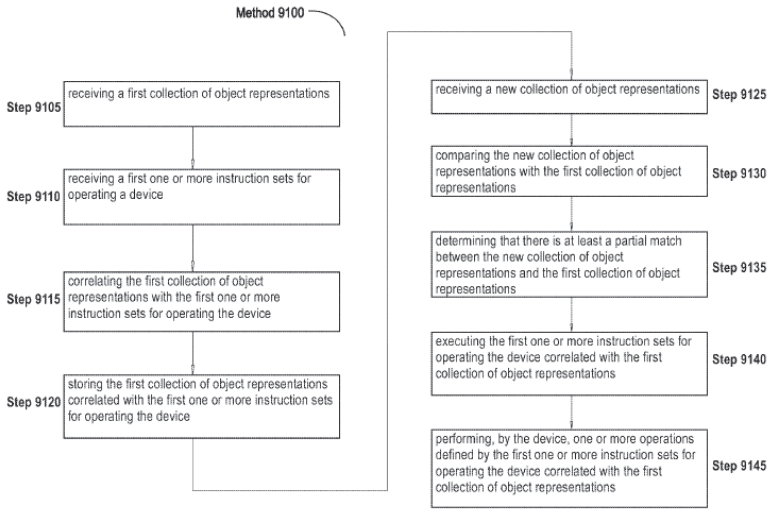
Referring to Figs. 4A-4B, an exemplary embodiment of Objects 615 (also referred to simply as objects or other suitable name or reference) detected in Device's 98 surrounding, and resulting Collection of Object Representations 525 are illustrated. As shown for example in Fig. 4A, Object 615a is detected. Object 615a may be recognized as a cat. Object 615a may be detected at a distance of 6m from Device 98. Object 615a may be detected at a bearing/angle of 56° from Device's 98 centerline. Furthermore, Object 615b is also detected. Object 615b may be recognized as a tree. Object 615b may be detected at a distance of 1 Om from Device 98. Object 615b may be detected at a bearing/angle of 131 ° from

	Device's 98 centerline. Furthermore, Object 615c is also detected. Object 615c may be recognized as a person. Object 615c may be identified as John Doe. Object 615c may be detected at a distance of 8m from Device 98. Object 615c may be detected at a bearing/angle of 287° from Device's 98 centerline. Any other Objects 615 instead of or in addition to Object 615a, Object 615b, and Object 615c may be detected. In some aspects, any features, functionalities, and embodiments of Camera 92a/Picture Recognizer 94a, Microphone 92b/Sound Recognizer 94b, and/or other sensors or techniques can be utilized for recognizing and/or identifying a person, a cat, a tree, and/or other Objects 615. In further aspects, any features, functionalities, and embodiments of Camera 92a/Picture Recognizer 94a, Microphone 92b/Sound Recognizer 94b, Lidar 92cilidar Processing Unit 94c, Radar 92d/Radar Processing Unit 94d, Sonar 92e/Sonar Processing Unit 94e, and/or other sensors or techniques can be utilized for detecting distance, bearing/angle, and/or other object properties. As shown for example in Fig. 4B, Object Processing Unit 93 may create or generate Collection of Object Representations 525 including Object Representation 625a representing Object 615a, Object Representation 625b representing Object 615b, Object Representation 625c representing Object 615c, etc. For instance, Object Representation 625a may include Object Property 630aa "Cat" in Category 635aa "Type", Object Property 630ab "6m" in Category 635ab "Distance", Object Property 630ac "56°" in Category 635ac "Bearing", etc. Also, Object Representation 625b may include Object Property 630ba "Tree" in Category 635ba "Type", Object Property 630bb "1 Om" in Category 635bb "Distance", Object Property 630bc "131 °" in Category 635bc "Bearing", etc. Also, Object Representation 625c may include Object Property 630ca "Person" in Category 635ca "Type", Object Property 630cb "John Doe" in Category 635cb "Identity", Object Property 630cc "Sm" in Category 635cc "Distance", Object Property 630cd "287°;' in Category 635cd "Bearing"; etc. Any number of Object Representations 625, and/or other elements or information

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	can be included in Collection of Object Representations 525. Any number of Object Properties 630 (also referred to simply as object properties or other suitable name or reference), and/or other elements or information can be included in an Object Representation 625. In some aspects, a reference to Collection of Object Representations 525 comprises a reference to a collection of Object Properties 630 and/or other elements or information related to one or more Objects 615. Other additional Object Representations 625, Object Properties 630, elements, and/or information can be included as needed, or some of the disclosed ones can be excluded, or a combination thereof can be utilized in alternate embodiments of Collection of Object Representations 525. '991 Application at [72:14-73:8]. In certain embodiments, the artificial intelligence unit is further configured to: receive a second collection of object representations, the second collection of object representations including one or more representations of objects detected by the sensor; receive a second one or more instruction sets for operating the device; and learn the second collection of object representations correlated with the second one or more instruction sets for operating the device. '991 Application at [14:6-10]. In some embodiments, Object Processing Unit 93 comprises the functionality for creating or generating Collection of Object Representations 525 (also referred to as Coll of Obj Rep or other suitable name or reference) '991 Application at [65:5-7]. Object Processing Unit 93 may create or generate one or more (i.e. stream, etc.) Collections of Object Representations 525 comprising Object Representations 625, Object Properties 630, and/or other elements or

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	information representing Objects 615 detected in Loader's 98a surrounding. ’991 Application at [146:35-37]. In the future, DCADO Unit 110 may compare incoming Collections of Object Representations 525 representing Objects 615 detected in Loader's 98a surrounding with previously learned Collections of Object Representations 525 including optionally using any Extra Info 527 for enhanced decision making. ’991 Application at [147:25-26].  FIG. 32 ’991 Application at [Fig. 32]. At step 9125, a new collection of object representations is received. Step 9125 may include any action or operation described in Step 9105 as applicable. ’991 Application at [139:13-14].

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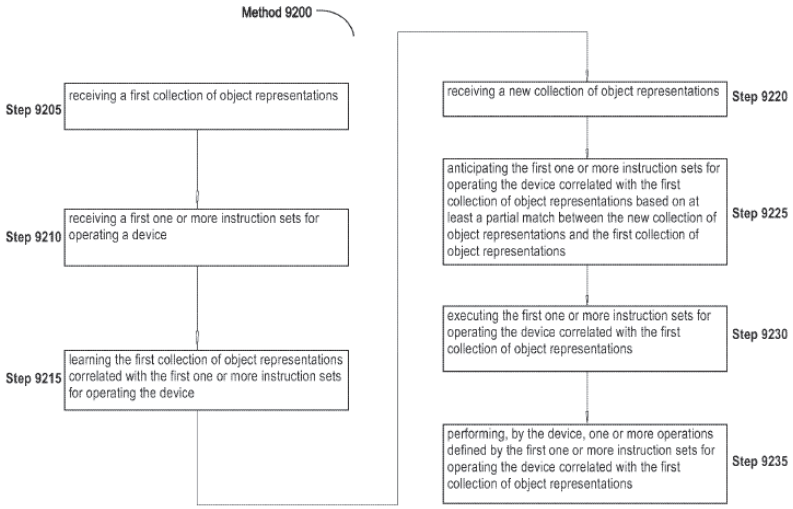


FIG. 33

’991 Application at [Fig. 33].

At step 9220, a new collection of object representations is received. Step 9220 may include any action or operation described in Step 9125 of method 9100 as applicable.

’991 Application at [143:12-13].

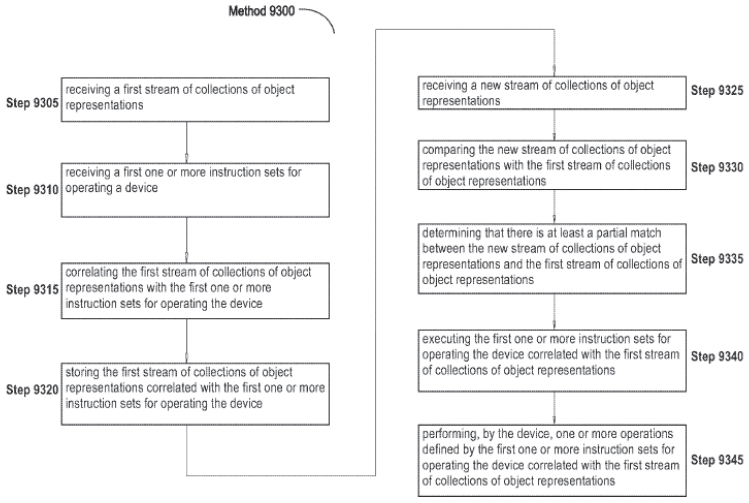


FIG. 34

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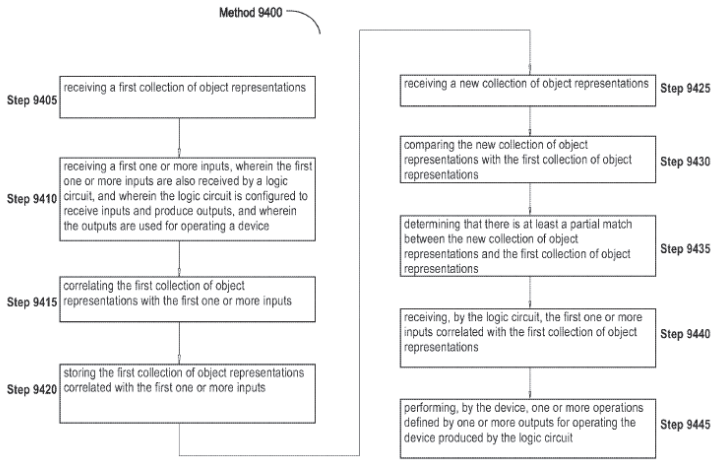


FIG. 35

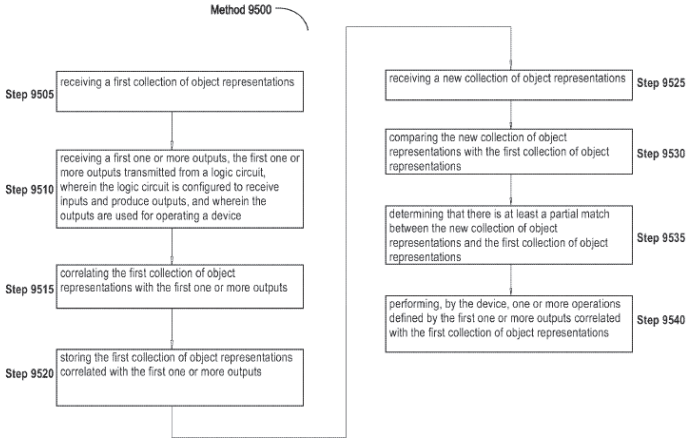


FIG. 36

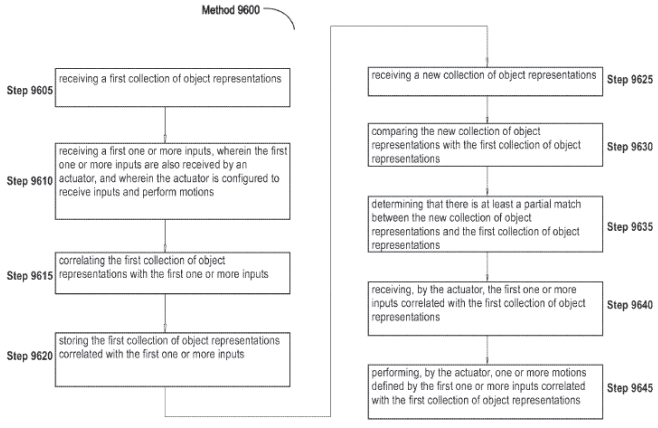
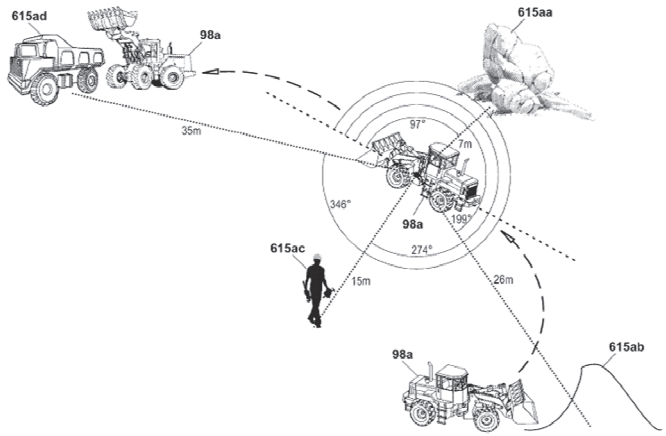


FIG. 37

’991 Application at [Figs. 34-37].

	In some aspects, an object processing unit may create or generate a collection of object representations. In other aspects, an object processing unit may create or generate a stream of collections of object representations. '991 Application at [136:24-26]. For example, one Collection of Object Representations 525 may be associated with time stamp t1, another Collection of Object Representations 525 may be associated with time stamp t2, and so on. Time stamps t1, t2, etc. may indicate the times of generating Collections of Object Representations 525, for instance. '991 Application at [65:19-22].
obtaining or receiving the fourth one or more instruction sets for operating the second device.	The '991 Application supports obtaining or receiving the fourth one or more instruction sets for operating the second device. For example: For example, a Device 98 including or interfaced with DCADO Unit 100 having access to a combined Knowledgebase 530 can use the collective knowledge learned from multiple Devices 98 for the Device's 98 autonomous operation. '991 Application at [93:21-23]. Any number of Devices 98 may connect to such remote DCADO Unit 100 and the remote DCADO Unit 100 may learn their operations in circumstances including objects with various properties. '991 Application at [86:13-14]. For example, multiple operators {i.e. Users 50, etc.) may operate their Devices 98 where the Devices 98 may be configured to transmit their operations in circumstances including objects with various properties to a remote DCADO Unit 100. Such remote DCADO Unit 100 enables

	learning of the operators' collective knowledge of operating Device 98 in circumstances including objects with various properties. ’991 Application at [86:20-24].  FIG. 38 ’991 Application at [Fig. 38 – “first device”: Loader 98a]. DCADO Unit 100 can obtain Instruction Sets 526 used or executed by Logic Circuit 250, Processor 11, Application Program 18, and/or other processing element. ’991 Application at [147:11-13 – obtaining/receiving instruction sets for operating a first device Loader 98a].

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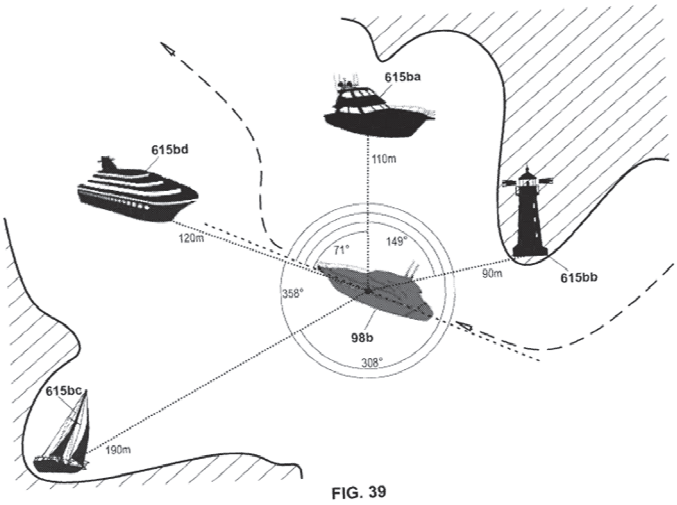


FIG. 39

’991 Application at [Fig. 39 – “second device”: Boat 98b].

DCADO Unit 100 can obtain Instruction Sets 526 used or executed by Logic Circuit 250, Processor 11, Application Program 18, and/or other processing element.

’991 Application at [150:19-20 – obtaining/receiving instruction sets for operating a second device Boat 98b].

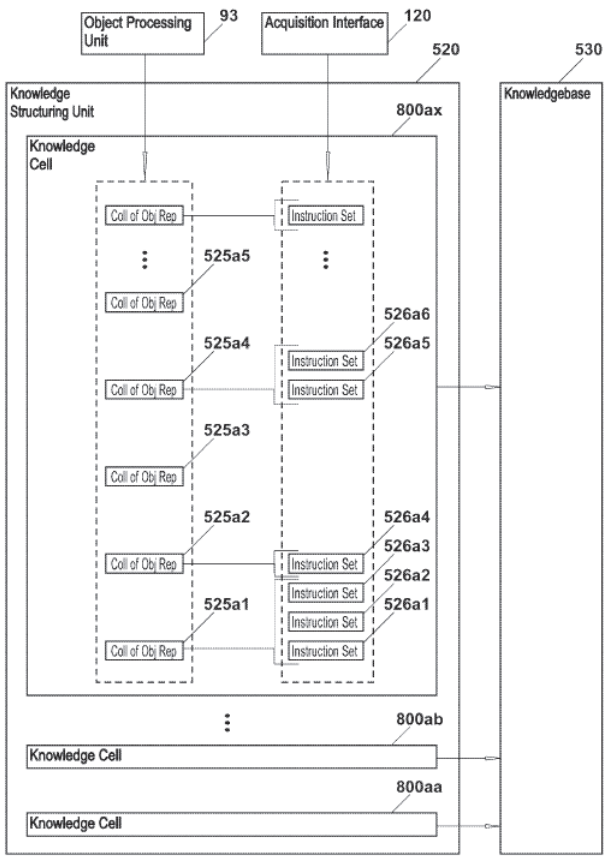
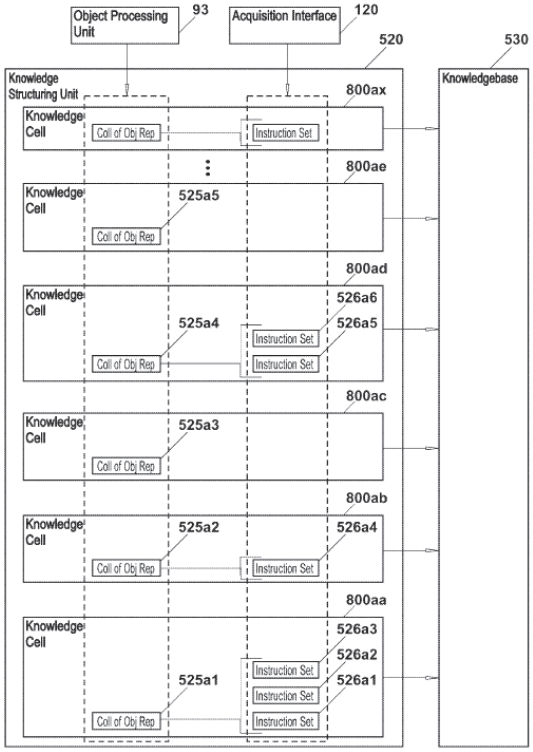


FIG. 13

’991 Application at [Fig. 13].

For example, Knowledge Structuring Unit 520 may create Knowledge Cell 800ax and structure within it Collection of Object Representations 525a1 correlated with Instruction Sets 526a1-526a3 and/or any Extra Info 527 (not shown). Knowledge Structuring Unit 520 may further structure within Knowledge Cell 800ax a Collection of Object Representations 525a2 correlated with Instruction Set 526a4 and/or any Extra Info 527 (not shown). Knowledge Structuring Unit 520 may further structure within Knowledge Cell 800ax a Collection of Object Representations 525a3 without a correlated Instruction Set 526 and/or Extra Info 527. Knowledge Structuring Unit 520 may further structure within Knowledge Cell 800ax a Collection of Object Representations 525a4 correlated with Instruction Sets 526a5-526a6 and/or any Extra Info

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	527 (not shown). Knowledge Structuring Unit 520 may further structure within Knowledge Cell 800ax a Collection of Object Representations 525a5 without a correlated Instruction Set 526 and/or Extra Info 527. Knowledge Structuring Unit 520 may structure within Knowledge Cell 800ax additional Collections of Object Representations 525 correlated with any number {including zero [i.e. uncorrelated]) of Instruction Sets 526 and/or Extra Info 527 by following similar logic as described above. '991 Application at [89:20-32].  FIG. 14

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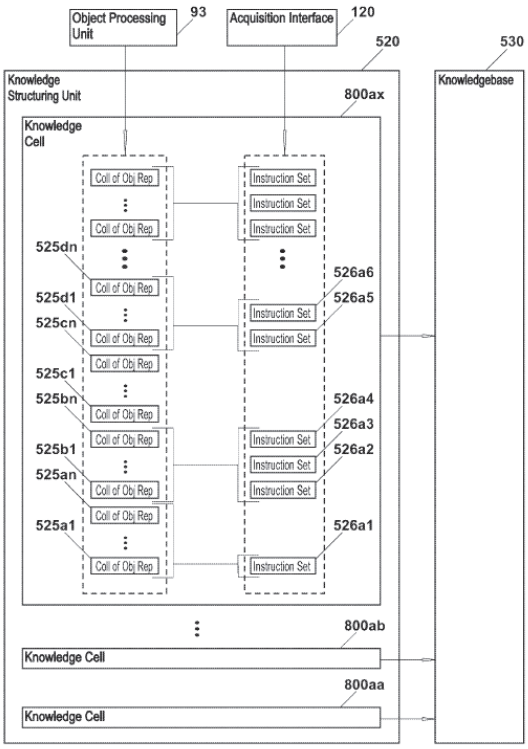


FIG. 15

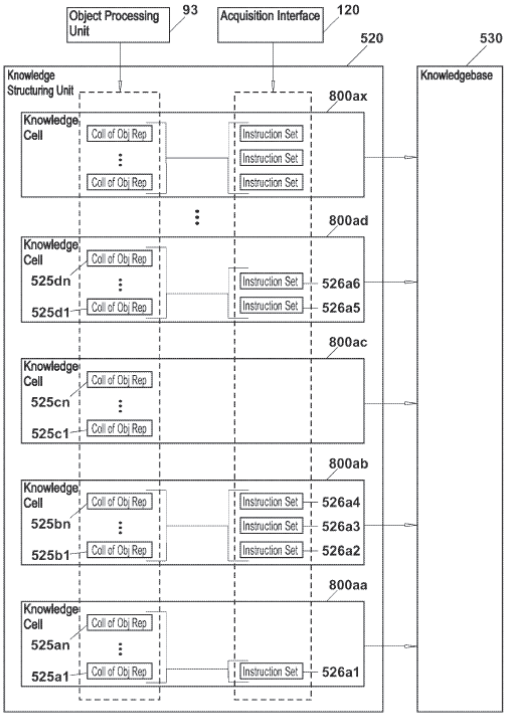


FIG. 16

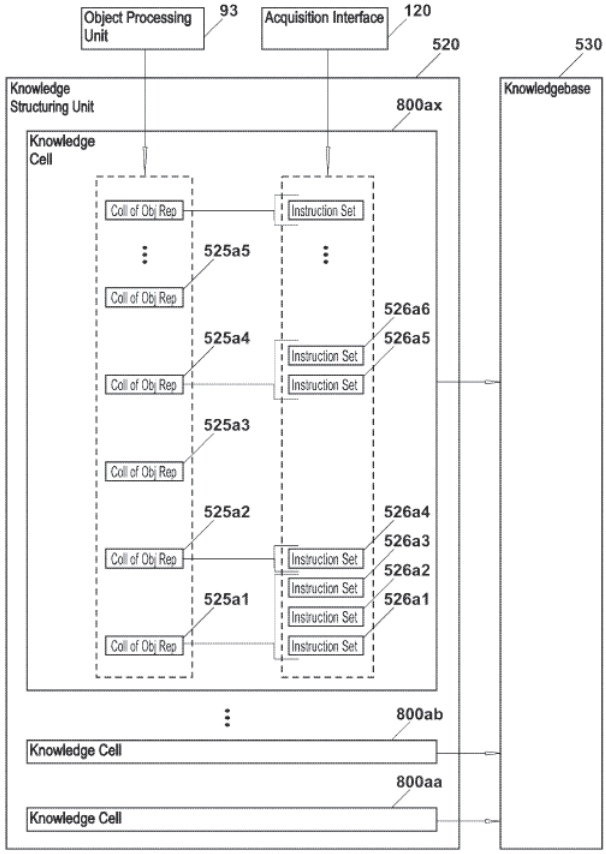
’991 Application at [Figs. 14-16].

	A collection of object representations correlated with one or more instruction sets may be part of a stored plurality of collections of object representations correlated with one or more instruction sets. '991 Application at [138:25-27].
Substitute Claim 22	
wherein the anticipating the first one or more instruction sets for operating the first device learned in the learning process based on the at least partial match between the third circumstance representation and the first circumstance representation includes: determining that a number of at least partially matching portions of the third circumstance representation and portions of the first circumstance representation	The '991 Application supports wherein the anticipating the first one or more instruction sets for operating the first device learned in the learning process based on the at least partial match between the third circumstance representation and the first circumstance representation includes: determining that a number of at least partially matching portions of the third circumstance representation and portions of the first circumstance representation exceeds a threshold number, or determining that a percentage of at least partially matching portions of the third circumstance representation and portions of the first circumstance representation exceeds a threshold percentage. For example: The substantial similarity may be achieved when a number or a percentage of matching or partially matching portions of the new collection of object representations and portions of the first collection of object representations exceeds a threshold number or threshold percentage. '991 Application at [8:20-22]. In another example, substantial similarity can be achieved when at least a threshold number (i.e. 1, 2, 4, 7, 18, etc.) or percentage (i.e. 41 %, 62%, 79%, 85%, 93%, etc.) of Object Representations 625 or portions thereof from the compared Collections of Object Representations 525 match or substantially match. Similarly, substantial similarity can be achieved when the number or percentage of matching or substantially matching Object Representations 625 or portions thereof from the compared Collections of Object Representations 525 exceeds a threshold number (i.e. 1, 2, 4, 7, 18, etc.) or a threshold

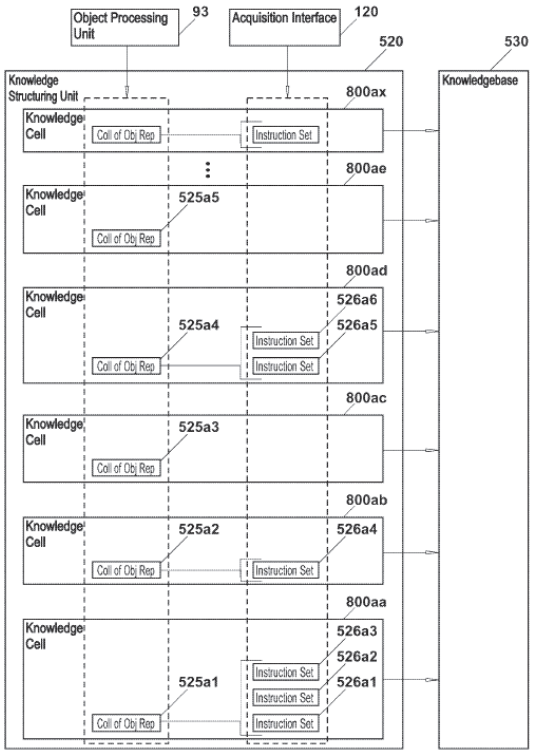
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exceeds a threshold number, or determining that a percentage of at least partially matching portions of the third circumstance representation and portions of the first circumstance representation exceeds a threshold percentage.	percentage (i.e. 41 %, 62%, 79%, 85%, 93%, etc.). ’991 Application at [101:2-8].
Substitute Claim 23	
wherein the knowledgebase further includes a fourth correlation including a fourth circumstance representation correlated with a fourth one or more instruction sets for operating: the first device, the second device, or a third device,	The ’911 Application supports wherein the knowledgebase further includes a fourth correlation including a fourth circumstance representation correlated with a fourth one or more instruction sets for operating: the first device, the second device, or a third device. For example:

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device	 FIG. 13 ’991 Application at [Fig. 13]. For example, Knowledge Structuring Unit 520 may create Knowledge Cell 800ax and structure within it Collection of Object Representations 525a1 correlated with Instruction Sets 526a1-526a3 and/or any Extra Info 527 (not shown). Knowledge Structuring Unit 520 may further structure within Knowledge Cell 800ax a Collection of Object Representations 525a2 correlated with Instruction Set 526a4 and/or any Extra Info 527 (not shown). Knowledge Structuring Unit 520 may further structure within Knowledge Cell 800ax a Collection of Object Representations 525a3 without a correlated Instruction Set 526 and/or Extra Info 527. Knowledge Structuring Unit 520 may further structure within Knowledge Cell 800ax a Collection of Object Representations 525a4 correlated with Instruction Sets 526a5-526a6 and/or any Extra Info

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	527 (not shown). Knowledge Structuring Unit 520 may further structure within Knowledge Cell 800ax a Collection of Object Representations 525a5 without a correlated Instruction Set 526 and/or Extra Info 527. Knowledge Structuring Unit 520 may structure within Knowledge Cell 800ax additional Collections of Object Representations 525 correlated with any number {including zero [i.e. uncorrelated]) of Instruction Sets 526 and/or Extra Info 527 by following similar logic as described above. '991 Application at [89:20-32].  FIG. 14

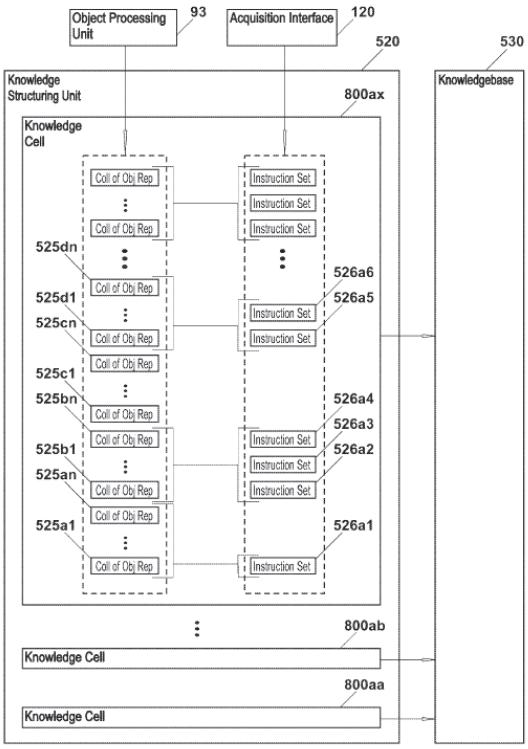


FIG. 15

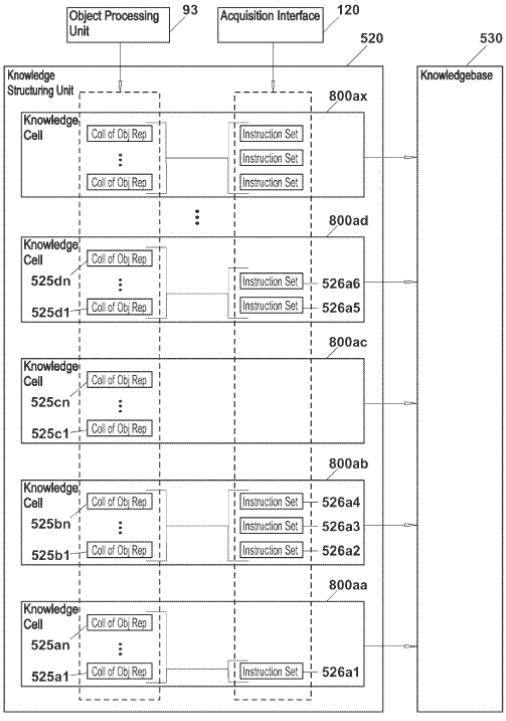
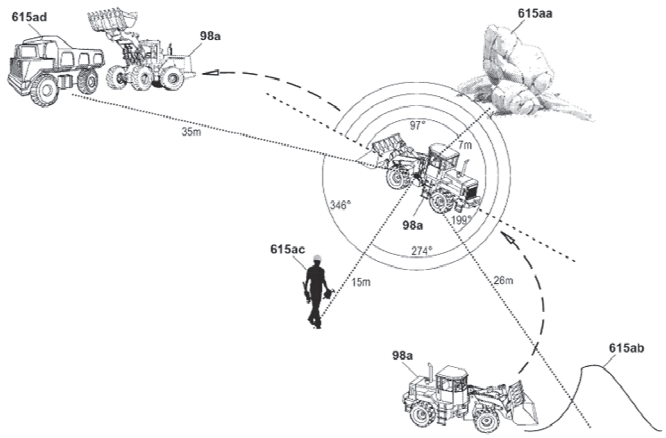


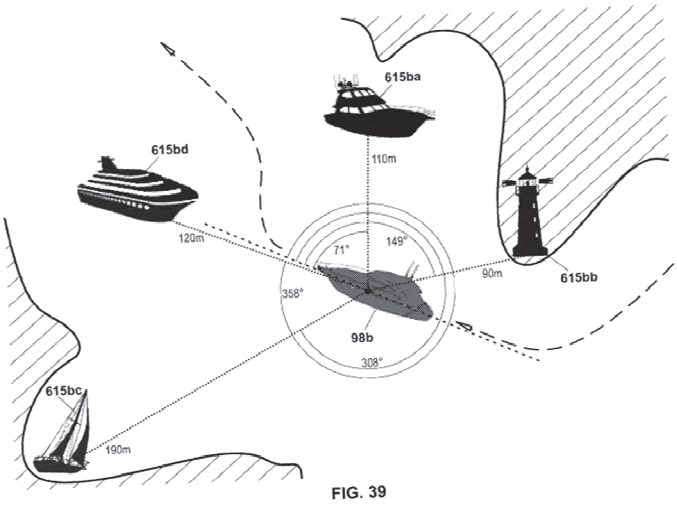
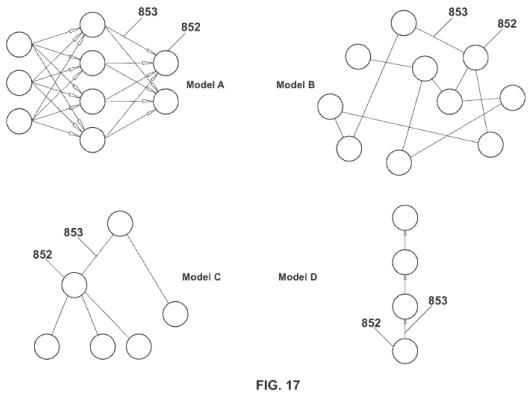
FIG. 16

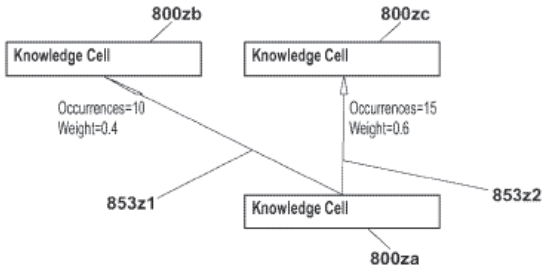
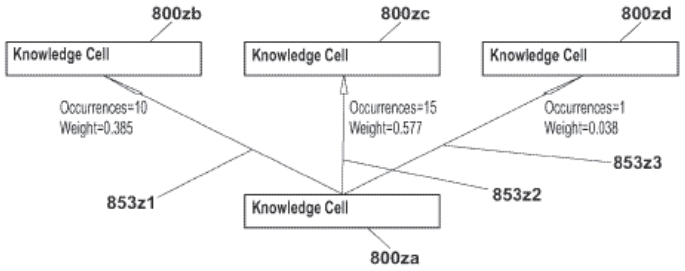
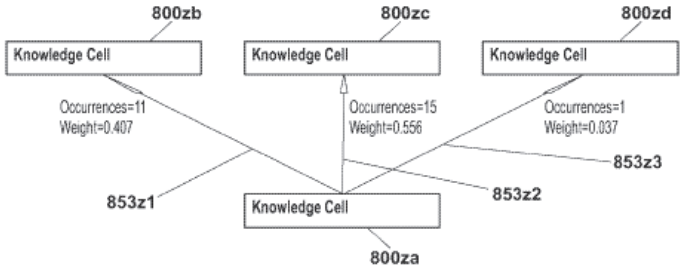
’991 Application at [Figs. 14-16].

	A collection of object representations correlated with one or more instruction sets may be part of a stored plurality of collections of object representations correlated with one or more instruction sets. ’991 Application at [138:25-27]. For example, a Device 98 including or interfaced with DCADO Unit 100 having access to a combined Knowledgebase 530 can use the collective knowledge learned from multiple Devices 98 for the Device's 98 autonomous operation. ’991 Application at [93:21-23]. Any number of Devices 98 may connect to such remote DCADO Unit 100 and the remote DCADO Unit 100 may learn their operations in circumstances including objects with various properties. ’991 Application at [86:13-14]. For example, multiple operators {i.e. Users 50, etc.) may operate their Devices 98 where the Devices 98 may be configured to transmit their operations in circumstances including objects with various properties to a remote DCADO Unit 100. Such remote DCADO Unit 100 enables learning of the operators' collective knowledge of operating Device 98 in circumstances including objects with various properties. ’991 Application at [86:20-24]. In some embodiments, DCADO Unit 100 may reside on Server 96 accessible over Network 95 as previously described. In such embodiments, any number of Loaders 98a may connect to such remote DCADO Unit 100 and the remote DCADO Unit 100 may learn their operations in circumstances including objects with various properties. In

	turn, any number of Loaders 98a can utilize the remote DCADO Unit 100 for autonomous operation in circumstances including objects with various properties. For example, multiple operators (i.e. Users 50, etc.) may operate their Loaders 98a that are configured to transmit their operations in circumstances including objects with various properties to a remote DCADO Unit 100. Such remote DCADO Unit 100 enables learning of the operators' collective knowledge of operating Loaders 98 in circumstances including objects with various properties. Any number of Loaders 98 can utilize such collective knowledge comprised in the remote DCADO Unit 100 for their autonomous operation. Any of the disclosed elements such as Artificial Intelligence Unit 110, Knowledgebase 530, and/or others may reside on Server 96, and any combination of local and remote elements can be implemented in alternate embodiments. ’991 Application at [147:38-148:10].  FIG. 38 ’991 Application at [Fig. 38 – “first device”: Loader 98a].

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	 FIG. 39 ’991 Application at [Fig. 39 – “second device”: Boat 98b].  FIG. 17 ’991 Application at [Fig. 17].
wherein a first connection is generated to connect the first correlation with the second correlation, and wherein a second	The ’991 Application supports wherein a first connection is generated to connect the first correlation with the second correlation, and wherein a second connection is generated to connect the second correlation with the fourth correlation. For example: As such, machine learning, knowledge structuring or representation, decision making, pattern recognition, and/or other artificial intelligence functionalities may include a network of Nodes 852 (also referred to as neurons, etc.) and Connections 853 similar to that of a

connection is generated to connect the second correlation with the fourth correlation.	brain. ’991 Application at [93:35-37].  FIG. 18A  FIG. 18B  FIG. 18C ’991 Application at [Fig. 18A-18C]. Referring to Figs. 18A-18C, embodiments of interconnected Knowledge Cells 800 and updating weights of Connections 853 are illustrated. As shown for example in Fig. 18A, Knowledge Cell 800za is connected to Knowledge Cell 800zb and Knowledge Cell 800zc by Connection 853z1 and Connection 853z2, respectively.

’991 Application at [96:3-5].

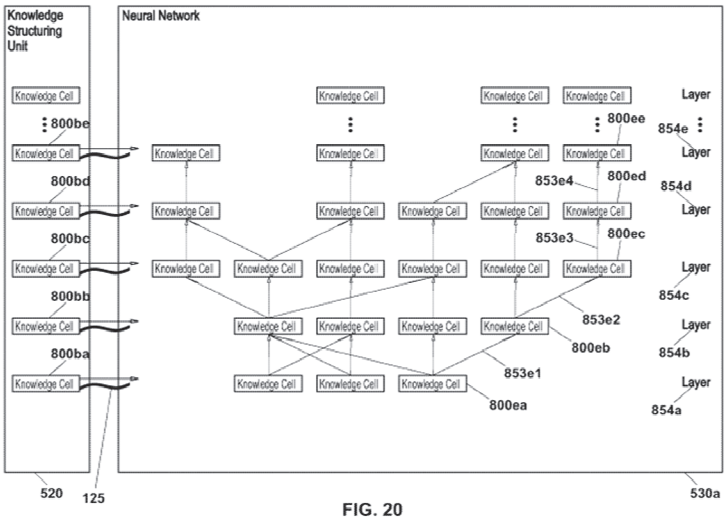


FIG. 20

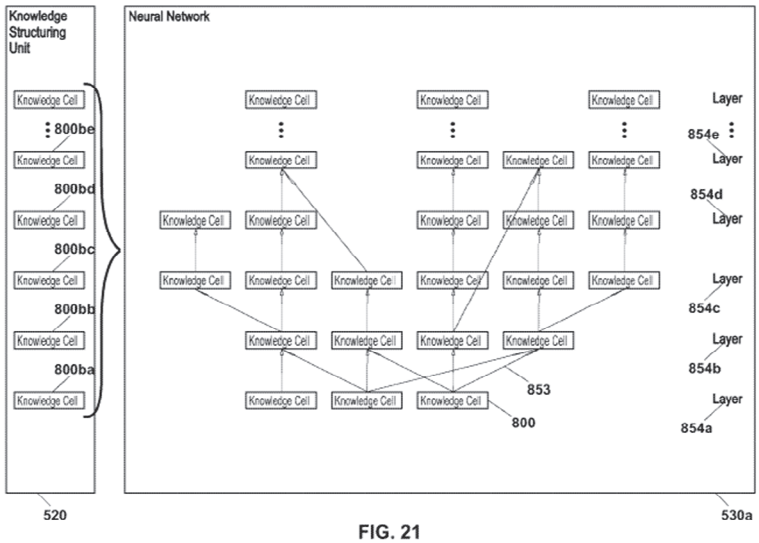


FIG. 21

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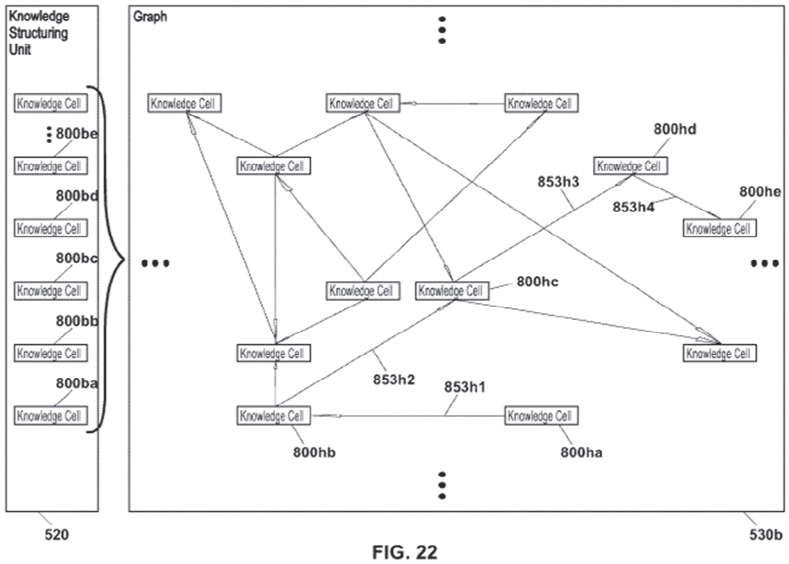


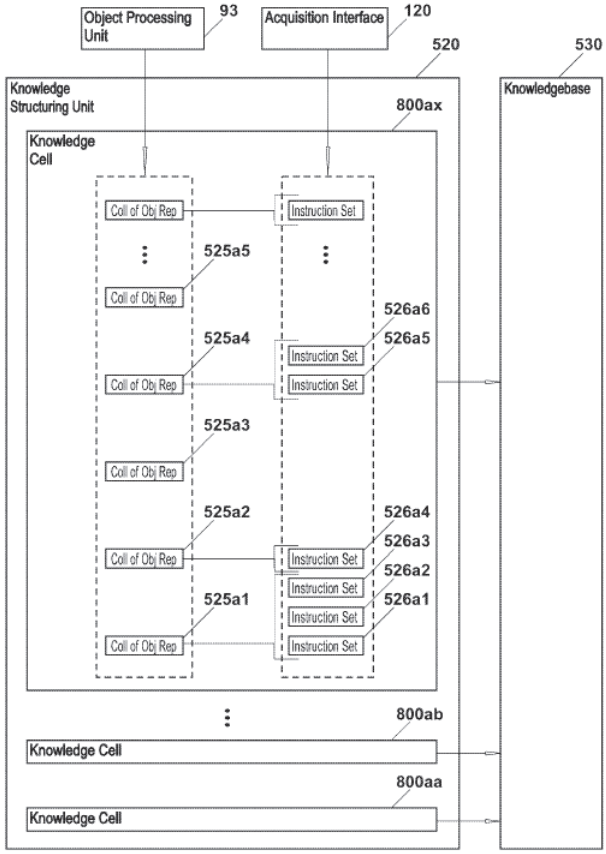
FIG. 22

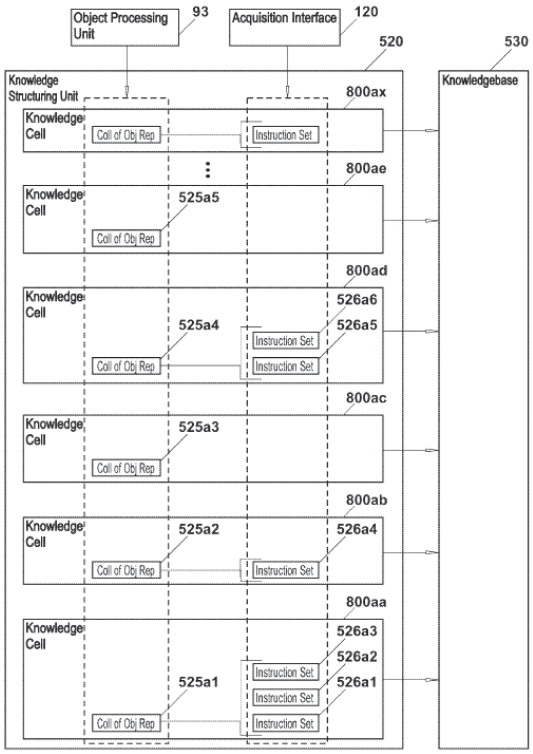
’991 Application at [Figs. 20-22].

In further embodiments, the learning the first collection of object representations correlated with the first one or more instruction sets for operating the device and the learning the second collection of object representations correlated with the second one or more instruction sets for operating the device include creating a connection between the first collection of object representations correlated with the first one or more instruction sets for operating the device and the second collection of object representations correlated with the second one or more instruction sets for operating the device.

’991 Application at [14:14-19].

Substitute Claim 24

wherein the knowledgebase further includes a fourth correlation including a fourth circumstance representation correlated with a fourth one or more instruction sets for operating the second device	 FIG. 13 ’991 Application at [Fig. 13]. For example, Knowledge Structuring Unit 520 may create Knowledge Cell 800ax and structure within it Collection of Object Representations 525a1 correlated with Instruction Sets 526a1-526a3 and/or any Extra Info 527 (not shown). Knowledge Structuring Unit 520 may further structure within Knowledge Cell 800ax a Collection of Object Representations 525a2 correlated with Instruction Set 526a4 and/or any Extra Info 527 (not shown). Knowledge Structuring Unit 520 may further structure within Knowledge Cell 800ax a Collection of Object Representations 525a3 without a correlated Instruction Set 526 and/or Extra Info 527. Knowledge Structuring Unit 520 may further structure within Knowledge Cell 800ax a Collection of Object Representations 525a4 correlated with Instruction Sets 526a5-526a6 and/or any Extra Info

	527 (not shown). Knowledge Structuring Unit 520 may further structure within Knowledge Cell 800ax a Collection of Object Representations 525a5 without a correlated Instruction Set 526 and/or Extra Info 527. Knowledge Structuring Unit 520 may structure within Knowledge Cell 800ax additional Collections of Object Representations 525 correlated with any number {including zero [i.e. uncorrelated]) of Instruction Sets 526 and/or Extra Info 527 by following similar logic as described above. '991 Application at [89:20-32].  FIG. 14

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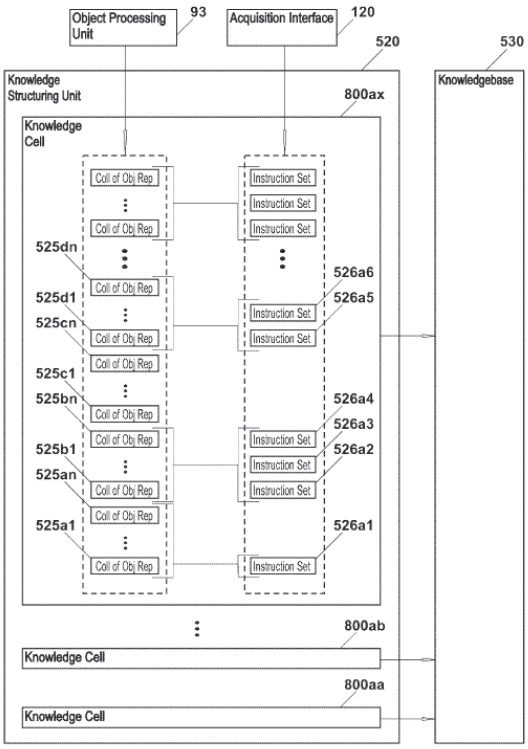


FIG. 15

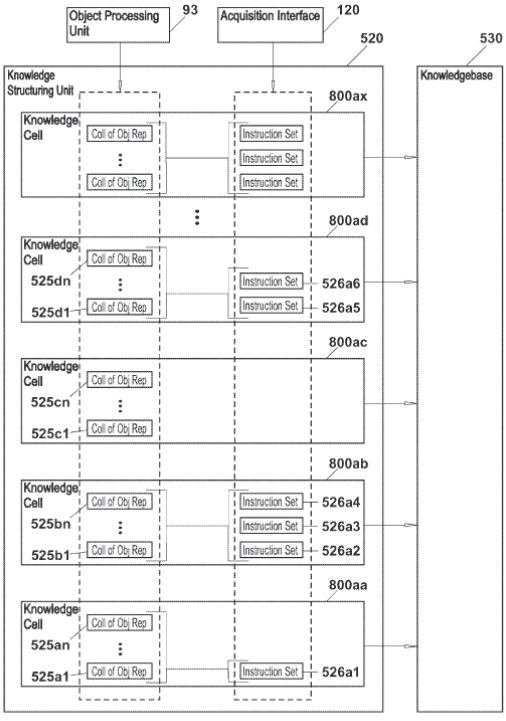
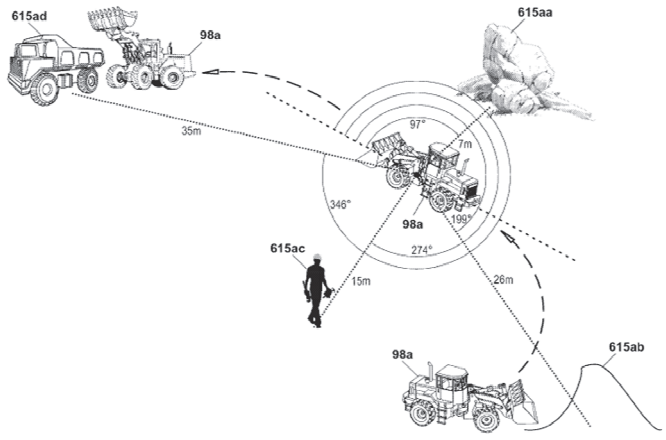


FIG. 16

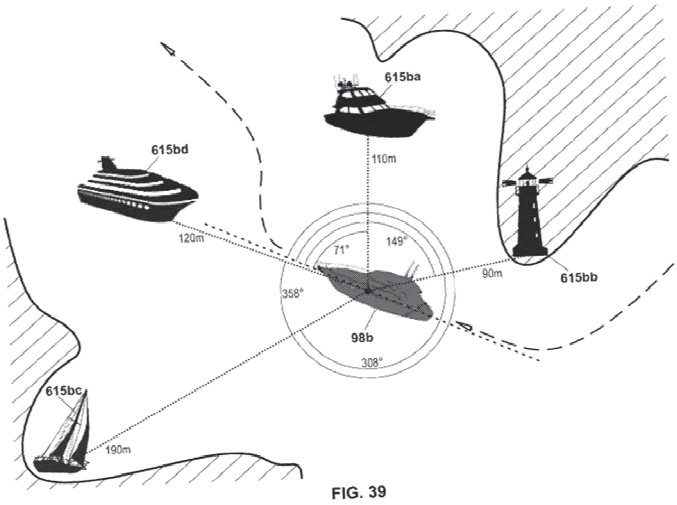
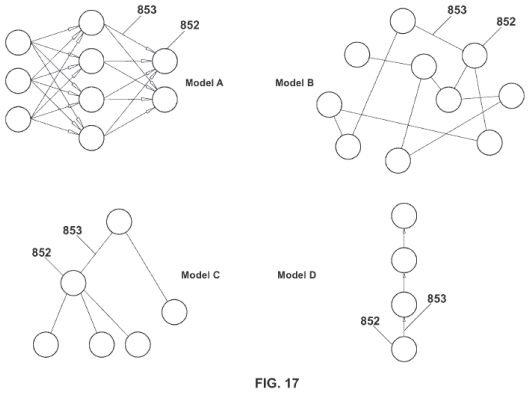
’991 Application at [Figs. 14-16].

	A collection of object representations correlated with one or more instruction sets may be part of a stored plurality of collections of object representations correlated with one or more instruction sets. ’991 Application at [138:25-27]. For example, a Device 98 including or interfaced with DCADO Unit 100 having access to a combined Knowledgebase 530 can use the collective knowledge learned from multiple Devices 98 for the Device's 98 autonomous operation. ’991 Application at [93:21-23]. Any number of Devices 98 may connect to such remote DCADO Unit 100 and the remote DCADO Unit 100 may learn their operations in circumstances including objects with various properties. ’991 Application at [86:13-14]. For example, multiple operators {i.e. Users 50, etc.) may operate their Devices 98 where the Devices 98 may be configured to transmit their operations in circumstances including objects with various properties to a remote DCADO Unit 100. Such remote DCADO Unit 100 enables learning of the operators' collective knowledge of operating Device 98 in circumstances including objects with various properties. ’991 Application at [86:20-24]. In some embodiments, DCADO Unit 100 may reside on Server 96 accessible over Network 95 as previously described. In such embodiments, any number of Loaders 98a may connect to such remote DCADO Unit 100 and the remote DCADO Unit 100 may learn their operations in circumstances including objects with various properties. In turn, any number of Loaders 98a can utilize the remote

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	DCADO Unit 100 for autonomous operation in circumstances including objects with various properties. For example, multiple operators (i.e. Users 50, etc.) may operate their Loaders 98a that are configured to transmit their operations in circumstances including objects with various properties to a remote DCADO Unit 100. Such remote DCADO Unit 100 enables learning of the operators' collective knowledge of operating Loaders 98 in circumstances including objects with various properties. Any number of Loaders 98 can utilize such collective knowledge comprised in the remote DCADO Unit 100 for their autonomous operation. Any of the disclosed elements such as Artificial Intelligence Unit 110, Knowledgebase 530, and/or others may reside on Server 96, and any combination of local and remote elements can be implemented in alternate embodiments. '991 Application at [147:38-148:10].  FIG. 38 '991 Application at [Fig. 38 – "first device": Loader 98a].

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	 FIG. 39 '991 Application at [Fig. 39 – "second device": Boat 98b].  FIG. 17 '991 Application at [Fig. 17].
and wherein the fourth circumstance representation represents a fourth circumstance detected at least in part by the one or more sensors	*See* [Fig. 2], [Figs. 3A-3E], [62:33-63:14], [63:15-64:36], Object Processing Unit 93 comprises the functionality for processing output from Sensor 92 to obtain information of interest, and/or other functionalities. As such, Object Processing Unit 93 can be used to process output from Sensor 92 to detect objects and/or their properties in Device's 98 surrounding. In some embodiments, Object Processing Unit 93 comprises the functionality for creating or generating Collection of Object Representations 525 (also referred to as Coll of Obj Rep or other suitable name

of the second device	or reference) and storing one or more Object Representations 625 (also referred to simply as object representations, representations of objects, or other suitable name or reference), Object Properties 630 (also referred to simply as object properties or other suitable name or reference), and/or other elements or information into the Collection of Object Representations 525. As such, Collection of Object Representations 525 comprises the functionality for storing one or more Object Representations 625, Object Properties 630, and/or other elements or information. Object Representation 625 may include an electronic representation of an object (i.e. Object 615 [later described], etc.) detected in Device's 98 surrounding. In some aspects, Collection of Object Representations 525 includes one or more Object Representations 625, Object Properties 630, and/or other elements or information related to objects detected in Device's 98 surrounding at a particular time. Collection of Object Representations 525 may, therefore, include knowledge (i.e. unit of knowledge, etc.) of Device's 98 circumstances including objects with various properties at a particular time. in some designs, a Collection of Object Representations 525 may include or be associated with a time stamp (not shown), order (not shown), or other time related information. For example, one Collection of Object Representations 525 may be associated with time stamp t1, another Collection of Object Representations 525 may be associated with time stamp t2, and so on. Time stamps t1, t2, etc. may indicate the times of generating Collections of Object Representations 525, for instance. In other embodiments, Object Processing Unit 93 comprises the functionality for creating or generating a stream of Collections of Object Representations 525. A stream of Collections of Object Representations 525 may include one Collection of Object Representations 525 or a group, sequence, or other plurality of Collections of Object Representations 525. In some aspects, a stream of Collections of Object Representations 525 includes one or more Collections of Object Representations 525, and/or other elements or information related to objects detected in

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	Device's 98 surrounding over time. A stream of Collections of Object Representations 525 may, therefore, include knowledge (i.e. unit of knowledge, etc.) of Device's 98 circumstances including objects with various properties over time. As circumstances including objects with various properties in Device's 98 surrounding change (i.e. objects and/or their properties change, move, act, transform, etc.) over time, this change may be captured in a stream of Collections of Object Representations 525. In some designs, each Collection of Object Representations 525 in a stream may include or be associated with the aforementioned time stamp, order, or other time related information. For example, one Collection of Object Representations 525 in a stream may be associated with order 1, a next Collection of Object Representations 525 in 35 the stream may be associated with order 2, and so on. Orders 1, 2, etc. may indicate the orders or places of Collections of Object Representations 525 within a stream (Le. sequence, etc.), for instance. Examples of objects include biological objects (i.e. persons, animals, vegetation, etc.), nature objects (i.e. rocks, bodies of water, etc.), manmade objects (i.e. buildings, streets, ground/aerial/aquatic vehicles, etc.), and/or others. In some aspects, any part of an object may be detected as an object itself. For instance, instead of or in addition to detecting a vehicle as an object, a wheel and/or other parts of the vehicle may be detected as objects. In general, object may include any object or part thereof that can be detected. Examples of object properties include existence of an object, type of an object (i.e. person, cat, vehicle, building, street, tree, rock, etc.), identity of an object (i.e. name, identifier, etc.), distance of an object, bearing/angle of an object, location of an object (i.e. distance and bearing/angle from a known point. coordinates, etc.), shape/size of an object (i.e. height, width, depth, computer model, point cloud, etc.), activity of an object (i.e. motion, gestures, etc.), and/or other properties of an object. Type of an object, for example, may include any classification of objects ranging from detailed such as person, cat, vehicle, building, street, tree, rock,

	etc. to generalized such as biological object, nature object, manmade object, etc., and/or others including their subtypes. Location of an object, for example, can include a relative location such as one defined by distance and bearing/angle from a known point or location (i.e. Device 98 location, etc.). Location of an object, for example, can also include absolute location such as one defined by object coordinates. In general, an object property may include any attribute of an object (i.e. existence of an object, type of an object, identity of an object, shape/size of an object, etc.), any relationship of an object with Device 98, other objects, or the environment (i.e. distance of an object, bearing/angle of an object, friend/foe relationship, etc.), and/or other information related to an object. In some implementations, Object Processing Unit 93 and/or any of its elements or functionalities can be included in Sensor 92. In other implementations, Object Processing Unit 93 and/or any of its elements or functionalities can be embedded into or operate on Processor 11. In further implementations, Object Processing Unit 93 and/or any of its elements or functionalities can be embedded into or operate in DCADO Unit 100, and/or other disclosed elements. Object Processing Unit 93 may be provided in any suitable configuration. Object Processing Unit 93 may include any signal processing techniques or elements known in art as applicable. ’991 Application at [65:3-66:20].

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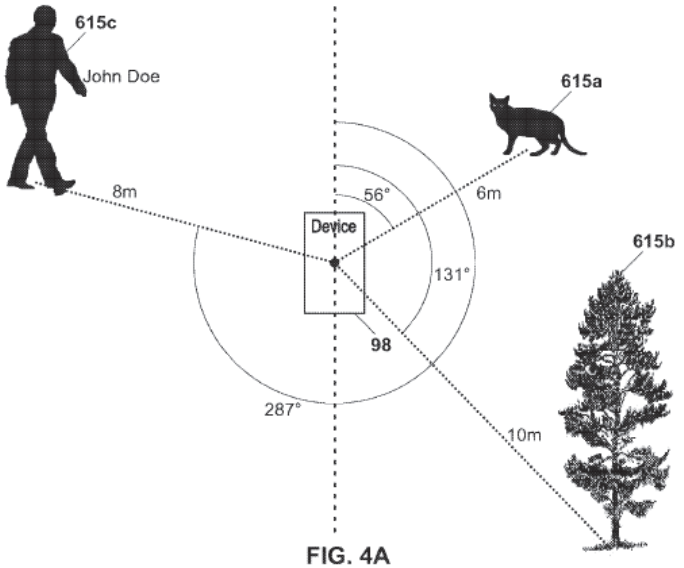


FIG. 4A

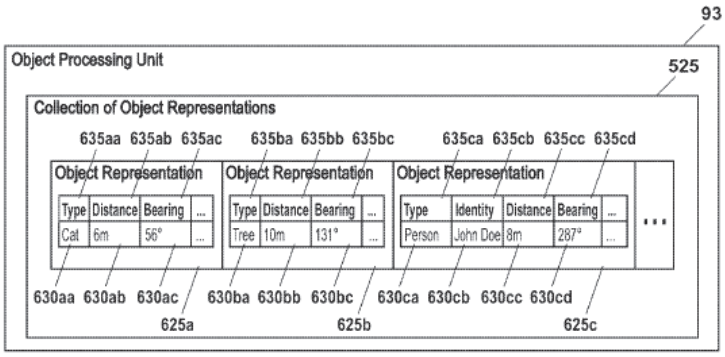


FIG. 4B

’991 Application at [Figs. 4A-4B].

Referring to Figs. 4A-4B, an exemplary embodiment of Objects 615 (also referred to simply as objects or other suitable name or reference) detected in Device's 98 surrounding, and resulting Collection of Object Representations 525 are illustrated. As shown for example in Fig. 4A, Object 615a is detected. Object 615a may be recognized as a cat. Object 615a may be detected at a distance of 6m from Device 98. Object 615a may be detected at a bearing/angle of 56° from Device's 98 centerline. Furthermore, Object 615b is also detected. Object 615b may be recognized as a tree. Object 615b may be detected at a distance of 1 Om from Device 98. Object 615b may be detected at a bearing/angle of 131 ° from

	Device's 98 centerline. Furthermore, Object 615c is also detected. Object 615c may be recognized as a person. Object 615c may be identified as John Doe. Object 615c may be detected at a distance of 8m from Device 98. Object 615c may be detected at a bearing/angle of 287° from Device's 98 centerline. Any other Objects 615 instead of or in addition to Object 615a, Object 615b, and Object 615c may be detected. In some aspects, any features, functionalities, and embodiments of Camera 92a/Picture Recognizer 94a, Microphone 92b/Sound Recognizer 94b, and/or other sensors or techniques can be utilized for recognizing and/or identifying a person, a cat, a tree, and/or other Objects 615. In further aspects, any features, functionalities, and embodiments of Camera 92a/Picture Recognizer 94a, Microphone 92b/Sound Recognizer 94b, Lidar 92cilidar Processing Unit 94c, Radar 92d/Radar Processing Unit 94d, Sonar 92e/Sonar Processing Unit 94e, and/or other sensors or techniques can be utilized for detecting distance, bearing/angle, and/or other object properties. As shown for example in Fig. 4B, Object Processing Unit 93 may create or generate Collection of Object Representations 525 including Object Representation 625a representing Object 615a, Object Representation 625b representing Object 615b, Object Representation 625c representing Object 615c, etc. For instance, Object Representation 625a may include Object Property 630aa "Cat" in Category 635aa "Type", Object Property 630ab "6m" in Category 635ab "Distance", Object Property 630ac "56°" in Category 635ac "Bearing", etc. Also, Object Representation 625b may include Object Property 630ba "Tree" in Category 635ba "Type", Object Property 630bb "1 Om" in Category 635bb "Distance", Object Property 630bc "131 °" in Category 635bc "Bearing", etc. Also, Object Representation 625c may include Object Property 630ca "Person" in Category 635ca "Type", Object Property 630cb "John Doe" in Category 635cb "Identity", Object Property 630cc "Sm" in Category 635cc "Distance", Object Property 630cd "287°;' in Category 635cd "Bearing"; etc. Any number of Object Representations 625, and/or other elements or information

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	can be included in Collection of Object Representations 525. Any number of Object Properties 630 (also referred to simply as object properties or other suitable name or reference), and/or other elements or information can be included in an Object Representation 625. In some aspects, a reference to Collection of Object Representations 525 comprises a reference to a collection of Object Properties 630 and/or other elements or information related to one or more Objects 615. Other additional Object Representations 625, Object Properties 630, elements, and/or information can be included as needed, or some of the disclosed ones can be excluded, or a combination thereof can be utilized in alternate embodiments of Collection of Object Representations 525. '991 Application at [72:14-73:8]. Any number of Devices 98 may connect to such remote DCADO Unit 100 and the remote DCADO Unit 100 may learn their operations in circumstances including objects with various properties. '991 Application at [86:13-14]. For example, multiple operators {i.e. Users 50, etc.) may operate their Devices 98 where the Devices 98 may be configured to transmit their operations in circumstances including objects with various properties to a remote DCADO Unit 100. Such remote DCADO Unit 100 enables learning of the operators' collective knowledge of operating Device 98 in circumstances including objects with various properties. '991 Application at [86:20-24]. In some embodiments, DCADO Unit 100 may reside on Server 96 accessible over Network 95 as previously described. In such embodiments, any number of Loaders 98a may connect to such remote DCADO Unit 100 and the remote DCADO Unit 100 may learn their operations in

	circumstances including objects with various properties. In turn, any number of Loaders 98a can utilize the remote DCADO Unit 100 for autonomous operation in circumstances including objects with various properties. For example, multiple operators (i.e. Users 50, etc.) may operate their Loaders 98a that are configured to transmit their operations in circumstances including objects with various properties to a remote DCADO Unit 100. Such remote DCADO Unit 100 enables learning of the operators' collective knowledge of operating Loaders 98 in circumstances including objects with various properties. Any number of Loaders 98 can utilize such collective knowledge comprised in the remote DCADO Unit 100 for their autonomous operation. Any of the disclosed elements such as Artificial Intelligence Unit 110, Knowledgebase 530, and/or others may reside on Server 96, and any combination of local and remote elements can be implemented in alternate embodiments. ’991 Application at [147:38-148:10]. In certain embodiments, the artificial intelligence unit is further configured to: receive a second collection of object representations, the second collection of object representations including one or more representations of objects detected by the sensor; receive a second one or more instruction sets for operating the device; and learn the second collection of object representations correlated with the second one or more instruction sets for operating the device. ’991 Application at [14:6-10].

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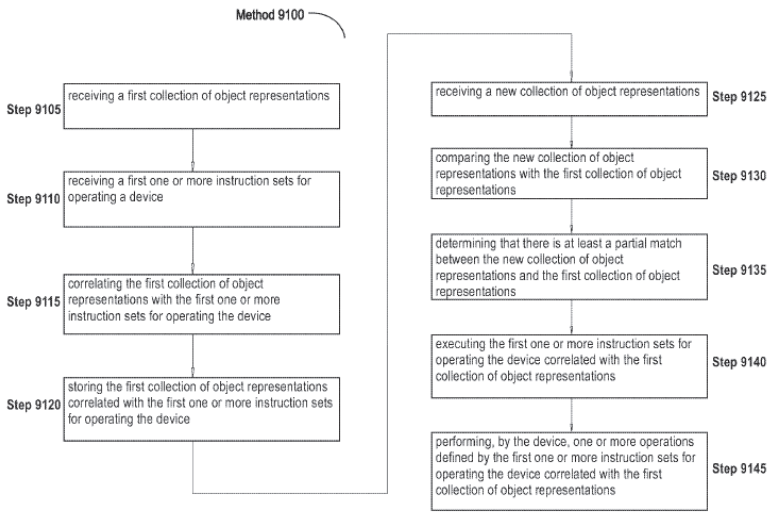


FIG. 32

’991 Application at [Fig. 32 – “learning process”].

Referring to Fig. 32, the illustration shows an embodiment of a method 9100 for learning and/or using a device's circumstances for autonomous device operation. in some aspects, the method can be used on a computing enabled device or system to enable learning of a device's operation in circumstances including objects with various properties and enable autonomous device operation in similar circumstances.

’991 Application at [135:14-17].

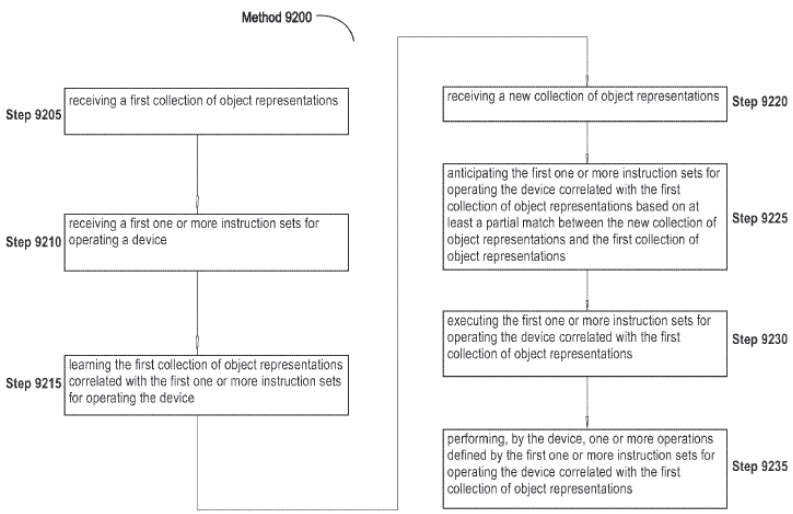


FIG. 33

’991 Application at [Fig. 33 – “another learning process”].

Referring to Fig. 33, the illustration shows an embodiment of a method 9200 for learning and/or using a device's circumstances for autonomous device operation. in some aspects, the method can be used on a computing enabled device or system to enable learning of a device's operation in circumstances including objects with various properties and enable autonomous device operation in similar circumstances.

’991 Application at [142:37-143:1].

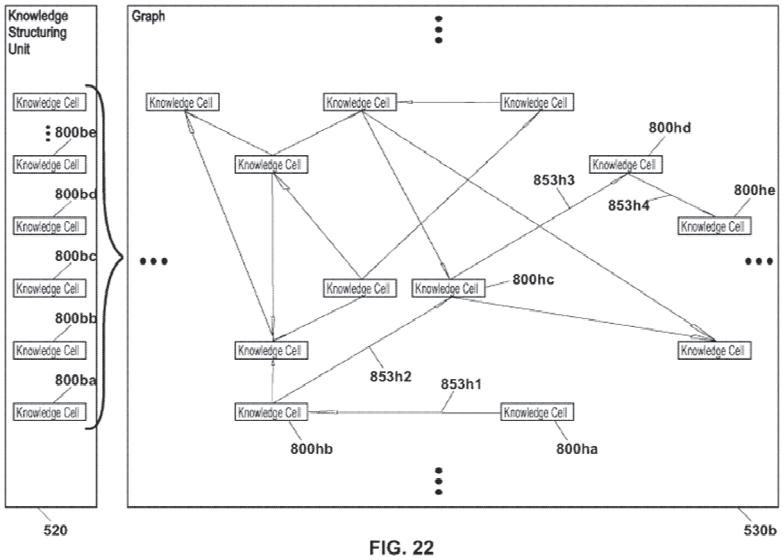


FIG. 22

’991 Application at [Fig. 22 – “learning process”].

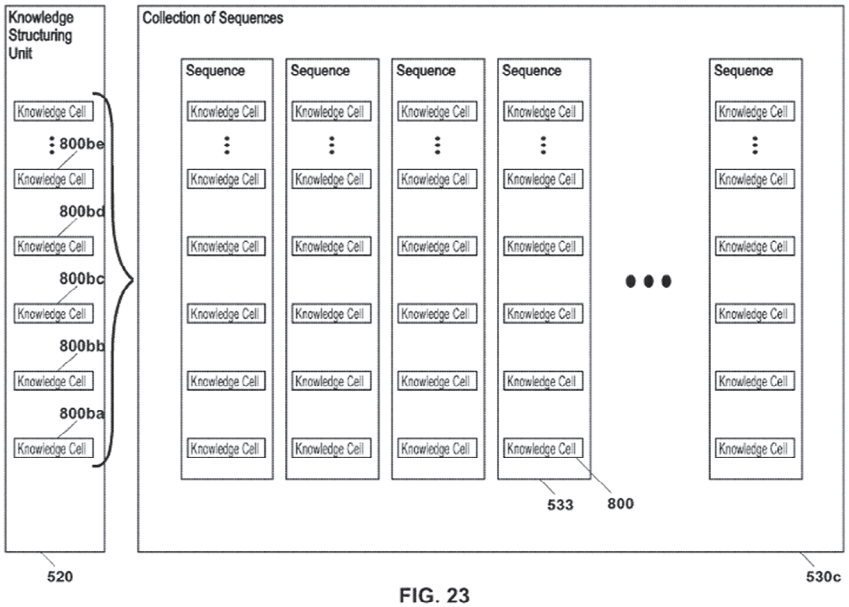


FIG. 23

’991 Application at [Fig. 23 – “another learning process”].

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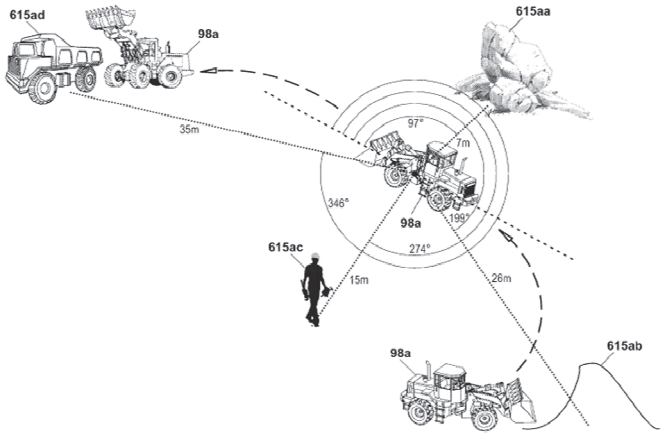


FIG. 38

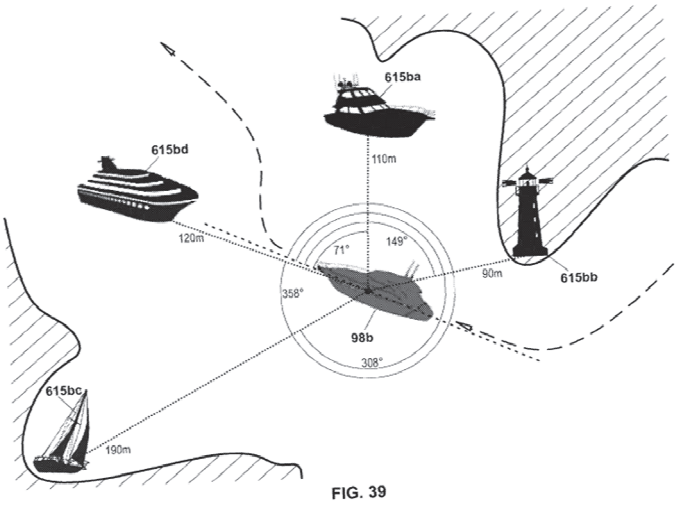
’991 Application at [Fig. 38 – “first device”: Loader 98a].

Referring to Fig. 38, in some exemplary embodiments, Device 98 may be or include Loader 98a. Loader 98a may be operated by User 50 in person or remotely.

’991 Application at [146:29-30].

For example, multiple operators (i.e. Users 50, etc.) may operate their Loaders 98a that are configured to transmit their operations in circumstances including objects with various properties to a remote DCADO Unit 100.

’991 Application at [148:3-5].

	 FIG. 39 ’991 Application at [Fig. 39 – “second device”: Boat 98b]. Referring to Fig. 39, in some exemplary embodiments, Device 98 may be or include Boat 98b. Boat 98b may be operated by User 50 in person or remotely. Boat 98b may include or be coupled to one or more Sensors 92 (i.e. collectively referred to as Sensor 92, etc.) such as Camera 92a, Microphone 92b, Udar 92c, Radar 92d, Sonar 92e, etc. and/or Object Processing Unit 93 that can detect Objects 615ba-615bd, and/or other elements or information in Boat's 98b surrounding. Object Processing Unit 93 may include Picture Recognizer 94a, Sound Recognizer 94b, Lidar Processing Unit 94c, Radar Processing Unit 94d, Sonar Processing Unit 94e, and/or other elements or functionalities as applicable. Object Processing Unit 93 may create or generate one or more (i.e. stream, etc.) Collections of Object Representations 525 comprising Object Representations 625, Object Properties 630, and/or other elements or information representing Objects 615 detected in Boat's 98b surrounding. ’991 Application at [149:38-150:7].
and wherein at least a portion	The ’991 Application supports wherein at least a portion of the fourth correlation is learned in another learning process

of the fourth correlation is learned in another learning process that includes operating the second device at least partially by another user	that includes operating the second device at least partially by another user. For example: Any number of Devices 98 may connect to such remote DCADO Unit 100 and the remote DCADO Unit 100 may learn their operations in circumstances including objects with various properties. ’991 Application at [86:13-14]. For example, multiple operators {i.e. Users 50, etc.) may operate their Devices 98 where the Devices 98 may be configured to transmit their operations in circumstances including objects with various properties to a remote DCADO Unit 100. Such remote DCADO Unit 100 enables learning of the operators' collective knowledge of operating Device 98 in circumstances including objects with various properties. ’991 Application at [86:20-24]. In some embodiments, DCADO Unit 100 may reside on Server 96 accessible over Network 95 as previously described. In such embodiments, any number of Loaders 98a may connect to such remote DCADO Unit 100 and the remote DCADO Unit 100 may learn their operations in circumstances including objects with various properties. In turn, any number of Loaders 98a can utilize the remote DCADO Unit 100 for autonomous operation in circumstances including objects with various properties. For example, multiple operators (i.e. Users 50, etc.) may operate their Loaders 98a that are configured to transmit their operations in circumstances including objects with various properties to a remote DCADO Unit 100. Such remote DCADO Unit 100 enables learning of the operators' collective knowledge of operating Loaders 98 in circumstances including objects with various properties. Any number of Loaders 98 can utilize such collective knowledge comprised in the remote DCADO Unit 100 for their autonomous operation. Any of the disclosed elements

such as Artificial Intelligence Unit 110, Knowledgebase 530, and/or others may reside on Server 96, and any combination of local and remote elements can be implemented in alternate embodiments.

’991 Application at [147:38-148:10].

In certain embodiments, the artificial intelligence unit is further configured to: receive a second collection of object representations, the second collection of object representations including one or more representations of objects detected by the sensor; receive a second one or more instruction sets for operating the device; and learn the second collection of object representations correlated with the second one or more instruction sets for operating the device.

’991 Application at [14:6-10].

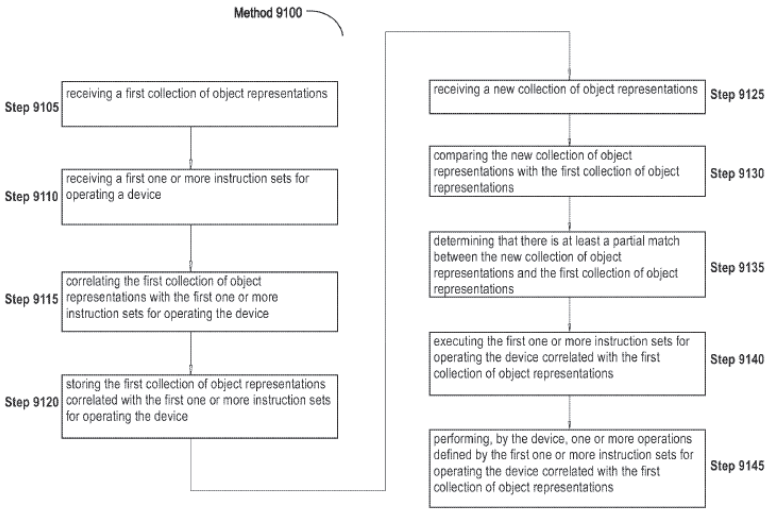
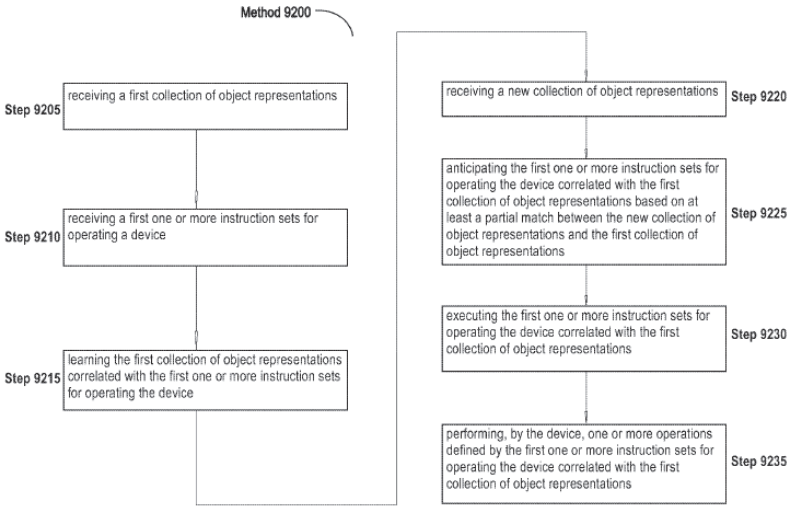


FIG. 32

’991 Application at [Fig. 32 – “learning process”].

Referring to Fig. 32, the illustration shows an embodiment of a method 9100 for learning and/or using a device's circumstances for autonomous device operation. in some aspects, the method can be used on a computing enabled

	device or system to enable learning of a device's operation in circumstances including objects with various properties and enable autonomous device operation in similar circumstances. '991 Application at [135:14-17].  FIG. 33 '991 Application at [Fig. 33 – "another learning process"]. Referring to Fig. 33, the illustration shows an embodiment of a method 9200 for learning and/or using a device's circumstances for autonomous device operation. in some aspects, the method can be used on a computing enabled device or system to enable learning of a device's operation in circumstances including objects with various properties and enable autonomous device operation in similar circumstances. '991 Application at [142:37-143:1].

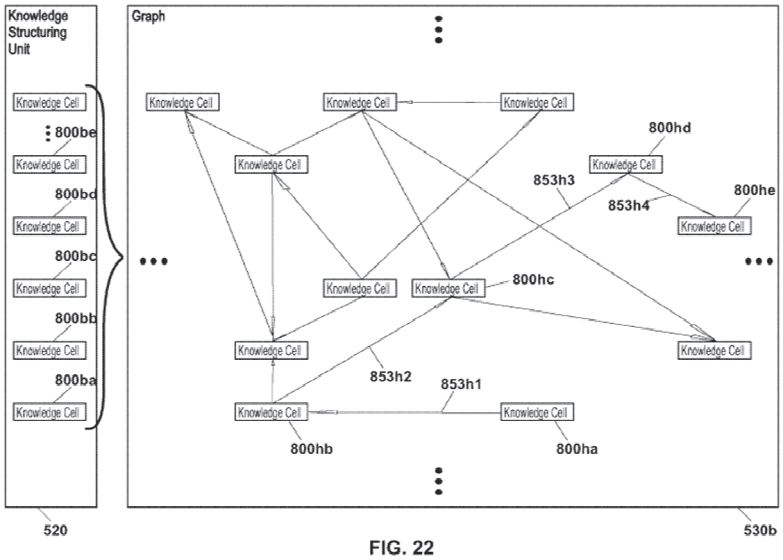


FIG. 22

’991 Application at [Fig. 22 – “learning process”].

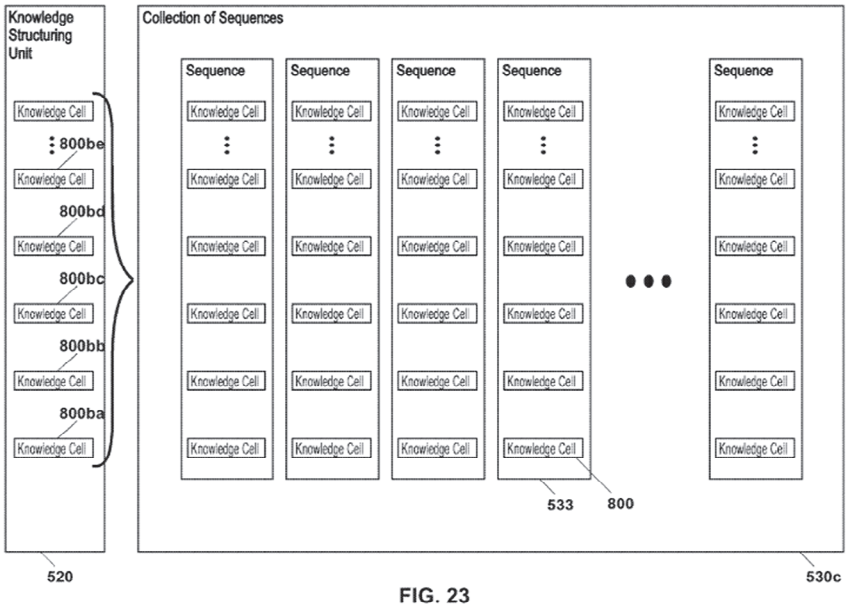


FIG. 23

’991 Application at [Fig. 23 – “another learning process”].

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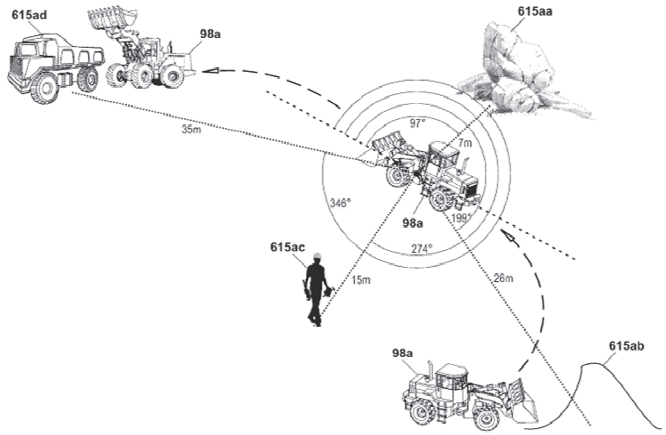


FIG. 38

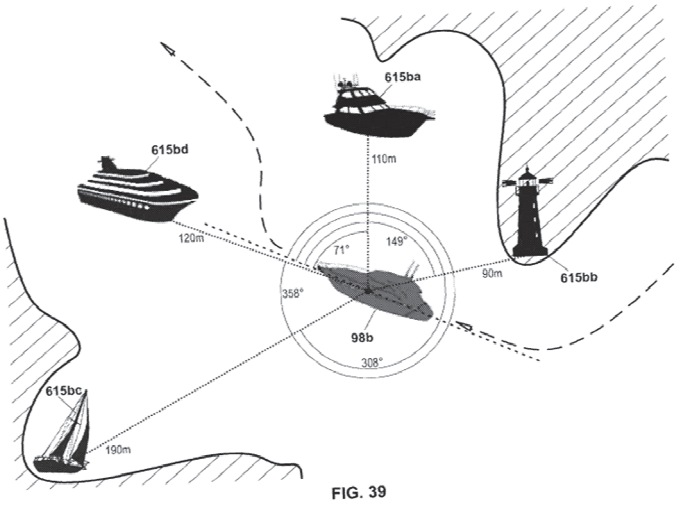
’991 Application at [Fig. 38 – “first device”: Loader 98a].

Referring to Fig. 38, in some exemplary embodiments, Device 98 may be or include Loader 98a. Loader 98a may be operated by User 50 in person or remotely.

’991 Application at [146:29-30].

For example, multiple operators (i.e. Users 50, etc.) may operate their Loaders 98a that are configured to transmit their operations in circumstances including objects with various properties to a remote DCADO Unit 100.

’991 Application at [148:3-5].

	 FIG. 39 ’991 Application at [Fig. 39 – “second device”: Boat 98b]. Referring to Fig. 39, in some exemplary embodiments, Device 98 may be or include Boat 98b. Boat 98b may be operated by User 50 in person or remotely. ’991 Application at [149:38-39].
Substitute Claim 25	
wherein the first circumstance representation includes: one or more object representations, or one or more collections of object representations, and wherein the second circumstance representation includes: one	The ’991 Application supports wherein the first circumstance representation includes: one or more object representations, or one or more collections of object representations, and wherein the second circumstance representation includes: one or more object representations, or one or more collections of object representations, and wherein the third circumstance representation includes: one or more object representations, or one or more collections of object representations. For example: In some embodiments; the first collection of object representations correlated with the first one or more instruction sets for operating the device include a knowledge of how the device operated in a circumstance. ’991 Application at [6:16-17].

or more object representations, or one or more collections of object representations, and wherein the third circumstance representation includes: one or more object representations, or one or more collections of object representations	Referring to Fig. 32, the illustration shows an embodiment of a method 9100 for learning and/or using a device's circumstances for autonomous device operation. in some aspects, the method can be used on a computing enabled device or system to enable learning of a device's operation in circumstances including objects with various properties and enable autonomous device operation in similar circumstances. '991 Application at [135:14-17]. A collection of object representations may, therefore, include knowledge (i.e. unit of knowledge, etc.) of a device's circumstances including objects with various properties at a particular time. '991 Application at [135:27-28]. DCADO Unit 100 comprises the functionality for learning the operation of Device 98 in circumstances including objects with various properties. DCADO Unit 100 comprises the functionality for structuring and/or storing this knowledge in a knowledgebase (i.e. neural network, graph, sequences, other repository, etc.). DCADO Unit 100 comprises the functionality for enabling autonomous operation of Device 98 in circumstances including objects with various properties. '991 Application at [73:10-14]. Object Processing Unit 93 comprises the functionality for processing output from Sensor 92 to obtain information of interest, and/or other functionalities. As such, Object Processing Unit 93 can be used to process output from Sensor 92 to detect objects and/or their properties in Device's 98 surrounding. In some embodiments, Object Processing Unit 93 comprises the functionality for creating or generating Collection of Object Representations 525 (also referred to as Coll of Obj Rep or other suitable name

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	or reference) and storing one or more Object Representations 625 (also referred to simply as object representations, representations of objects, or other suitable name or reference), Object Properties 630 (also referred to simply as object properties or other suitable name or reference), and/or other elements or information into the Collection of Object Representations 525. As such, Collection of Object Representations 525 comprises the functionality for storing one or more Object Representations 625, Object Properties 630, and/or other elements or information. Object Representation 625 may include an electronic representation of an object (i.e. Object 615 [later described], etc.) detected in Device's 98 surrounding. In some aspects, Collection of Object Representations 525 includes one or more Object Representations 625, Object Properties 630, and/or other elements or information related to objects detected in Device's 98 surrounding at a particular time. Collection of Object Representations 525 may, therefore, include knowledge (i.e. unit of knowledge, etc.) of Device's 98 circumstances including objects with various properties at a particular time. in some designs, a Collection of Object Representations 525 may include or be associated with a time stamp (not shown), order (not shown), or other time related information. For example, one Collection of Object Representations 525 may be associated with time stamp t1, another Collection of Object Representations 525 may be associated with time stamp t2, and so on. Time stamps t1, t2, etc. may indicate the times of generating Collections of Object Representations 525, for instance. In other embodiments, Object Processing Unit 93 comprises the functionality for creating or generating a stream of Collections of Object Representations 525. A stream of Collections of Object Representations 525 may include one Collection of Object Representations 525 or a group, sequence, or other plurality of Collections of Object Representations 525. In some aspects, a stream of Collections of Object Representations 525 includes one or more Collections of Object Representations 525, and/or other elements or information related to objects detected in

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	Device's 98 surrounding over time. A stream of Collections of Object Representations 525 may, therefore, include knowledge (i.e. unit of knowledge, etc.) of Device's 98 circumstances including objects with various properties over time. As circumstances including objects with various properties in Device's 98 surrounding change (i.e. objects and/or their properties change, move, act, transform, etc.) over time, this change may be captured in a stream of Collections of Object Representations 525. In some designs, each Collection of Object Representations 525 in a stream may include or be associated with the aforementioned time stamp, order, or other time related information. For example, one Collection of Object Representations 525 in a stream may be associated with order 1, a next Collection of Object Representations 525 in 35 the stream may be associated with order 2, and so on. Orders 1, 2, etc. may indicate the orders or places of Collections of Object Representations 525 within a stream (Le. sequence, etc.), for instance. Examples of objects include biological objects (i.e. persons, animals, vegetation, etc.), nature objects (i.e. rocks, bodies of water, etc.), manmade objects (i.e. buildings, streets, ground/aerial/aquatic vehicles, etc.), and/or others. In some aspects, any part of an object may be detected as an object itself. For instance, instead of or in addition to detecting a vehicle as an object, a wheel and/or other parts of the vehicle may be detected as objects. In general, object may include any object or part thereof that can be detected. Examples of object properties include existence of an object, type of an object (i.e. person, cat, vehicle, building, street, tree, rock, etc.), identity of an object (i.e. name, identifier, etc.), distance of an object, bearing/angle of an object, location of an object (i.e. distance and bearing/angle from a known point. coordinates, etc.), shape/size of an object (i.e. height, width, depth, computer model, point cloud, etc.), activity of an object (i.e. motion, gestures, etc.), and/or other properties of an object. Type of an object, for example, may include any classification of objects ranging from detailed such as person, cat, vehicle, building, street, tree, rock,

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	etc. to generalized such as biological object, nature object, manmade object, etc., and/or others including their subtypes. Location of an object, for example, can include a relative location such as one defined by distance and bearing/angle from a known point or location (i.e. Device 98 location, etc.). Location of an object, for example, can also include absolute location such as one defined by object coordinates. In general, an object property may include any attribute of an object (i.e. existence of an object, type of an object, identity of an object, shape/size of an object, etc.), any relationship of an object with Device 98, other objects, or the environment (i.e. distance of an object, bearing/angle of an object, friend/foe relationship, etc.), and/or other information related to an object. In some implementations, Object Processing Unit 93 and/or any of its elements or functionalities can be included in Sensor 92. In other implementations, Object Processing Unit 93 and/or any of its elements or functionalities can be embedded into or operate on Processor 11. In further implementations, Object Processing Unit 93 and/or any of its elements or functionalities can be embedded into or operate in DCADO Unit 100, and/or other disclosed elements. Object Processing Unit 93 may be provided in any suitable configuration. Object Processing Unit 93 may include any signal processing techniques or elements known in art as applicable. '991 Application at [65:3-66:20].

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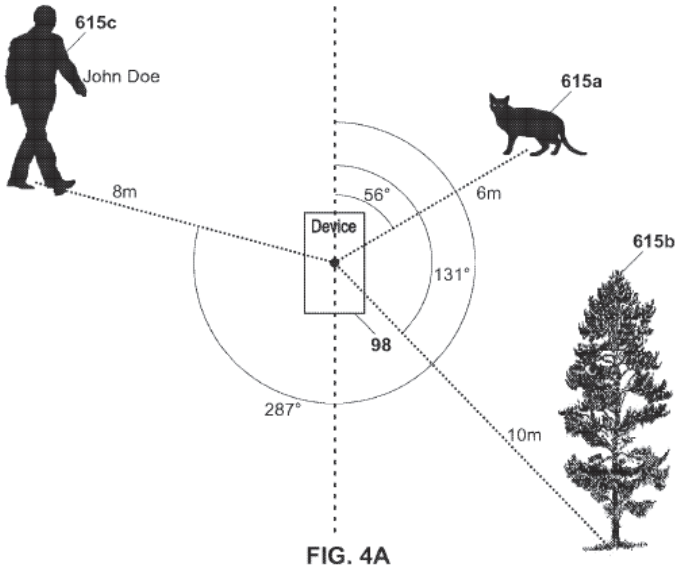


FIG. 4A

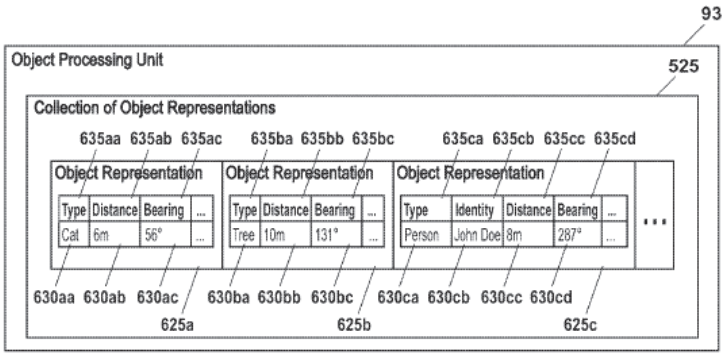


FIG. 4B

’991 Application at [Figs. 4A-4B].

Referring to Figs. 4A-4B, an exemplary embodiment of Objects 615 (also referred to simply as objects or other suitable name or reference) detected in Device's 98 surrounding, and resulting Collection of Object Representations 525 are illustrated. As shown for example in Fig. 4A, Object 615a is detected. Object 615a may be recognized as a cat. Object 615a may be detected at a distance of 6m from Device 98. Object 615a may be detected at a bearing/angle of 56° from Device's 98 centerline. Furthermore, Object 615b is also detected. Object 615b may be recognized as a tree. Object 615b may be detected at a distance of 1 Om from Device 98. Object 615b may be detected at a bearing/angle of 131 ° from

	Device's 98 centerline. Furthermore, Object 615c is also detected. Object 615c may be recognized as a person. Object 615c may be identified as John Doe. Object 615c may be detected at a distance of 8m from Device 98. Object 615c may be detected at a bearing/angle of 287° from Device's 98 centerline. Any other Objects 615 instead of or in addition to Object 615a, Object 615b, and Object 615c may be detected. In some aspects, any features, functionalities, and embodiments of Camera 92a/Picture Recognizer 94a, Microphone 92b/Sound Recognizer 94b, and/or other sensors or techniques can be utilized for recognizing and/or identifying a person, a cat, a tree, and/or other Objects 615. In further aspects, any features, functionalities, and embodiments of Camera 92a/Picture Recognizer 94a, Microphone 92b/Sound Recognizer 94b, Lidar 92cilidar Processing Unit 94c, Radar 92d/Radar Processing Unit 94d, Sonar 92e/Sonar Processing Unit 94e, and/or other sensors or techniques can be utilized for detecting distance, bearing/angle, and/or other object properties. As shown for example in Fig. 4B, Object Processing Unit 93 may create or generate Collection of Object Representations 525 including Object Representation 625a representing Object 615a, Object Representation 625b representing Object 615b, Object Representation 625c representing Object 615c, etc. For instance, Object Representation 625a may include Object Property 630aa "Cat" in Category 635aa "Type", Object Property 630ab "6m" in Category 635ab "Distance", Object Property 630ac "56°" in Category 635ac "Bearing", etc. Also, Object Representation 625b may include Object Property 630ba "Tree" in Category 635ba "Type", Object Property 630bb "1 Om" in Category 635bb "Distance", Object Property 630bc "131 °" in Category 635bc "Bearing", etc. Also, Object Representation 625c may include Object Property 630ca "Person" in Category 635ca "Type", Object Property 630cb "John Doe" in Category 635cb "Identity", Object Property 630cc "Sm" in Category 635cc "Distance", Object Property 630cd "287°;' in Category 635cd "Bearing"; etc. Any number of Object Representations 625, and/or other elements or information

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	can be included in Collection of Object Representations 525. Any number of Object Properties 630 (also referred to simply as object properties or other suitable name or reference), and/or other elements or information can be included in an Object Representation 625. In some aspects, a reference to Collection of Object Representations 525 comprises a reference to a collection of Object Properties 630 and/or other elements or information related to one or more Objects 615. Other additional Object Representations 625, Object Properties 630, elements, and/or information can be included as needed, or some of the disclosed ones can be excluded, or a combination thereof can be utilized in alternate embodiments of Collection of Object Representations 525. '991 Application at [72:14-73:8]. In certain embodiments, the artificial intelligence unit is further configured to: receive a second collection of object representations, the second collection of object representations including one or more representations of objects detected by the sensor; receive a second one or more instruction sets for operating the device; and learn the second collection of object representations correlated with the second one or more instruction sets for operating the device. '991 Application at [14:6-10].
Substitute Claim 26	
wherein, to correlate the first circumstance representation with the first one or more instruction sets for operating the first	The '991 Application supports wherein, to correlate the first circumstance representation with the first one or more instruction sets for operating the first device, a determination is made that the first one or more instruction sets for operating the first device temporally correspond to the first circumstance representation. For example: In some embodiments, Knowledge Structuring Unit 520 may correlate a Collection of Object Representations 525 with one or more temporally corresponding Instruction

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device, a determination is made that the first one or more instruction sets for operating the first device temporally correspond to the first circumstance representation	Sets 526 and/or Extra Info 527. This way, Knowledge Structuring Unit 520 can structure the knowledge of Device's 98 operation at or around the time of generating Collections of Object Representations 525. Such functionality enables spontaneous or seamless learning of Device's 98 operation in circumstances including objects with various properties as Device 98 is operated in real life situations. in some designs, Knowledge Structuring Unit 520 may receive a stream of Instruction Sets 526 used or executed to effect Device's 98 operations as well as a stream of Collections of Object Representations 525 as the operations are performed. Knowledge Structuring Unit 520 can then correlate Collections of Object Representations 525 from the stream of Collections of Object Representations 525 with temporally corresponding Instruction Sets 526 from the stream of Instruction Sets 526 and/or any Extra Info 527. Collections of Object Representations 525 without a temporally corresponding Instruction Set 526 may be uncorrelated, for instance. In some aspects, Instruction Sets 526 and/or Extra Info 527 that temporally correspond to a Collection of Object Representations 525 may include Instruction Sets 526 used and/or Extra Info 527 obtained at the time of generating the Collection of Object Representations 525. In other aspects, Instruction Sets 526 and/or Extra Info 527 that temporally correspond to a Collection of Object Representations 525 may include Instruction Sets 526 used and/or Extra Info 527 obtained within a certain time period before and/or after generating the Collection of Object Representations 525. For example, instruction Sets 526 and/or Extra Info 527 that temporally correspond to a Collection of Object Representations 525 may include Instruction Sets 526 used and/or Extra Info 527 obtained within 50 milliseconds, 1 second, 3 seconds, 20 seconds, 1 minute, 41 minutes, 2 hours, or any other time period before and/or after generating the Collection of Object Representations 525. Such time periods can be defined by a user, by DCADO system administrator, or automatically by the system based on experience, testing, inquiry, analysis, synthesis, or other

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	techniques, knowledge, or input In other aspects, Instruction Sets 526 and/or Extra Info 527 that temporally correspond to a Collection of Object Representations 525 may include Instruction Sets 526 used and/or Extra info 527 obtained from the time of generating the Collection of Object Representations 525 to the time of generating a next Collection of Object Representations 525. In further aspects, Instruction Sets 526 and/or Extra Info 527 that temporally correspond to a Collection of Object Representations 525 may include Instruction Sets 526 used and/or Extra Info 527 obtained from the time of generating a previous Collection of Object Representations 525 to the time of generating the Collection of Object Representations 525. Any other temporal relationship or correspondence between Collections of Object Representations 525 and correlated Instruction Sets 526 and/or Extra Info 527 can be implemented. '991 Application at [89:33-90:23]. In certain embodiments, the first one or more instruction sets for operating the device include one or more instruction sets that temporally correspond to the first collection of object representations. In further embodiments, the one or more instruction sets that temporally correspond to the first collection of object representations include one or more instruction sets executed at a time of generating the first collection of object representations. In further embodiments, the one or more instruction sets that temporally correspond to the first collection of object representations include one or more instruction sets executed prior to generating the first collection of object representations. in further embodiments, the one or more instruction sets that temporally correspond to the first collection of object representations include one or more instruction sets executed within a threshold period of time prior to generating the first collection of object representations. !n further embodiments, the one or more instruction sets that temporally correspond to the first collection of object

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	representations include one or more instruction sets executed subsequent to generating the first collection of object representations. In further embodiments, the one or more instruction sets that temporally correspond to the first collection of object representations include one or more instruction sets executed within a threshold period of time subsequent to generating the first collection of object representations. in further embodiments, the one or more instruction sets that temporally correspond to the first collection of object representations include one or more instruction sets executed within a threshold period of time prior to generating the first collection of object representations or a threshold period of time subsequent to generating the first collection of object representations. '991 Application at [3:31-4:8]. One or more instruction sets may temporally correspond to a collection of object representations. In some aspects, an instruction set that temporally corresponds to a collection of object representations includes an instruction set used or executed at the time of generating the collection of object representations. In other aspects, an instruction set that temporally corresponds to a collection of object representations includes an instruction set used or executed within a certain time period before and/or after generating the collection of object representations. Any time period can be utilized depending on implementation. In further aspects, an instruction set that temporally corresponds to a collection of object representations includes an instruction set used or executed from the time of generating the collection of object representations to the time of generating a next collection of object representations. in further aspects, an instruction set that temporally corresponds to a collection of object representations includes an instruction set used or executed from the time of generating a preceding collection of object representations to the time of generating the collection of object representations. Any other temporal relationship or correspondence between collections of object

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	representations and correlated instruction sets can be implemented. In general, one or more instruction sets that temporally correspond to a collection of object representations enable structuring knowledge of a device's operation at or around the time of generating the collection of object representations. Such functionality enables spontaneous or seamless learning of a device's operation in circumstances including objects with various properties as the device is operated in real life situations. '991 Application at [137:19-35].
and wherein the first circumstance representation includes: one or more object representations, or one or more collections of object representations	The '991 Application supports wherein the first circumstance representation includes: one or more object representations, or one or more collections of object representations. For example: In some embodiments; the first collection of object representations correlated with the first one or more instruction sets for operating the device include a knowledge of how the device operated in a circumstance. '991 Application at [6:16-17]. Referring to Fig. 32, the illustration shows an embodiment of a method 9100 for learning and/or using a device's circumstances for autonomous device operation. in some aspects, the method can be used on a computing enabled device or system to enable learning of a device's operation in circumstances including objects with various properties and enable autonomous device operation in similar circumstances. '991 Application at [135:14-17]. A collection of object representations may, therefore, include knowledge (i.e. unit of knowledge, etc.) of a device's circumstances including objects with various properties at a particular time. '991 Application at [135:27-28].

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	DCADO Unit 100 comprises the functionality for learning the operation of Device 98 in circumstances including objects with various properties. DCADO Unit 100 comprises the functionality for structuring and/or storing this knowledge in a knowledgebase (i.e. neural network, graph, sequences, other repository, etc.). DCADO Unit 100 comprises the functionality for enabling autonomous operation of Device 98 in circumstances including objects with various properties. '991 Application at [73:10-14]. Object Processing Unit 93 comprises the functionality for processing output from Sensor 92 to obtain information of interest, and/or other functionalities. As such, Object Processing Unit 93 can be used to process output from Sensor 92 to detect objects and/or their properties in Device's 98 surrounding. In some embodiments, Object Processing Unit 93 comprises the functionality for creating or generating Collection of Object Representations 525 (also referred to as Coll of Obj Rep or other suitable name or reference) and storing one or more Object Representations 625 (also referred to simply as object representations, representations of objects, or other suitable name or reference), Object Properties 630 (also referred to simply as object properties or other suitable name or reference), and/or other elements or information into the Collection of Object Representations 525. As such, Collection of Object Representations 525 comprises the functionality for storing one or more Object Representations 625, Object Properties 630, and/or other elements or information. Object Representation 625 may include an electronic representation of an object (i.e. Object 615 [later described], etc.) detected in Device's 98 surrounding. In some aspects, Collection of Object Representations 525 includes one or more Object Representations 625, Object Properties 630, and/or other elements or information related to objects detected in Device's 98 surrounding at a particular time. Collection of

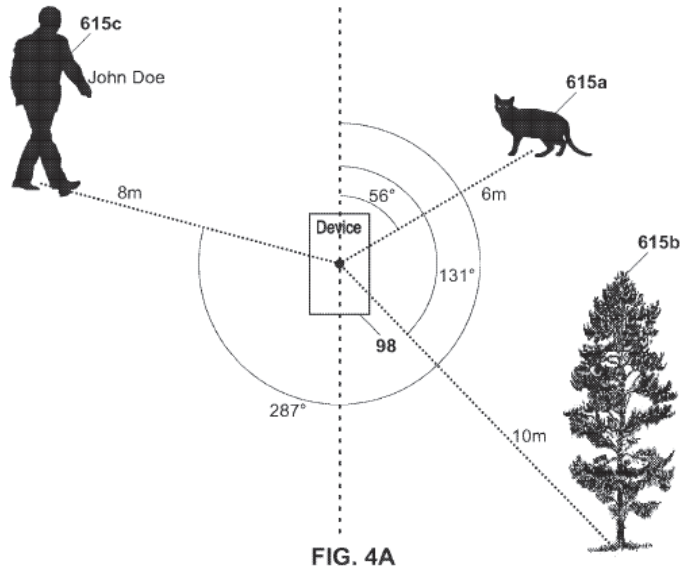
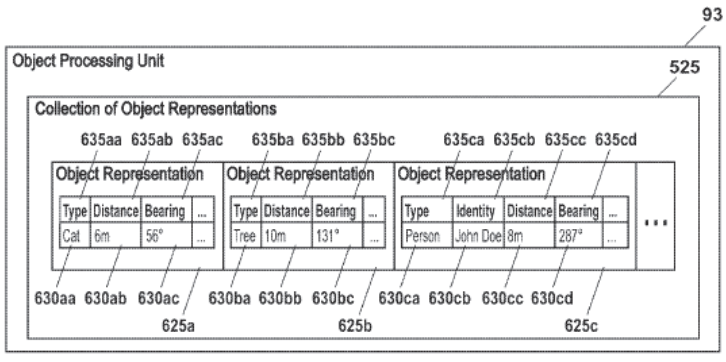
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	Object Representations 525 may, therefore, include knowledge (i.e. unit of knowledge, etc.) of Device's 98 circumstances including objects with various properties at a particular time. in some designs, a Collection of Object Representations 525 may include or be associated with a time stamp (not shown), order (not shown), or other time related information. For example, one Collection of Object Representations 525 may be associated with time stamp t1, another Collection of Object Representations 525 may be associated with time stamp t2, and so on. Time stamps t1, t2, etc. may indicate the times of generating Collections of Object Representations 525, for instance. In other embodiments, Object Processing Unit 93 comprises the functionality for creating or generating a stream of Collections of Object Representations 525. A stream of Collections of Object Representations 525 may include one Collection of Object Representations 525 or a group, sequence, or other plurality of Collections of Object Representations 525. In some aspects, a stream of Collections of Object Representations 525 includes one or more Collections of Object Representations 525, and/or other elements or information related to objects detected in Device's 98 surrounding over time. A stream of Collections of Object Representations 525 may, therefore, include knowledge (i.e. unit of knowledge, etc.) of Device's 98 circumstances including objects with various properties over time. As circumstances including objects with various properties in Device's 98 surrounding change (i.e. objects and/or their properties change, move, act, transform, etc.) over time, this change may be captured in a stream of Collections of Object Representations 525. In some designs, each Collection of Object Representations 525 in a stream may include or be associated with the aforementioned time stamp, order, or other time related information. For example, one Collection of Object Representations 525 in a stream may be associated with order 1, a next Collection of Object Representations 525 in 35 the stream may be associated with order 2, and so on. Orders 1, 2, etc. may indicate the orders or places of Collections of Object Representations 525 within a stream

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	(Le. sequence, etc.), for instance. Examples of objects include biological objects (i.e. persons, animals, vegetation, etc.), nature objects (i.e. rocks, bodies of water, etc.), manmade objects (i.e. buildings, streets, ground/aerial/aquatic vehicles, etc.), and/or others. In some aspects, any part of an object may be detected as an object itself. For instance, instead of or in addition to detecting a vehicle as an object, a wheel and/or other parts of the vehicle may be detected as objects. In general, object may include any object or part thereof that can be detected. Examples of object properties include existence of an object, type of an object (i.e. person, cat, vehicle, building, street, tree, rock, etc.), identity of an object (i.e. name, identifier, etc.), distance of an object, bearing/angle of an object, location of an object (i.e. distance and bearing/angle from a known point. coordinates, etc.), shape/size of an object (i.e. height, width, depth, computer model, point cloud, etc.), activity of an object (i.e. motion, gestures, etc.), and/or other properties of an object. Type of an object, for example, may include any classification of objects ranging from detailed such as person, cat, vehicle, building, street, tree, rock, etc. to generalized such as biological object, nature object, manmade object, etc., and/or others including their subtypes. Location of an object, for example, can include a relative location such as one defined by distance and bearing/angle from a known point or location (i.e. Device 98 location, etc.). Location of an object, for example, can also include absolute location such as one defined by object coordinates. In general, an object property may include any attribute of an object (i.e. existence of an object, type of an object, identity of an object, shape/size of an object, etc.), any relationship of an object with Device 98, other objects, or the environment (i.e. distance of an object, bearing/angle of an object, friend/foe relationship, etc.), and/or other information related to an object. In some implementations, Object Processing Unit 93 and/or any of its elements or functionalities can be included in Sensor 92. In other implementations, Object Processing Unit 93 and/or any of its elements or

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	functionalities can be embedded into or operate on Processor 11. In further implementations, Object Processing Unit 93 and/or any of its elements or functionalities can be embedded into or operate in DCADO Unit 100, and/or other disclosed elements. Object Processing Unit 93 may be provided in any suitable configuration. Object Processing Unit 93 may include any signal processing techniques or elements known in art as applicable. '991 Application at [65:3-66:20].  FIG. 4A  FIG. 4B '991 Application at [Figs. 4A-4B]. Referring to Figs. 4A-4B, an exemplary embodiment of

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	Objects 615 (also referred to simply as objects or other suitable name or reference) detected in Device's 98 surrounding, and resulting Collection of Object Representations 525 are illustrated. As shown for example in Fig. 4A, Object 615a is detected. Object 615a may be recognized as a cat. Object 615a may be detected at a distance of 6m from Device 98. Object 615a may be detected at a bearing/angle of 56° from Device's 98 centerline. Furthermore, Object 615b is also detected. Object 615b may be recognized as a tree. Object 615b may be detected at a distance of 1 Om from Device 98. Object 615b may be detected at a bearing/angle of 131 ° from Device's 98 centerline. Furthermore, Object 615c is also detected. Object 615c may be recognized as a person. Object 615c may be identified as John Doe. Object 615c may be detected at a distance of 8m from Device 98. Object 615c may be detected at a bearing/angle of 287° from Device's 98 centerline. Any other Objects 615 instead of or in addition to Object 615a, Object 615b, and Object 615c may be detected. In some aspects, any features, functionalities, and embodiments of Camera 92a/Picture Recognizer 94a, Microphone 92b/Sound Recognizer 94b, and/or other sensors or techniques can be utilized for recognizing and/or identifying a person, a cat, a tree, and/or other Objects 615. In further aspects, any features, functionalities, and embodiments of Camera 92a/Picture Recognizer 94a, Microphone 92b/Sound Recognizer 94b, Lidar 92cilidar Processing Unit 94c, Radar 92d/Radar Processing Unit 94d, Sonar 92e/Sonar Processing Unit 94e, and/or other sensors or techniques can be utilized for detecting distance, bearing/angle, and/or other object properties. As shown for example in Fig. 4B, Object Processing Unit 93 may create or generate Collection of Object Representations 525 including Object Representation 625a representing Object 615a, Object Representation 625b representing Object 615b, Object Representation 625c representing Object 615c, etc. For instance, Object Representation 625a may include Object Property 630aa "Cat" in Category 635aa "Type", Object Property 630ab "6m" in Category 635ab "Distance",

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	Object Property 630ac "56°" in Category 635ac "Bearing", etc. Also, Object Representation 625b may include Object Property 630ba "Tree" in Category 635ba "Type", Object Property 630bb "1 Om" in Category 635bb "Distance", Object Property 630bc "131 °" in Category 635bc "Bearing", etc. Also, Object Representation 625c may include Object Property 630ca "Person" in Category 635ca "Type", Object Property 630cb "John Doe" in Category 635cb "Identity", Object Property 630cc "Sm" in Category 635cc "Distance", Object Property 630cd "287°;' in Category 635cd "Bearing"; etc. Any number of Object Representations 625, and/or other elements or information can be included in Collection of Object Representations 525. Any number of Object Properties 630 (also referred to simply as object properties or other suitable name or reference), and/or other elements or information can be included in an Object Representation 625. In some aspects, a reference to Collection of Object Representations 525 comprises a reference to a collection of Object Properties 630 and/or other elements or information related to one or more Objects 615. Other additional Object Representations 625, Object Properties 630, elements, and/or information can be included as needed, or some of the disclosed ones can be excluded, or a combination thereof can be utilized in alternate embodiments of Collection of Object Representations 525. '991 Application at [72:14-73:8]. In certain embodiments, the artificial intelligence unit is further configured to: receive a second collection of object representations, the second collection of object representations including one or more representations of objects detected by the sensor; receive a second one or more instruction sets for operating the device; and learn the second collection of object representations correlated with the second one or more instruction sets for operating the device. '991 Application at [14:6-10].

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3. The Original Application for the '974 Patent Enables the Proposed Substitute Claims

134. I have also been asked to evaluate whether the proposed Substitute Claims are enabled by the original application. I have been informed that, to be enabling, a specification or application must teach those skilled in the art how to make and use the full scope of the claimed invention without undue experimentation, as of the patent's effective filing date. I understand that the factors to consider when determining whether a disclosure would require undue experimentation include (1) the quantity of experimentation necessary; (2) the amount of direction or guidance presented; (3) the presence or absence of working examples; (4) the nature of the invention; (5) the state of the prior art; (6) the relative skill of those in the art; (7) the predictability or unpredictability of the art; and (8) the breadth of the claims.

135. Given the table of exemplary citations in the previous section, it is my opinion that a POSA would have had more than enough information to make and use the full scope of the proposed substitute claims without undue experimentation To the extent Petitioner and/or Petitioner's expert argue differently, I reserve the right to respond.

4. The Proposed Substitute Claims are Patentable Over the Cited Prior Art

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136. As discussed in Section IX above, neither Grotmol alone, in view of the knowledge of a POSA, or in view of Hickman discloses the claimed limitations. *See supra* Section IX. Claim 21 further narrows claim 4.

137. With regard to Ground 1, for claim 4, the Petition relies on anticipation by Grotmol. Petition, 3, 13-14. *See supra* Section IX.1.A. For Ground 1, Petitioner maps Grotmol's images to the claimed "object representations." *See* Petition, 41-42 (citing Ex. 1004, 38:45-46). However, Grotmol does not disclose the substitute amended features including the first and second circumstance representations including first and second collections of object representations, respectively, wherein (i) the first and second collections comprise specific data structures (comprising labels and coordinates as claimed), (ii) those data structures are correlated with instruction sets, (iii) the first collection represents objects detected at a first time or during a first time period and the second collection represents the objects detected at a second time or during a second time period, as recited in proposed substitute claim 21.

138. Regarding (i), Grotmol merely discloses images depicting objects. A POSA would not understand images to necessarily include labels indicating object type and coordinates indicating object locations. Rather, the '974 Patent discloses a collection of object representations comprising a data structure, as shown in Figure 4B. *See* Ex. 1001, Fig. 4B. Therefore, Grotmol does not disclose

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the first collection of object representations comprising a first data structure including labels indicating types of the multiple objects, and coordinates indicating locations of the multiple objects. Accordingly, Grotmol certainly cannot disclose the ***second*** collection of object representations comprises a ***second*** data structure including labels indicating types of the multiple objects and coordinates indicating locations of the multiple objects. Grotmol does not disclose any object representations including labels and coordinates corresponding to said objects.

139. Regarding (ii), Grotmol fails to disclose data structures in the way claimed, let alone the first data structure correlated with the first one or more instruction sets for operating the first device, and the second data structure is correlated with the second one or more instruction sets for operating the first device.

140. Regarding (iii), Grotmol does not disclose that its images of scenes from a robot vehicle's operation (mapped by Petitioner to the "[first|second] circumstance representation") include, respectively, a first collection of object representations and a second collection of object representations data structures (that each includes the recited object labels and coordinates), where the first collection of object representations represents multiple objects detected at a first time or during a first time period, and the second collection of object

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representations represents the multiple objects (i.e., the same objects) detected at a second time or during a second time period. Grotmol's disclosure of images corresponding to times does not amount to first and second ***collections of object representations*** comprising data structures (that each includes the recited labels and coordinates) representing multiple objects detected at first/second times or during first/second time periods. Further, because Petitioner maps Grotmol's images to the claimed circumstance representations, Grotmol cannot also disclose that the first/second circumstance representations include first/second collections of object representations as claimed, with the collections comprising specific data structures.

141. Grotmol in view of Hickman would also not render obvious proposed substitute claim 21 because those references do not disclose or suggest all the elements of the claim in their claimed configuration. A POSA would not have been motivated to modify Grotmol's disclosure in view of Hickman to arrive at the invention claimed by proposed substitute claim 21.

142. With respect to claim 4, in Ground 3, Petitioner also relies on Grotmol in view of Hickman to argue that claim 4 is rendered obvious. However, Petitioner does not rely on Hickman as disclosing the claimed first circumstance representation. As discussed above, Hickman does not disclose the various claimed limitations which have been amended into proposed substitute claim 21,

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nor would a POSA have been motivated to modify Grotmol's disclosure in view of Hickman to arrive at the invention claimed by proposed substitute claim 21.

143. Furthermore, claims 22-26 narrow claims 5, 7, 11, 14 and 15, respectively. The proposed substitutes add limitations to these claims that I just discussed with respect to claim 21. While the claims are phrased differently, the substantive narrowing additions cover the same material. Therefore, for the reasons discussed regarding claim 21, Grotmol does not disclose each of the limitations of claims 22-23 and 25-26. Claims 5, 7, 14 and 15 are all challenged under Ground 1, which is anticipation by Grotmol. *See supra* Section IX.1. Further still, Grotmol in view of Hickman does not disclose or suggest all of the limitations of claim 24, or any of claims 22-26 for that matter. Claim 11 is first challenged under Ground 2, which assert it is obvious over Grotmol in view of the knowledge of a POSA. *See supra* Section IX.2.A. However, it would not have been obvious for a POSA to modify Grotmol's system to implement the substitute limitations added to claim 24, as a POSA would not have had the motivation to combine or modify Grotmol's system to implement such features, as explained above. Claim 11 is also challenged under Ground 3, which asserts that claim 11 is obvious over Grotmol in view of Hickman. *See supra* Section IX.3. This is also incorrect with regard to substitute claim 24, for the reasons discussed above.

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XI. CONCLUSION

144. This declaration represents the opinions that I have formed up to date based on the material currently available to me. I reserve the right to revise, supplement, and/or amend my opinions stated in this declaration based on new information that becomes available to me and on my continuing analysis of the materials available to me.

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



Dated: March 7, 2024

Dr. Eli Saber

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