

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TESLA, INC.,
Petitioner
v.

AUTONOMOUS DEVICES, LLC,
Patent Owner

Case: IPR2024-00745
U.S. Patent No. 11,663,474

DECLARATION OF DR. ELI SABER, PH.D.

TABLE OF CONTENTS

I.	INTRODUCTION	1
II.	BACKGROUND AND QUALIFICATIONS.....	2
III.	MATERIALS REVIEWED AND TIME OF ALLEGED INVENTION.....	7
IV.	LEGAL STANDARDS	9
1.	Overview	9
2.	Patent Claims.....	9
3.	Burden of Proof for Invalidity.....	10
4.	Claim Construction	11
5.	Person of Ordinary Skill in the Art	11
6.	Prior Art.....	11
7.	Anticipation	12
8.	Obviousness.....	13
V.	PERSON OF ORDINARY SKILL IN THE ART (POSA)	16
VI.	THE '474 PATENT	17
1.	Existing Technology	17
2.	Advantages Provided by the '474 Patent	18
VII.	CLAIM CONSTRUCTION.....	20
VIII.	OVERVIEW OF ALLEGED PRIOR ART REFERENCES	20
1.	Buibas	20
2.	Grotmol	22
3.	Sinyavskiy	23
IX.	THE ALLEGED PRIOR ART DOES NOT DISCLOSE OR SUGGEST CERTAIN CLAIMS OF THE '474 PATENT.....	24
1.	Ground 1A	24
A.	Claim 56: Buibas and Sinyavskiy do not disclose or suggest wherein the one or more inputs are further correlated with another one or more instruction sets for operating a third device.....	24
B.	Claim 56: Buibas and Sinyavskiy do not disclose or suggest wherein at least a portion of the another one or	

	more instruction sets for operating the third device or at least an information related to the another one or more instruction sets for operating he third device is learned in another learning process that includes operating the third device at least partially by another user.....	38
C.	Claim 57: Buibas and Sinyavskiy do not disclose or suggest wherein the one or more inputs are further correlated with another one or more instruction sets for operating a third device.....	42
2.	Ground 2C	46
A.	Claim 56: Grotmol and Buibas do not disclose or suggest wherein the one or more inputs are further correlated with another one or more instruction sets for operating a third device.....	46
B.	Claim 56: Grotmol and Buibas do not disclose or suggest wherein at least a portion of the another one or more instruction sets for operating the third device or at least an information related to the another one or more instruction sets for operating thethird device is learned in another learning process that includes operating the third device at least partially by another user.....	52
C.	Claim 57: Grotmol and Buibas do not disclose or suggest wherein the one or more inputs are further correlated with another one or more instruction sets for operating a third device.....	58
X.	PATENT OWNER’S SUBSTITUTE CLAIMS ARE PATENTABLE	62
1.	Proposed Substitute Claims.....	64
	Claim 85 (Proposed Substitute for Claim 45, if claim 45 Found Unpatentable).....	64
	Claim 86 (Proposed substitute for claim 46, if claim 45 Found Unpatentable).....	66
	Claim 87 (Proposed substitute claim for claim 47, if claim 45 Found Unpatentable).....	67
	Claim 88 (Proposed substitute for claim 51, if claim 45 Found Unpatentable).....	67
	Claim 89 (Proposed substitute for claim 56, if claim 56	

	Found Unpatentable).....	67
	Claim 90 (Proposed substitute claim for claim 57, if claim 57 Found Unpatentable).....	68
	Claim 91 (Proposed substitute claim for claim 60, if claim 45 Found Unpatentable).....	68
	Claim 92 (Proposed substitute for claim 56, if claim 56 Found Patentable)	68
	Claim 93 (Proposed substitute for claim 57, if claim 57 Found Patentable)	70
2.	The Original Application for the '474 Patent Includes Support for the Proposed Substitute Claims	72
	Support for Limitations Present in Original Claim 45.....	74
	Support for Limitations Present in Original Claim 46.....	121
	Support for Limitations Present in Original Claim 47.....	127
	Support for Limitations Present in Original Claim 51.....	133
	Support for Limitations Present in Original Claim 56.....	141
	Support for Limitations Present in Original Claim 57.....	154
	Support for Limitations Present in Original Claim 60.....	160
	Support for Limitations Added to Substitute Claim 85	164
3.	The Original Application for the '474 Patent Enables the Proposed Substitute Claims.....	212
4.	The Proposed Substitute Claims are Patentable Over the Cited Prior Art.....	213
XI.	CONCLUSION.....	218

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 these *Inter Partes* Review proceedings (“IPRs”) before the Patent Trial and Appeal Board (“Board” or PTAB”) of the United States Patent and Trademark Office (“PTO”) regarding U.S. Patent No. 11,663,474 (“the ’474 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 ’474 patent (claims 56 and 57) which I understand Tesla, Inc. (“Petitioner” or “Tesla”) has challenged

¹ In this Declaration, I reference documents by exhibit numbers that, as I understand, are attached as exhibits in the *Inter Partes* Reviews of the ’474 patent (IPR2024-00745). I refer to the Petition in IPR2024-00745 as the “’474 Petition.”

in this IPR. In my view, the alleged prior art references do neither. In addition, I have been asked to consider, and provide my opinions regarding, Patent Owner's motion to amend various claims of the Challenged Patent. In doing so, I discuss support and enablement for the amendments from the original applications for the '474 patent and review whether the alleged prior art references disclose or suggest the added limitations. 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.

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, 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” and the “Advanced Neural Network and Deep Learning: Part 1” courses; and reestablished the Pattern Recognition course 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 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. The graduate course titled: “Advanced Neural Networks and Deep Learning: Theory, Mathematics and Algorithms: Part 1” 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 begins with an in-depth study of the mathematical methodologies for neural networks and optimization (zero-, first- and second-order) techniques. It then progresses to provide a thorough study of shallow and deep neural networks architectures and algorithms, activation functions, regression, two- and multi-class classification, unsupervised learning, feature

engineering/selection, backpropagation along with applications to a variety of engineering problems.

13. I am currently working to develop a follow-on course (Part 2) to the Advanced Neural Networks and Deep Learning course described above. This course is intended to cover convolutional and recurrent style neural networks, principles of feature engineering, kernel methods, tree-based learners, attention mechanisms/transformers, reinforcement learning and generative adversarial networks. This course is targeted to debut in Fall 2025.

14. My current research focuses on machine learning for object 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.

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

16. I am the author or co-author of 38 peer-reviewed journal publications.

17. 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.

18. 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.

19. A complete statement of my industrial and academic records including a listing of the above publications and patents is included with my curriculum vitae in Exhibit 2002.

III. MATERIALS REVIEWED AND TIME OF ALLEGED INVENTION

20. 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 '474 patent.

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

- the '474 patent (Ex. 1001);
- the file history of the '474 patent (Ex. 1002);
- the declaration of Dr. Jason Janet (Ex. 1003);
- U.S. Patent Application Publication No. 2014/0089232 to Buibas, et al. (“Buibas” – Ex. 1005);
- U.S. Patent Application Publication No. 2013/0325768 to Sinyavskiy, et al. (“Sinyavskiy” – Ex. 1006);
- U.S. Patent No. 9,604,359 to Grotmol, et al. (“Grotmol” – Ex. 1008);
- The Parties’ papers and exhibits in this case (IPR2024-00745); and
- any other materials that I refer to in this declaration in support of my opinions.

22. 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 application (U.S. Patent Application No. 15/340,991) (“the '991 Application”) (Ex. 2004) to which the '474 patent claims priority (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 '474 patent, the prior art to the patent, and the state of the art, at the time of the alleged invention.

23. As I discuss in detail below, it is my opinion that the claims of the '474 patent that I discuss below are not disclosed or suggested by the prior art references cited by Petitioner in this *Inter Partes* Review.

IV. LEGAL STANDARDS

1. Overview

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

25. 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

26. 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.

27. 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.

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

29. 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.

30. 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

31. 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

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

33. 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

34. 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.

35. 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

36. 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.

37. 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 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

38. 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.

39. 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.

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

41. 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 their combination.

42. 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.

43. 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.

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

45. 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 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)

46. Based on my review of the '474 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 two to 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.

47. 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., 2016). During this time frame, I possessed at least the qualifications of a POSA, as defined above.

VI. THE '474 PATENT

48. The '474 patent, titled “Artificially intelligent systems, devices, and methods for learning and/or using a device’s circumstances for autonomous device operation,” discloses systems and methods for learning and using a device’s circumstances for autonomous device operation. Ex. 1001, Abstract, 1:58-64. The '474 patent discloses systems and methods for autonomous driving by learning and using a device’s circumstances including detecting objects with various properties along with correlated instruction sets for operating the device in various circumstances. *Id.*, 67:19-60, claim 45.

1. Existing Technology

49. Prior to the innovations described in the '474 patent, “[c]ommonly employed device or system operating techniques lack[ed] a way to learn [the] operation of a device or system and enable autonomous operation of a device or system.” *Id.*, 1:51-54. The '474 patent solved this problem by utilizing a

sophisticated system for learning the scenarios encountered by a device and distilling those scenarios into a set of circumstances (which may include one or more objects) and then using correlated instructions that can be efficiently performed autonomously. *Id.*, 67:19-60, claim 45.

2. Advantages Provided by the '474 Patent

50. The '474 patent is directed to artificially intelligent devices, systems, and methods that store a knowledgebase for autonomous operation. Ex. 1001, Abstract. Referring to Figure 38 (shown below) and the specification's description of Figure 38, for example, vehicle 98a includes sensors 92, such as a camera 92a, that capture the vehicle's 98a's surrounding. Ex. 1001, 162:58-164:15, Fig. 38, claim 45. The vehicle's computer(s) process the output from the sensors 92 to form a circumstance representation that includes object representations 625 representing objects 615aa-ad (people, boulders, materials, vehicles, etc.) in the vehicle's surrounding. *Id.*, Fig. 38. If a vehicle's computer(s) detect a match with a previously learned circumstance representation (i.e. by inputting the incoming circumstance representation into inputs of a knowledgebase), the vehicle 98a performs autonomous operation using previously learned instructions 526 correlated with the previously learned circumstance representations. *Id.*, 162:58-164:15, Fig. 38, claim 45.

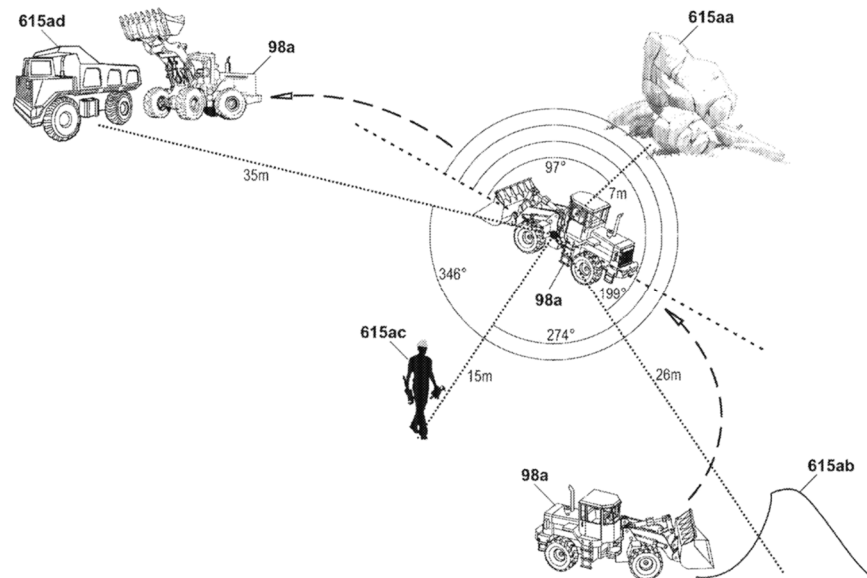


FIG. 38

Ex. 1001, Fig. 38.

51. The '474 patent describes and claims methods and systems implementing its innovative techniques for autonomous operation. For example, one such method is claimed in claim 45. Claim 45 is directed to a first device with a knowledgebase that includes one or more inputs for inputting at least a portion of a circumstance representation, wherein the one or more inputs are correlated with one or more instruction sets for operating a second device. This claim uses correlations between inputs and instruction sets to achieve autonomous operation. In addition, claims 56 and 57 contain numerous limitations that the Petition has not established are disclosed, suggested or rendered obvious by the cited references.

52. The claims that I discuss below introduce limitations that the Petitioner has not established are disclosed, suggested or rendered obvious by any of the cited prior art references, as explained in more detail below. The '474 patent provides novel and innovative techniques for autonomous operations.

VII. CLAIM CONSTRUCTION

53. 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 understand that neither party has proposed any terms for construction and I have given the claim terms their ordinary and customary meaning in performing my analysis.

VIII. OVERVIEW OF ALLEGED PRIOR ART REFERENCES

54. In its Petition, Tesla relies on several references for its arguments, including Buibas, Sinyavskiy, and Grotmol. I describe these references briefly below.

1. Buibas

55. Buibas is titled “Neural Network Learning and Collaboration Apparatus and Methods” and discloses an “[a]pparatus and methods for learning

and training in neural network-based devices.” Ex. 1005, Abstract. Buibas discloses a “robotic brain” that “may comprise one or more neural networks.” *Id.*, ¶[0079]. Figure 10 of Buibas, shown below, discloses that a processing apparatus 1000 receives sensor input 1020. *Id.*, ¶[0136]. This input is transformed into an encoded signal 1026, which is sent to detectors 1002_n, which are used for object detection. *Id.*, ¶¶[0137]-[0139].

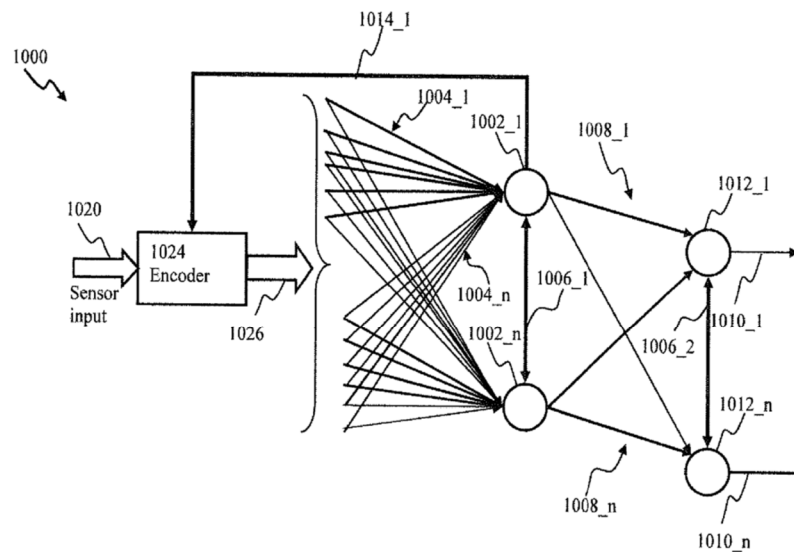


FIG. 10

Ex. 1005, Fig. 10.

56. Figure 4 from Buibas, shown below, discloses that weight vectors, which are vectors that comprise weight values, can be merged in merge 400, “where the parent[] A provides the portion 432 and the parent B provides the portion 434 to the off-spring 436.” *Id.*, ¶[0096]. Figure 4 merely shows that

“offspring network configuration (e.g., the weight vector W) 408 may be obtained using two parent weight vectors,” *id.*, ¶[0095], and never discloses or suggests instruction sets for operating a device.

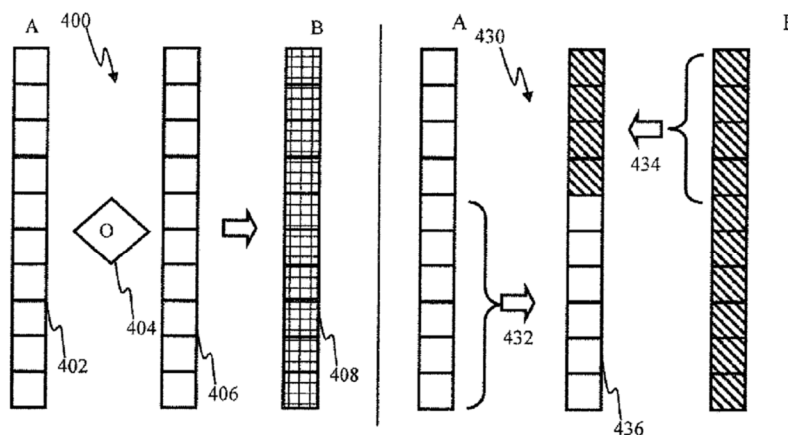


FIG. 4

2. Grotmol

57. Grotmol discloses a method for training and operating a robotic device to follow a simple trajectory based on a simple sequence (i.e., ordered buffer) of images. Ex. 1008, Abstract. If any circumstance occurs for which the simple trajectory is not trained (i.e., different objects, etc.) the robot in Grotmol would not know what to do or would collide with an obstacle. The robotic device “may utilize a camera” to store a “sequence of images of a visual scene seen when following a trajectory during training in an ordered buffer.” Ex. 1008, Abstract. During training, “[m]otor commands issued by a trainer corresponding to time instances when the images are acquired may be stored.” *Id.*, 39:17-19. During autonomous operation, the robotic device may be configured to compare an

acquired image “with one or more images from the training buffer in order to determine the most likely match.” *Id.*, Abstract. After an acquired image is matched to an image stored in the training buffer, the best match may be used “to predict motor command for controlling operation of a robot.” *Id.*, 27:57-58.

58. Figure 1 from Grotmol, shown below, discloses that robot 160 includes sensor 166. *Id.*, 8:57-61. Sensor 166 provides “information associated with objects within the field-of-view 168.” *Id.*, 8:64-66. Grotmol discloses that its device also includes a memory that stores “training sets,” which may include “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.*, 3:35-39.

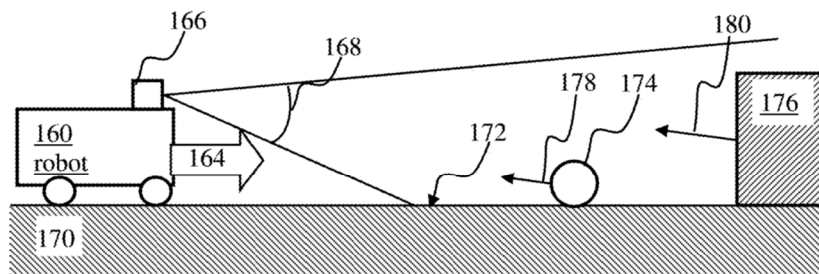


FIG. 1

Ex. 1008, Fig. 1.

3. Sinyavskiy

59. Sinyavskiy is titled “Stochastic Spiking Network Learning Apparatus and Methods” and discloses a “framework” to “enable [an] adaptive

spiking neuron signal processing system to flexibly combine different learning rules.” Ex. 1006, Abstract. Sinyavskiy discloses “spiking” neural networks that can be trained to control the operation of robotic devices. Ex. 1006, ¶¶[0185]-[0188].

IX. THE ALLEGED PRIOR ART DOES NOT DISCLOSE OR SUGGEST CERTAIN CLAIMS OF THE ’474 PATENT

60. In my opinion, the alleged prior art does not disclose or suggest to a POSA all of the elements of claims 56 and 57 of the ’474 Patent under the two grounds presented for these claims in the ’474 Petition. Each ground is addressed individually below.

1. Ground 1A

61. Regarding Ground 1A, in my opinion Buibas in view of Sinyavskiy does not disclose or suggest all of the features of claims 56 and 57.

A. Claim 56: Buibas and Sinyavskiy do not disclose or suggest wherein the one or more inputs are further correlated with another one or more instruction sets for operating a third device

62. Claim 56, which depends from claim 46, states, in part, “wherein *the one or more inputs* are *further* correlated with *another one or more instruction sets for operating a third device*.” Ex. 1001, Claim 56 (emphasis added). In my opinion, Buibas in view of Sinyavskiy does not disclose or suggest this limitation.

63. In the Petition, Petitioner cites its reasoning regarding claim element

45.1, Petition, 41-42, but in my opinion that claim element does not include *further* correlating the one or more inputs with *another* instruction set for operating *a third device*, as required by claim 56. Claim 45 only mentions instruction sets for operating a second device. Ex. 1001, Claim 45 (reciting for element 45.1: “a knowledgebase that includes one or more inputs for inputting at least a portion of a circumstance representation, wherein the *one or more inputs are correlated with one or more instruction sets for operating a second device*”).

64. Petitioner next contends that “Buibas further discloses techniques for ‘merging’ brain images to combine behavior modules learned on two or more robots (a second device and a third device). For example, ‘non-interleaved’ network merges can be used ‘to combine capabilities of two (or more) parents or to add a capability to one of the parent network.’ TESLA-1005, ¶[0096], FIG. 4; *see generally id.*, ¶¶[0090]-[0098], [0124]-[0127], [0189], [0225], FIG. 9.” Petition, 41-42. Petitioner’s argument and Petitioner’s citations of Buibas *do not even discuss or mention instruction sets, much less instruction sets for operating a third device*. Petition, 41-43. In addition, Petitioner’s contention and citations of Buibas do not mention *any one or more inputs that are further correlated with another instruction set for operating a third device*.

65. Petitioner’s argument and citations of Buibas rely on Figure 4 and ¶[0096] (describing Figure 4) of Buibas. Petition, 41-42. Below is Figure 4

showing that network weight updates and merging of weight vectors do not involve any instruction sets. Figure 4 does not mention instruction sets at all and is described by Buibas as disclosing “network weight update,” “merging of weight vectors,” “weights,” and “merges” (including how they are used and implemented). Petition, 41-42.

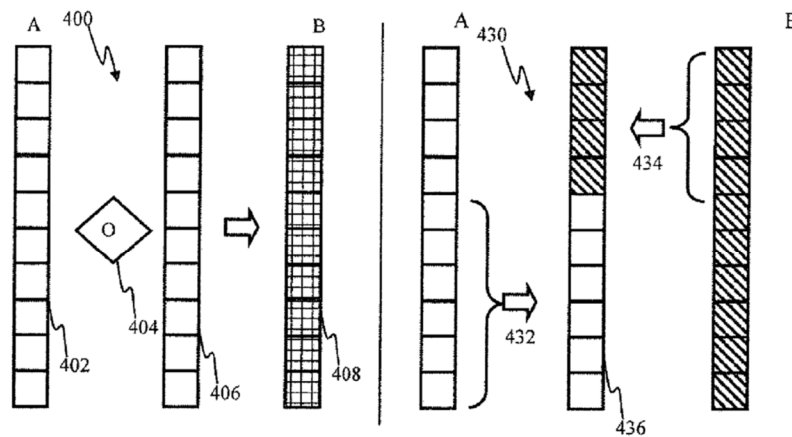


FIG. 4

66. First, in my opinion a neural network typically contains input neurons (i.e. inputs) connected by connections with potentially multiple layers of intermediate neurons that are further connected by additional connections with output neurons (i.e. outputs). Output neurons or outputs typically provide instruction sets (i.e. instruction set 1, instruction set 2, etc.) for operating a device. ***Connections among neurons are associated with weights, where weights are typically represented by numerical values.*** When an input is provided to the input neurons or inputs, the neural network uses the weights of its connections in a

feedforward calculation manner to lead to an instruction set for operating a device at the output neurons or outputs.

67. Second, a ***weight vector*** (also referred to by Buibas as “network configuration,” “offspring network configuration (e.g., the weight vector W) 408,” Ex. 1005, ¶[0095] and other references) ***is a list of weights*** that are read/copied from the associations with connections among neurons of an originating/parent neural network as shown in the Buibas FIG. 4. ***A weight vector is not a neural network*** since a weight vector does not include any neurons and instruction sets for operating a device. Generally speaking, a neural network is made up of an input layer with one or multiple inputs, one or more hidden layers – each of which is potentially made up of several neurons - , and an output layer with one or more output neurons. Neurons within a given layers are typically connected to neurons in other layers using weights. The weights are typically utilized to calculate the output of a given neuron within a layer. The offspring weight vector, as described in Buibas, is a list of weights, Ex. 1005 ¶[0094-0098]. Petitioner’s contention and Petitioner’s citations of Buibas describing updates of network weights and merging of weight vectors do not involve any instruction sets. Petitioner’s argument that Buibas’s “network merges can be used ‘to combine capabilities of two (or more) parents or to add a capability to one of the parent network,’” Petition, 42, to meet the limitations of claim 56 is wrong for

the following reasons:

68. First, a network merge is a term Buibas uses for a merge of weight vectors of the neural networks. The entire section of Buibas titled “**Network Merges**” (Ex. 1005, ¶[0094-0098]) *specifically describes merging of weight vectors*. Further, Buibas specifically states that “merges” are “network weight updates comprising two or more sources.” Ex. 1005, ¶[0094]. Even Further, Petitioner’s own citations of Buibas clearly show that a network merge is a merge of weight vectors of the neural networks (*see* Ex. 1005, ¶[0028] stating “FIG. 4 is a functional block diagram illustrating a **network merge** in accordance with one or more implementations” and *showing merging of weight vectors*; *see also* Ex. 1005, FIG. 4 (showing an example of merging of weight vectors and using the resulting merged weight vector to update weights of a neural network)).

69. Second, in my opinion, Petitioner’s contention of combining capabilities by a network merge (i.e. merging weight vectors as Buibas specifically defines a “network merge” as discussed above) is not, and indeed does not even mention, further correlating the same one or more inputs with another instruction set, let alone an instruction set for operating a third device as required by claim 56. Merging two weight vectors as Buibas specifically discloses in its “Network Merges” involves combining weights of weight vectors and does not involve any instruction sets, much less *further correlating the same*

one or more inputs with *another* instruction set *for operating a third device* as a part of the merge process, and as required by claim 56. Further correlating instruction sets would require additional training or retraining to properly incorporate the added instructions into the network.

70. Third, in its merge process, Buibas explains that an “*‘offspring’ network configuration (e.g., the weight vector W)* 408 may be obtained *using two parent weight vectors*,” Ex. 1005, ¶[0095], and that the merge “may be used . . . *to combine capabilities of two (or more) parents* or to add a capability to one of the parent network.” *Id.*, ¶[0096]. But in my opinion “combining capabilities” and “adding a capability” by merging weight vectors and further correlating the same one or more inputs with another instruction set(s) *are two entirely different concepts*. Buibas’s disclosure of obtaining an offspring weight vector or network configuration by combining two parent weight vectors says nothing about instruction sets, and thus does not contemplate further correlating another instruction set with the same one or more inputs, as required by claim 56. *See also* Ex. 1005, ¶¶[0097-0099] (discussing combining traits and adding traits to determine offspring weight vectors but never mentioning further correlating one or more inputs with another instruction set).

71. In addition, Buibas’s operations - shown below ([Eqn. 3] and [Eqn. 4]; Ex. 1005, ¶¶[0097-0098]) - used in merges to arrive at an offspring weight

vector are formulated using weights instead of instruction sets, is further explicit evidence that Buibas’s network weight updates and merges of weight vectors do not involve any instruction sets, and especially not instruction sets for operating a third device. The equations shown below clearly involve “and” and “or” operations and do not involve any type of correlation or retraining.

$$W^{eff} = (W^A \text{ OR } W^B) \quad (\text{Eqn. 3})$$

$$W^{eff} = (W^A \text{ AND } W^B). \quad (\text{Eqn. 4})$$

72. Petitioner’s additional citation to Buibas’s disclosure of Figure 9 and its accompanying text, Petition 41-42, only illustrates a “robotic brain update” or “network merge,” Ex. 1005, ¶[0124], where splice points for the merge are selected, *source weights* for each segment are selected, and *target weights* are generated for each segment. *Id.*, ¶¶[0124-0127]. Petitioner’s citation of Buibas describes merging of weights and never mentions that existing same inputs are further correlated with another instruction set for operating a third device when the weight merge occurs. *Id.*

73. Petitioner’s further citations to Buibas ¶[0189] (generally discussing combining brain images), and ¶[0225] (generally discussing merging brain images) also never mention instruction sets and further correlating the same one or more inputs with another instruction set for operating a third device as required

by claim 56. In my opinion, Buibas ¶[0189] and ¶[0225] discuss merging brain images very generally without even a mention of *additional another* instruction set(s) for operating *a third device*, the *same one or more inputs*, and how they are *further* correlated as required by the claim. In addition, Buibas makes clear - in its other sections as described below- what its brain image merges actually involve and how that happens:

(i) “[a]n authenticated user connecting through a user interface device 1202 connects to the cloud server, and identifies a brain image 1404 to be loaded onto the computerized neuromorphic apparatus 1150.” Ex. 1005, ¶[0183]. The robot then “downloads the selected brain image, and *set its synaptic weights appropriately.*” *Id.*

(ii) “The brain image 1404 may comprise *the network weights* so that the download effectuates *the weight configuration* of the computerized neuromorphic apparatus network.” Ex. 1005, ¶[0183].

(iii) “[T]he target configuration may comprise *network weights downloaded into the target robotic device*. In some implementations, the target configuration may comprise *network weight vectors stored within the cloud server and available for subsequent downloads to one or more robotic devices*. Ex. 1005, ¶[0123].

74. The above quotes from Buibas confirm that what is shared and loaded *from* an originating robot into a receiving robot are, in general, weight

values, not instruction sets, and especially not instruction sets for operating a third device further correlated with the same one or more inputs as required by claim 56.

75. Petitioner next argues that “it would have been understood and obvious to a POSITA that the parents to a merged network that forms a partition of a brain image on the first device can be trained [by different users on different devices] such that the inputs to the offspring brain image on the first device are correlated with commands (instruction sets) for operating both the second device and the third device,” Petition, 42, but this is conclusory, wrong, and not supported by Buibas. Petitioner cites no expert testimony to support this conclusory argument, and merely cites to its analysis of claim 51 and its previous citations of Buibas. But *claim 51 does not claim further correlating an input with another instruction set for operating a third device* and only *recites a different concept* “wherein at least a portion of the one or more instruction sets for operating the second device is learned in a learning process that includes operating the second device at least partially by a user.” Ex. 1001, Claim 51. And as previously discussed, the portions of Buibas cited by Petitioner merely disclose network weight updates and merging of weight vectors, and say nothing about instruction sets, and thus do not disclose or suggest that the same one or more inputs are further correlated with another instruction set for operating the third

device.

76. In my opinion, a POSA reading Buibas's disclosure would not have been motivated to arrive at the claimed invention of claim 56. A POSA reading Buibas's disclosure regarding updates of network weights and merging weight vectors would not have arrived at the invention of claim 56 because Buibas's disclosure does not disclose, suggest, or even mention further correlating the same one or more inputs with another instruction set for operating a third device.

Claim 56 does not recite some general grouping of separate neural networks as partitions (partitions themselves are separate neural networks for different tasks) that each includes its own inputs, but recites "the [same] one or more inputs are further correlated with another one or more instruction sets for operating a third device."

77. *Further, additional instruction sets cannot simply be added to existing instruction sets that are already correlated with existing same inputs in a knowledgebase (i.e. neural network) without appropriately retraining the network.* As of the critical date (see my discussion above at Sections III and V), additional instruction sets could only be added to existing instruction sets that are already correlated with existing inputs *by appropriately retraining the knowledgebase with training sets that include the additional instructions sets.* This is so because, during retraining, proper weights for correlations/connections

are calculated/adjusted through backpropagation process (*see* Ex. 1001, 18:64-67) for specific instruction sets associated with specific same inputs in each training set. Backpropagation, generally speaking, typically involves an iterative process of training a neural network where a training input is provided to a given network and the corresponding calculated output is computed via feed forward operations through the network. The error between the calculated and expected output is then backpropagated through the network using algorithms such as gradient descent in order to properly update the weights throughout the layers. This process is repeated multiple times with various inputs using an appropriately chosen training dataset until convergence is achieved. The optimized network is then tested and further optimized using a validation dataset and then further tested using a test dataset to measure/quantify its performance.

78. A POSA would have understood that *further* correlating *the same one or more inputs* with *another* instruction set for operating *a third device* would require properly *retraining* Buibas's neural network in order for the added instruction set(s) to be properly integrated into the network. *Buibas does not disclose or suggest retraining a knowledgebase to correlate the same one or more inputs with another additional instruction set for operating a third device as required by claim 56.* Buibas's disclosure of merging does not suggest retraining the neural network to a POSA, and a POSA reading this disclosure

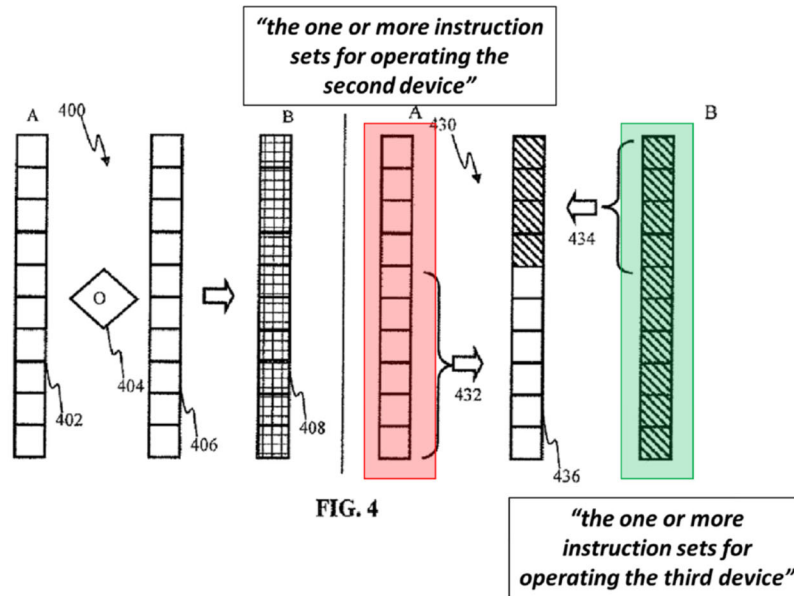
would not have arrived at the invention of claim 56.

79. To the extent that Petitioner argues that a brain image in Buibas is an entire neural network (although Buibas is clear in the quotes cited above in Paragraph 73 that “the brain image 1404 may comprise *the network weights* so that the download effectuates *the weight configuration* of the computerized neuromorphic apparatus network,” Ex. 1005, ¶[0183]), instruction sets of this assumed neural network *cannot simply be added to pre-existing instruction sets that are already correlated with existing same inputs in a knowledgebase (i.e. neural network) without appropriately retraining the network.* The addition of instruction sets to pre-existing instruction sets would require retraining to seamlessly integrate these newly added instruction sets in order to ensure the proper functionality of the network.

80. In my opinion, *none of Petitioner’s contentions, Petitioner’s citations of Buibas, Buibas’s figures, and Buibas’s text assert, show, or describe a “merged” neural network where instruction sets of two neural networks are merged and properly integrated into the network.* Such merging of instruction sets of two neural networks would require appropriate technical explanation of how the additional instruction sets are correlated/connected with inputs via correlations/connections and/or intermediate neurons and how those correlations/connections are correctly weighted for proper statistical predictions

of those additional instructions sets, which requires retraining the knowledgebase (i.e. neural network) with training sets that include the additional instructions sets as discussed above. Buibas does not show or describe merging instruction sets of two neural networks or the underlying retraining process(es) that would be required to appropriately and seamlessly merge additional instructions sets. Instead, what Buibas actually shows and describes is the merging of weights in weight vectors of two neural networks that does not involve instruction sets.

81. Turning to Petitioner's annotated Figure 4 from Buibas, the Petition specifically mapped Buibas's weights in weight vectors to the claimed instruction sets as shown below in the annotated Figure 4 from the Petition. Petition, 43. But Buibas's weight vectors do not include any instruction sets or anything other than weights in the parent weight vector A, in the parent weight vector B, and in the offspring weight vector. *See* Ex. 1005, ¶¶[0089-0098], [0123-0127], [0179], [0183], Figure 4. The sections of Buibas cited by Petitioner regarding Buibas's weight vectors deal with updating and merging weights or weight values and do not have anything to do with instruction sets that are claimed in claim 56. Petition, 41-43.



TESLA-1005, FIG. 4 (annotated and color added).

Petition, 43.

82. *In my opinion, a weight is a fundamentally different concept than the claimed instruction set.* Weights are typically statistical “value[s]” or “numeric attribute[s],” Ex. 1001, 104:10-13, that can be “properties of a connection[,]” Ex. 1005, ¶[0077]. Conversely, instruction sets are commands for operating a device or its actuators. Ex. 1001, 152:13-29. To illustrate the point, a clear fundamental difference between a weight and an instruction set of operating a device is that a weight is a number such as 0.238 that signifies a weight of an associated connection between two neurons, whereas an instruction set is typically a command such as “Device1.moveForward(27)... for moving a

Device forward 27 units.” Ex. 1001, 142:53-57.

83. Further, Petitioner does not rely on Sinyavskiy for this limitation of claim 56 and Sinyavskiy does not contemplate this limitation of claim 56. Thus, the Buibas-Sinyavskiy combination does not disclose or suggest the same one or more inputs are further correlated with another one or more instruction sets for operating a third device as required by claim 56.

B. Claim 56: Buibas and Sinyavskiy do not disclose or suggest wherein at least a portion of the another one or more instruction sets for operating the third device or at least an information related to the another one or more instruction sets for operating the third device is learned in another learning process that includes operating the third device at least partially by another user

84. Claim 56 also requires:

wherein at least a portion of the *another one or more instruction sets for operating the third device* or at least an information related to the *another one or more instruction sets for operating the third device* is learned in *another learning process* that includes *operating the third device at least partially by another user*.

Ex. 1001, Claim 56.

85. In my opinion, Buibas and Sinyavskiy does not disclose or suggest that at least a portion of “the another one or more instruction sets for operating the third device or at least an information related to the another one or more instruction sets” is learned in “another learning process that includes operating

the third device at least partially by another user.” Ex. 1001, Claim 56.

86. Petitioner contends without support that “it would have been understood and obvious to a POSITA that the parents to a merged network that forms a partition of a brain image on the first device can be trained on separate devices, e.g., a second device and a third device, by respective users” in multiple learning processes. Petition, 42. In my opinion, Petitioner provides ***no basis for its obviousness argument***. And while Petitioner does point out that Buibas discloses multiple devices, Petition, 42, Petitioner does not identify ***a single instruction set nor a single learning process*** in either Buibas or Sinyavskiy to support why the claimed another instruction set or its related information is learned in another learning process involving another user and a third device would have been obvious based on the references’ disclosure.

87. In its argument, Petitioner cites Buibas, but none of Petitioner’s citations mention ***any instruction sets***. Petition, 42. Further, none of Petitioner’s citations mention ***another learning process***. Petitioner has not shown that Buibas and/or Sinyavskiy disclose or suggest that an ***instruction set for operating the third device*** or its related information is ***learned in another learning process*** that includes ***operating a third device by another user***. Petitioner next contends with no explanation that it would have been obvious to learn another instruction set or its related information in another learning process involving another user

operating a third device with Buibas’s brain image “such that the inputs to the offspring brain image on the first device are correlated with commands (instruction sets) for operating both the second device and the third device.” Petition, 42.

88. Petitioner is wrong for several reasons. **First**, Petitioner’s citations of Buibas involving merging of brain images *do not even mention instruction sets* as discussed above. Also, Buibas is clear in the quotes cited above from Buibas in Paragraph 73 that “the brain image 1404 may comprise *the network weights* so that the download effectuates *the weight configuration* of the computerized neuromorphic apparatus network.” Ex. 1005, ¶[0183]. **Second**, Petitioner’s obviousness argument lacks *any supporting explanation or expert testimony*. Something that is not explained and supported by Petitioner, and indeed not even mentioned in Petitioner’s own citations of Buibas, is clearly not obvious to a POSA.

89. Further, Petitioner does not provide a reason to modify Buibas by the teaching of Sinyavskiy (and did not even rely on Sinyavskiy for claim 56) to achieve the claimed invention and has does not provide evidence of a reasonable expectation of success in the proposed modification.

90. In addition, Petitioner has not established that the portion of the claim at issue here, which involves not only a process that uses different instances

of instruction sets, different learning processes, different devices, and different users, but specifically requires that this claimed process results in *the same one or more inputs further correlated with instruction sets learned in different learning processes involving different users operating different devices integrated into a single knowledgebase*. Claim 56 is straightforward or unusually simple to a POSA because the seamless integration of additional or newly acquired instruction sets with existing instructions sets requires high levels to retraining to ensure that the entire network is properly optimized. This is not trivial but rather require skilled expertise to do so properly.

91. Further, as I discussed above, any additional instruction sets (especially instruction sets learned in an additional or different learning process involving an additional user operating an additional device) *cannot be simply integrated with the existing instruction sets that are already correlated with the existing inputs without appropriately retraining the network via processes such as backpropagation in order to update the weights of the newly added connections to allow for the proper integration of the added instruction sets*. Such retraining of the knowledgebase with additional instruction sets learned in an additional learning process involving an additional user operating an additional device is a complex process that is not straightforward or unusually simple. Further evidence of this is the fact that none of the prior art references

mention such retraining.

92. Further, Buibas and Sinyavskiy cannot and do not disclose or suggest the claimed another instruction set of claim 56 at all because Petitioner has mapped the instruction sets of claim 56 to weights in Buibas's weight vectors, *which are totally different concepts*, as discussed in detail above.

93. I note that Petitioner did not rely on Sinyavskiy for any of the limitations in claim 56 for this ground. Petition, 41-43. Therefore, it is my opinion that Buibas-Sinyavskiy does not disclose or suggest that another instruction set for operating the third device or its related information is learned in "another learning process that includes operating the third device at least partially by another user." Ex. 1001, Claim 56.

C. Claim 57: Buibas and Sinyavskiy do not disclose or suggest wherein the one or more inputs are further correlated with another one or more instruction sets for operating a third device

94. Claim 57 recites the first limitation of claim 56 (as I discussed above), which states "wherein the one or more inputs are further correlated with another one or more instruction sets for operating a third device." Ex. 1001, Claim 57.

95. Petitioner first argues that the "Buibas-Sinyavskiy combination renders obvious [claim 57] for each of the reasons described above with respect to [claim] 56." Petition, 43. But Buibas in view of Sinyavskiy does not disclose

or suggest claim 57 of the '474 patent for the same reasons discussed above with respect to the same limitation in claim 56. Some of the reasons for Buibas and Sinyavskiy failure to disclose or suggest the features of claim 56 and features of claim 57 include: **(i)** none of Petitioner's citations of Buibas discuss instruction sets at all, and as a result, none of them further mention the same one or more inputs further correlated with another instruction set for operating a third device, **(ii)** Buibas's updates of network weights and merging of weight vectors do not involve instruction sets at all, **(iii)** Buibas's combining and merging of brain images also never mention instruction sets, and as a result, further do not mention correlating the same one or more inputs with another instruction set for operating a third device, **(iv)** instruction sets (standalone or from another neural network) cannot simply be integrated with existing instruction sets that are already correlated with existing same inputs in a knowledgebase (i.e. neural network) without appropriately retraining the network as discussed earlier in Paragraph 73 and Buibas does not disclose or suggest, and **(v)** Buibas's weights are a totally different concept than instruction sets in my opinion.

96. Further, Petitioner does not rely on Sinyavskiy for this limitation of claim 56 and claim 57 and Sinyavskiy still does not contemplate this limitation of claim 56. Thus, the Buibas-Sinyavskiy combination does not disclose or suggest the *same one or more inputs* are *further* correlated with *an additional*

another one or more instruction sets for operating *an additional third device* as required by claim 57.

97. Petitioner next contends that claim 57 is obvious because “mere duplication of parts has no patentable significance unless a new and unexpected result is produced,” Petition, 43. ***But claim 57 does not merely duplicate an element from claims 45 and 46 from which claim 57 depends.*** Mere duplication would recite “the one or more inputs are further correlated with another one or more instruction sets for operating *the [same] second device*,” not what claim 57 actually recites “the one or more inputs are further correlated with another one or more instruction sets for operating *a third device*.”

98. Mere duplicating of the same one or more instruction sets for operating the second device, as Petitioner suggests, ***would be nonsensical since it would not provide any additional knowledge in the knowledgebase.*** Actually, ***it would create a potential issue*** since correlations/connections from inputs should lead to unique instruction sets in a knowledgebase (i.e., neural network) that relies on inputs correlated with instructions in order to perform the appropriate action in a timely manner.

99. ***What would have been expected*** (the opposite of new and unexpected) as of the priority date in 2016 is that knowledgebase with inputs correlated with instruction sets for operating one (first) device is used on that

same device. *It was new and unexpected* to have a knowledgebase with *the same inputs* correlated with instruction sets for operating a second device *and further correlated* with instruction sets for operating a third device, be used on another (first) device as claimed in claim 57.

100. In addition, the claimed invention provides a new and unexpected result in its very terms. It is one level of complexity to copy a knowledgebase with inputs correlated with instruction sets for operating a second device (that does not include inputs correlated with instruction sets for operating any other devices) to a first device (i.e. copying knowledge learned on one device to another device). But *it is an entirely different higher level of complexity to make an integrated knowledgebase with the same inputs correlated with instruction sets for operating multiple different devices operable on the first device*. This is especially clear in view of the inability to simply add an additional instruction set (especially instruction set for operating an additional device) to existing instruction sets that are already correlated with existing inputs without retraining with a training set that includes the additional instruction set (that Buibas does not mention, disclose, or suggest) as discussed in more detail above. The claimed *same one or more inputs correlated with* an instruction set for operating *the second device* and *further correlated with another* instruction set for operating *a third device* in a single integrated knowledgebase being operable on the first

device would have been new and unexpected as of the priority date of the ‘474 patent in 2016.

101. I note that Petitioner did not rely on Sinyavskiy for any of the limitations in claim 57 for this ground. Petition, 43-44. Therefore, it is my opinion that Buibas in view of Sinyavskiy still does not disclose or suggest the limitations that I discussed above.

2. Ground 2C

102. Regarding Ground 2C, in my opinion Grotmol in view of Buibas does not disclose or suggest all of the features of claims 56 and 57.

A. Claim 56: Grotmol and Buibas do not disclose or suggest wherein the one or more inputs are further correlated with another one or more instruction sets for operating a third device

103. Claim 56, which depends from claim 46, states, in part:

wherein *the one or more inputs* are *further* correlated with *another one or more instruction sets for operating a third device*.

Ex. 1001, Claim 56 (emphasis added).

104. Petitioner first argues that “Grotmol discloses that the inputs of its adaptive controller (knowledgebase) are correlated with control outputs (instruction sets) stored in and produced by the adaptive controller, as described above in Ground 2A with respect to [45.1]” and “Grotmol discloses that the control outputs can be learned in a learning process by which the user operates a

robot, as described above with respect to [47] and [51] (operating the ... device at least partially by another user),” Petition, 80-81. This argument *does not mention an instruction set for operating a third device* at all *nor even attempt to explain* how the inputs of the adaptive controller are *further* correlated with *another* instruction set for operating *a third device*. Petitioner does not attempt to explain this because Grotmol nowhere discloses or suggests this further correlation of the same one or more inputs with another instruction set for operating a third device. Petition, 81. In fact, Petitioner suggests this in stating “[t]o the extent it is argued or determined that Grotmol does not expressly disclose that the inputs to an adaptive controller on a first device are correlated with control outputs (instructions sets) learned on at least two other devices (i.e., a second device and a third device).” *Id.*, 81.

105. Petitioner’s citations to its own arguments in claims 45.1, 47, and 51, Petition, 81, are wrong because claims 45, 47, and 51 recite “one or more inputs are correlated with one or more instruction sets for operating *a second device*” and do not recite the actual limitation of claim 56: “wherein the one or more inputs are further correlated with another one or more instruction sets for operating a third device.” Claim 56 requires that the *same* one or more inputs be *further* correlated with an *additional another instruction set* for operating *an additional third device*, which is beyond what claims 45.1, 47, and 51 recite and

what Petitioner's arguments for those claims address.

106. Petitioner cites Grotmol's disclosure that "the trained configuration may be loaded to one or more other robots in order to provide learned behaviors," (Petition, 81 (citing Ex. 1008, 33:30-35)). This disclosure does not disclose the claimed elements for several reasons. **First**, Petitioner's citation discusses loading a trained configuration from one robot to other robots to provide learned behaviors and *says nothing about (and indeed do not even mention) instruction sets*, let alone that the same one or more inputs are further correlated with an additional instruction set for operating an additional third device, which is what claim 56 requires. **Second**, Grotmol discloses operating *one (first) device* in a training and the knowledge gained from this training in Grotmol, when loaded into *another (second) device*, is still knowledge of operating that one (originating) device, which is about loading the previously learned knowledge on one robot into another robot and not the further correlation that claim 56 requires: the *same* one or more inputs *further* correlated with *an additional another* instruction set for operating an *additional third device*. In other words, all of the instruction sets for operating the first robot where they were learned are still the same instruction sets for operating the same first robot (not a third robot) when they are loaded into a second robot in Grotmol. Since Grotmol discloses learning on one robot and loading this knowledge to a second robot without mentioning

an instruction set for operating a third robot, Grotmol does not disclose or suggest that the same inputs are further correlated with another instruction for operating a third device, as claimed in claim 56. The seamless integration of additional or newly acquired instruction sets with existing instructions sets requires high levels to retraining to ensure that the entire network is properly optimized. This is not trivial but rather require skilled expertise to do so properly.

107. Turning to the asserted Grotmol-Buibas combination, Petitioner's argument that "[t]o the extent it is argued or determined that Grotmol does not expressly disclose that the inputs to an adaptive controller on a first device are correlated with control outputs (instructions sets) learned on at least two other devices (i.e., a second device and a third device), these features nonetheless would have been obvious in view of Buibas. TESLA-1003, ¶160," is wrong and not supported by Buibas. Petition, 81. **First**, the single paragraph in its expert report cited by Petitioner, Petition, 81, to support its obviousness argument merely repeats the Petition's citations of Buibas and *does not explain how* Buibas discloses further correlating the same one or more inputs with additional another instruction set for operating a third device.

108. **Second**, as discussed above and as shown in Petitioner's own cited FIG. 4, Buibas does not disclose or suggest the same one or more inputs are further correlated with another one or more instruction sets for operating a third

device because (i) none of Petitioner’s citations of Buibas even mention instruction sets, and as a result, none of them further mention the same one or more inputs further correlated with another instruction set for operating a third device, (ii) Buibas’s updates of network weights and merging of weight vectors do not involve instruction sets at all, (iii) Buibas’s combining and merging brain images also never mention instruction sets, and as a result, further do not mention correlating the same one or more inputs with another instruction set for operating a third device, (iv) instruction sets (standalone or from another neural network) cannot simply be added to existing instruction sets that are already correlated with existing same inputs in a knowledgebase (i.e. neural network) without the required retraining that Buibas does not disclose or suggest, and (v) Buibas’s weights are a totally different concept than instruction sets.

109. Petitioner’s next contention that Buibas “describes techniques for sharing and merging behaviors learned on multiple different robots into a single controller. TESLA-1005, ¶¶[0070], [0090]-[0100], [0103], [0225],” Petition, 81, is also wrong. The citations from Buibas that Petitioner’s contention relies on provide:

(i) “download such *stored state information [i.e. weights]* and apply it to a second neural network,” Ex. 1005, ¶[0070],

(ii) “The network updates illustrated in FIG. 3 may comprise for

instance *a complete weight update 300, where the existing trained weights vector W 302 is replaced with a different weight vector 304.*” Ex. 1005, ¶[0090]-[0100],

(iii) “The interleaved network merge may be used in some implementations to generate *new weight vector for a network* configured to be use by off-spring configured to implement (a subset) of parent functionality.” Ex. 1005, ¶[0103], and

(iv) “The merging of brain images involves the combination of one brain image with another brain image.” Ex. 1005, ¶[0225]. *See also id.*, ¶[0183] (defining its brain image: “[T]he brain image 1404 may comprise *the network weights* so that the download effectuates *the weight configuration* of the computerized neuromorphic apparatus network.”).

110. First, Petitioner’s contention and *Petitioner’s citations of Buibas do not even mention instruction sets, much less instruction sets for operating a third device*, Petition, 41-43. And as a result, none of Petitioner’s citations identify *any same one or more inputs that are further correlated with additional another instruction set for operating an additional third device*. In effect, Petitioner has not mapped one or more *inputs that are further correlated with another instruction set for operating a third device to any disclosure of Grotmol*

or Buibas.

111. To the extent that Petitioner argues that a brain image in Buibas is an entire *neural* network (although Buibas is clear in the quotes cited above in Paragraph 73 that “the brain image 1404 may comprise *the network weights* so that the download effectuates *the weight configuration* of the computerized neuromorphic apparatus network,” Ex. 1005, ¶[0183]), instruction sets of this assumed neural network *cannot simply be added to existing instruction sets that are already correlated with existing same inputs in a knowledgebase (i.e. neural network) without appropriately retraining the network.* The addition of instruction sets to pre-existing instruction sets would require retraining to seamlessly integrate these newly added instruction sets in order to ensure the proper functionality of the network.

112. None of Petitioner’s citations of Grotmol or Buibas, or other Grotmol or Buibas disclosure, mention any *same* one or more inputs that are *further* correlated with *additional another* instruction set for operating *an additional third device*. Thus, the Grotmol-Buibas combination does not disclose or suggest this limitation of claim 56.

B. Claim 56: Grotmol and Buibas do not disclose or suggest wherein at least a portion of the another one or more instruction sets for operating the third device or at least an information related to the another one or more instruction sets for operating the third device

is learned in another learning process that includes operating the third device at least partially by another user

113. Claim 56 also requires:

wherein at least a portion of the *another one or more instruction sets for operating the third device* or at least an information related to the *another one or more instruction sets for operating the third device* is learned in *another learning process* that includes *operating the third device* at least partially *by another user*.

Ex. 1001, Claim 56.

114. Petitioner first states that “Grotmol discloses that the inputs of its adaptive controller (knowledgebase) are correlated with control outputs (instruction sets) stored in and produced by the adaptive controller, as described above in Ground 2A with respect to [45.1]. *See supra* § IV.C.2 at [45.1].” and “Grotmol discloses that the control outputs can be learned in a learning process by which the user operates a robot, as described above with respect to [47] and [51] (operating the ... device at least partially by another user). *See supra* §§IV.C.2.[47], [51].” *id.*, 80-81, but Petitioner’s citations to its own arguments in claims 45.1, 47, and 51 are wrong because claim 45.1 does not recite *any learning process* that includes *operating any device* by *any user*, and claims 47 and 51 recite “instruction sets for operating *the second device* [or related information] is learned in a *[single] learning process* that includes operating *the second device [not an additional third device]* at least partially by *a [single] user*.” None of

claims 45.1, 47, and 51 recite the actual limitation of claim 56: “another instruction set for operating the third device or its related information is learned in another learning process that includes operating the third device by another user” nor its constituent elements “*another instruction set for operating the third device,*” “*another learning process,*” “*operating the third device,*” and “*another user,*” which are all beyond what claims 45, 47, and 51 recite and what Petitioner’s arguments for those claims address.

115. Petitioner cites Grotmol’s disclosure that “the trained configuration may be loaded to one or more other robots in order to provide learned behaviors,” (Petition, 81 (citing Ex. 1008, 33:30-35)), but Petitioner’s citation of Grotmol and Grotmol in general discloses a learning process in which *one* user operates *one* device. In my opinion, the knowledge gained from this process in Grotmol, when loaded into another device, is still knowledge of one user operating one (originating) device, which is about loading the previously learned knowledge on one robot into another robot and not the learning that claim 56 requires: *another instruction set for operating the third device* or its related information is learned in *another learning process* that includes *operating the third device* at least partially by *another user*.

116. Grotmol does not disclose or suggest *another one or more instruction sets for operating the third device*. As discussed above, Grotmol’s

disclosure of loading previously learned knowledge of *operating one robot into another (second) robot* does not disclose “another instruction set for operating the third device” *since this limitation of claim 56 involves the third device that Grotmol does not disclose or suggest in addition to the first and second devices referred to in Grotmol*. Grotmol does not disclose or suggest the claimed third device, much less another instruction set for operating the third device, as required by claim 56.

117. Grotmol does not disclose or suggest the claimed “*another user*,” as Grotmol only discloses a single user using a device and does not even mention another user, let alone another user operating a third device in another learning process. Petitioner provides no basis for its argument and merely states that “Grotmol discloses that the control outputs can be learned in a learning process by which *[a single] the user* operates a robot, as described above with respect to [47] and [51],” Petition, 81, but claims 47 and 51 recite only a single “a user” and do not recite “another user” at all. Therefore, Petitioner’s citation of its discussion of claims 47 and 51 in the Petition also never mentions the “another user” limitation of claim 56. Petition, 81. Since Petitioner only contends a single “the user”, and relies on claims 47 and 51 that do not recite “another user” at all and its arguments for claims 47 and 51 that do not discuss “another user” at all, Petitioner does not map the “another user” limitation of claim 56 to anything in

any of the prior art references.

118. Grotmol does not disclose or suggest the claimed “another learning process that includes operating the third device.” Petitioner’s citation of Grotmol is about **loading** the previously learned knowledge on one robot into another robot and NOT the **learning** that claim 56 requires. Petitioner ignores that loading a trained configuration from a first robot to a second robot does not constitute an additional another learning process involving operating a third device, as claimed in claim 56. Petitioner’s contention is wrong given that Grotmol does not even mention ***another learning process that includes operating the third device***, much less another learning process that includes operating the third device by another user (that Grotmol also does not mention as discussed above).

119. Turning to Buibas, Petitioner’s argument that “[t]o the extent it is argued or determined that Grotmol does not expressly disclose that the inputs to an adaptive controller on a first device are correlated with control outputs (instructions sets) learned on at least two other devices (i.e., a second device and a third device), these features nonetheless would have been obvious” in view of Buibas is wrong and not supported by Buibas. Petition, 81.

120. First, as I discussed above: **(i)** in my opinion, Petitioner has not mapped instruction sets for operating the third device or their related information learned in another learning process that includes operating a third device by

another user to the disclosure of Buibas, **(ii)** Petitioner has not provided reasoning for its obviousness contention, **(iii)** Petitioner has not provided expert support for its obviousness contention, **(iv)** Petitioner’s own citations of Buibas do not mention key elements of claim 56 ([a] any instruction sets as well as [b] another learning process), **(v)** Petitioner has not pointed to nor does Buibas disclose or suggest the required retraining since additional instruction sets (especially instruction sets learned in different learning processes that involve different devices and different users) cannot be simply added to existing instruction sets correlated with existing inputs as discussed above, and **(vi)** Petitioner has actually mapped the instruction sets of claim 56 to weights in Buibas’s weight vectors as mentioned above, which are totally different concepts.

121. Second, Petitioner’s contention ***does not include another learning process involving another user at all***. Thus, Petitioner has not mapped the another learning process that involves another user as claimed in claim 56 to Buibas. *See* Petition, 81.

122. Petitioner’s final statement that Buibas “describes techniques for sharing and merging behaviors learned on multiple different robots into a single controller. TESLA-1005, ¶¶[0070], [0090]-[0100], [0103], [0225],” Petition, 81, is incorrect, as the portions of Buibas cited by Petitioner only discuss general merging and do not discuss ***any instruction sets at all***, let alone ***an additional***

another instruction set for operating a third device or its related information *learned in an additional another learning process* involving an *additional another user*.

123. Therefore, Grotmol-Buibas does not disclose or suggest that another instruction set for operating the third device or its related information is learned in “another learning process that includes operating the third device at least partially by another user” required by claim 56.

C. Claim 57: Grotmol and Buibas do not disclose or suggest wherein the one or more inputs are further correlated with another one or more instruction sets for operating a third device

124. Claim 57 recites the first limitation of claim 56 (discussed above), which states:

wherein *the one or more inputs* are *further* correlated with *another one or more instruction sets for operating a third device*.

Ex. 1001, Claim 57.

125. Petitioner first argues that the “Grotmol-Buibas combination renders this claim obvious for at least the reasons addressed above with respect to [56].” Petition, 82. But Grotmol in view of Buibas does not disclose or suggest claim 57 of the ’474 patent for the same reasons discussed above with respect to the same provision in claim 56. Namely, Grotmol discloses a learning process in which *one* user operates *one* device, does not mention a third device, and as a result,

does not disclose or suggest that inputs are *further correlated* with the *another one or more instruction sets for operating a third device*. And, as discussed above (*see* Paragraph 73), Buibas’s merging does not mention instruction sets at all, and as a result, does not disclose or suggest *the same one or more inputs* are *further correlated* with *another one or more instruction sets for operating a third device* as required by claim 57. Thus, the Grotmol-Buibas combination does not disclose or suggest this limitation of claim 57.

126. Petitioner next argues that “the limitations in claim 45 directed to ‘one or more instruction sets for operating the second device’ further would have been rendered obvious by the Grotmol-Buibas combination in view of Buibas’ teachings for sharing trained controllers among devices and for each of the reasons described above in the combination overview and with respect to claims 56 and 57. TESLA-1005, ¶¶[0070]-[0071], [0184], [0188], [0196], [0201]; TESLA-1003, ¶162; *supra*, §§IV.C.2, [47], [51].” Petition, 82. Petitioner’s argument is incorrect. First, Petitioner’s same citations of Buibas as in claim 56 do not mention this limitation of claim 57 for the same reasons as discussed above in Paragraph 73. Second, claims 45, 47, and 51 recite “one or more inputs are correlated with one or more instruction sets for operating *a second device*” and do not recite the actual limitation of claim 57: “one or more inputs are further correlated with another one or more instruction sets for operating *a third device*.”

Claim 57 requires that the *same* one or more inputs be *further* correlated with an *additional another instruction set* for operating *an additional third device*, which is beyond what claims 45, 47, and 51 recite and what Petitioner's arguments for those claims address.

127. Petitioner next argues “mere duplication of parts has no patentable significance unless a new and unexpected result is produced,” Petition, 82. ***But claim 57 does not merely duplicate an element from claims 45 and 46 from which claim 57 depends.*** Mere duplication would recite “the one or more inputs are further correlated with another one or more instruction sets for operating *the [same] second device*,” not what claim 57 actually recites “the one or more inputs are further correlated with another one or more instruction sets for operating *a third device*.”

128. Mere duplicating of the same one or more instruction sets for operating the second device, as Petitioner suggests, ***would be nonsensical since it would not provide any additional knowledge in the knowledgebase.*** Actually, ***it would create a potential issue*** since correlations/connections from inputs should lead to unique instruction sets in a knowledgebase (i.e. neural network) that relies on inputs correlated with instructions in order to perform the appropriate action in a timely manner.

129. ***What would have been expected*** (the opposite of new and

unexpected) as of the priority date in 2016 is that knowledgebase with inputs correlated with instruction sets for operating one (first) device is used on that same device. ***It was new and unexpected*** to have a knowledgebase with ***the same inputs*** correlated with instruction sets for operating a second device ***and further correlated*** with instruction sets for operating a third device, be used on another (first) device as claimed in claim 57.

130. Finally, the claimed invention provides a new and unexpected result in its very recitation. It is one level of complexity to copy a knowledgebase with inputs correlated with instruction sets for operating a second device (that does not include inputs correlated with instruction sets for operating any other devices) to a first device (i.e. copying knowledge learned on one device to another device). But ***it is an entirely different higher level of complexity to make an integrated knowledgebase with the same inputs correlated with instruction sets for operating multiple different devices operable on the first device.*** This is especially clear in view of the inability to simply add an additional instruction set (especially instruction set for operating an additional device) to existing instruction sets that are already correlated with existing inputs without retraining with a training set that includes the additional instruction set (that Buibas does not mention, disclose, or suggest) as discussed in more detail above. The claimed ***same one or more inputs correlated with*** an instruction set for operating ***the***

second device and *further correlated with another* instruction set for operating *a third device* in a single integrated knowledgebase being operable on the first device would have been new and unexpected as of the priority date of the '474 patent in 2016.

X. PATENT OWNER'S SUBSTITUTE CLAIMS ARE PATENTABLE

131. I understand that Patent Owner has proposed potentially substituting claims as listed below. The proposed substitute claims do not broaden the claim scope or introduce new subject matter. The proposed claim amendments add certain narrowing limitations to original claim 45 and rewrite certain dependent claims to now ultimately depend from substitute claim 85, which is a substitute for claim 45 in the event that the Board finds claim 45 to be unpatentable. I also understand that Patent Owner is proposing two substitute claims in the alternative for each of original claims 56 and 57 depending on the outcome of this IPR proceeding. I have provided my thoughts on the patentability of original claims 56 and 57 (*see* Section IX, above). In either event, I understand that one set of proposed substitute claims (i.e., 92/93) for each of 56/57 would simply rewrite the current claims into independent form,² while the other set of proposed

² I understand that in the event that either of original claim 56/57 are found patentable by the Board, then Patent Owner seeks to rewrite these claims in independent form

substitute claims (i.e., 89/90) would amend the claims to now ultimately depend from substitute claim 85 (the same amendment as other challenged dependent claims). In other words, substitute claims 89/90 inherit the new limitations being added by Patent Owner to claim 85. In this declaration, I focus below on these new limitations as they are presented in claim 85, but my discussion about those limitations is also applicable to substitute claims 86-91 because they inherit those same new limitations through claim dependency. I do not believe that the Substitute Claims contain any claim terms that would need to be construed.

132. These amendments regarding the new limitations being added into substitute claim 85 further distinguish substitute claims 85-91 over the asserted prior art and narrow the claim scope. Substitute claims 85-91 are also patentable over prior art from original prosecution of the '474 patent, as well as prior art identified in the petitions in IPR2023-{01054, 01055, 01169, 01172, and 01173}, which are other proceedings challenging patents owned by Patent Owner. 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

to be substitute claims 92/93. Thus, claims 92 and 93 include all of the limitations of original claims 45 and 46, since original claims 56/57 each depend from 46 which itself depends from claim 45.

sufficiently enabled in how to make and use the invention recited in the Substitute Claims.

1. **Proposed Substitute Claims**

133. According to Patent Owner's proposal, I understand that some challenged claims in the '474 patent may be replaced with corresponding proposed substitute claims. I have been asked to evaluate these proposed substitute claims. I understand that substitute claims 85-91 are not currently claims in the '474 patent. I understand that substitute claims 92/93 are the same original claim 56/57 except for being rewritten in independent form. I am informed by Counsel that in the substitute claims, 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 85 (Proposed Substitute for Claim 45, if claim 45 Found Unpatentable)

A first device comprising:

a knowledgebase that includes one or more inputs for inputting at least a portion of a circumstance representation, wherein the one or more inputs are correlated with one or more instruction sets for operating a second device;

one or more sensors;

one or more processors; and

one or more non-transitory machine readable media storing machine

readable code that, when executed by the one or more processors, causes the one or more processors to perform at least:

generating a circumstance representation, wherein the generated circumstance representation represents a circumstance detected at least in part by the one or more sensors;

determining the one or more instruction sets for operating the second device at least by: inputting at least a portion of the generated circumstance representation into the one or more inputs, and using a correlation between the one or more inputs and the one or more instruction sets for operating the second device; and

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

wherein the knowledgebase includes a neural network, wherein the one or more inputs are one or more input neurons of the neural network,

wherein the machine readable code, when executed by the one or more processors, further causes the one or more processors to perform at least:

generating a stream of circumstance representations comprising:

the generated circumstance representation that (i) includes

multiple object representation data structures that each comprises: a label for object type, coordinates for object location, and a computer model for object size, and (ii) represents multiple objects detected at a first time, and

another circumstance representation that (i) includes another multiple object representation data structures that each includes: a label for object type, coordinates for object location, and a computer model for object size, and (ii) represents the multiple objects detected at a second time,

wherein the determining the one or more instruction sets for operating the second device includes: inputting the multiple object representation data structures of the stream into the one or more input neurons, and using a correlation between the one or more input neurons and the one or more instruction sets for operating the second device; and

determining another one or more instruction sets for operating a third device at least by: inputting the another multiple object representation data structures of the stream into the one or more input neurons, and using a correlation between the one or more input neurons and the another one or more instruction sets for operating the third device.

Claim 86 (Proposed substitute for claim 46, if claim 45 Found Unpatentable)

The first device of claim 45 ~~85~~,85,

wherein the one or more inputs for inputting the at least the portion of the

circumstance representation include one or more inputs for inputting at least a portion of one or more object representations, and wherein the generated circumstance representation includes one or more object representations, and

wherein the first device is a first vehicle, and wherein the second device is a second vehicle.

Claim 87 (Proposed substitute claim for claim 47, if claim 45 Found Unpatentable)

The first device of claim 46 86,

wherein at least an information related to the one or more instruction sets for operating the second device is learned in a learning process that includes operating the second vehicle at least partially by a user.

Claim 88 (Proposed substitute for claim 51, if claim 45 Found Unpatentable)

The first device of claim 46 86,

wherein at least a portion of the one or more instruction sets for operating the second device is learned in a learning process that includes operating the second device at least partially by a user.

Claim 89 (Proposed substitute for claim 56, if claim 56 Found Unpatentable)

The first device of claim 46 86,

wherein the one or more inputs are further correlated with another one or more instruction sets for operating a third device, and

wherein at least a portion of the one or more instruction sets for operating the second device or at least an information related to the one or more instruction sets for operating the second device is learned in a learning process that includes operating the second device at least partially by a user, and wherein at least a portion of the another one or more instruction sets for operating the third device is learned in another learning process that includes operating the third device at least partially by another user.

Claim 90 (Proposed substitute claim for claim 57, if claim 57 Found Unpatentable)

The first device of claim 46 86,

wherein the one or more inputs are further correlated with another one or more instruction sets for operating a third device.

Claim 91 (Proposed substitute claim for claim 60, if claim 45 Found Unpatentable)

The first device of claim 46 86,

wherein the one or more object representations of the generated circumstance representation include one or more coordinates of one or more objects.

Claim 92 (Proposed substitute for claim 56, if claim 56 Found Patentable)

A first device comprising:

a knowledgebase that includes one or more inputs for inputting at least a

portion of a circumstance representation, wherein the one or more inputs are correlated with one or more instruction sets for operating a second device;

one or more sensors;

one or more processors; and

one or more non-transitory machine readable media storing machine readable code that, when executed by the one or more processors, causes the one or more processors to perform at least:

generating a circumstance representation, wherein the generated circumstance representation represents a circumstance detected at least in part by the one or more sensors;

determining the one or more instruction sets for operating the second device at least by: inputting at least a portion of the generated circumstance representation into the one or more inputs, and using a correlation between the one or more inputs and the one or more instruction sets for operating the second device; and

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

wherein the one or more inputs for inputting the at least the portion of the

circumstance representation include one or more inputs for inputting at least a portion of one or more object representations, and wherein the generated circumstance representation includes one or more object representations, and

wherein the first device is a first vehicle, and wherein the second device is a second vehicle; and

wherein the one or more inputs are further correlated with another one or more instruction sets for operating a third device, and

wherein at least a portion of the one or more instruction sets for operating the second device or at least an information related to the one or more instruction sets for operating the second device is learned in a learning process that includes operating the second device at least partially by a user, and wherein at least a portion of the another one or more instruction sets for operating the third device is learned in another learning process that includes operating the third device at least partially by another user.

Claim 93 (Proposed substitute for claim 57, if claim 57 Found Patentable)

A first device comprising:

a knowledgebase that includes one or more inputs for inputting at least a portion of a circumstance representation, wherein the one or more inputs are correlated with one or more instruction sets for operating a second device;

one or more sensors;

one or more processors; and

one or more non-transitory machine readable media storing machine readable code that, when executed by the one or more processors, causes the one or more processors to perform at least:

generating a circumstance representation, wherein the generated circumstance representation represents a circumstance detected at least in part by the one or more sensors;

determining the one or more instruction sets for operating the second device at least by: inputting at least a portion of the generated circumstance representation into the one or more inputs, and using a correlation between the one or more inputs and the one or more instruction sets for operating the second device; and

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

wherein the one or more inputs for inputting the at least the portion of the circumstance representation include one or more inputs for inputting at least a portion of one or more object representations, and wherein the generated circumstance representation includes one or more object representations, and

wherein the first device is a first vehicle, and wherein the second device is a second vehicle; and

wherein the one or more inputs are further correlated with another one or more instruction sets for operating a third device.

2. The Original Application for the '474 Patent Includes Support for the Proposed Substitute Claims

134. I have been asked to provide my opinions regarding whether the proposed substitute claims are supported by the original application for the '474 Patent. In performing this analysis, I have applied the plain and ordinary meaning of the terms. 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 '474 patent issued from U.S. Patent Application No. 17/651,976 (“the '976 Application”), which is found at pages 279-485³ of Exhibit 1002.⁴

³ The figures and specification accompanying the '976 Application begin at page 294.

⁴ The '474 patent is a continuation of U.S. Patent Application No. 16/540, 972 (“the '972 Application”), which issues as U.S. Patent No. 11,238,344 (“the '344 patent”). The '972 Application is a continuation of U.S. Patent Application No. 15/340,991 (“the '991 Application”) (Ex. 2004), which issued as U.S. Patent No. 10,452,974

135. As noted above, the Substitute Claims add further limitations to independent claim 45,⁵ rewrite certain challenged dependent claims to depend from substitute claim 85 (the base claim),⁶ and/or rewrite claims 56/57 in independent form *without* the narrowing limitations.⁷ Because the following features are in each Substitute Claim and also in original independent claim 45, the substitute claims are supported by the '991 and '976 Applications. A POSA would have found that the inventor was in possession of the features (and each

("the '974 patent"). Citations are provided herein to the originally-filed '976 and '991 Applications—e.g., '976 Application at [1:25-30] refers to Ex. 1007, 334:25-30, and '991 Application at [1:15-20] refers to Ex. 2004, 305:15-20.

⁵ Support for Substitute Claim 85 is comprised of the support for original claim 45 as well as the limitations added via amendment.

⁶ Support for Substitute Claims 86-91 is comprised of the support for original claims 46, 47, 51, 56, 57, and 60.

⁷ Support for Substitute Claims 92-93 is comprised of support for original claims 44, 46, and 56 or 57, respectively. Since each of original claims 56/57 depend from claim 46 which depends from claim 45, the full text of Substitute Claims 92-93 includes the claim subject matter of both original claims 45/46, as well as the subject matter in original claims 56/57, respectively.

claim as a whole) at the time of filing the '991 and '976 Applications.

Support for Limitations Present in Original Claim 45

Claim Limitation	Support from Original U.S. Application for the '474 Patent
A first device comprising:	The '991 and '976 Applications support a first device. For example, the '991 Application discloses: 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 learning 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].

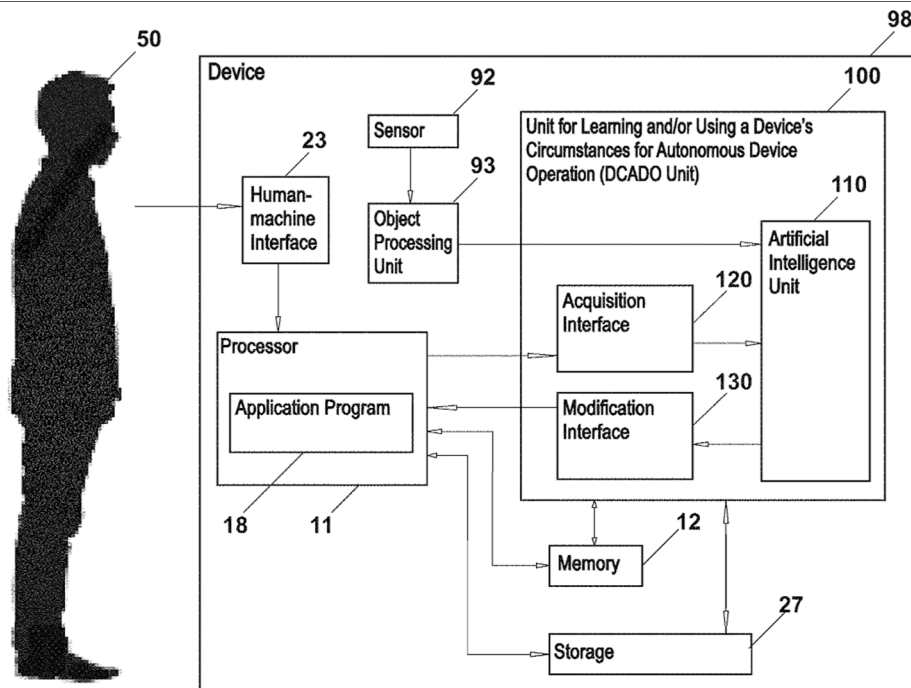


FIG. 2

'991 Application at [Fig. 2].

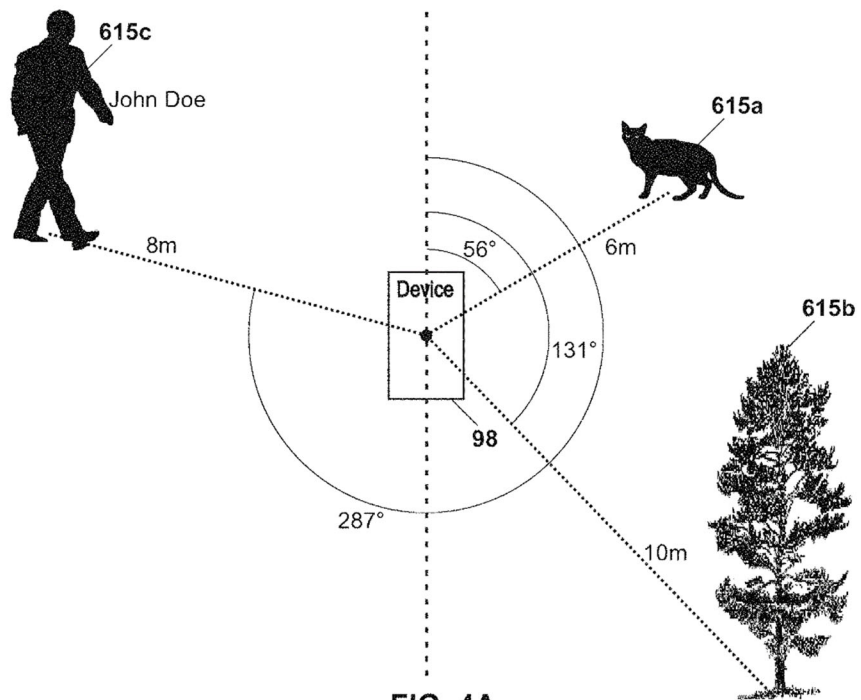


FIG. 4A

'991 Application at [Fig. 4A].

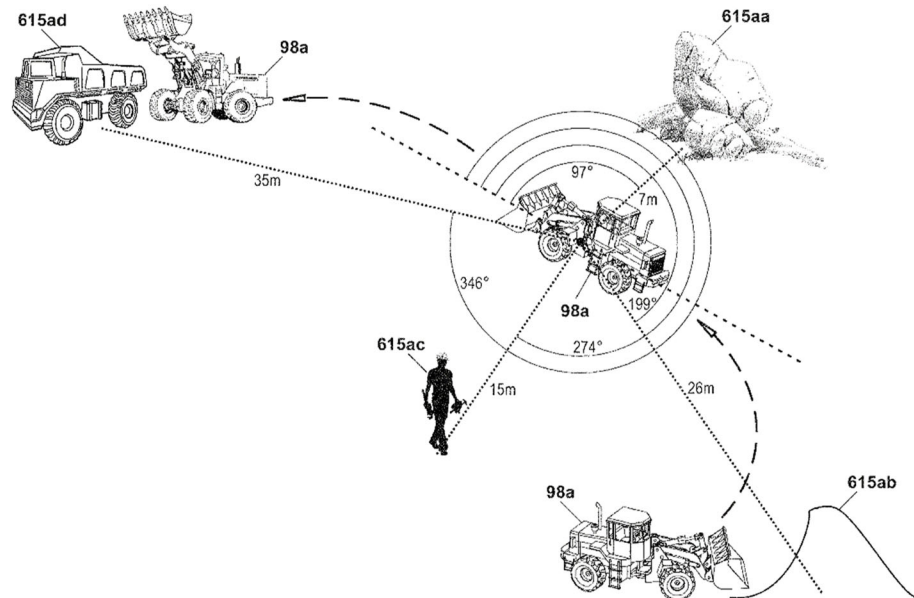


FIG. 38

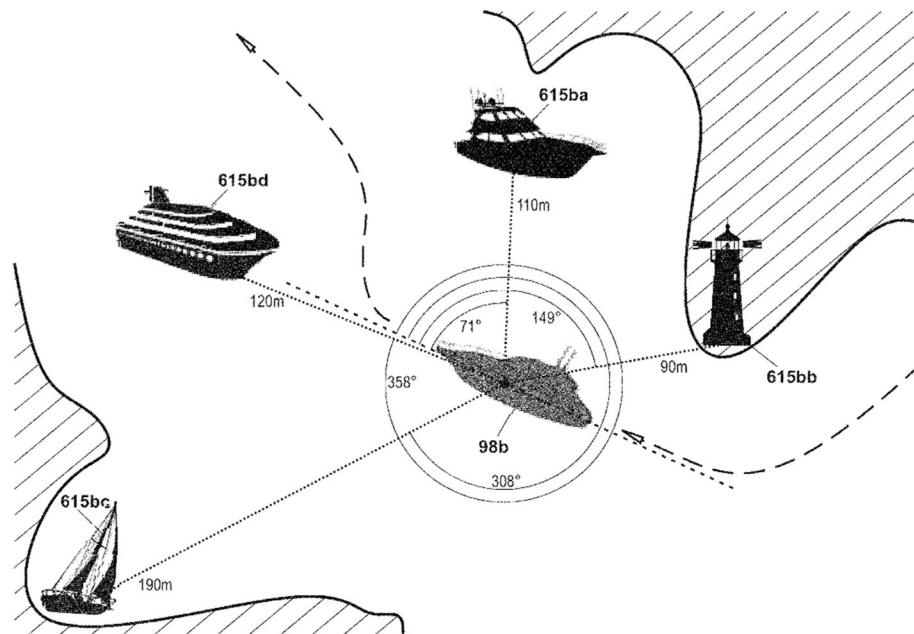


FIG. 39

'991 Application at [Figs. 38-39].

See also '976 Application at [Title], [Abstract], [Fig. 2], [Fig. 4A], [Figs. 38-39].

a knowledgebase

The '991 and '976 Applications support a knowledgebase

that includes one or more inputs for inputting at least a portion of a circumstance representation, wherein the one or more inputs are correlated with one or more instruction sets for operating a second device

that includes one or more inputs for inputting at least a portion of a circumstance representation, wherein the one or more inputs are correlated with one or more instruction sets for operating a second device. For example, the '991 Application discloses:

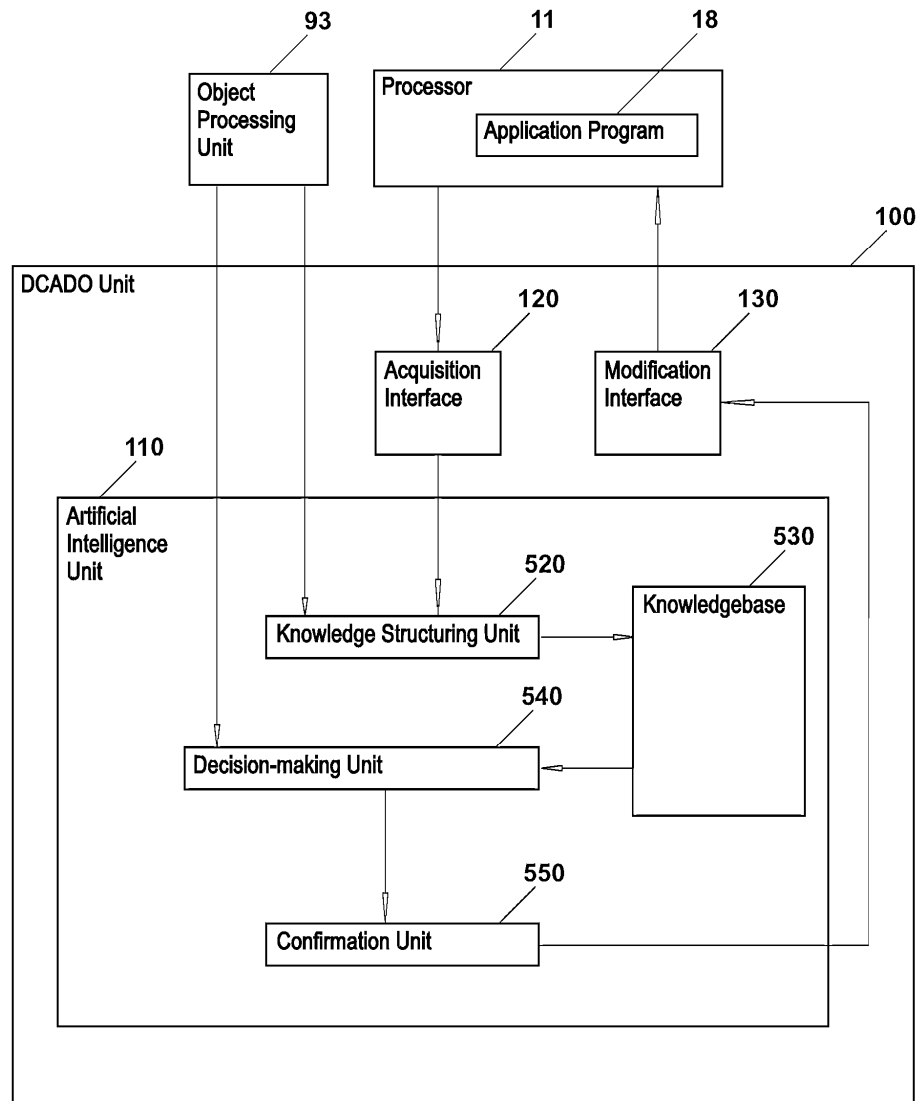


FIG. 12

'991 Application at [Fig. 12] (Artificial Intelligence Unit 110 anticipates Instruction Sets 526 based on incoming/inputted Collections of Object Representations 525).

	Referring to Fig. 12, an embodiment of Artificial Intelligence Unit 110 is illustrated. Artificial Intelligence Unit 110 comprises interconnected Knowledge Structuring Unit 520, Knowledgebase 530, Decision-making Unit 540, and Confirmation Unit 550. '991 Application at [87:10-12]. 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. '991 Application at [92:7-22].
--	---

Further, Artificial Intelligence Unit 110 comprises the functionality for anticipating Device's 98 operation in circumstances including objects with various properties. Artificial Intelligence Unit 110 comprises the functionality for anticipating one or more instruction sets, data, and/or other information. Artificial Intelligence Unit 110 comprises the functionality for anticipating one or more Instruction Sets 526 based on one or more incoming Collections of Object Representations 525. Artificial Intelligence Unit 110 comprises the functionality for anticipating one or more Instruction Sets 526 to be used or executed in Device's 98 autonomous operation.

'991 Application at [87:21-26].

In some embodiments, Knowledgebase 530 may be or include Neural Network 530a (later described).

'991 Application at [92:14-15].

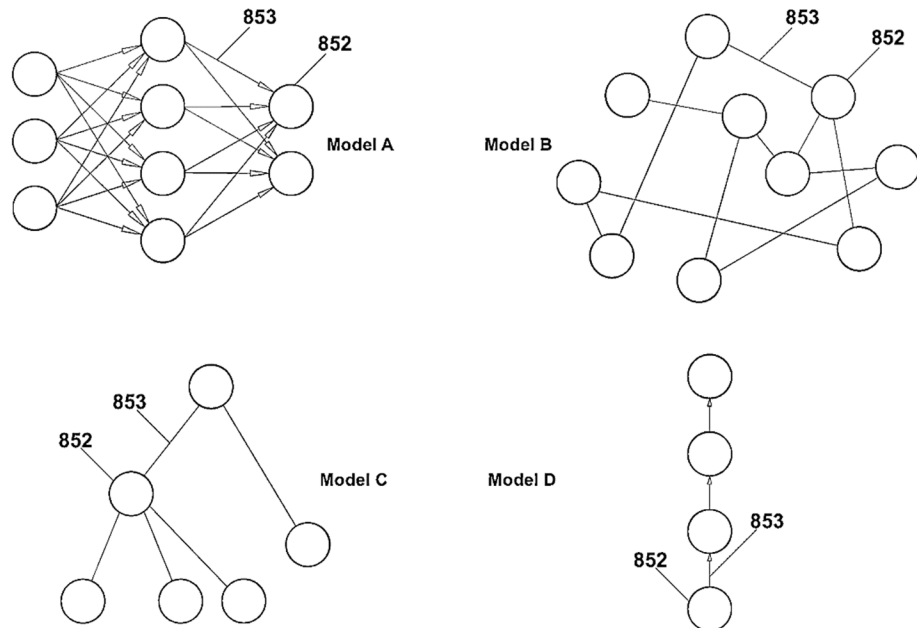


FIG. 17

'991 Application at [Fig. 17] (Model A showing input nodes/neurons correlated using downstream connections with

	output nodes/neurons that include/product instruction sets for operating a device). For example, a neural network may include one or more input neurons that can be activated by inputs. Activations of these neurons can then be passed on, weighted, and transformed by a function to other neurons. '991 Application at [94:7-9]. In one example shown in Model A, the disclosed artificially intelligent devices, systems, and methods for learning and/or using a device's circumstances for autonomous device operation may include a neural network (also referred to as artificial neural network, etc.). 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 brain. Node 852 can store any data, object, data structure, and/or other item, or reference thereto. Node 852 may also include a function for transforming or manipulating any data, object, data structure, and/or other item. Examples of such transformation functions include mathematical functions (i.e. addition, subtraction, multiplication, division, sin, cos, log, derivative, integral, etc.), object manipulation functions (i.e. creating an object, modifying an object, deleting an object, appending objects, etc.), data structure manipulation functions (i.e. creating a data structure, modifying a data structure, deleting a data structure, creating a data field, modifying a data field, deleting a data field, etc.), and/or other transformation functions. 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.). A computational model can be utilized to compute values from inputs based on a pre-programmed or learned function or method. For example, a neural network may include one or more input neurons that can be activated by inputs. Activations of these neurons can then be passed on, weighted, and transformed by a function to other neurons. Neural networks may range from those with only one
--	--

	layer of single direction logic to multi-layer of multi-directional feedback loops. A neural network can use weights to change the parameters of the network's throughput. A neural network can learn by input from its environment or from self-teaching using written-in rules. A neural network can be utilized as a predictive modeling approach in machine learning. An exemplary embodiment of a neural network (i.e. Neural Network 530a, etc.) is described later. '991 Application at [93:33-94:13]. In some embodiments, the processor circuit includes a logic circuit, the instruction sets for operating the device include outputs from the logic circuit for operating the device, and executing instruction sets for operating the device includes performing logic operations on inputs into the logic circuit and producing the outputs from the logic circuit for operating the device. '991 Application at [2:17-20]. The operations may further comprise: receiving a first one or more inputs, wherein the first one or more inputs are also received by a logic circuit, and wherein the logic circuit is configured to receive inputs and produce outputs, and wherein the outputs are used for operating a device. '991 Application at [46:5-7]. 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]. Referring to Fig. 10, an embodiment where DCADO Unit 100 resides on Server 96 accessible over Network 95 is illustrated. 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. In turn, any number of Devices 98 can utilize the remote DCADO Unit 100 for autonomous operation in circumstances including objects with various properties. A remote DCADO Unit 100 can be offered as a network service (i.e. online application, etc.). '991 Application at [86:13-16]. 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].

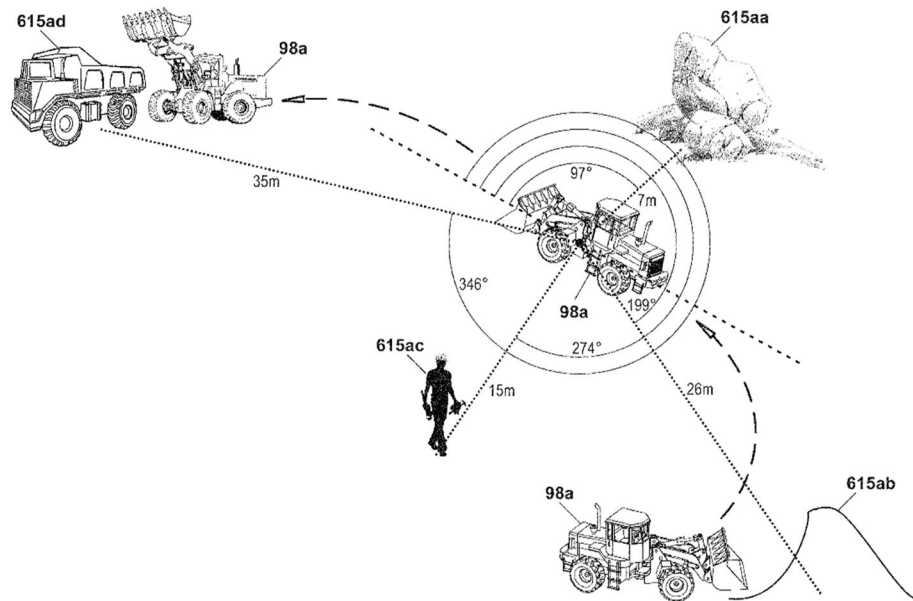


FIG. 38

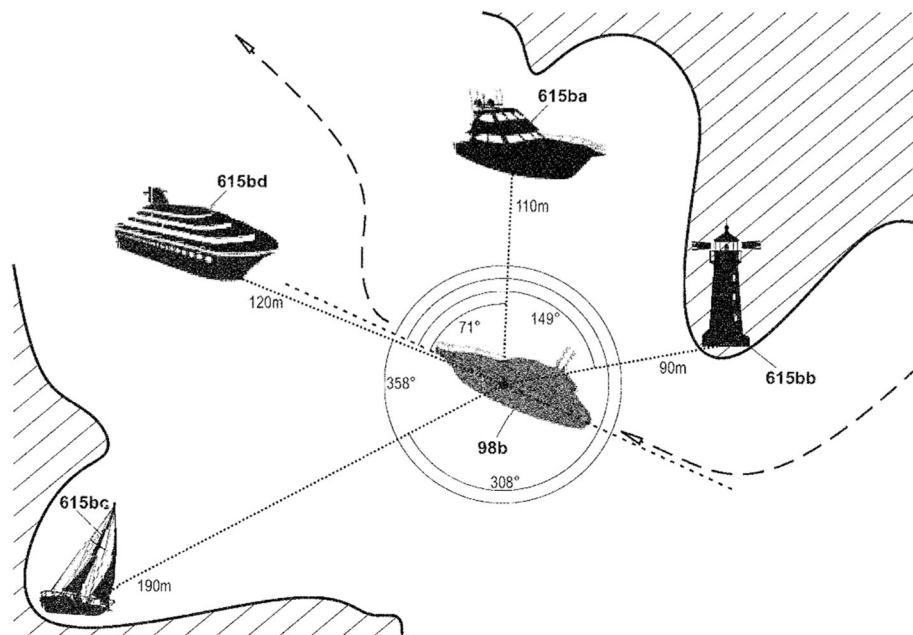


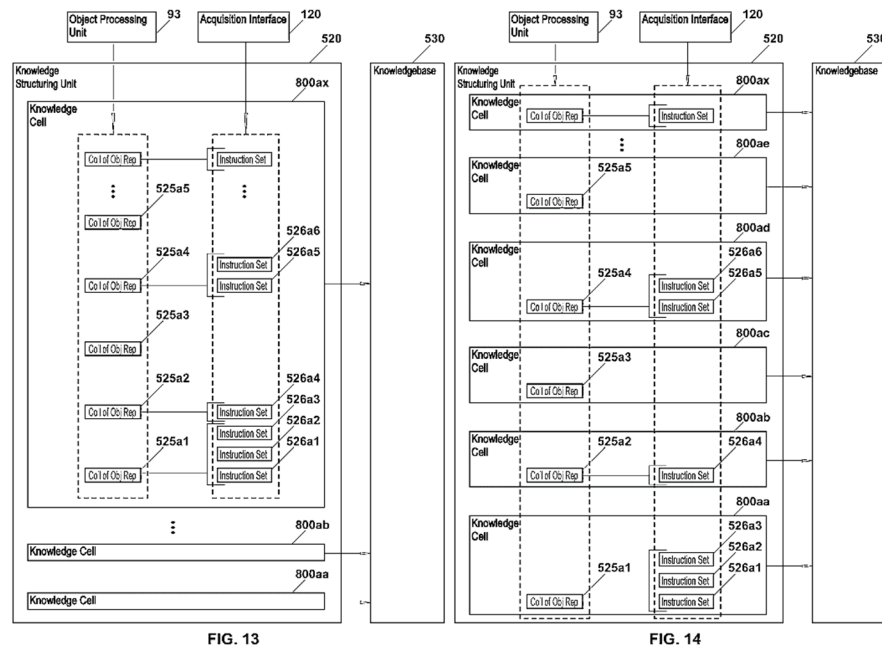
FIG. 39

'991 Application at [Figs. 38-39].

In some embodiments, Knowledgebase 530 from one Device 98 or DCADO Unit 100 can be transferred to one or more other Devices 98 or DCADO Units 100. Therefore, the knowledge of Device's 98 operation in circumstances including objects with

various properties learned on one Device 98 or DCADO Unit 100 can be transferred to one or more other Devices 98 or DCADO Units 100. In one example, Knowledgebase 530 can be copied or downloaded to a file or other repository from one Device 98 or DCADO Unit 100 and loaded or inserted into another Device 98 or DCADO Unit 100. In another example, Knowledgebase 530 from one Device 98 or DCADO Unit 100 can be available on a server accessible by other Devices 98 or DCADO Units 100 over a network or an interface. Once loaded into or accessed by a receiving Device 98 or DCADO Unit 100, the receiving Device 98 or DCADO Unit 100 can then implement the knowledge of Device's 98 operation in circumstances including objects with various properties learned on the originating Device 98 or DCADO Unit 100.

'991 Application at [92:23-32].



'991 Application at [Figs. 13-14].

See also '976 Application at [Fig. 12], [87:5-7], [92:1-16], [87:15-21], [92:8-9], [Fig. 17], [94:1-3], [93:27-94:7], [2:27-30], [46:12-14], [93:15-17], [86:8-11], [86:15-19], [147:32-148:4], [Figs. 38-39], [92:17-26], [Figs. 13-14].

one or more sensors

The '991 and '976 Applications support one or more sensors. For example, the '991 Application discloses:

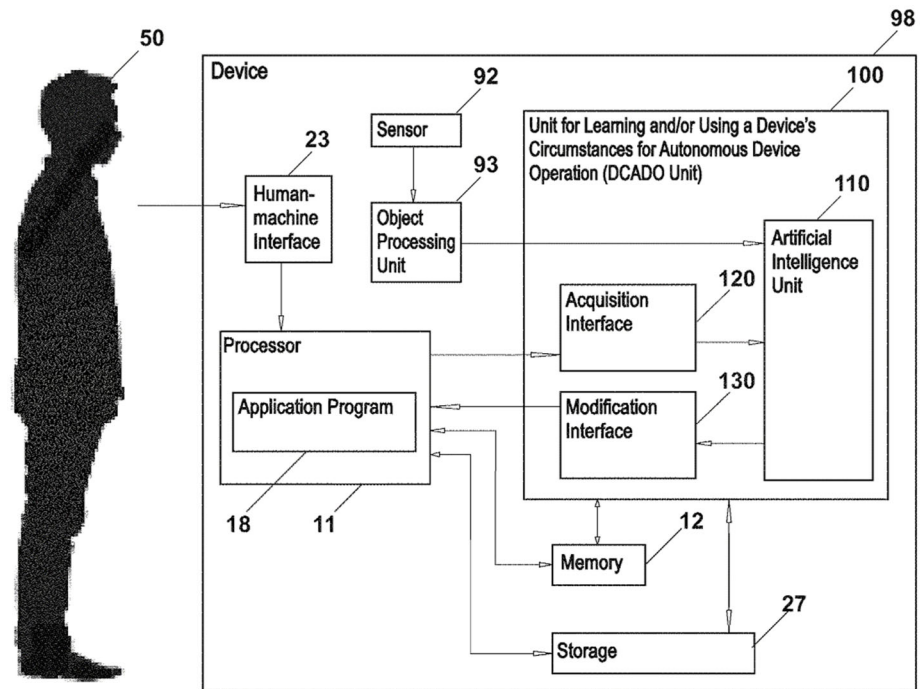


FIG. 2

'991 Application at [Fig. 2].

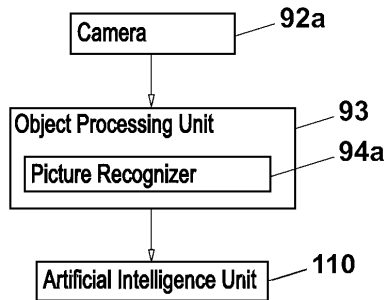


FIG. 3A

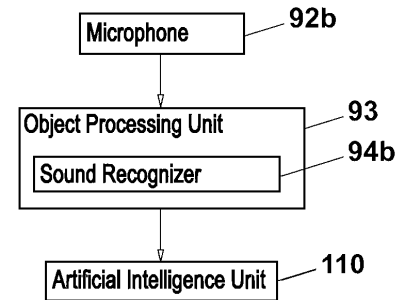


FIG. 3B

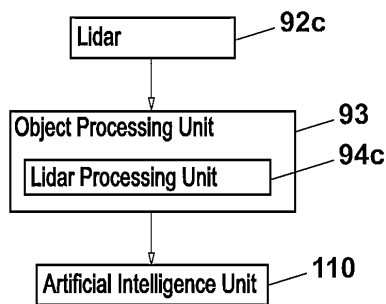


FIG. 3C

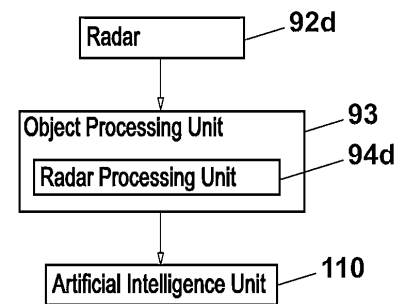


FIG. 3D

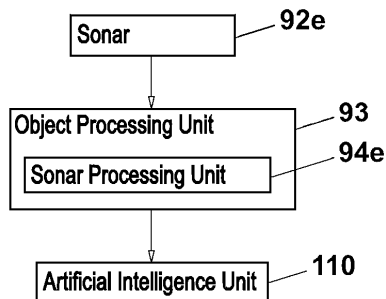


FIG. 3E

'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 (i.e. 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 corners 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 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 JPEG, 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, 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].

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 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 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 (i.e. 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 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, 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]. <i>See also</i> '976 Application at [Fig. 2], [Figs. 3A-3E], [62:32-63:13], [63:14-64:36], [65:3-66:19].
one or more processors	The '991 and '976 Applications support one or more processors. For example, the '991 Application discloses:

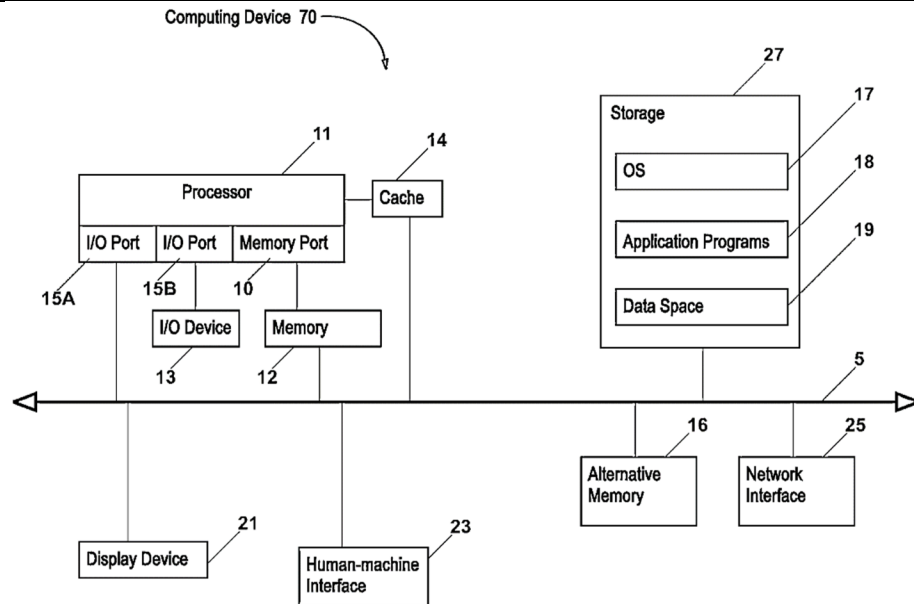


FIG. 1

'991 Application at [Fig. 1].

The disclosed artificially intelligent devices, systems, and methods for learning and/or using a device's circumstances for autonomous device operation, any of their elements, any of their embodiments, or a combination thereof can generally be referred to as DCADO, DCADO Unit, or as other suitable name or reference.

'991 Application at [52:26-29].

Various embodiments of the disclosed devices, systems, and methods include hardware, functions, logic, programs, and/or a combination thereof that can be implemented using any type or form of computing, computing enabled, or other device or system such as a mobile device, a computer, a computing enabled telephone, a server, a gaming device, a television device, a digital camera, a GPS receiver, a media player, an embedded device, a supercomputer, a wearable device, an implantable device, a cloud, or any other type or form of computing, computing enabled, or other device or system capable of performing the operations described herein.

'991 Application at [52:34-53:1].

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, N.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 first node and the second node may be connected by a connection. In further embodiments, the first collection of object representations correlated with the first one or more instruction sets for operating the device is stored into a first node of a sequence and the second collection of object representations correlated with the second one or more instruction sets for operating the device is stored into a second node of the sequence. '991 Application at [15:13-16]. <i>See also</i> '976 Application at [Fig. 1], [52:30-33], [52:38-53:5], [53:25-54:9], [1:35-36], [15:22-26].
one or more non-transitory machine readable media storing machine readable code that, when executed by the one or more processors, causes the one or	The '991 and '976 Applications support one or more non-transitory machine readable media storing machine readable code that, when executed by the one or more processors, causes the one or more processors to perform the claimed functionality. For example, the '991 Application discloses: In some aspects, the disclosure relates to a non-transitory computer storage medium having a computer program stored thereon, the program including instructions that when executed by one or more processor circuits cause the one or more processor circuits to perform operations comprising:

more processors to perform at least:

'991 Application at [15:17-19].

The operations or steps of the non-transitory computer storage medium and/or the method may be performed by any of the elements of the above described systems as applicable. The non-transitory computer storage medium and/or the method may include any of the operations, steps, and embodiments of the above described systems, non-transitory computer storage media, and/or methods as applicable.

'991 Application at [50:5-8].

Computing Device 70 may include or be interfaced with a computer program product comprising instructions or logic encoded on a computer-readable medium. Such instructions or logic, when executed, may configure or cause one or more processors to perform the operations and/or functionalities disclosed herein.

'991 Application at [58:9-11].

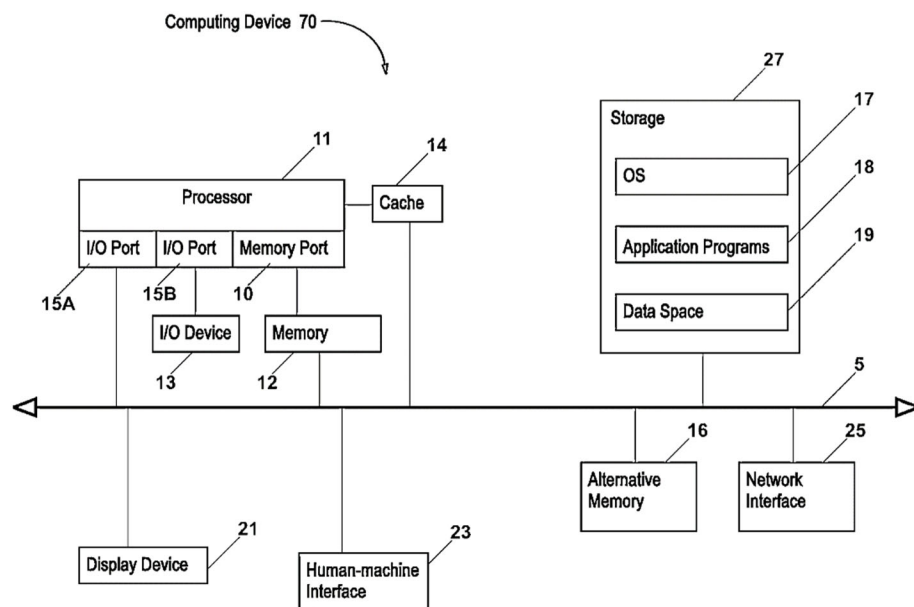


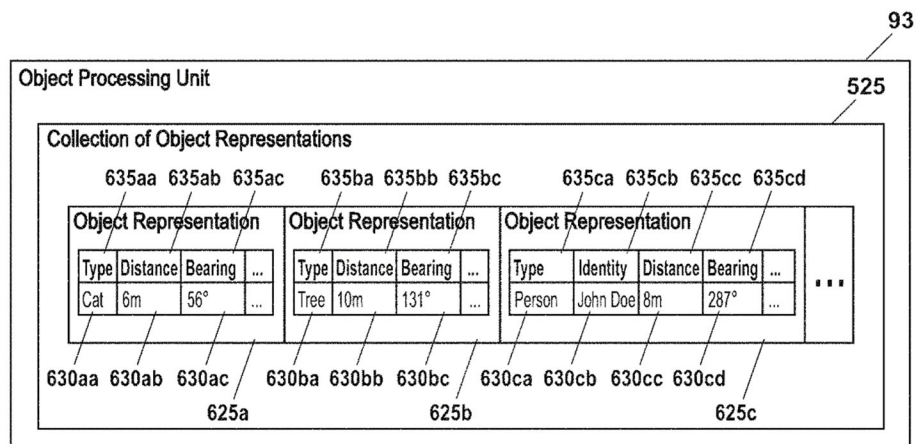
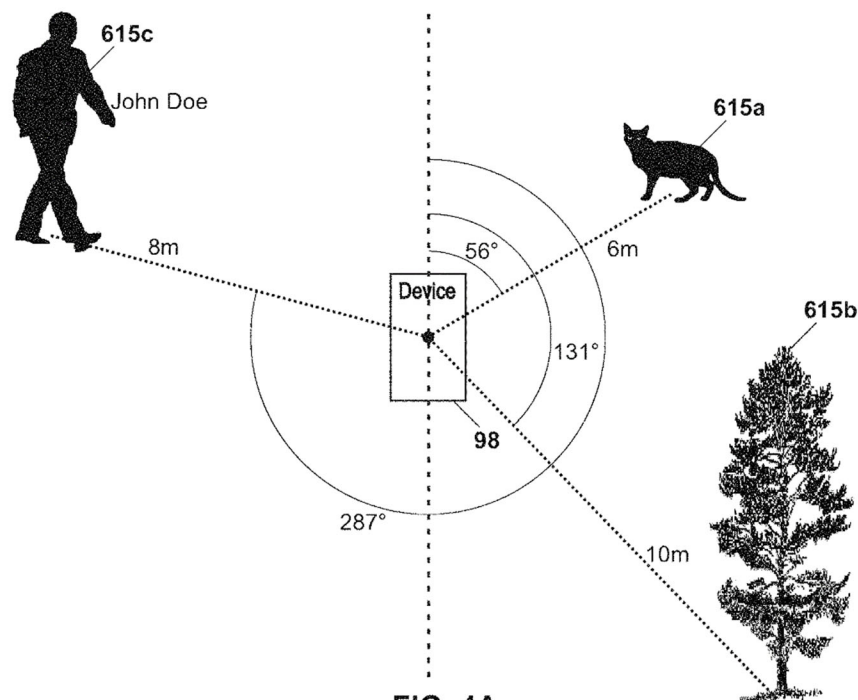
FIG. 1

	'991 Application at [Fig. 1]. Computing Device 70 may further include memory 12, which can be connected to the remainder of the components of Computing Device 70 via bus 5. Memory 12 can be connected to processor 11 via memory port 10. '991 Application at [53:6-7]. 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 [54:2-6]. 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 Synch Burst SRAM (BS RAM), Dynamic random access memory (DRAM), Fast Page Mode DRAM (FPM DRAM), Enhanced DRAM (EDRAM), 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 (DDR 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].
--	--

	<i>See also</i> '976 Application at [15:27-29], [50:9-12], [58:7-9], [Fig. 1], [53:10-11], [54:5-9], [54:10-18].
generating a circumstance representation, wherein the generated circumstance representation represents a circumstance detected at least in part by the one or more sensors	The '991 and '976 Applications support generating a circumstance representation, wherein the generated circumstance representation represents a circumstance detected at least in part by the one or more sensors. For example, the '991 Application discloses: 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. '991 Application at [65:5-10]. 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]. 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. In some aspects, an object processing unit may create or generate a collection of object representations. '991 Application at [136:23-25]. 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].



'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 10m 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 92c/Lidar 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 10m in Category 635bb "Distance", Object Property 630bc "131 °" in Category 635bc "Bearing", etc. Also, Object 35 Representation 625c may include Object Property 630ca "Person" in Category 635ca "Type", Object Property 630cb John Doe in Category 635cb "Identity", Object Property 630cc "8m" 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].
--	--

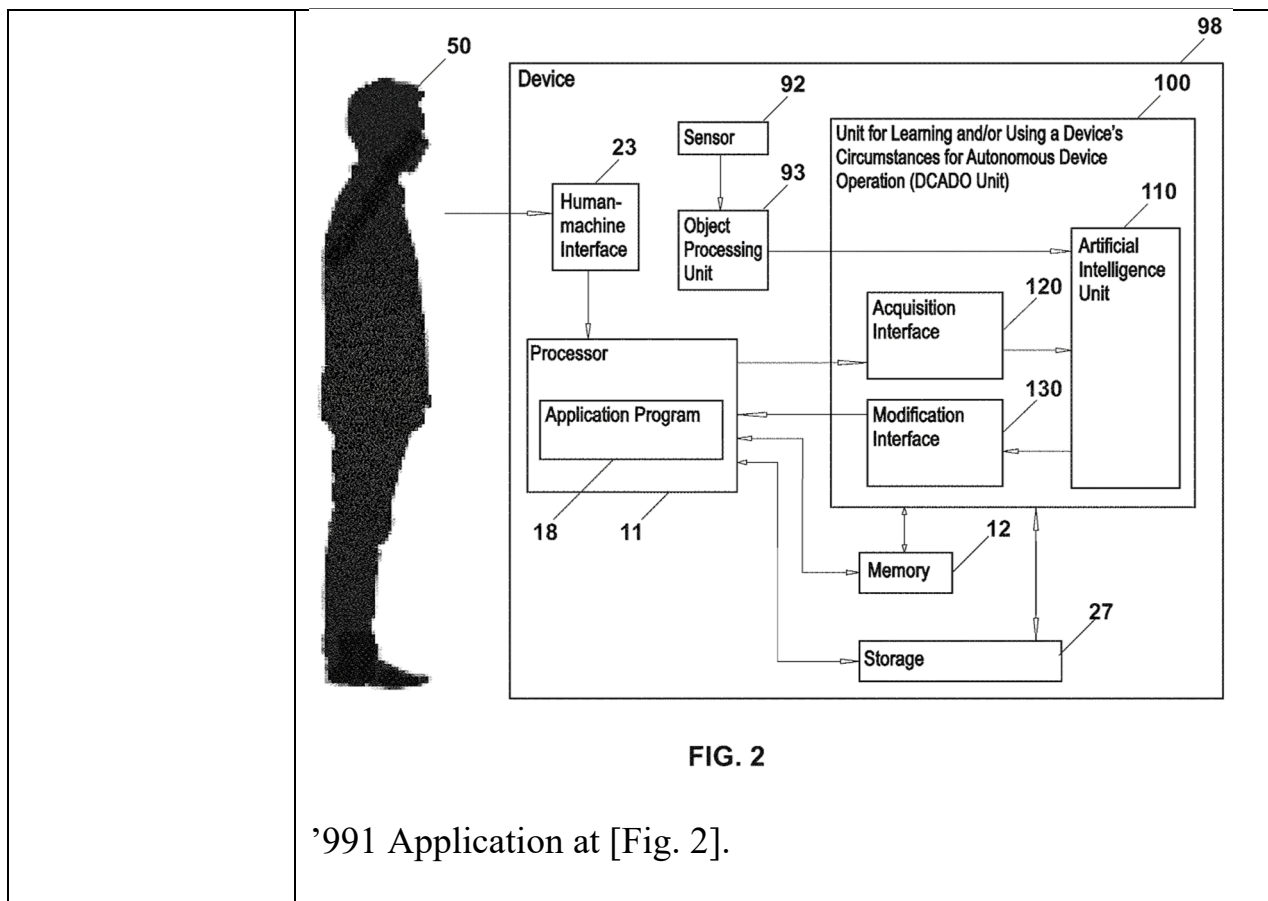


FIG. 2

'991 Application at [Fig. 2].

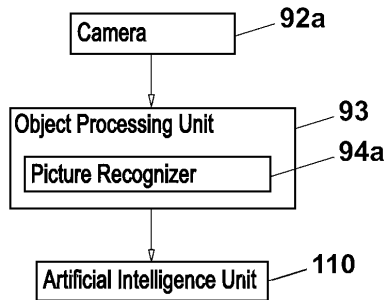


FIG. 3A

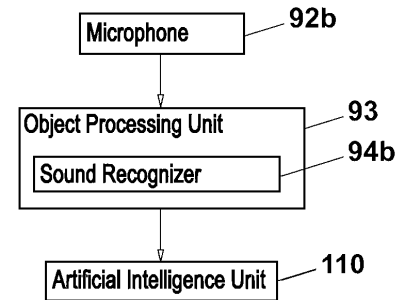


FIG. 3B

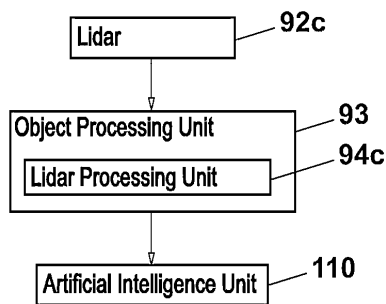


FIG. 3C

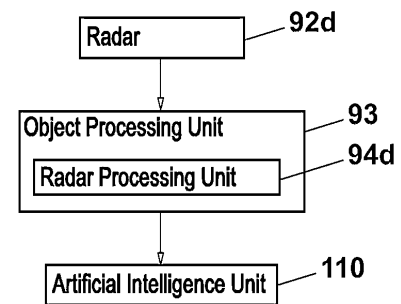


FIG. 3D

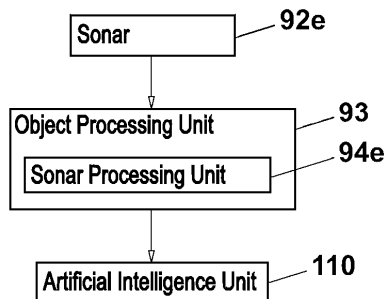


FIG. 3E

'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 (i.e. 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 corners 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 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 JPEG, 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, 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].

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 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 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 (i.e. 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 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, 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]. <i>See also</i> '976 Application at [65:5-10], [146:30-32], [136:13-15], [65:19-22], [Figs. 4A-4B], [72:11-73:5], [Fig. 2], [Figs. 3A-3E], [62:32-63:13], [63:14-64:36], [65:3-66:19].
determining the one or more instruction sets for operating the second device at least by: inputting at least a portion of the generated circumstance representation into the one or more inputs, and using a	The '991 and '976 Applications support determining the one or more instruction sets for operating the second device at least by: inputting at least a portion of the generated circumstance representation into the one or more inputs, and using a correlation between the one or more inputs and the one or more instruction sets for operating the second device. For example, the '991 Application discloses: Further, Artificial Intelligence Unit 110 comprises the functionality for anticipating Device's 98 operation in circumstances including objects with various properties. Artificial Intelligence Unit 110 comprises the functionality for anticipating one or more instruction sets, data, and/or other information. Artificial Intelligence Unit 110 comprises the

correlation between the one or more inputs and the one or more instruction sets for operating the second device

functionality for anticipating one or more Instruction Sets 526 based on one or more incoming Collections of Object Representations 525. Artificial Intelligence Unit 110 comprises the functionality for anticipating one or more Instruction Sets 526 to be used or executed in Device's 98 autonomous operation.

'991 Application at [87:21-26].

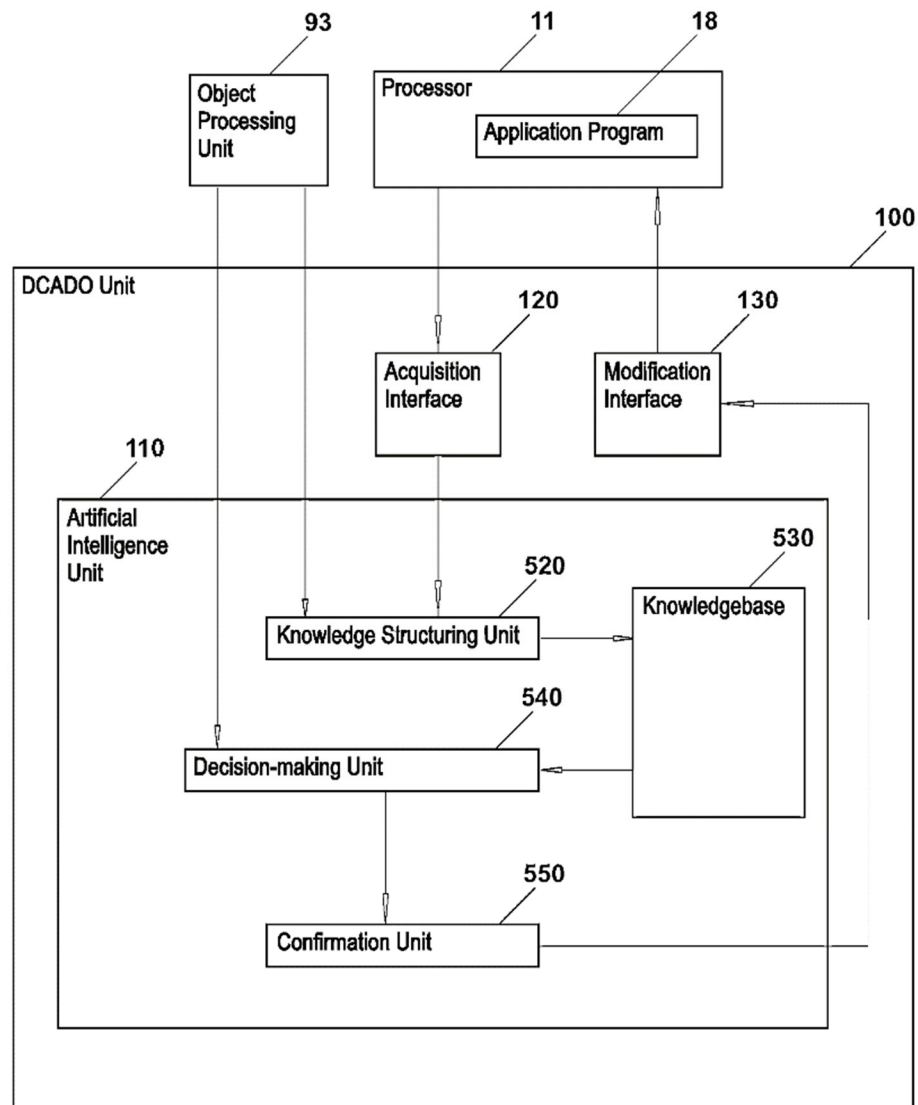


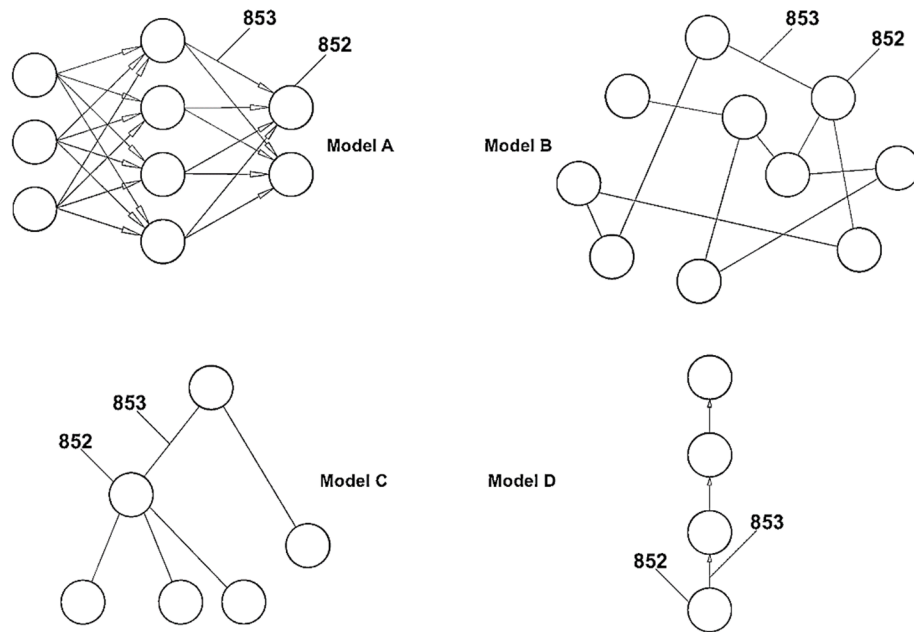
FIG. 12

'991 Application at [Fig. 12] (Artificial Intelligence Unit 110

anticipates Instruction Sets 526 based on incoming/inputted Collections of Object Representations 525).

In some embodiments, Knowledgebase 530 may be or include Neural Network 530a (later described).

'991 Application at [92:14-15].



'991 Application at [Fig. 17] (Model A showing input nodes/neurons correlated using downstream connections with output nodes/neurons that include/product instruction sets for operating a device).

For example, a neural network may include one or more input neurons that can be activated by inputs. Activations of these neurons can then be passed on, weighted, and transformed by a function to other neurons.

'991 Application at [94:7-9].

In one example shown in Model A, the disclosed artificially intelligent devices, systems, and methods for learning and/or using a device's circumstances for autonomous device

operation may include a neural network (also referred to as artificial neural network, etc.). 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 brain. Node 852 can store any data, object, data structure, and/or other item, or reference thereto. Node 852 may also include a function for transforming or manipulating any data, object, data structure, and/or other item. Examples of such transformation functions include mathematical functions (i.e. addition, subtraction, multiplication, division, sin, cos, log, derivative, integral, etc.), object manipulation functions (i.e. creating an object, modifying an object, deleting an object, appending objects, etc.), data structure manipulation functions (i.e. creating a data structure, modifying a data structure, deleting a data structure, creating a data field, modifying a data field, deleting a data field, etc.), and/or other transformation functions. 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.). A computational model can be utilized to compute values from inputs based on a pre-programmed or learned function or method. For example, a neural network may include one or more input neurons that can be activated by inputs. Activations of these neurons can then be passed on, weighted, and transformed by a function to other neurons. Neural networks may range from those with only one layer of single direction logic to multi-layer of multi-directional feedback loops. A neural network can use weights to change the parameters of the network's throughput. A neural network can learn by input from its environment or from self-teaching using written-in rules. A neural network can be utilized as a predictive modeling approach in machine learning. An exemplary embodiment of a neural network (i.e. Neural Network 530a, etc.) is described later.

'991 Application at [93:33-94:13].

In some embodiments, the processor circuit includes a logic circuit, the instruction sets for operating the device include

	outputs from the logic circuit for operating the device, and executing instruction sets for operating the device includes performing logic operations on inputs into the logic circuit and producing the outputs from the logic circuit for operating the device. '991 Application at [2:17-20]. The operations may further comprise: receiving a first one or more inputs, wherein the first one or more inputs are also received by a logic circuit, and wherein the logic circuit is configured to receive inputs and produce outputs, and wherein the outputs are used for operating a device. '991 Application at [46:5-7]. 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]. Referring to Fig. 10, an embodiment where DCADO Unit 100 resides on Server 96 accessible over Network 95 is illustrated. 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. In turn, any number of Devices 98 can utilize the remote DCADO Unit 100 for autonomous operation in circumstances including objects with various properties. A remote DCADO Unit 100 can be offered as a network service (i.e. online application, etc.). '991 Application at [86:13-16]. 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].
--	---

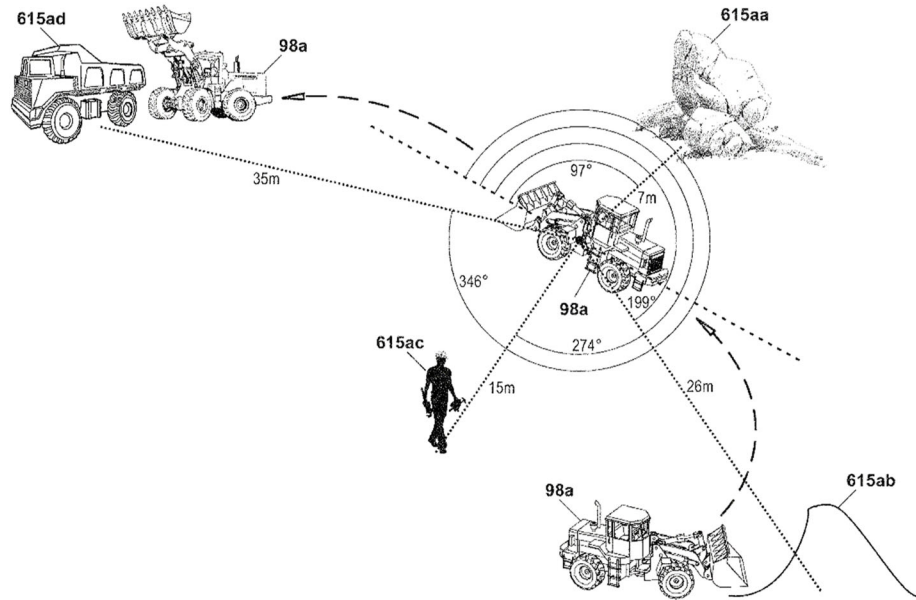


FIG. 38

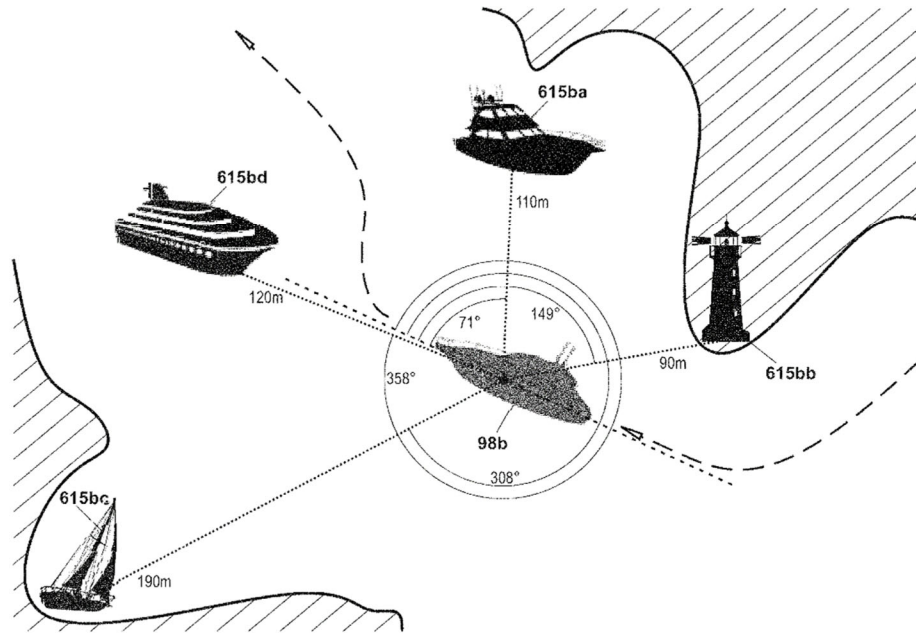
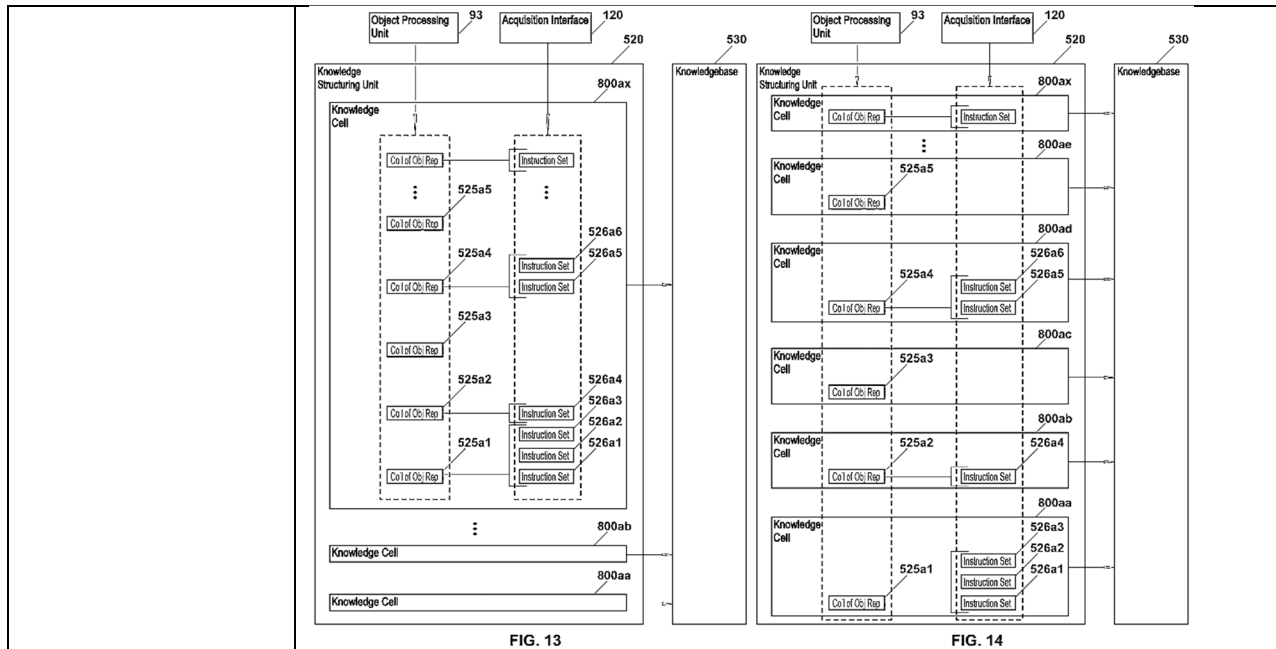


FIG. 39

'991 Application at [Figs. 38-39] ("second device": Loader 98a or Boat 98b).



'991 Application at [Figs. 13-14].

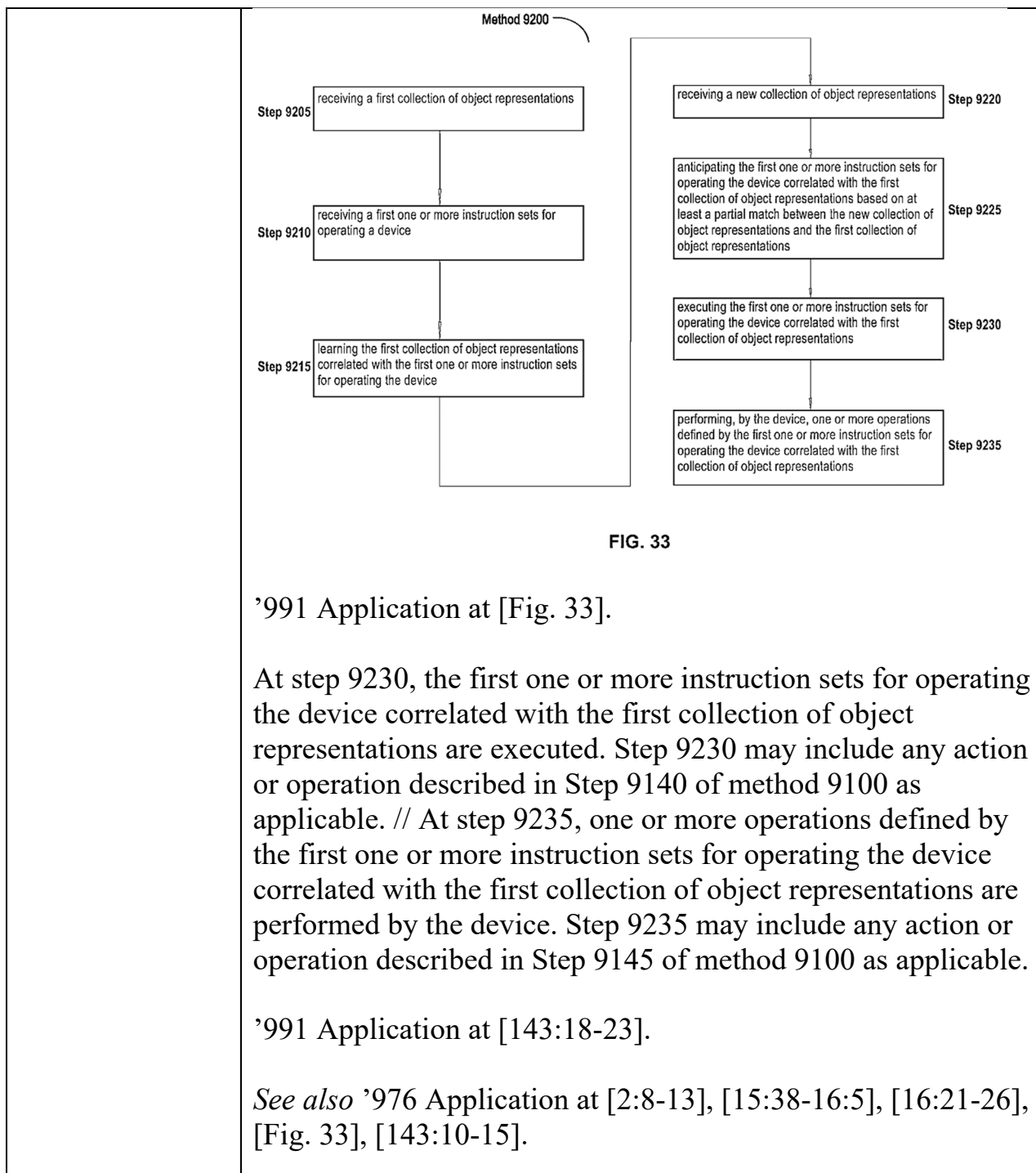
See also '976 Application at [87:15-21], [Fig. 12], [92:8-9], [Fig. 17], [94:1-3], [93:27-94:7], [2:27-30], 46:12-14], [93:15-17], [86:8-11], [86:15-19], [147:32-148:4], [Figs. 38-39], [Figs. 13-14].

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

The '991 and '976 Applications support at least in response to the determining, executing the one or more instruction sets for operating the second device, wherein the first device autonomously performs one or more operations defined by the one or more instruction sets for operating the second device. For example, the '991 Application discloses:

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.

second device	'991 Application at [1:37-2:3]. 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 of object representations, the one or more operations by the device performed in response to the executing of (f). '991 Application at [16:11-16].
---------------	---



Support for Limitations Present in Original Claim 46

Claim Limitation	Support from Original U.S. Application for the '474 Patent
wherein the one or more inputs for inputting the at least the portion of the circumstance representation include one or more inputs for inputting at least a portion of one or more object representations, and wherein the generated circumstance representation includes one or more object representations	The '991 and '976 Applications support wherein the one or more inputs for inputting the at least the portion of the circumstance representation includes one or more inputs for inputting at least a portion of one or more object representations, and wherein the generated circumstance representation includes one or more object representations. For example, the '991 Application discloses: 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. '991 Application at [65:5-10]. 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]. 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. In some aspects, an object processing unit may create or generate a collection of object representations.

'991 Application at [136:23-25].

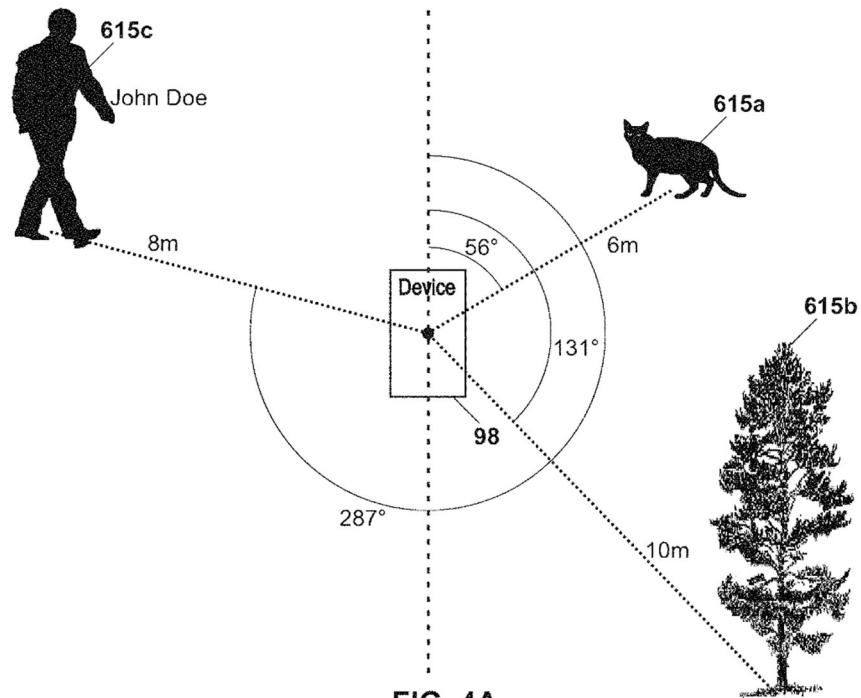


FIG. 4A

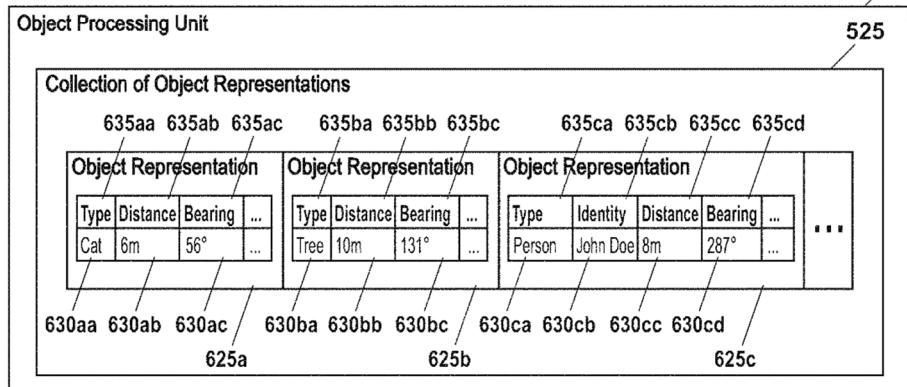


FIG. 4B

'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 10m 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 92c/Lidar 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 10m 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
--	---

	"8m" 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]. <i>See also</i> '976 Application at [65:5-10], [146:30-32], [136:13-15], [Figs. 4A-4B], [72:11-73:5].
wherein the first device is a first vehicle, and wherein the second device is a second vehicle	The '991 and '976 Applications support wherein the first device is a first vehicle, and wherein the second device is a second vehicle. For example, the '991 Application discloses:

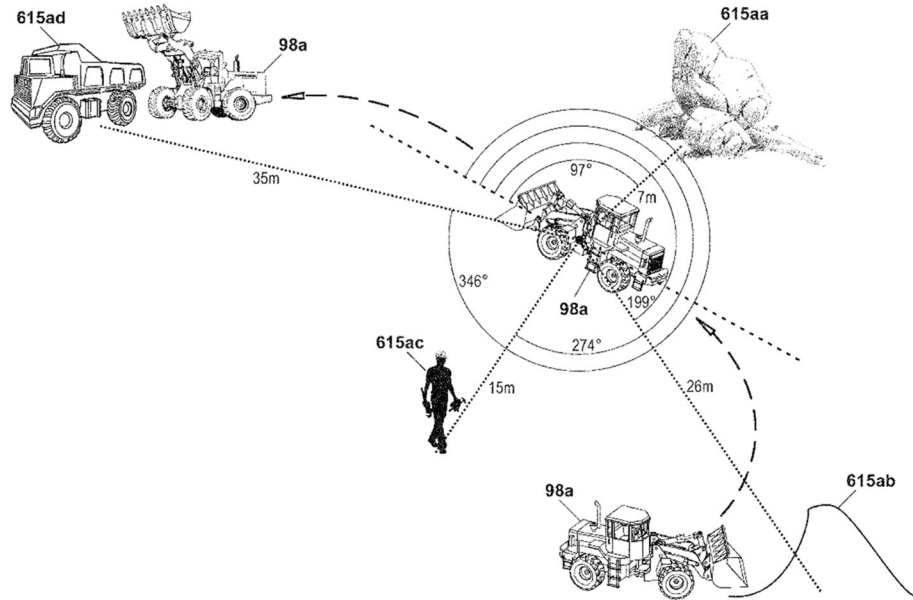


FIG. 38

'991 Application at [Fig. 38] (Loader 98a ground vehicle).

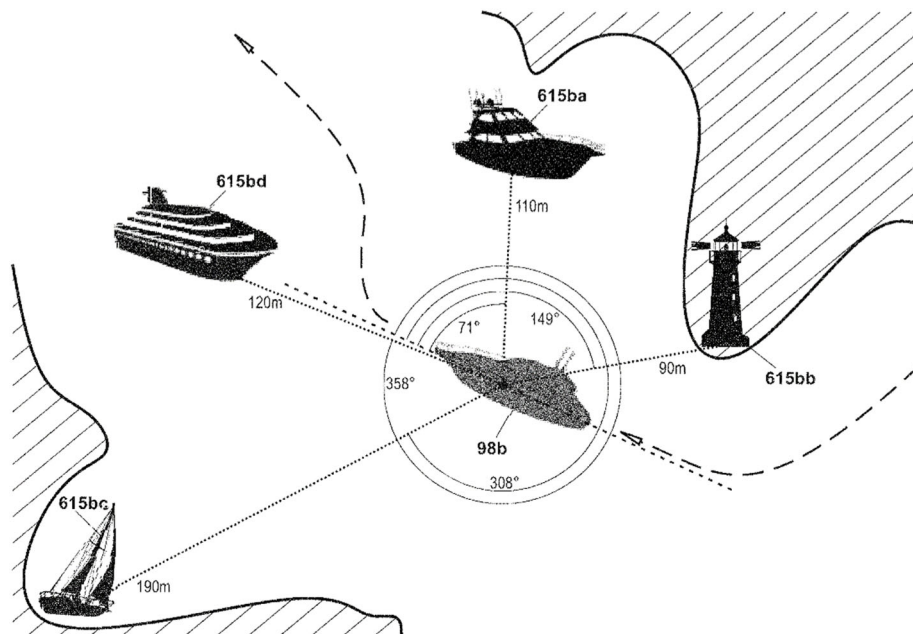


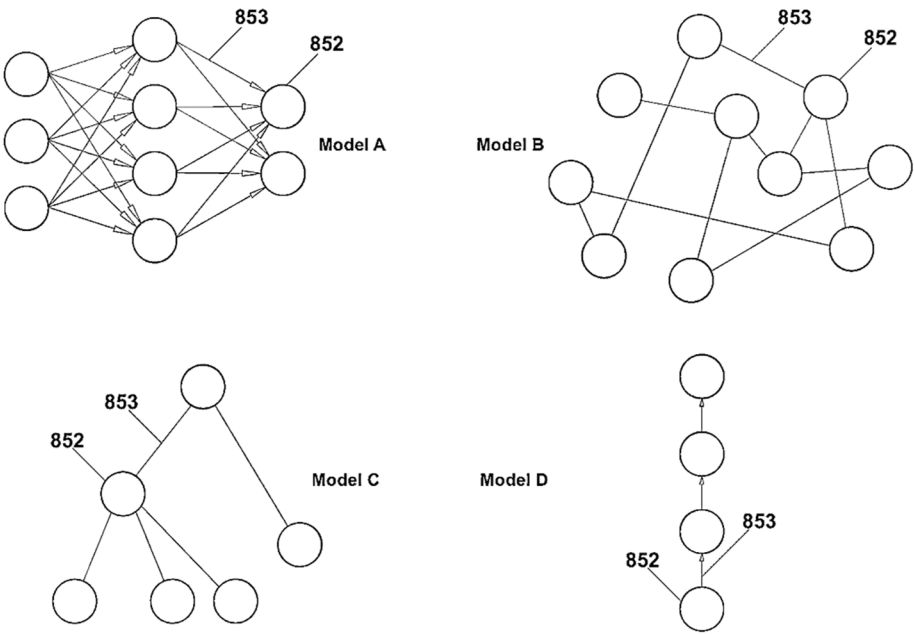
FIG. 39

'991 Application at [Fig. 39] (Boat 98b aquatic vehicle).

In some embodiments, at least one of: the processor circuit, the memory unit, the sensor, or the artificial intelligence unit are part of, operating on, or coupled to the device. In further embodiments, the device includes one or more devices. In

	further embodiments, the device includes a construction machine, an assembly machine, an object handling machine, an object dispensing machine, a sorting machine, a restocking machine, an industrial machine, an agricultural machine, a harvesting machine, an appliance, a toy, a robot, a ground vehicle, an aerial vehicle, an aquatic vehicle, a computer, a smartphone, a control device, or a computing enabled device. '991 Application at [2:4-9]. Examples of Device 98 include an industrial machine, a toy, a robot, a vehicle, an appliance, a control device, a smartphone or other mobile computer, any computer, and/or other computing enabled device or machine. '991 Application at [62:3-5]. <i>See also</i> '976 Application at [Figs. 38-39], [2:14-19], [62:2-4].
--	---

Support for Limitations Present in Original Claim 47

Claim Limitation	Support from Original U.S. Application for the '474 Patent
wherein at least an information related to the one or more instruction sets for operating the second device is learned in a learning process that includes operating the second device at least partially by a user	The '991 and '976 Applications support wherein at least an information related to the one or more instruction sets for operating the second device is learned in a learning process that includes operating the second device at least partially by a user. For example, the '991 Application discloses:  FIG. 17 '991 Application at [Fig. 17] (Model A showing input nodes/neurons correlated using downstream connections with output nodes/neurons that include/product instruction sets for operating a device). In one example shown in Model A, the disclosed artificially intelligent devices, systems, and methods for learning and/or using a device's circumstances for autonomous device operation may include a neural network (also referred to as artificial neural network, etc.). 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 brain. Node 852 can store any data, object, data structure, and/or other item, or reference thereto. Node 852 may also include a function for transforming or manipulating any data, object, data structure, and/or other item. Examples of such transformation functions include mathematical functions (i.e. addition, subtraction, multiplication, division, sin, cos, log, derivative, integral, etc.), object manipulation functions (i.e. creating an object, modifying an object, deleting an object, appending objects, etc.), data structure manipulation functions (i.e. creating a data structure, modifying a data structure, deleting a data structure, creating a data field, modifying a data field, deleting a data field, etc.), and/or other transformation functions. 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.). A computational model can be utilized to compute values from inputs based on a pre-programmed or learned function or method. For example, a neural network may include one or more input neurons that can be activated by inputs. Activations of these neurons can then be passed on, weighted, and transformed by a function to other neurons. Neural networks may range from those with only one layer of single direction logic to multi-layer of multi-directional feedback loops. A neural network can use weights to change the parameters of the network's throughput. A neural network can learn by input from its environment or from self-teaching using written-in rules. A neural network can be utilized as a predictive modeling approach in machine learning. An exemplary embodiment of a neural network (i.e. Neural Network 530a, etc.) is described later. '991 Application at [93:33-94:13]. The connection may include or be associated with at least one of: an occurrence count, a weight, a parameter, or a data. '991 Application at [14:19-20]. In another example, back-propagation of errors can be
--	---

implemented. Such back-propagations can then be used to adjust occurrence counts and/or weights of Connections 853 for better future predictions, for example. Any other back-propagation can be implemented for other purposes.

'991 Application at [98:16-18].

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].

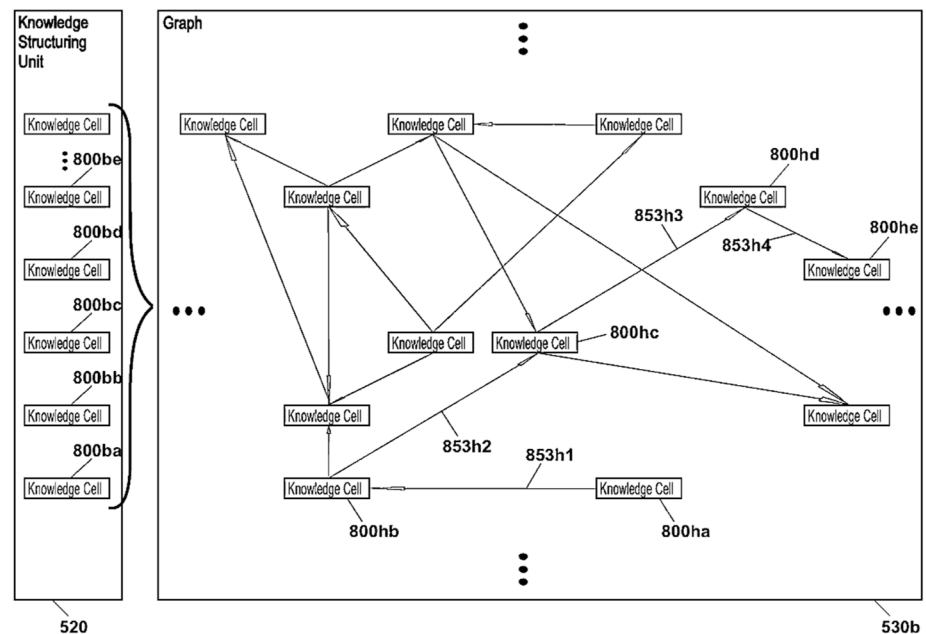


FIG. 22

'991 Application at [Fig. 22] ("learning process").

Referring to Fig. 10, an embodiment where DCADO Unit 100 resides on Server 96 accessible over Network 95 is illustrated. 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. In turn, any number of Devices 98 can utilize the remote DCADO Unit 100 for autonomous operation in circumstances including objects with various properties. A remote DCADO Unit 100 can be offered as a network service (i.e. online application, etc.). '991 Application at [86:13-16]. 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]. 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]. 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
--	--

'991 Application at [147:38-148:10].



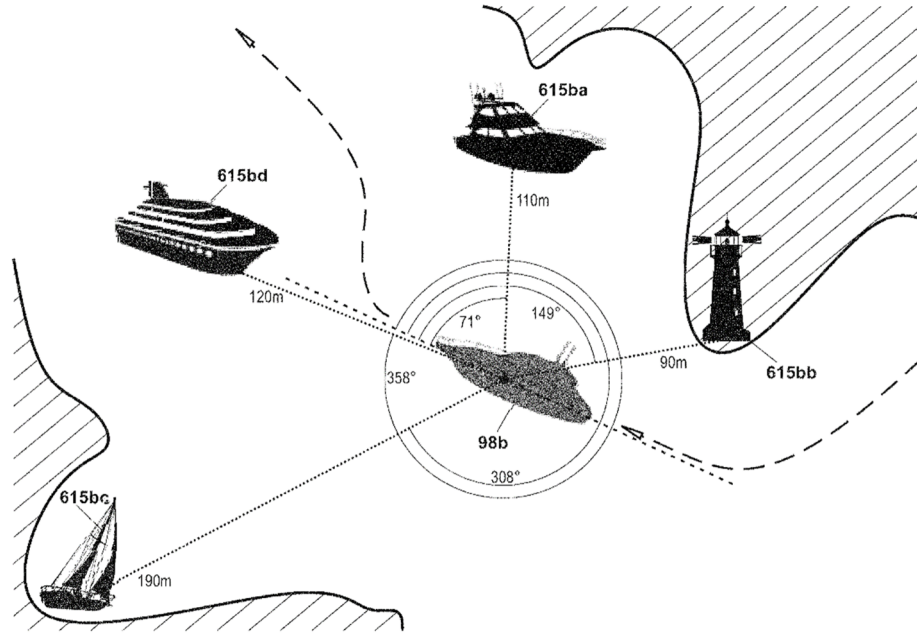


FIG. 39

'991 Application at [Figs. 38-39] ("second device": Loader 98a or Boat 98b).

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].

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].

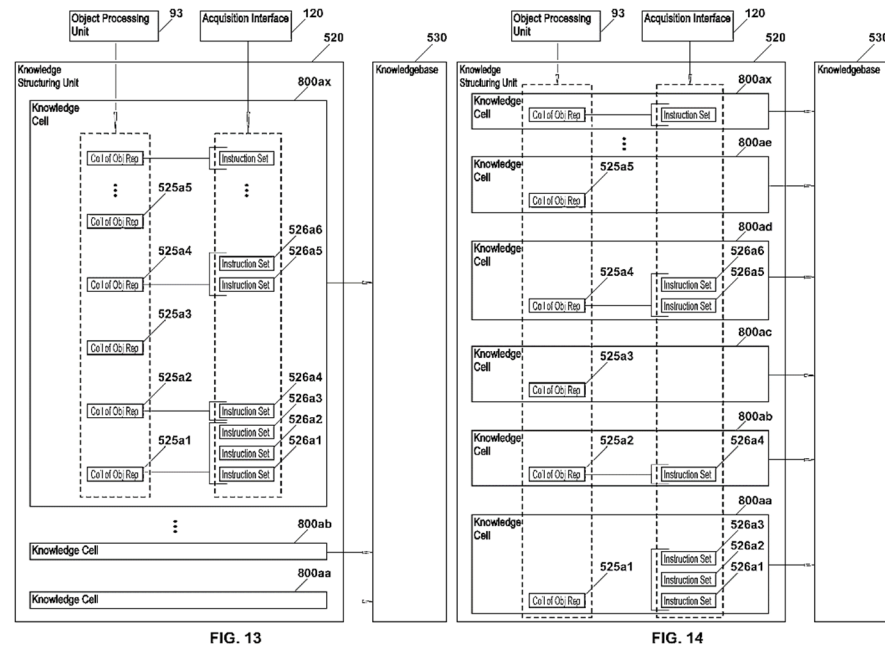
See also '976 Application at [Fig. 17], [93:27-94:7], [14:29-30], [98:9-11], [135:3-6], [Fig. 22], [86:8-11], [86:15-19], [93:15-17], [147:32-148:4], [Figs. 38-39], [146:24-25], [149:31-32].

Support for Limitations Present in Original Claim 51

Claim Limitation	Support from Original U.S. Application for the '474 Patent
wherein at least a portion of the one or more instruction sets for operating the second device is learned in a learning process that includes operating the second device at least partially by a user	The '991 and '976 Applications support wherein at least a portion of the one or more instruction sets for operating the second device is learned in a learning process that includes operating the second device at least partially by a user. For example, the '991 Application discloses: 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.

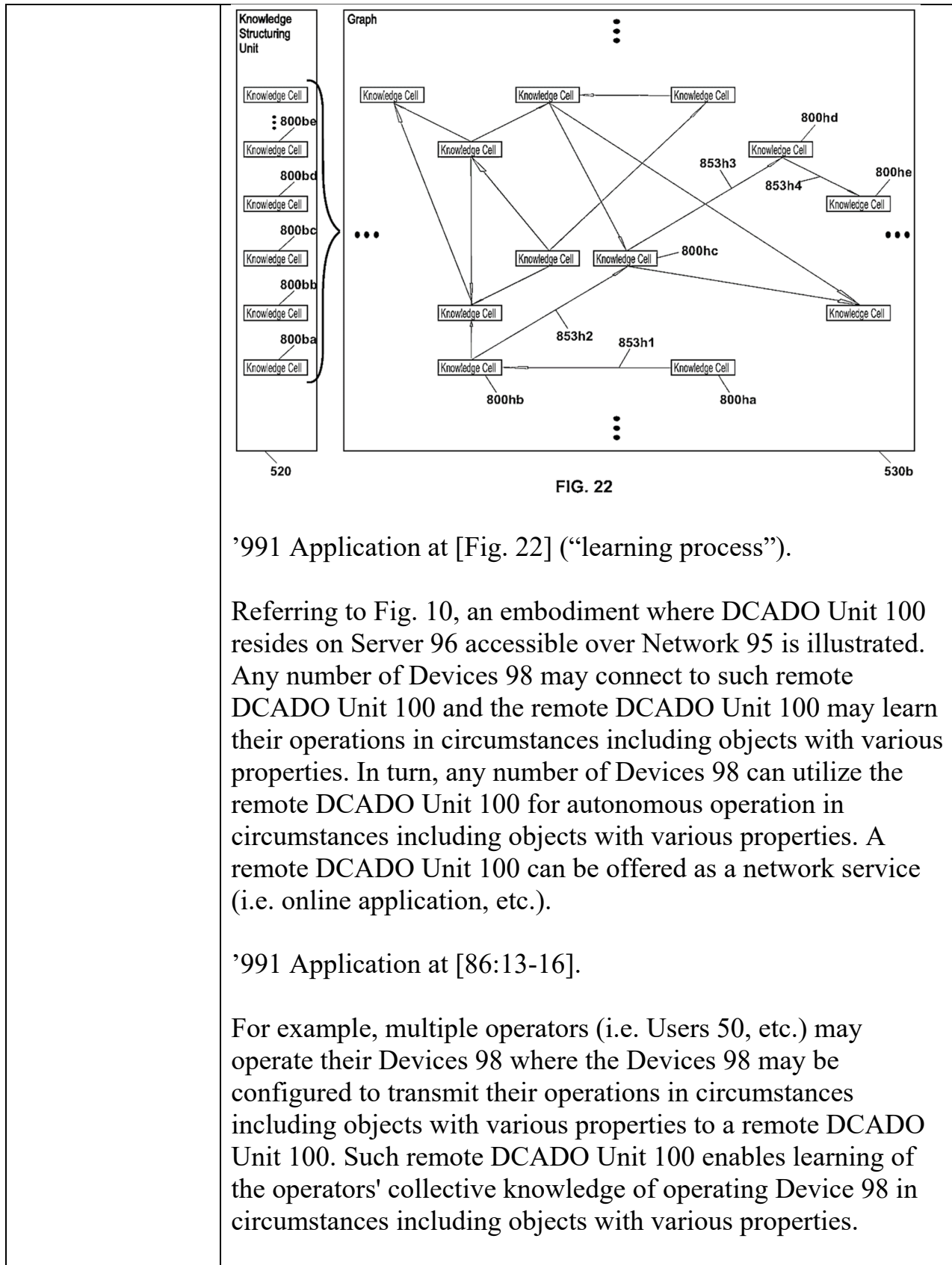
'991 Application at [92:7-22].



'991 Application at [Figs. 13-14].

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].



	'991 Application at [86:20-24]. 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]. 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].
--	---

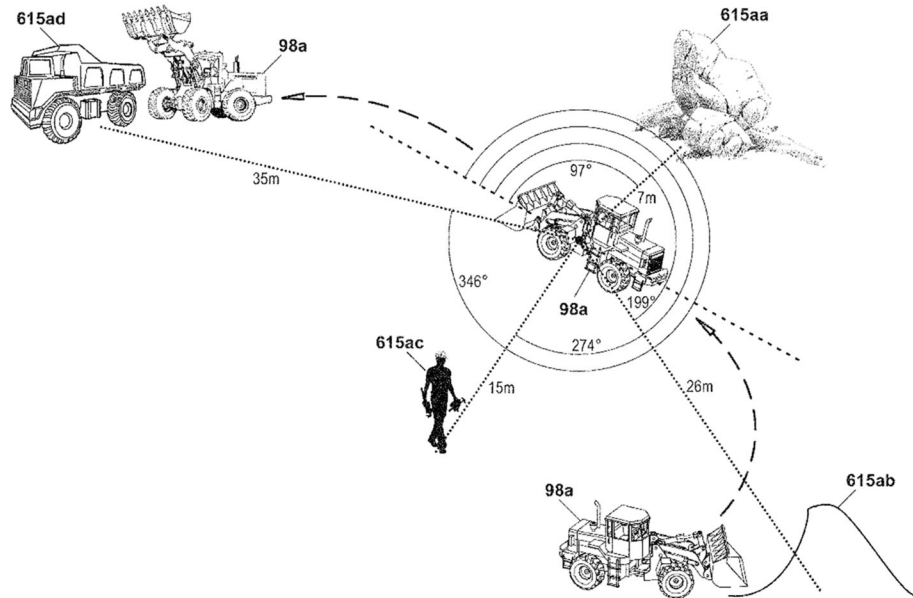


FIG. 38

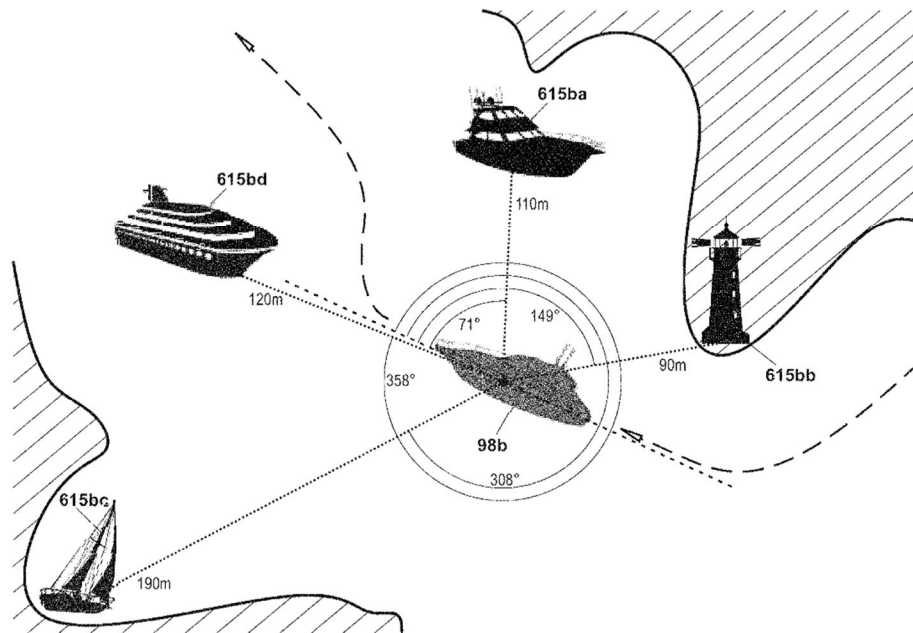


FIG. 39

'991 Application at [Figs. 38-39] ("second device": Loader 98a or Boat 98b).

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].

	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]. In some embodiments, Knowledgebase 530 from one Device 98 or DCADO Unit 100 can be transferred to one or more other Devices 98 or DCADO Units 100. Therefore, the knowledge of Device's 98 operation in circumstances including objects with various properties learned on one Device 98 or DCADO Unit 100 can be transferred to one or more other Devices 98 or DCADO Units 100. In one example, Knowledgebase 530 can be copied or downloaded to a file or other repository from one Device 98 or DCADO Unit 100 and loaded or inserted into another Device 98 or DCADO Unit 100. In another example, Knowledgebase 530 from one Device 98 or DCADO Unit 100 can be available on a server accessible by other Devices 98 or DCADO Units 100 over a network or an interface. Once loaded into or accessed by a receiving Device 98 or DCADO Unit 100, the receiving Device 98 or DCADO Unit 100 can then implement the knowledge of Device's 98 operation in circumstances including objects with various properties learned on the originating Device 98 or DCADO Unit 100. '991 Application at [92:23-32].
--	--

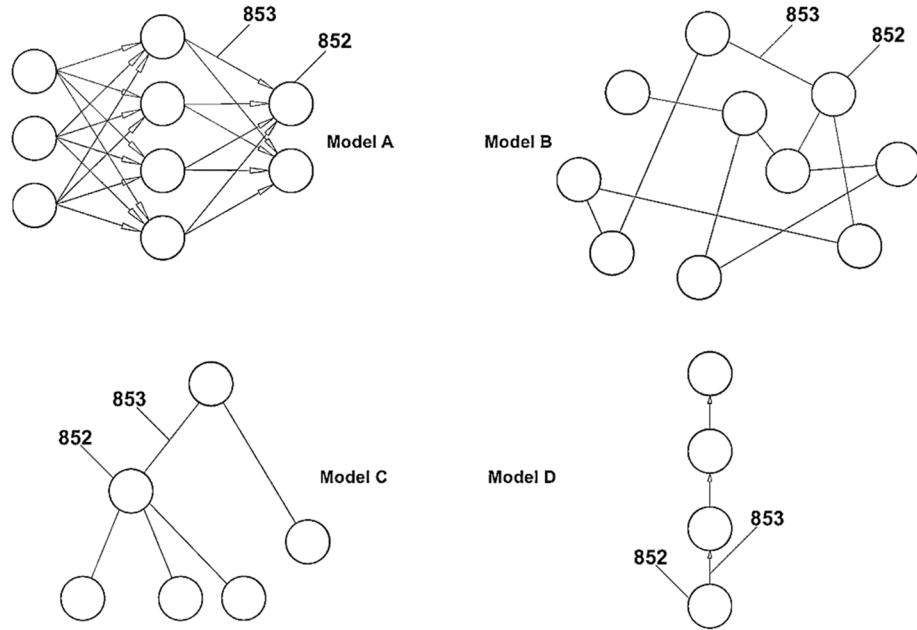


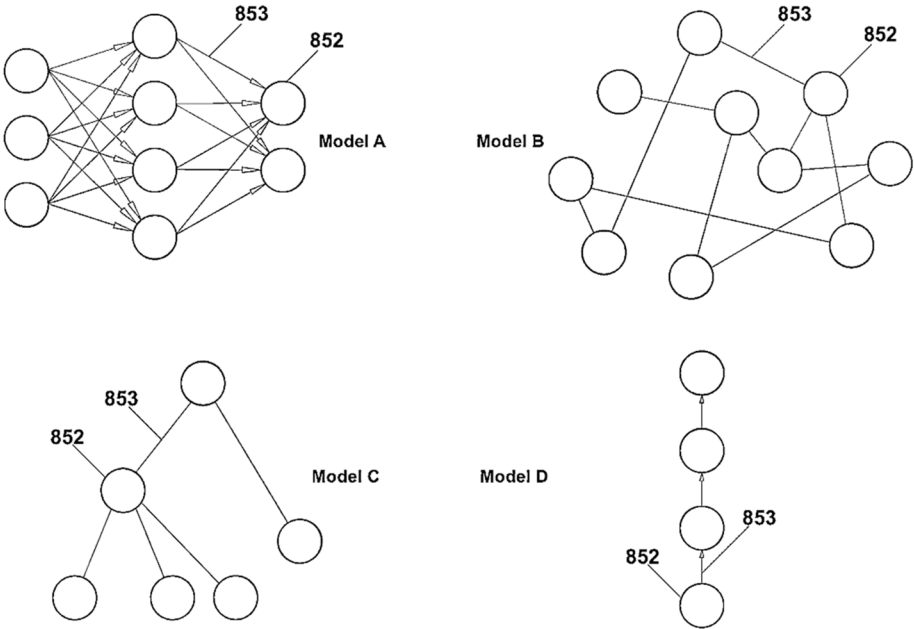
FIG. 17

'991 Application at [Fig. 17] (Model A showing input nodes/neurons correlated using downstream connections with output nodes/neurons that include/product instruction sets for operating a device).

In one example shown in Model A, the disclosed artificially intelligent devices, systems, and methods for learning and/or using a device's circumstances for autonomous device operation may include a neural network (also referred to as artificial neural network, etc.). 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 brain. Node 852 can store any data, object, data structure, and/or other item, or reference thereto. Node 852 may also include a function for transforming or manipulating any data, object, data structure, and/or other item. Examples of such transformation functions include mathematical functions (i.e. addition, subtraction, multiplication, division, sin, cos, log, derivative, integral, etc.), object manipulation functions (i.e. creating an object, modifying an object, deleting an object, appending objects, etc.), data structure manipulation functions

	(i.e. creating a data structure, modifying a data structure, deleting a data structure, creating a data field, modifying a data field, deleting a data field, etc.), and/or other transformation functions. 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.). A computational model can be utilized to compute values from inputs based on a pre-programmed or learned function or method. For example, a neural network may include one or more input neurons that can be activated by inputs. Activations of these neurons can then be passed on, weighted, and transformed by a function to other neurons. Neural networks may range from those with only one layer of single direction logic to multi-layer of multi-directional feedback loops. A neural network can use weights to change the parameters of the network's throughput. A neural network can learn by input from its environment or from self-teaching using written-in rules. A neural network can be utilized as a predictive modeling approach in machine learning. An exemplary embodiment of a neural network (i.e. Neural Network 530a, etc.) is described later. '991 Application at [93:33-94:13]. <i>See also</i> '976 Application at [92:1-16], [Figs. 13-14], [135:3-6], [Fig. 22], [86:8-11], [86:15-19], [93:15-17], [147:32-148:4], [Figs. 38-39], [146:24-25], [149:31-32], [92:17-26], [Fig. 17], [93:27-94:7].
--	--

Support for Limitations Present in Original Claim 56

Claim Limitation	Support from Original U.S. Application for the '474 Patent
wherein the one or more inputs are further correlated with another one or more instruction sets for operating a third device	The '991 and '976 Applications support wherein the one or more inputs are further correlated with another one or more instruction sets for operating a third device. For example, the '991 Application discloses: In some embodiments, Knowledgebase 530 may be or include Neural Network 530a (later described). '991 Application at [92:14-15].  FIG. 17 '991 Application at [Fig. 17] (Model A showing input nodes/neurons correlated using downstream connections with output nodes/neurons that include/product instruction sets for operating a device). For example, a neural network may include one or more input neurons that can be activated by inputs. Activations of these neurons can then be passed on, weighted, and transformed by a

	function to other neurons. '991 Application at [94:7-9]. In one example shown in Model A, the disclosed artificially intelligent devices, systems, and methods for learning and/or using a device's circumstances for autonomous device operation may include a neural network (also referred to as artificial neural network, etc.). 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 brain. Node 852 can store any data, object, data structure, and/or other item, or reference thereto. Node 852 may also include a function for transforming or manipulating any data, object, data structure, and/or other item. Examples of such transformation functions include mathematical functions (i.e. addition, subtraction, multiplication, division, sin, cos, log, derivative, integral, etc.), object manipulation functions (i.e. creating an object, modifying an object, deleting an object, appending objects, etc.), data structure manipulation functions (i.e. creating a data structure, modifying a data structure, deleting a data structure, creating a data field, modifying a data field, deleting a data field, etc.), and/or other transformation functions. 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.). A computational model can be utilized to compute values from inputs based on a pre-programmed or learned function or method. For example, a neural network may include one or more input neurons that can be activated by inputs. Activations of these neurons can then be passed on, weighted, and transformed by a function to other neurons. Neural networks may range from those with only one layer of single direction logic to multi-layer of multi-directional feedback loops. A neural network can use weights to change the parameters of the network's throughput. A neural network can learn by input from its environment or from self-teaching using written-in rules. A neural network can be utilized as a predictive modeling approach in machine learning.
--	---

	An exemplary embodiment of a neural network (i.e. Neural Network 530a, etc.) is described later. '991 Application at [93:33-94:13]. In some embodiments, the processor circuit includes a logic circuit, the instruction sets for operating the device include outputs from the logic circuit for operating the device, and executing instruction sets for operating the device includes performing logic operations on inputs into the logic circuit and producing the outputs from the logic circuit for operating the device. '991 Application at [2:17-20]. The operations may further comprise: receiving a first one or more inputs, wherein the first one or more inputs are also received by a logic circuit, and wherein the logic circuit is configured to receive inputs and produce outputs, and wherein the outputs are used for operating a device. '991 Application at [46:5-7]. 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]. Referring to Fig. 10, an embodiment where DCADO Unit 100 resides on Server 96 accessible over Network 95 is illustrated. 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. In turn, any number of Devices 98 can utilize the remote DCADO Unit 100 for autonomous operation in circumstances including objects with various properties. A remote DCADO Unit 100 can be offered as a network service (i.e. online application, etc.).
--	--

	'991 Application at [86:13-16]. 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].
--	--

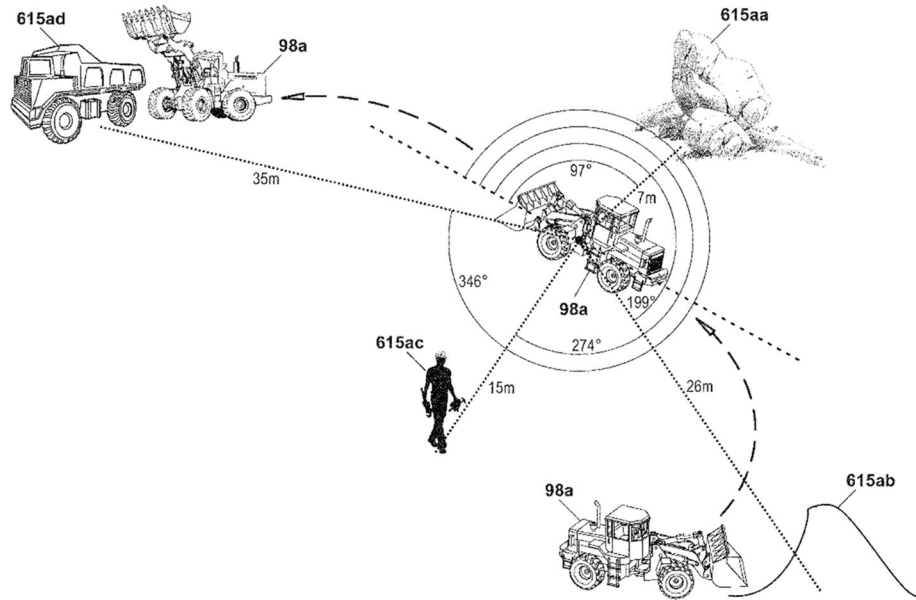


FIG. 38

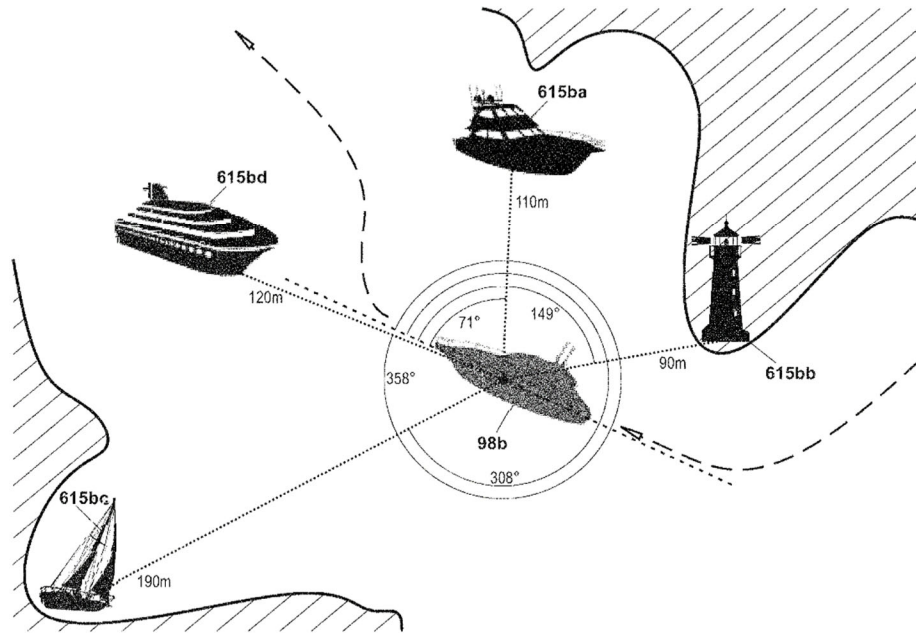


FIG. 39

'991 Application at [Figs. 38-39] ("third device": Loader 98a or Boat 98b).

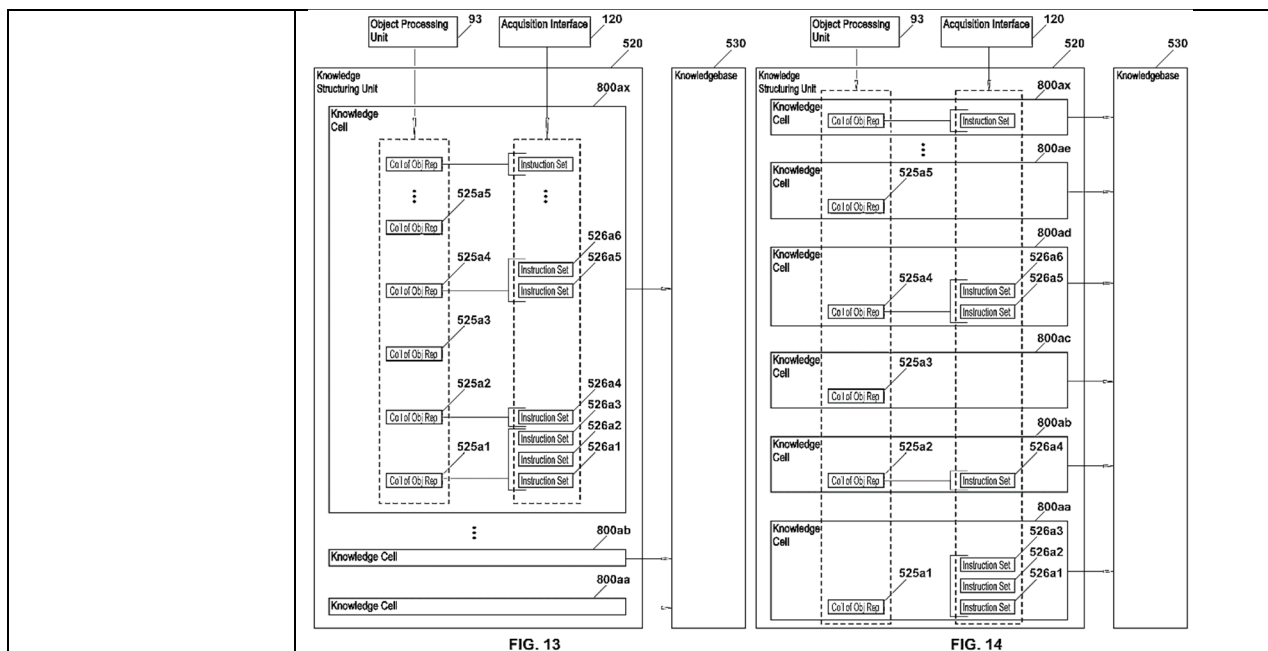


FIG. 13

FIG. 14

'991 Application at [Figs. 13-14].

See also '976 Application at [92:8-9], [Fig. 17], [94:1-3], [93:27-94:7], [2:27-30], [46:12-14], [93:15-17], [86:8-11], [86:15-19], [147:32-148:4], [Figs. 38-39], [Figs. 13-14].

wherein at least a portion of the one or more instruction sets for operating the second device or at least an information related to the one or more instruction sets for operating the second device is learned in a learning process that includes operating the second device at

The '991 and '976 Applications support wherein at least a portion of the one or more instruction sets for operating the second device or at least an information related to the one or more instruction sets for operating the second device is learned in a learning process that includes operating the second device at least partially by a user, and wherein at least a portion of the another one or more instruction sets for operating the third device or at least an information related to the another one or more instruction sets for operating the third device is learned in another learning process that includes operating the third device at least partially by a user. For example, the '991 Application discloses:

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

least partially by a user, and wherein at least a portion of the another one or more instruction sets for operating the third device or at least an information related to the another one or more instruction sets for operating the third device is learned in another learning process that includes operating the third device at least partially by another user	objects with various properties and enable autonomous device operation in similar circumstances. '991 Application at [135:14-17]. 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]. Referring to Fig. 10, an embodiment where DCADO Unit 100 resides on Server 96 accessible over Network 95 is illustrated. 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. In turn, any number of Devices 98 can utilize the remote DCADO Unit 100 for autonomous operation in circumstances including objects with various properties. A remote DCADO Unit 100 can be offered as a network service (i.e. online application, etc.). '991 Application at [86:13-16]. 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 such embodiments, instead of Knowledge Cells 800 generated by Knowledge Structuring Unit 520, the learning
--	--

process may utilize Knowledge Cells 800 from one Knowledgebase 530 to apply them onto another Knowledgebase 530. Any other techniques known in art including custom techniques for combining data structures can be utilized for combining Knowledgebases 530 in alternate implementations. In any of the aforementioned and/or other combining techniques, similarity of elements (i.e. nodes/vertices, edges/connections, etc.) can be utilized in determining whether an element from one Knowledgebase 530 matches an element from another Knowledgebase 530, and substantially or otherwise similar elements may be considered a match for combining purposes in some designs. Any features, functionalities, and embodiments of Similarity Comparison 125 (later described) can be used in such similarity determinations. A combined Knowledgebase 530 can be offered as a network service (i.e. online application, etc.), downloadable file, or other repository to all DCADO Units 100 configured to utilize the combined Knowledgebase 530. 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 [93:11-23].

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].

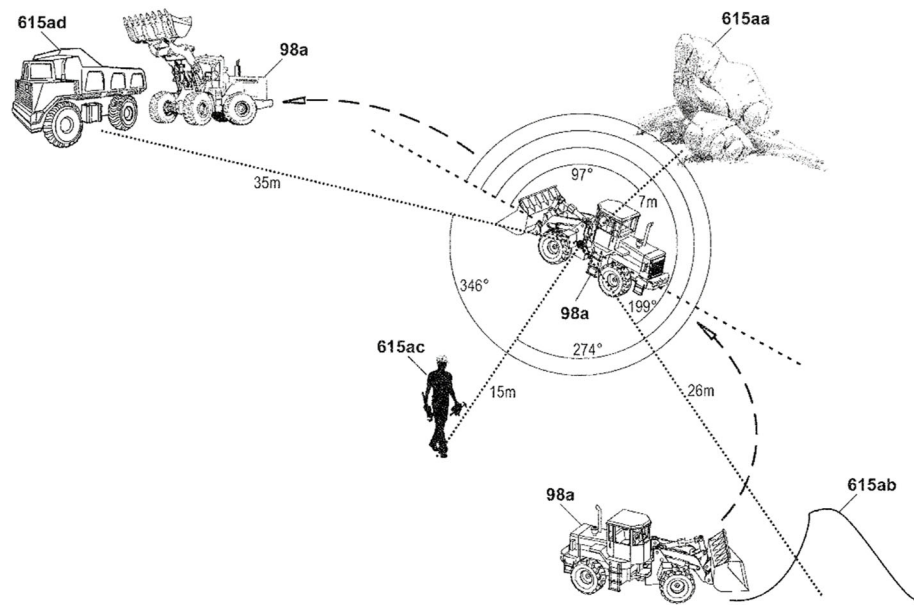


FIG. 38

'991 Application at [Fig. 38] ("second device": Loader 98a).

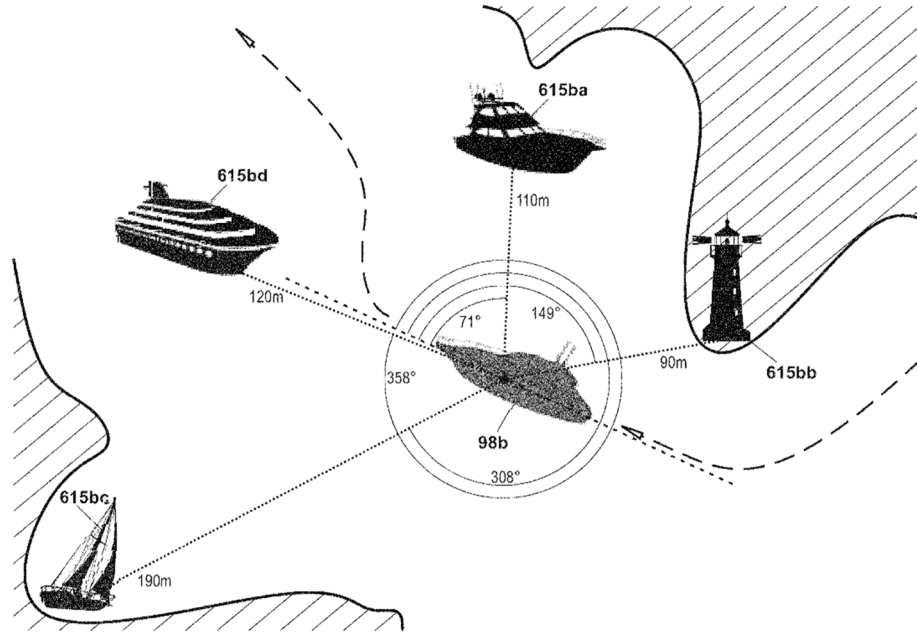


FIG. 39

'991 Application at [Fig. 39] ("third device": Boat 98b).

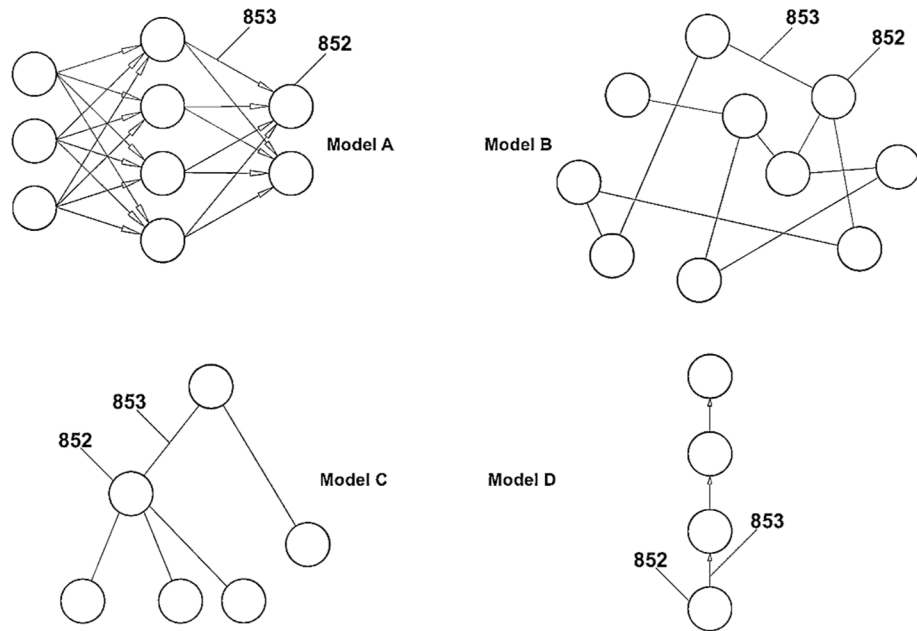
Referring to Fig. 39, in some exemplary embodiments, Device 98 may be or include Boat 98b. Boat 98b may be operated by User 50 in person or remotely.

'991 Application at [149:38-39].

In some embodiments, Knowledgebase 530 from one Device 98 or DCADO Unit 100 can be transferred to one or more other Devices 98 or DCADO Units 100. Therefore, the knowledge of Device's 98 operation in circumstances including objects with various properties learned on one Device 98 or DCADO Unit 100 can be transferred to one or more other Devices 98 or DCADO Units 100. In one example, Knowledgebase 530 can be copied or downloaded to a file or other repository from one Device 98 or DCADO Unit 100 and loaded or inserted into another Device 98 or DCADO Unit 100. In another example, Knowledgebase 530 from one Device 98 or DCADO Unit 100 can be available on a server accessible by other Devices 98 or DCADO Units 100 over a network or an interface. Once loaded into or accessed by a receiving Device 98 or DCADO Unit 100, the receiving Device 98 or DCADO Unit 100 can then

implement the knowledge of Device's 98 operation in circumstances including objects with various properties learned on the originating Device 98 or DCADO Unit 100.

'991 Application at [92:23-32].



'991 Application at [Fig. 17] (Model A showing input nodes/neurons correlated using downstream connections with output nodes/neurons that include/product instruction sets for operating a device).

The connection may include or be associated with at least one of: an occurrence count, a weight, a parameter, or a data.

'991 Application at [14:19-20].

In another example, back-propagation of errors can be implemented. Such back-propagations can then be used to adjust occurrence counts and/or weights of Connections 853 for better future predictions, for example. Any other back-propagation can be implemented for other purposes.

'991 Application at [98:16-18].

	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. '991 Application at [92:7-22].
--	--

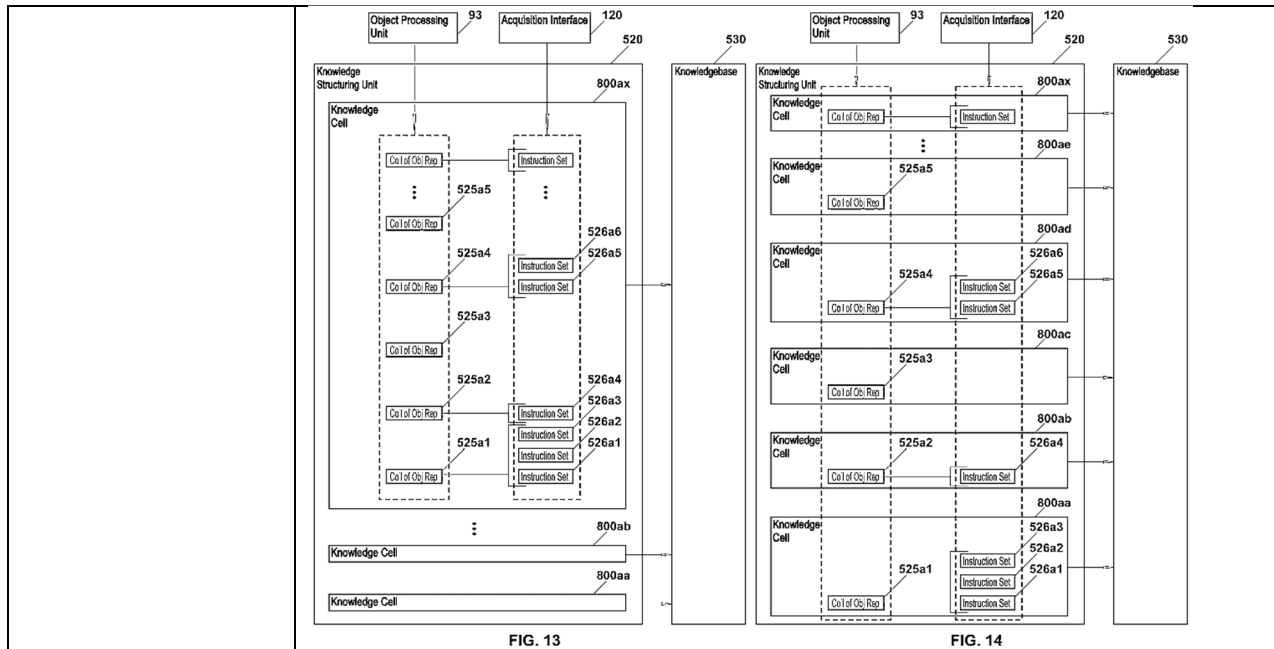


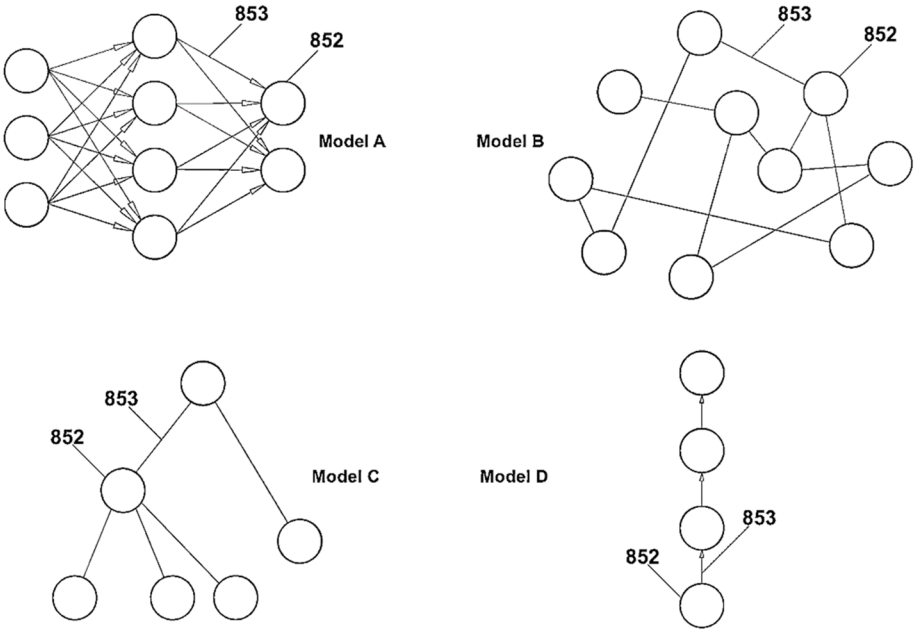
FIG. 13

FIG. 14

'991 Application at [Figs. 13-14].

See also '976 Application at [135:3-6], [142:27-30], [86:8-11], [86:15-19], [93:15-17], [147:32-148:4], [Figs. 38-39], [149:31-32], [92:17-26], [Fig. 17], [14:29-30], [98:9-11], [92:1-16], [Figs. 13-14].

Support for Limitations Present in Original Claim 57

Claim Limitation	Support from Original U.S. Application for the '474 Patent
wherein the one or more inputs are further correlated with another one or more instruction sets for operating a third device	The '991 and '976 Applications support wherein the one or more inputs are further correlated with another one or more instruction sets for operating a third device. For example, the '991 Application discloses: In some embodiments, Knowledgebase 530 may be or include Neural Network 530a (later described). '991 Application at [92:14-15].  FIG. 17 '991 Application at [Fig. 17] (Model A showing input nodes/neurons correlated using downstream connections with output nodes/neurons that include/product instruction sets for operating a device). For example, a neural network may include one or more input neurons that can be activated by inputs. Activations of these neurons can then be passed on, weighted, and transformed by a

	function to other neurons. '991 Application at [94:7-9]. In one example shown in Model A, the disclosed artificially intelligent devices, systems, and methods for learning and/or using a device's circumstances for autonomous device operation may include a neural network (also referred to as artificial neural network, etc.). 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 brain. Node 852 can store any data, object, data structure, and/or other item, or reference thereto. Node 852 may also include a function for transforming or manipulating any data, object, data structure, and/or other item. Examples of such transformation functions include mathematical functions (i.e. addition, subtraction, multiplication, division, sin, cos, log, derivative, integral, etc.), object manipulation functions (i.e. creating an object, modifying an object, deleting an object, appending objects, etc.), data structure manipulation functions (i.e. creating a data structure, modifying a data structure, deleting a data structure, creating a data field, modifying a data field, deleting a data field, etc.), and/or other transformation functions. 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.). A computational model can be utilized to compute values from inputs based on a pre-programmed or learned function or method. For example, a neural network may include one or more input neurons that can be activated by inputs. Activations of these neurons can then be passed on, weighted, and transformed by a function to other neurons. Neural networks may range from those with only one layer of single direction logic to multi-layer of multi-directional feedback loops. A neural network can use weights to change the parameters of the network's throughput. A neural network can learn by input from its environment or from self-teaching using written-in rules. A neural network can be utilized as a predictive modeling approach in machine learning.
--	---

	An exemplary embodiment of a neural network (i.e. Neural Network 530a, etc.) is described later. '991 Application at [93:33-94:13]. In some embodiments, the processor circuit includes a logic circuit, the instruction sets for operating the device include outputs from the logic circuit for operating the device, and executing instruction sets for operating the device includes performing logic operations on inputs into the logic circuit and producing the outputs from the logic circuit for operating the device. '991 Application at [2:17-20]. The operations may further comprise: receiving a first one or more inputs, wherein the first one or more inputs are also received by a logic circuit, and wherein the logic circuit is configured to receive inputs and produce outputs, and wherein the outputs are used for operating a device. '991 Application at [46:5-7]. 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]. Referring to Fig. 10, an embodiment where DCADO Unit 100 resides on Server 96 accessible over Network 95 is illustrated. 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. In turn, any number of Devices 98 can utilize the remote DCADO Unit 100 for autonomous operation in circumstances including objects with various properties. A remote DCADO Unit 100 can be offered as a network service (i.e. online application, etc.).
--	--

	'991 Application at [86:13-16]. 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].
--	--

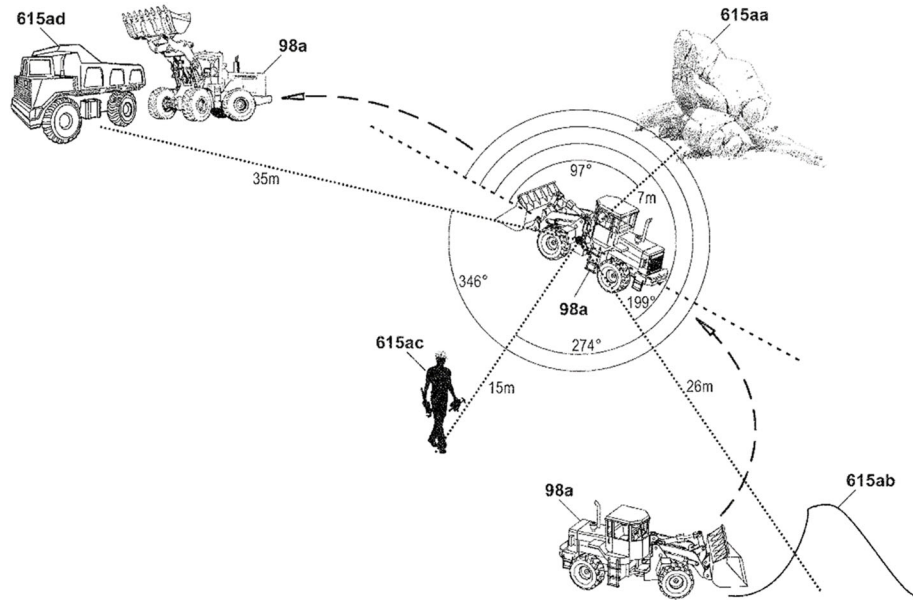


FIG. 38

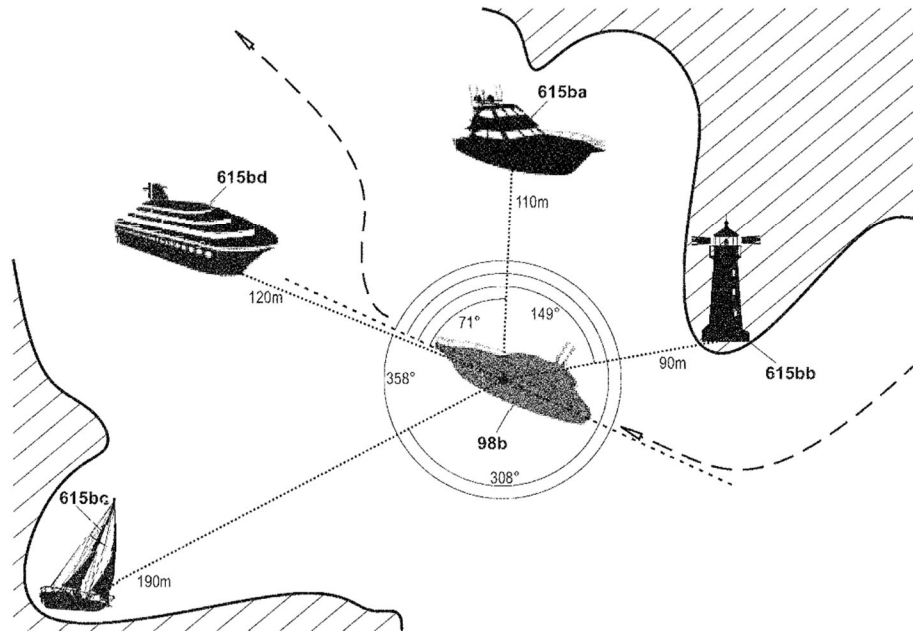


FIG. 39

'991 Application at [Figs. 38-39] ("third device": Loader 98a or Boat 98b).

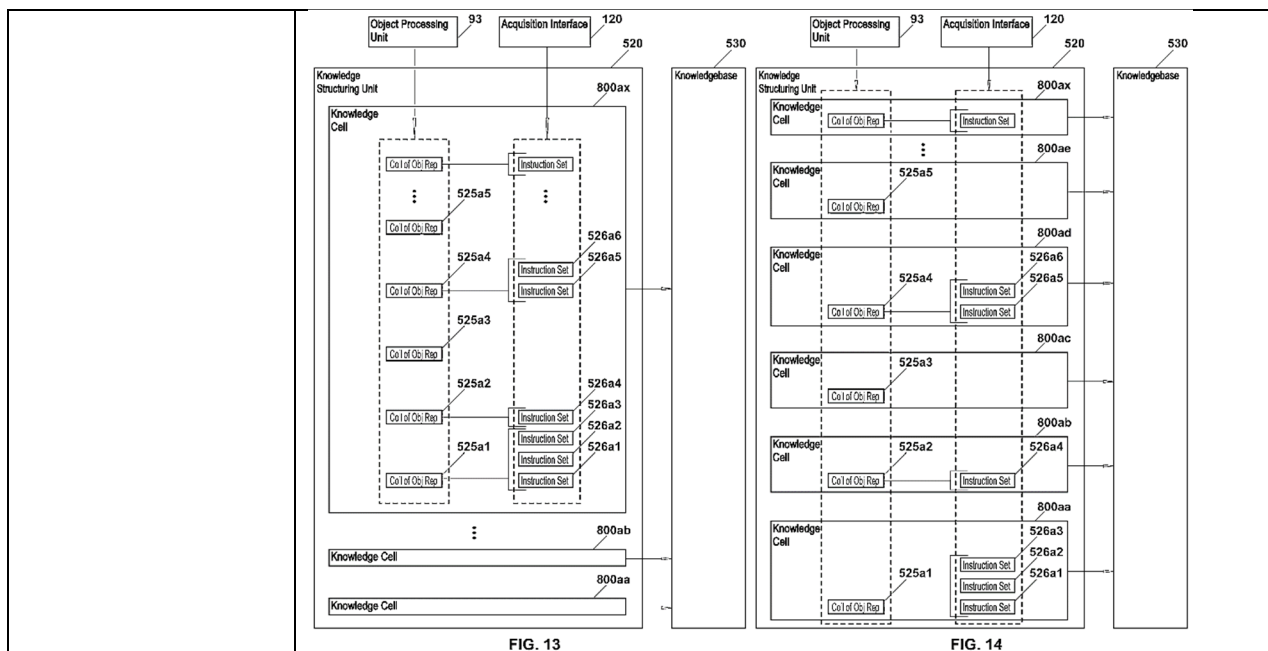


FIG. 13

FIG. 14

'991 Application at [Figs. 13-14].

See also '976 Application at [92:8-9], [Fig. 17], [94:1-3], [93:27-94:7], [2:27-30], [46:12-14], [93:15-17], [96:8-11], [86:15-19], [147:32-148:4], [Figs. 38-39], [Figs. 13-14].

Support for Limitations Present in Original Claim 60

Claim Limitation	Support from Original U.S. Application for the '474 Patent
wherein the one or more object representations of the generated circumstance representation include one or more coordinates of one or more objects	The '991 and '976 Applications support wherein the one or more object representations of the generated circumstance representation include one or more coordinates of one or more objects. For example, the '991 Application discloses: 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. '991 Application at [65:5-10]. 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. '991 Application at [66:1-6]. Location of an object, for example, can also include absolute location such as one defined by object coordinates. '991 Application at [66:10-11].

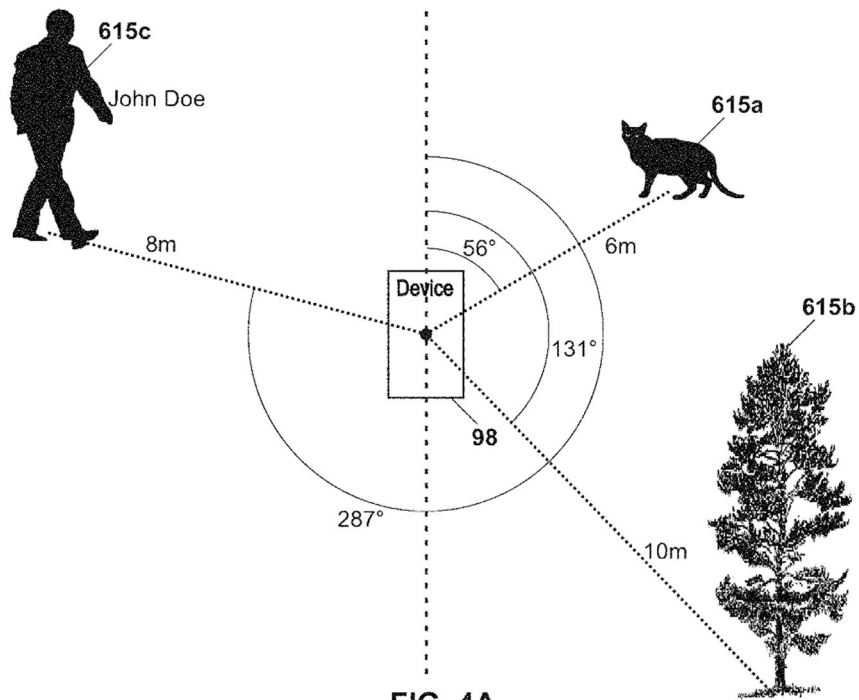


FIG. 4A

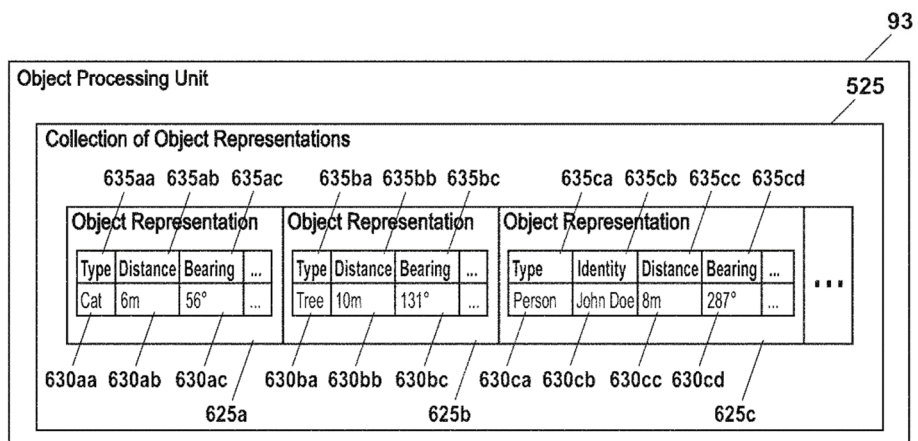


FIG. 4B

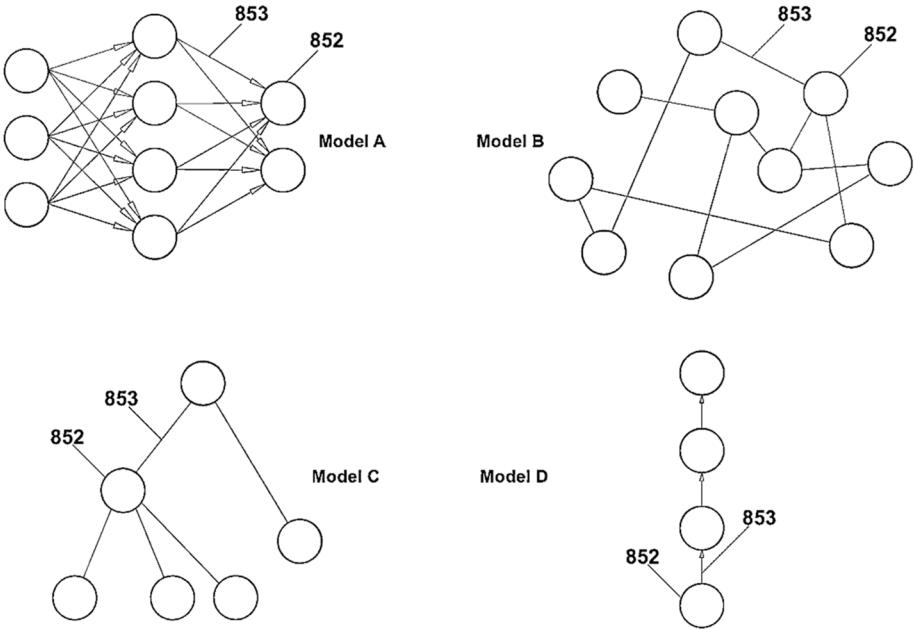
'991 Application at [Figs. 4A-B].

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 10m 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 92c/Lidar 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 10m 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 "8m" 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]. <i>See also</i> '976 Application at [65:5-10], [66:1-6], [66:10], [Figs. 4A-4B], [72:11-73:5].
--	---

Support for Limitations Added to Substitute Claim 85

Claim Limitation	Support from Original U.S. Application for the '474 Patent
wherein the knowledgebase includes a neural network, wherein the one or more inputs are one or more input neurons of the neural network	The '991 and '976 Applications support wherein the knowledgebase includes a neural network, wherein the one or more inputs are one or more input neurons of the neural network. For example, the '991 Application discloses: In some embodiments, Knowledgebase 530 may be or include Neural Network 530a (later described). '991 Application at [92:14-15].  FIG. 17 '991 Application at [Fig. 17] (Model A showing input nodes/neurons correlated using downstream connections with output nodes/neurons that include/product instruction sets for operating a device). For example, a neural network may include one or more input neurons that can be activated by inputs.

'991 Application at [94:7-8].

In one example shown in Model A, the disclosed artificially intelligent devices, systems, and methods for learning and/or using a device's circumstances for autonomous device operation may include a neural network (also referred to as artificial neural network, etc.). 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 brain. Node 852 can store any data, object, data structure, and/or other item, or reference thereto. Node 852 may also include a function for transforming or manipulating any data, object, data structure, and/or other item. Examples of such transformation functions include mathematical functions (i.e. addition, subtraction, multiplication, division, sin, cos, log, derivative, integral, etc.), object manipulation functions (i.e. creating an object, modifying an object, deleting an object, appending objects, etc.), data structure manipulation functions (i.e. creating a data structure, modifying a data structure, deleting a data structure, creating a data field, modifying a data field, deleting a data field, etc.), and/or other transformation functions. 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.). A computational model can be utilized to compute values from inputs based on a pre-programmed or learned function or method. For example, a neural network may include one or more input neurons that can be activated by inputs. Activations of these neurons can then be passed on, weighted, and transformed by a function to other neurons. Neural networks may range from those with only one layer of single direction logic to multi-layer of multi-directional feedback loops. A neural network can use weights to change the parameters of the network's throughput. A neural network can learn by input from its environment or from self-teaching using written-in rules. A neural network can be utilized as a predictive modeling approach in machine learning. An exemplary embodiment of a neural network (i.e. Neural Network 530a, etc.) is described later.

	'991 Application at [93:33-94:13]. <i>See also</i> '976 Application at [92:8-9], [Fig. 17], [94:1-2], [93:27-94:7].
wherein the machine readable code, when executed by the one or more processors, further causes the one or more processors to perform at least:	The '991 and '976 Applications support wherein the machine readable code that, when executed by the one or more processors, further causes the one or more processors to perform the claimed functionality. For example, the '991 Application discloses: In some aspects, the disclosure relates to a non-transitory computer storage medium having a computer program stored thereon, the program including instructions that when executed by one or more processor circuits cause the one or more processor circuits to perform operations comprising: '991 Application at [15:17-19]. The operations or steps of the non-transitory computer storage medium and/or the method may be performed by any of the elements of the above described systems as applicable. The non-transitory computer storage medium and/or the method may include any of the operations, steps, and embodiments of the above described systems, non-transitory computer storage media, and/or methods as applicable. '991 Application at [50:5-8]. Computing Device 70 may include or be interfaced with a computer program product comprising instructions or logic encoded on a computer-readable medium. Such instructions or logic, when executed, may configure or cause one or more processors to perform the operations and/or functionalities disclosed herein. '991 Application at [58:9-11].

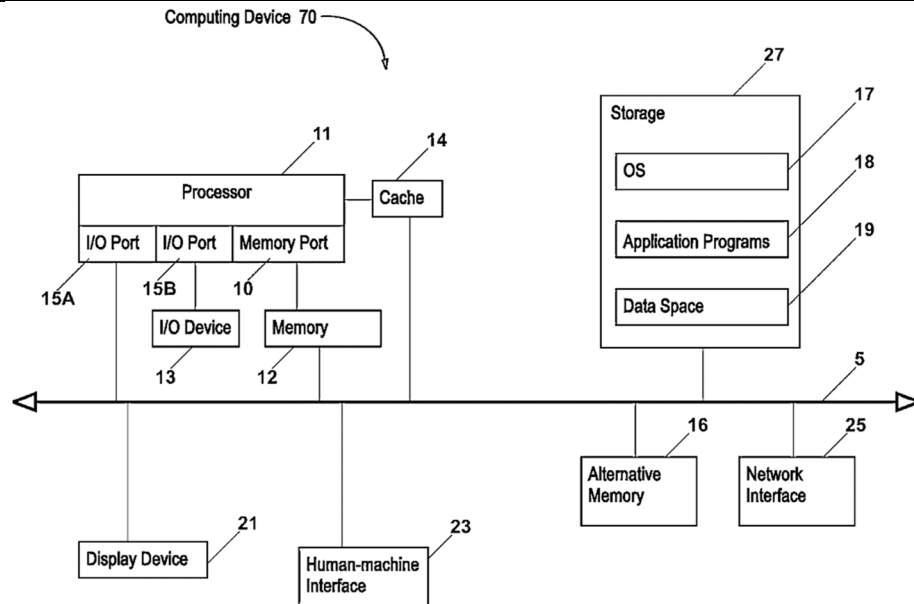


FIG. 1

'991 Application at [Fig. 1].

Computing Device 70 may further include memory 12, which can be connected to the remainder of the components of Computing Device 70 via bus 5. Memory 12 can be connected to processor 11 via memory port 10.

'991 Application at [53:6-7].

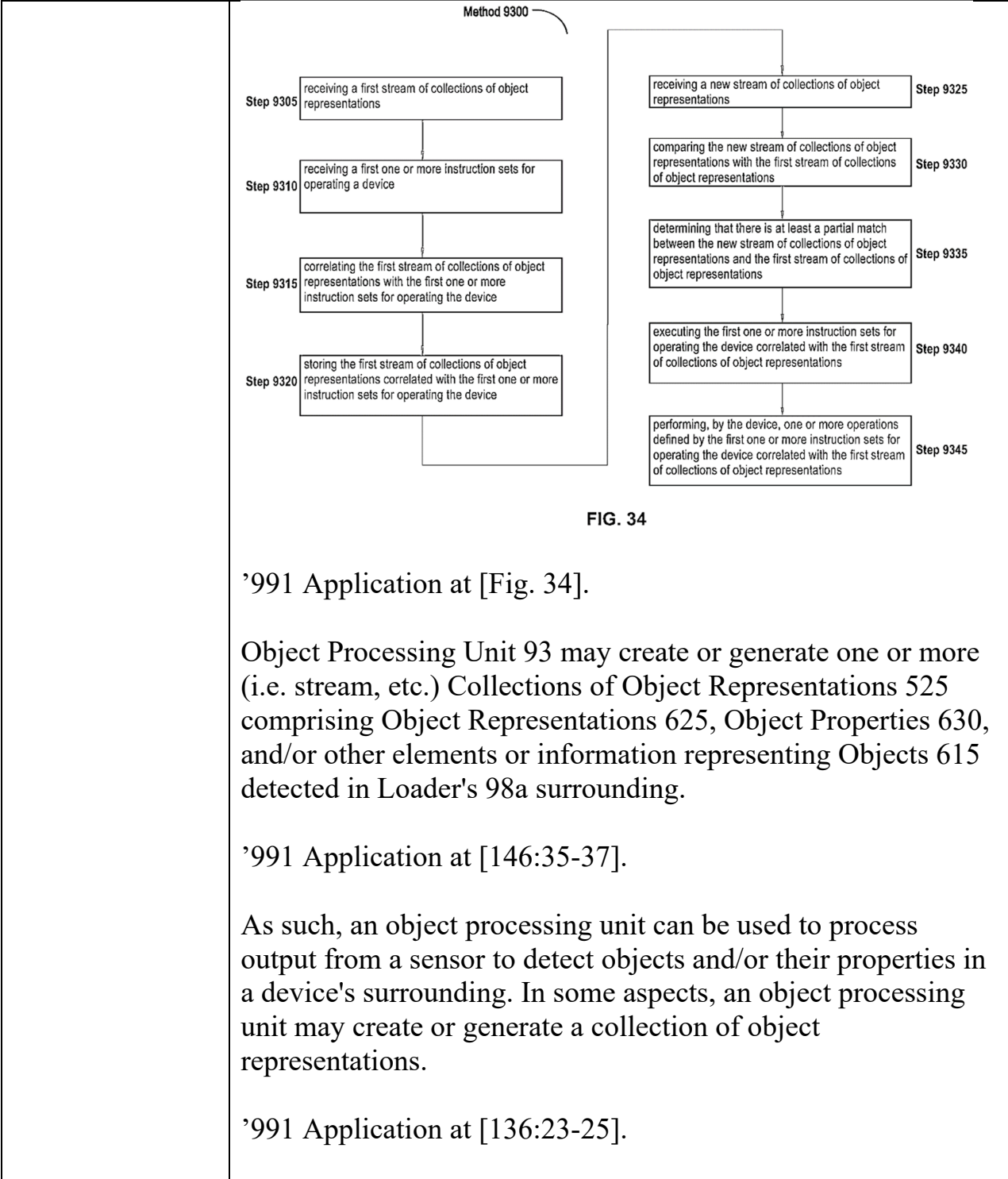
Processor 11 can be based on any of the aforementioned or other available processors capable of operating as described herein. Computing Device 70 may include one or more of the aforementioned or other processors. In some designs, processor 11 can communicate with memory 12 via a system bus 5. In other designs, processor 11 can communicate directly with memory 12 via a memory port 10.

'991 Application at [54:2-6].

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 Synch Burst SRAM (BS RAM), Dynamic random access memory (DRAM), Fast Page Mode DRAM (FPM DRAM), Enhanced DRAM (EDRAM), 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 (DDR 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] <i>See also</i> '976 Application at [15:27-29], [50:9-12], [58:7-9], [Fig. 1], [53:10-11], [54:5-9], [54:10-18].
generating a stream of circumstance representations comprising:	The '991 and '976 Applications support generating a stream of circumstance representations. For example, the '991 Application discloses: The system may further comprise: an artificial intelligence unit. 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 [24:34-37]. 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 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 (i.e. sequence, etc.), for instance. '991 Application at [65:22-36].
--	---



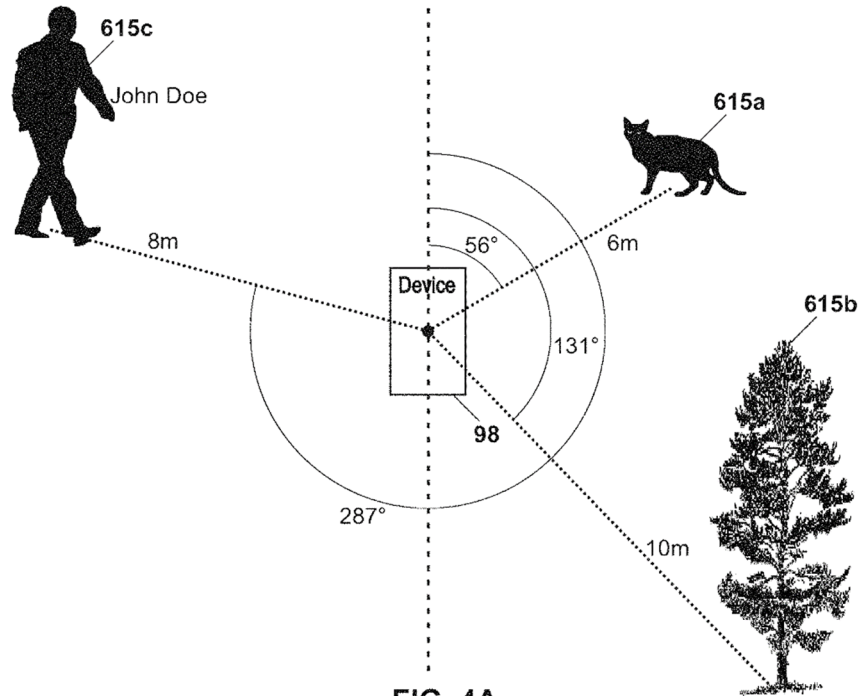


FIG. 4A

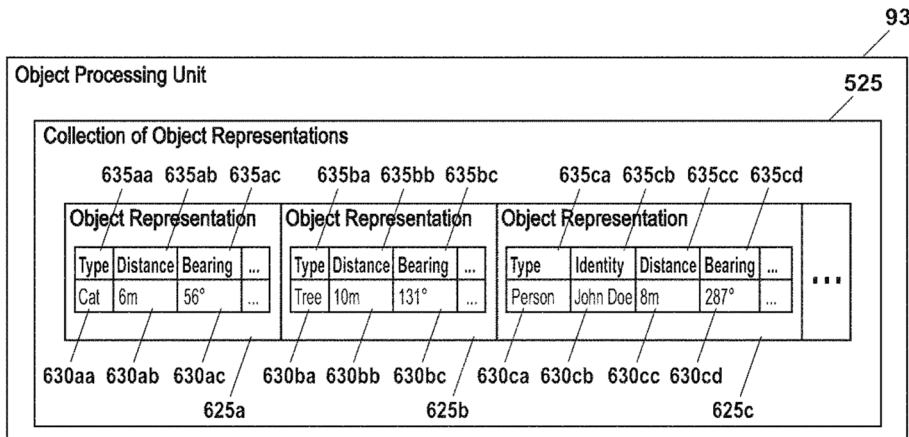


FIG. 4B

'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 10m 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 92c/Lidar 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 10m 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 "8m" 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]. <i>See also</i> '976 Application at [25:5-8], [65:22-36], [Fig. 34], [146:30-32], [136:13-15], [Figs. 4A-4B], [72:11-73:5].
the generated circumstance representation that (i) includes multiple object representation data structures that each comprises: a label for object type, coordinates for object location, and a computer model for object size, and (ii) represents multiple objects detected at a first	The '991 and '976 Applications support the generated circumstance representation that (i) includes a collection of object representation data structures that each comprises: a label for object type, coordinates for object location, and a computer model for object size, and (ii) represents multiple objects detected at a first time. For example, the '991 Application discloses: 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

time	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 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 (i.e. sequence, etc.), for instance. '991 Application at [65:5-36]. 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].
--	--

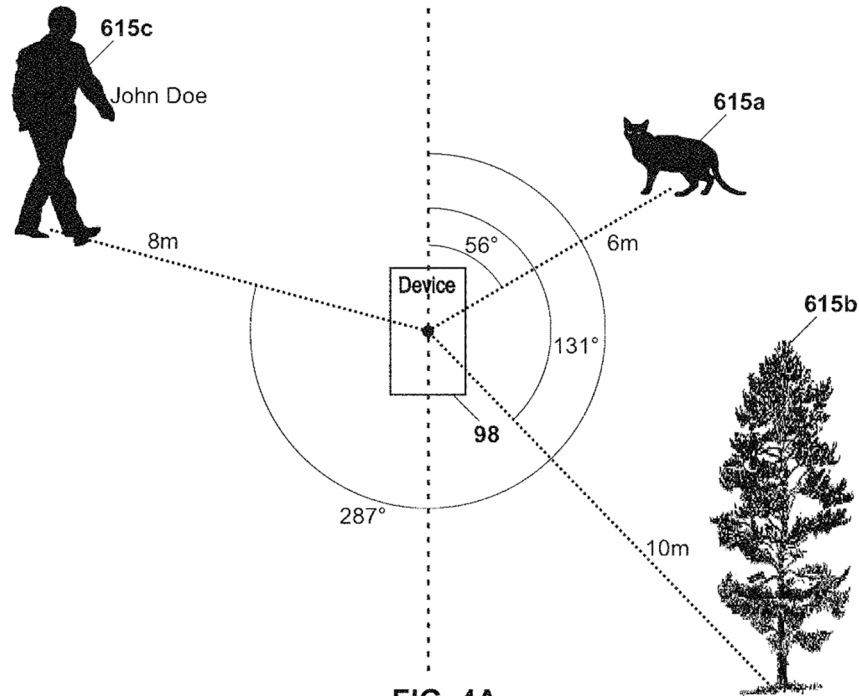


FIG. 4A

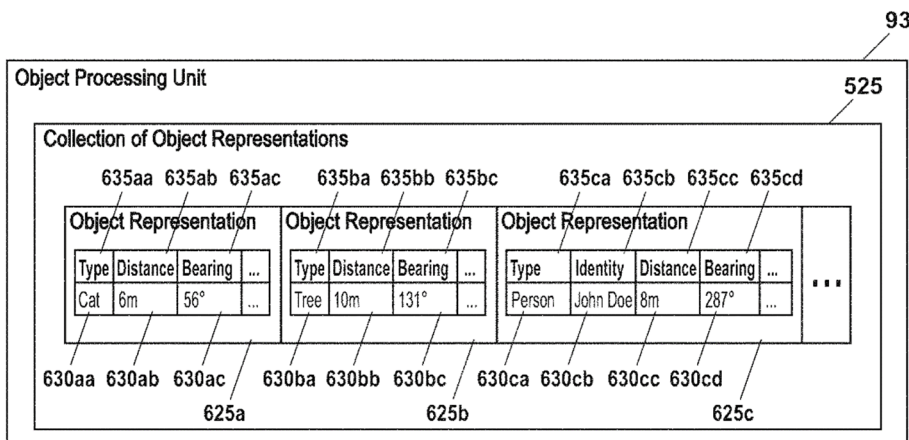


FIG. 4B

'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 10m 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 92c/Lidar 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 10m in Category 635bb "Distance", Object Property 630bc "131 °" in Category 635bc "Bearing", etc. Also, Object 35 Representation 625c may include Object Property 630ca "Person" in Category 635ca "Type", Object Property 630cb John Doe in Category 635cb "Identity", Object Property 630cc "8m" 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]. For example, Picture Recognizer 94a can be used for detecting or recognizing objects and/or their properties in one or more digital pictures captured by one or more Cameras 92a. 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 [66:25-29]. 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].
--	--

	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. '991 Application at [66:1-6]. 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 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]. 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. '991 Application at [25:12-17].
--	--

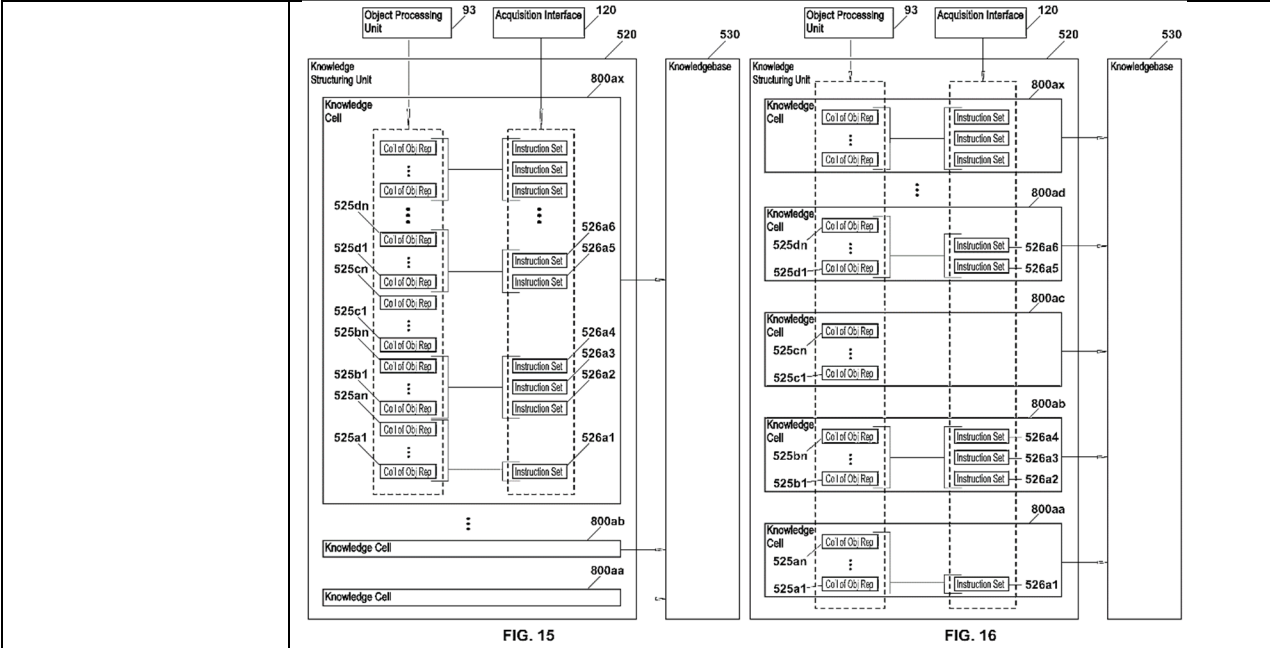


FIG. 15

FIG. 16

'991 Application at [Figs. 15-16].

See also '976 Application at [65:5-36], [146:30-32], [Figs. 4A-4B], [72:11-73:5], [66:24-28], [135:35-136:1], [66:1-6], [135:14-19], [135:19-31], [25:22-27], [Figs. 15-16].

another circumstance representation that (i) includes another multiple object representation data structures that each includes: a label for object type, coordinates for object location, and a computer model for object size, and (ii) represents the multiple objects

The '991 and '976 Applications support another circumstance representation that (i) includes another collection of object representation data structures that each includes: a label for object type, coordinates for object location, and a computer model for object size, and (ii) represents the multiple objects detected at a second time. For example, the '991 Application discloses:

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

detected at a second time	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 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 (i.e. sequence, etc.), for instance. '991 Application at [65:5-36]. 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].
--	--

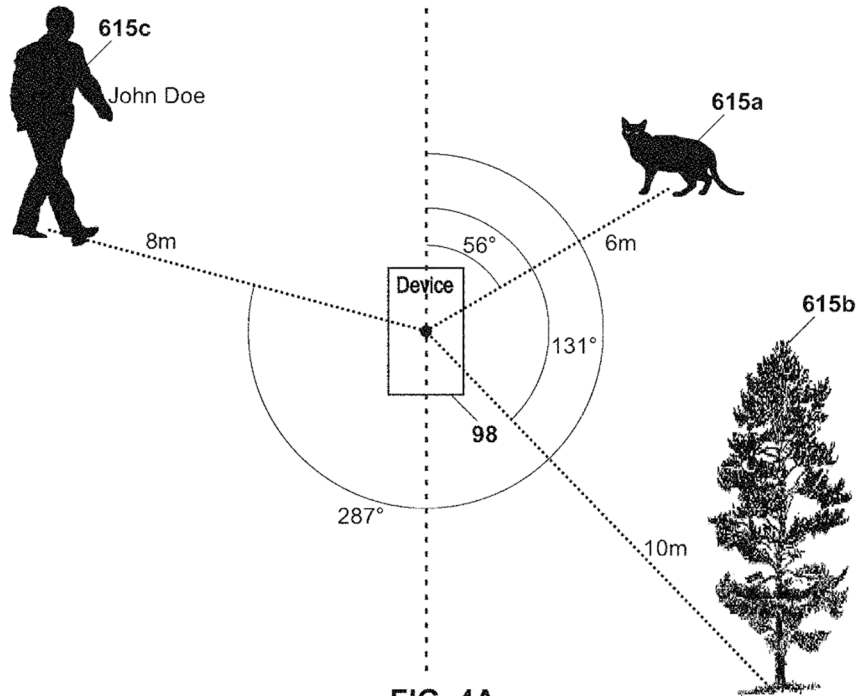


FIG. 4A

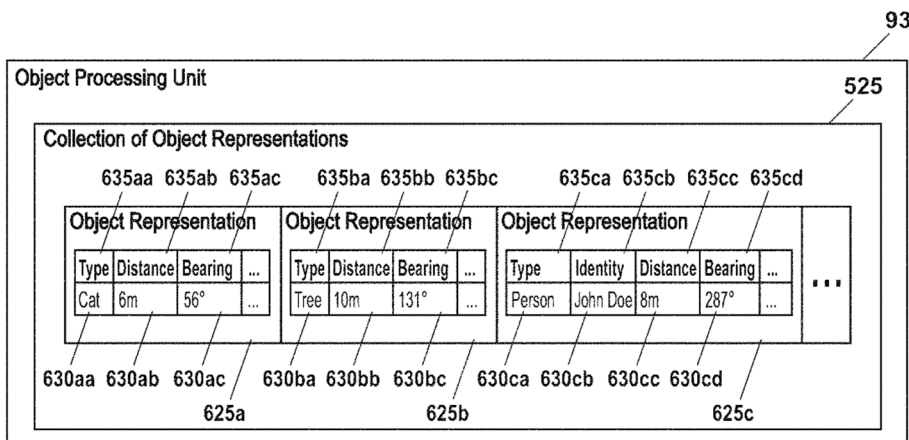


FIG. 4B

'991 Application at [Figs. 4A-4B].

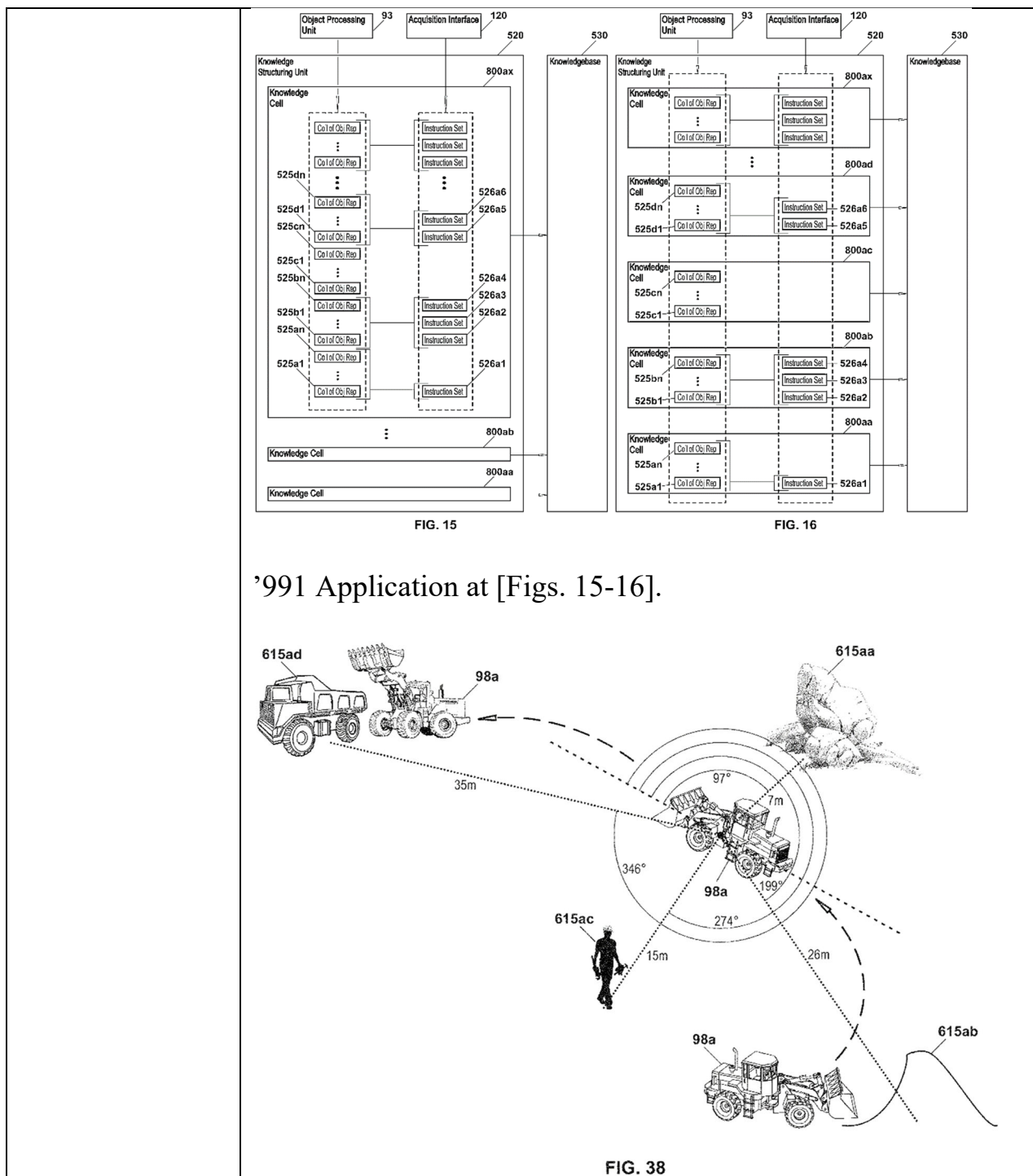
Referring to Figs. 4A-4B, an exemplary embodiment of Objects 615 (also referred to simply as objects or other suitable name or reference) detected in Device's 98 surrounding, and resulting Collection of Object Representations 525 are illustrated. // As shown for example in Fig. 4A, Object 615a is detected. 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

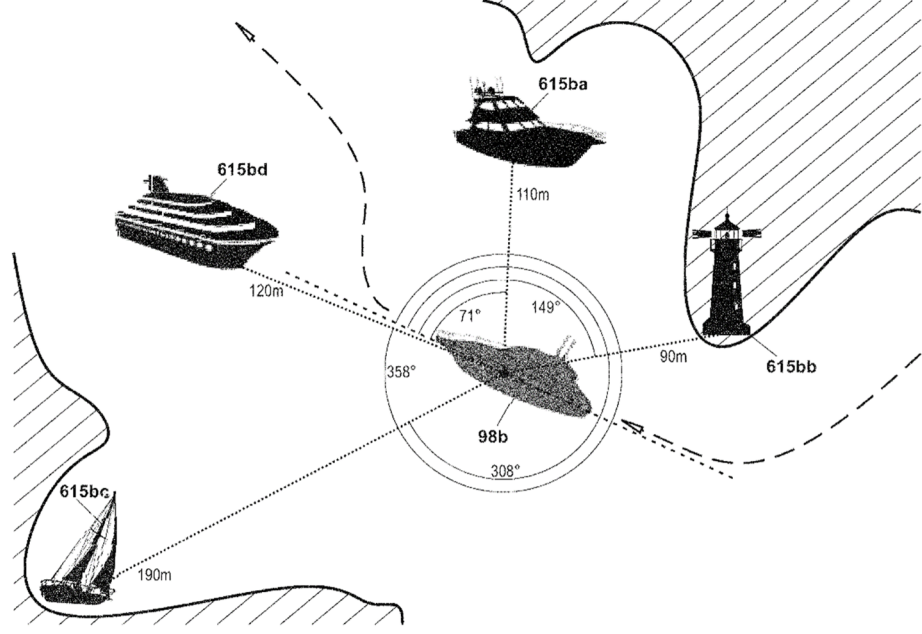
	98 centerline. Furthermore, Object 615b is also detected. Object 615b may be recognized as a tree. Object 615b may be detected at a distance of 10m from Device 98. Object 615b may be detected at a bearing/angle of 131° from Device's 98 centerline. Furthermore, Object 615c is also detected. Object 615c 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 92c/Lidar 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 10m 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 "8m" 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]. For example, Picture Recognizer 94a can be used for detecting or recognizing objects and/or their properties in one or more digital pictures captured by one or more Cameras 92a. 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 [66:25-29]. 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].
--	--

	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. '991 Application at [66:1-6]. 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 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]. 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. '991 Application at [25:12-17].
--	--



	 FIG. 39 '991 Application at [Figs. 38-39] (Objects 615aa-615ad different than Objects 615ba-615bd). <i>See also '976 Application at [65:5-36], [146:30-32], [Figs. 4A-4B], [72:11-73:5], [66:24-28], [135:35-136:1], [66:1-6], [135:14-19], [135:19-31], [25:22-27], [Figs. 15-16], [Figs. 38-39].</i>
wherein the determining the one or more instruction sets for operating the second device includes: inputting the multiple object representation data structures of the stream into the one or more input neurons, and using a	The '991 and '976 Applications support wherein the determining the one or more instruction sets for operating the second device includes: inputting the collection of object representation data structures into the one or more input neurons, and using a correlation between the one or more input neurons and the one or more instruction sets for operating the second device. For example, the '991 Application discloses: Further, Artificial Intelligence Unit 110 comprises the functionality for anticipating Device's 98 operation in circumstances including objects with various properties. Artificial Intelligence Unit 110 comprises the functionality for anticipating one or more instruction sets, data, and/or other information. Artificial Intelligence Unit 110 comprises the

correlation between the one or more input neurons and the one or more instruction sets for operating the second device

functionality for anticipating one or more Instruction Sets 526 based on one or more incoming Collections of Object Representations 525. Artificial Intelligence Unit 110 comprises the functionality for anticipating one or more Instruction Sets 526 to be used or executed in Device's 98 autonomous operation.

'991 Application at [87:21-26].

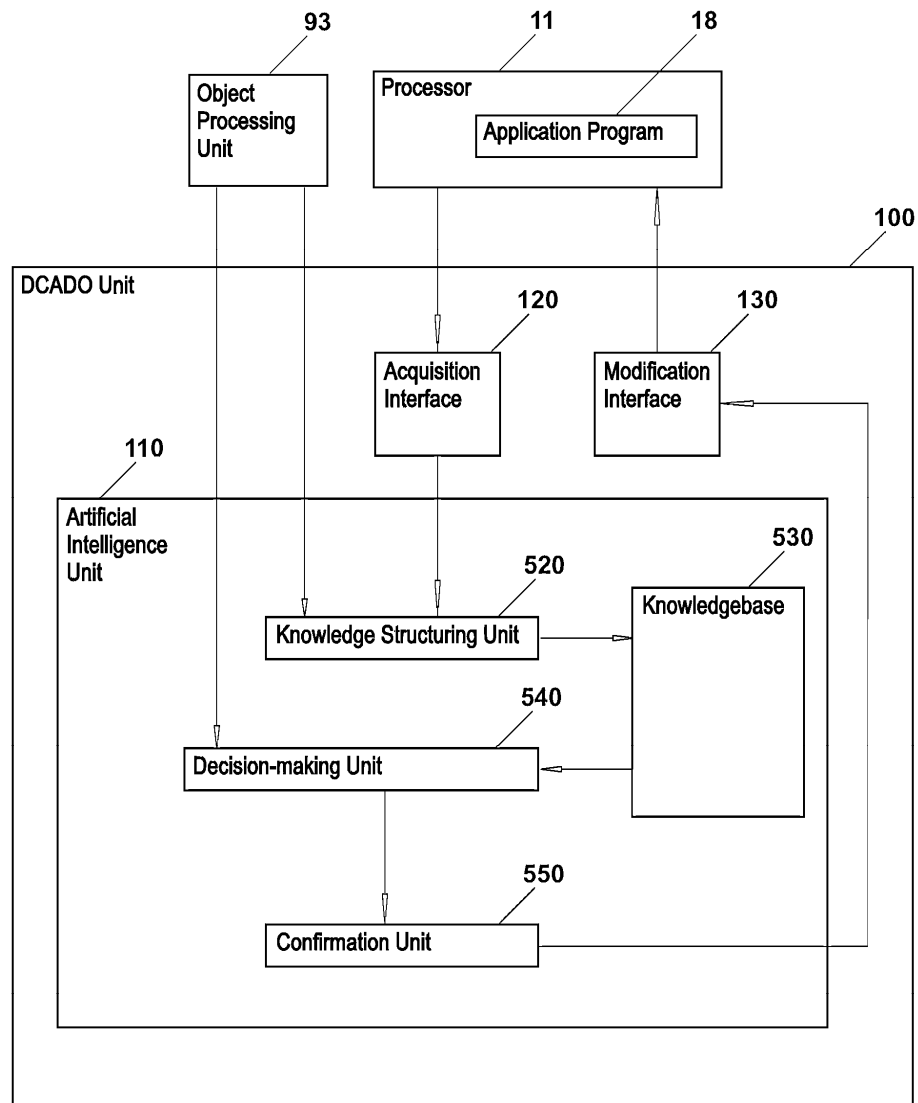


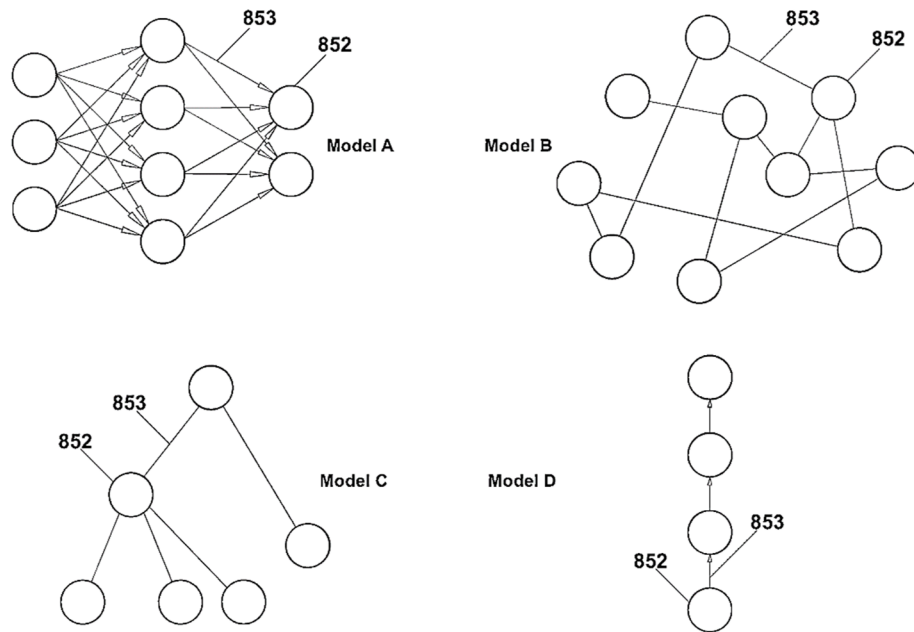
FIG. 12

'991 Application at [Fig. 12] (Artificial Intelligence Unit 110

anticipates Instruction Sets 526 based on one or more incoming Collections of Object Representations 525).

In some embodiments, Knowledgebase 530 may be or include Neural Network 530a (later described).

'991 Application at [92:14-15].



'991 Application at [Fig. 17] (Model A showing input nodes/neurons correlated using downstream connections with output nodes/neurons that include/product instruction sets for operating a device).

For example, a neural network may include one or more input neurons that can be activated by inputs. Activations of these neurons can then be passed on, weighted, and transformed by a function to other neurons.

'991 Application at [94:7-9].

In one example shown in Model A, the disclosed artificially intelligent devices, systems, and methods for learning and/or using a device's circumstances for autonomous device

operation may include a neural network (also referred to as artificial neural network, etc.). 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 brain. Node 852 can store any data, object, data structure, and/or other item, or reference thereto. Node 852 may also include a function for transforming or manipulating any data, object, data structure, and/or other item. Examples of such transformation functions include mathematical functions (i.e. addition, subtraction, multiplication, division, sin, cos, log, derivative, integral, etc.), object manipulation functions (i.e. creating an object, modifying an object, deleting an object, appending objects, etc.), data structure manipulation functions (i.e. creating a data structure, modifying a data structure, deleting a data structure, creating a data field, modifying a data field, deleting a data field, etc.), and/or other transformation functions. 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.). A computational model can be utilized to compute values from inputs based on a pre-programmed or learned function or method. For example, a neural network may include one or more input neurons that can be activated by inputs. Activations of these neurons can then be passed on, weighted, and transformed by a function to other neurons. Neural networks may range from those with only one layer of single direction logic to multi-layer of multi-directional feedback loops. A neural network can use weights to change the parameters of the network's throughput. A neural network can learn by input from its environment or from self-teaching using written-in rules. A neural network can be utilized as a predictive modeling approach in machine learning. An exemplary embodiment of a neural network (i.e. Neural Network 530a, etc.) is described later.

'991 Application at [93:33-94:13].

In some embodiments, the processor circuit includes a logic circuit, the instruction sets for operating the device include

	outputs from the logic circuit for operating the device, and executing instruction sets for operating the device includes performing logic operations on inputs into the logic circuit and producing the outputs from the logic circuit for operating the device. '991 Application at [2:17-20]. The operations may further comprise: receiving a first one or more inputs, wherein the first one or more inputs are also received by a logic circuit, and wherein the logic circuit is configured to receive inputs and produce outputs, and wherein the outputs are used for operating a device. '991 Application at [46:5-7]. The system may further comprise: an artificial intelligence unit. 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 [24:34-37]. 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 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 (i.e. sequence, etc.), for instance.

'991 Application at [65:22-36].

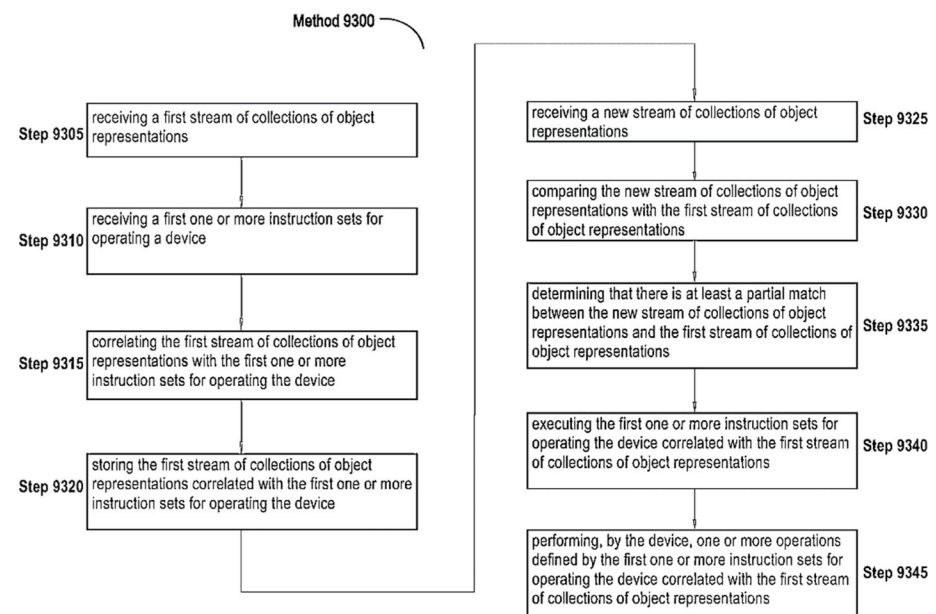


FIG. 34

'991 Application at [Fig. 34].

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].

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. In some aspects, an object processing unit may create or generate a collection of object representations.

'991 Application at [136:23-25].

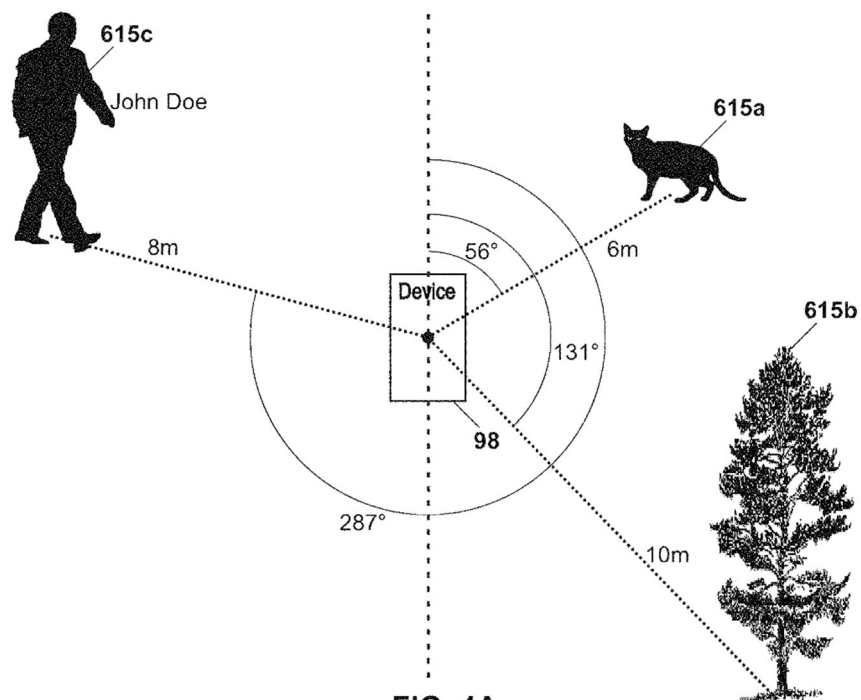


FIG. 4A

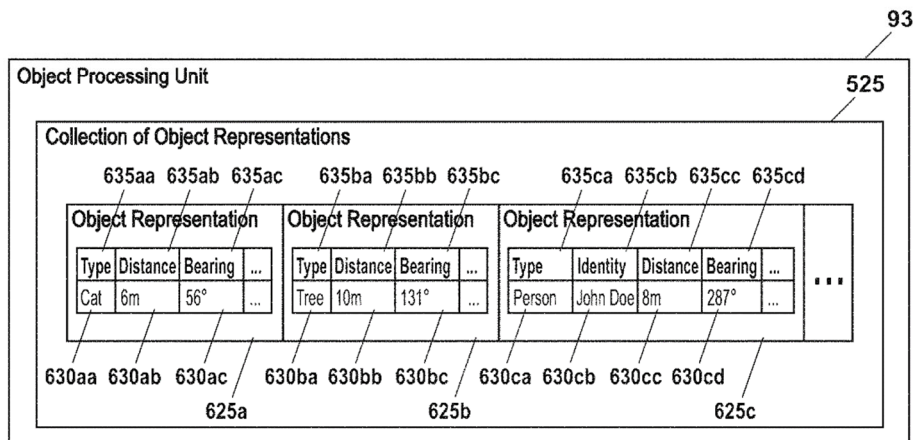


FIG. 4B

	'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 10m 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 92c/Lidar 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 10m in Category 635bb "Distance", Object Property 630bc "131 °" in Category 635bc "Bearing", etc. Also, Object 35 Representation 625c may include Object Property 630ca "Person" in Category 635ca "Type", Object Property 630cb John Doe in Category 635cb "Identity", Object Property 630cc "8m" 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]. 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]. Referring to Fig. 10, an embodiment where DCADO Unit 100 resides on Server 96 accessible over Network 95 is illustrated. 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. In turn, any number of Devices 98 can utilize the remote DCADO Unit 100 for autonomous operation in circumstances including objects with various properties. A remote DCADO Unit 100 can be offered as a network service (i.e. online application, etc.). '991 Application at [86:13-16]. 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].
--	---

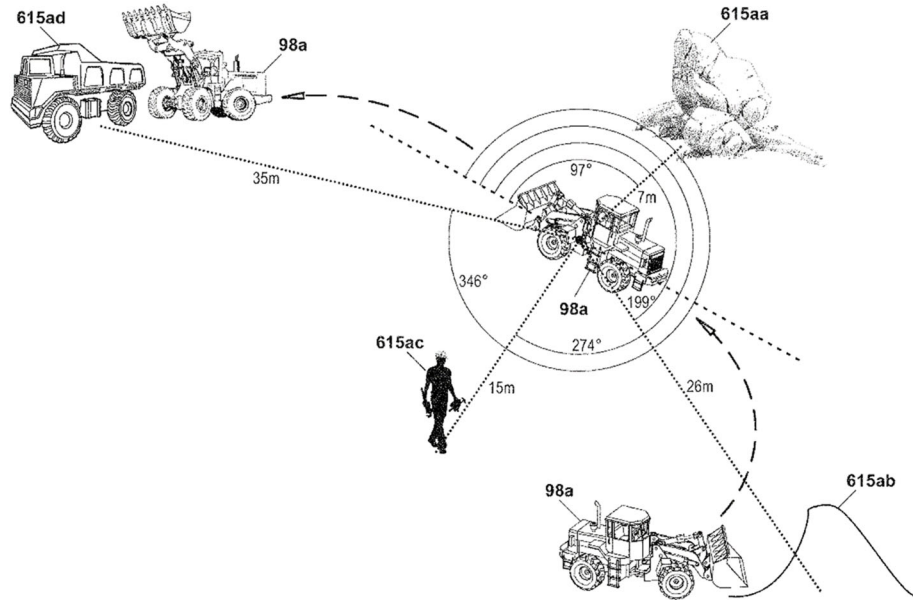


FIG. 38

'991 Application at [Fig. 38] ("second device": Loader 98a).

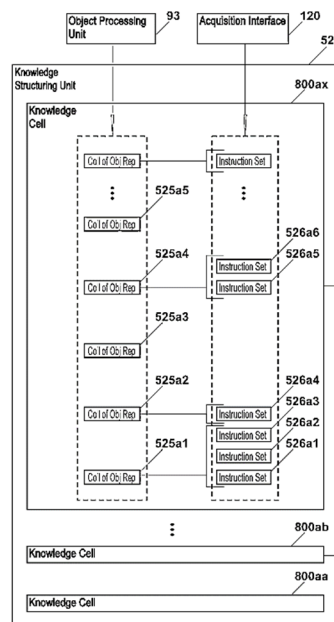


FIG. 13

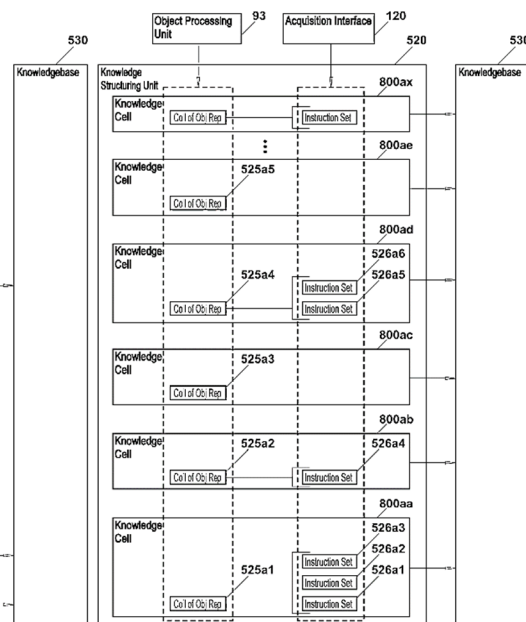


FIG. 14

'991 Application at [Figs. 13-14].

See also '976 Application at [87:15-21], [Fig. 12], [92:8-9], [Fig. 17], [94:1-3], [93:27-94:7], [2:27-30], [46:12-14], [25:5-8], [65:22-36], [Fig. 34], [146:30-32], [136:13-15], [Figs. 4A-

	4B], [72:11-73:5], [93:15-17], [86:8-11], [147:32-148:4], [Fig. 38], [Figs. 13-14].
determining another one or more instruction sets for operating a third device at least by: inputting the another multiple object representation data structures of the stream into the one or more input neurons, and using a correlation between the one or more input neurons and the another one or more instruction sets for operating the third device	The '991 and '976 Applications support determining another one or more instruction sets for operating a third device at least by: inputting the another collection of object representation data structures into the one or more input neurons, and using a correlation between the one or more input neurons and the another one or more instruction sets for operating the third device. For example, the '991 Application discloses: Further, Artificial Intelligence Unit 110 comprises the functionality for anticipating Device's 98 operation in circumstances including objects with various properties. Artificial Intelligence Unit 110 comprises the functionality for anticipating one or more instruction sets, data, and/or other information. Artificial Intelligence Unit 110 comprises the functionality for anticipating one or more Instruction Sets 526 based on one or more incoming Collections of Object Representations 525. Artificial Intelligence Unit 110 comprises the functionality for anticipating one or more Instruction Sets 526 to be used or executed in Device's 98 autonomous operation. '991 Application at [87:21-26].

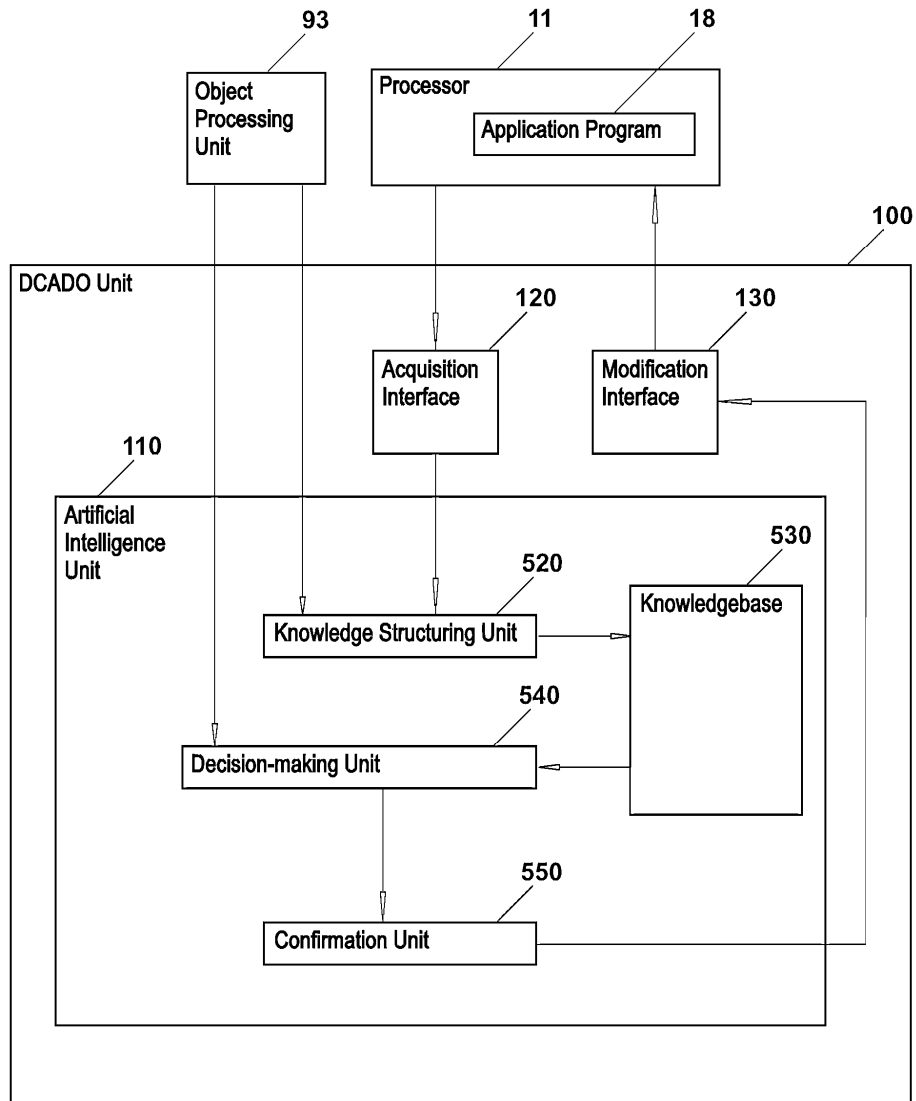


FIG. 12

'991 Application at [Fig. 12] (Artificial Intelligence Unit 110 anticipates Instruction Sets 526 based on incoming/inputted Collections of Object Representations 525).

In some embodiments, Knowledgebase 530 may be or include Neural Network 530a (later described).

'991 Application at [92:14-15].

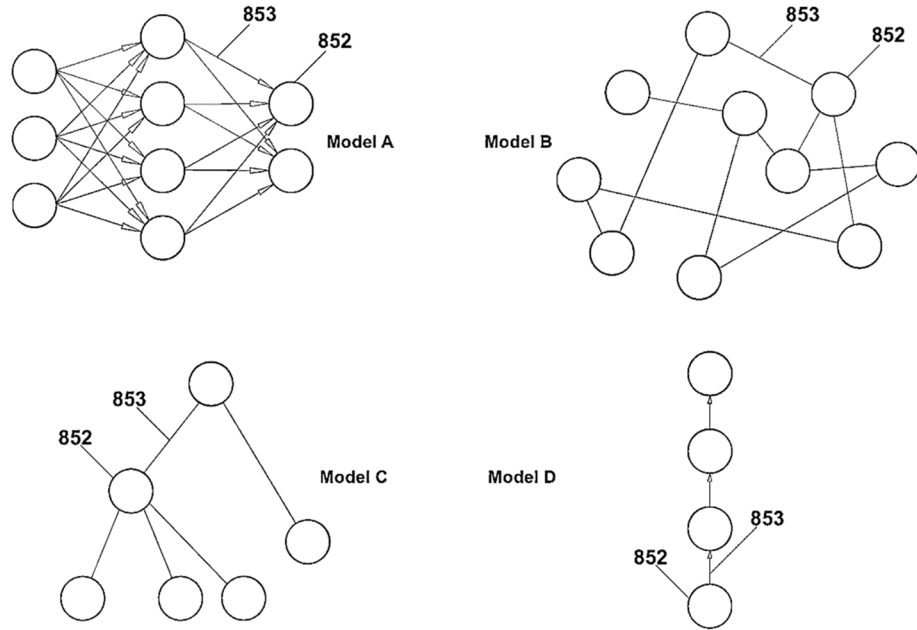


FIG. 17

'991 Application at [Fig. 17] (Model A showing input nodes/neurons correlated using downstream connections with output nodes/neurons that include/product instruction sets for operating a device).

For example, a neural network may include one or more input neurons that can be activated by inputs. Activations of these neurons can then be passed on, weighted, and transformed by a function to other neurons.

'991 Application at [94:7-9].

In one example shown in Model A, the disclosed artificially intelligent devices, systems, and methods for learning and/or using a device's circumstances for autonomous device operation may include a neural network (also referred to as artificial neural network, etc.). 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 brain. Node 852 can store any data, object, data structure, and/or other item, or reference thereto. Node 852 may also

include a function for transforming or manipulating any data, object, data structure, and/or other item. Examples of such transformation functions include mathematical functions (i.e. addition, subtraction, multiplication, division, sin, cos, log, derivative, integral, etc.), object manipulation functions (i.e. creating an object, modifying an object, deleting an object, appending objects, etc.), data structure manipulation functions (i.e. creating a data structure, modifying a data structure, deleting a data structure, creating a data field, modifying a data field, deleting a data field, etc.), and/or other transformation functions. 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.). A computational model can be utilized to compute values from inputs based on a pre-programmed or learned function or method. For example, a neural network may include one or more input neurons that can be activated by inputs. Activations of these neurons can then be passed on, weighted, and transformed by a function to other neurons. Neural networks may range from those with only one layer of single direction logic to multi-layer of multi-directional feedback loops. A neural network can use weights to change the parameters of the network's throughput. A neural network can learn by input from its environment or from self-teaching using written-in rules. A neural network can be utilized as a predictive modeling approach in machine learning. An exemplary embodiment of a neural network (i.e. Neural Network 530a, etc.) is described later.

'991 Application at [93:33-94:13].

In some embodiments, the processor circuit includes a logic circuit, the instruction sets for operating the device include outputs from the logic circuit for operating the device, and executing instruction sets for operating the device includes performing logic operations on inputs into the logic circuit and producing the outputs from the logic circuit for operating the device.

'991 Application at [2:17-20].

	The operations may further comprise: receiving a first one or more inputs, wherein the first one or more inputs are also received by a logic circuit, and wherein the logic circuit is configured to receive inputs and produce outputs, and wherein the outputs are used for operating a device. '991 Application at [46:5-7]. The system may further comprise: an artificial intelligence unit. 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 [24:34-37]. 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 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 (i.e. sequence, etc.), for instance.

'991 Application at [65:22-36].

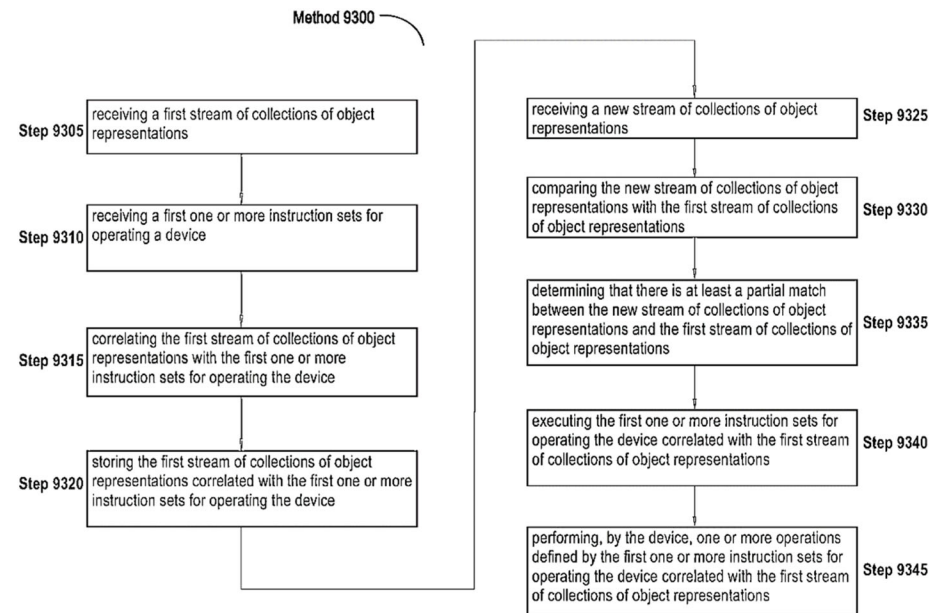


FIG. 34

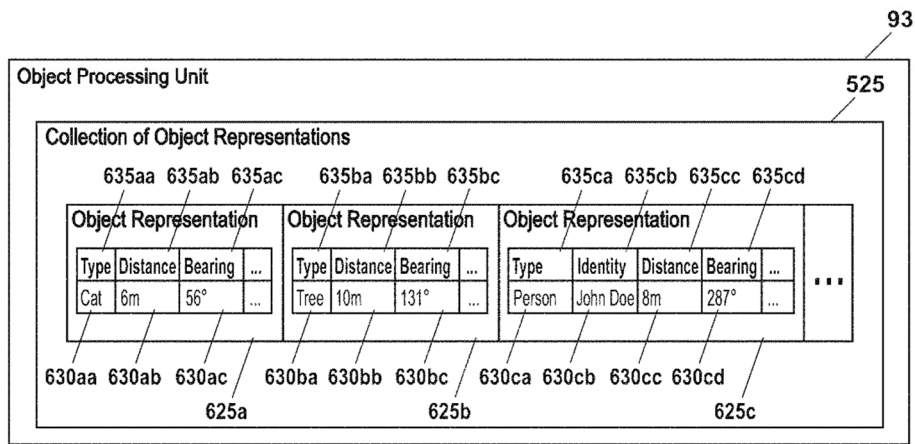
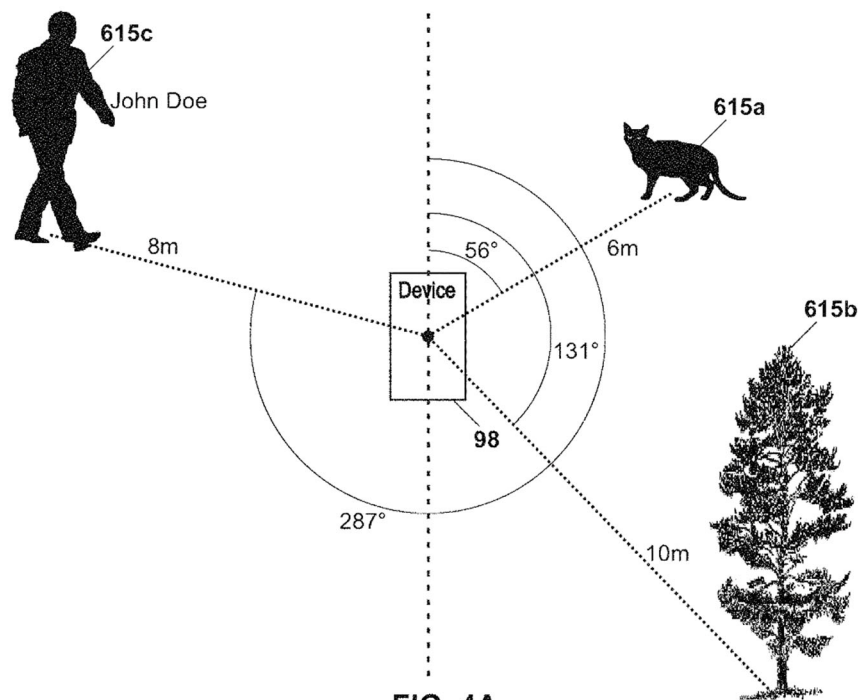
'991 Application at [Fig. 34].

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].

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. In some aspects, an object processing unit may create or generate a collection of object representations.

'991 Application at [136:23-25].



'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 10m 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 92c/Lidar 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 10m in Category 635bb "Distance", Object Property 630bc "131 °" in Category 635bc "Bearing", etc. Also, Object 35 Representation 625c may include Object Property 630ca "Person" in Category 635ca "Type", Object Property 630cb
--	---

	John Doe in Category 635cb "Identity", Object Property 630cc "8m" 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]. 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]. Referring to Fig. 10, an embodiment where DCADO Unit 100 resides on Server 96 accessible over Network 95 is illustrated. 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. In turn, any number of Devices 98 can utilize the remote DCADO Unit 100 for autonomous operation in circumstances including objects with various properties. A remote DCADO Unit 100 can be offered as a network service (i.e. online application, etc.). '991 Application at [86:13-16].
--	---

	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].
--	---

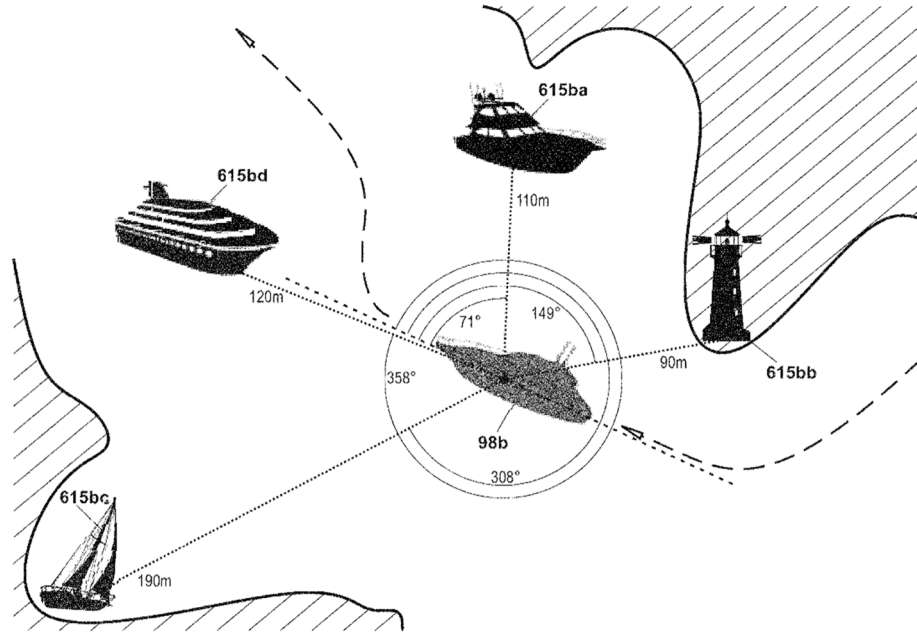


FIG. 39

'991 Application at [Fig. 39] ("third device: Boat 98b).

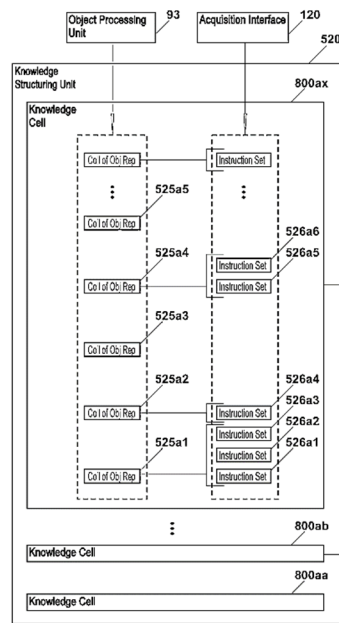


FIG. 13

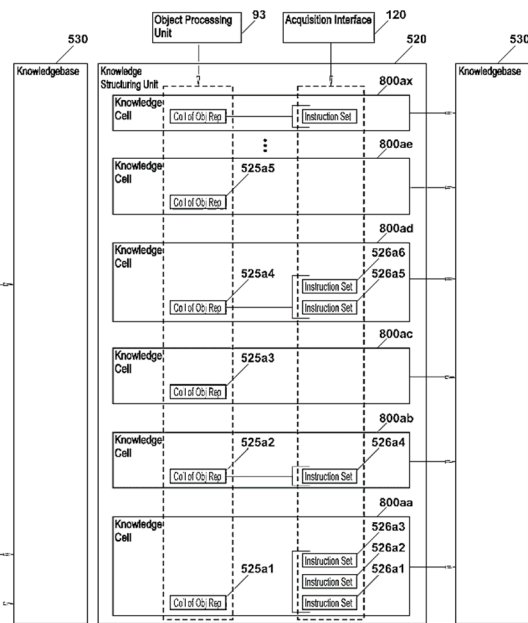


FIG. 14

'991 Application at [Figs. 13-14].

See also '976 Application at [87:15-21], [Fig. 12], [92:8-9], [Fig. 17], [94:1-3], [93:27-94:7], [2:27-30], [46:12-14], [25:5-8], [65:22-36], [Fig. 34], [146:30-32], [136:13-15], [Figs. 4A-

	4B], [72:11-73:5], [93:15-17], [86:8-11], [86:15-19], [147:32-148:4], [Fig. 29], [Figs. 13-14].
--	---

3. **The Original Application for the '474 Patent Enables the Proposed Substitute Claims**

136. I have also been asked to evaluate whether the proposed Substitute Claims are enabled by the original application (the '991 Application) (Ex. 2004). 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.

137. Given the table of exemplary citations in the previous section for the limitations found in proposed substitute claims 85-93, 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

138. As discussed in Section IX above, neither Grotmol, Buibas, Sinyavskiy, nor any purported combination of these references discloses the claimed limitations. Claim 85 further narrows claim 45.

139. With regard to Ground 1A, for claim 45, the Petition relies on obviousness by Buibas in view of Sinyavskiy. Petition, 16-38. The Petition maps Buibas's neural network to the claimed "knowledgebase" that "includes an 'interface' or 'connections' ... that allow the [neural network] to receive encoded sensory signals and information about the environment, thereby allowing the robot to react appropriately based on the circumstance," and "issue[s] commands ... to motors and other components of the robot that cause the robot to carry out a task/behavior defined by" the neural network. Petition, 21, 23. The Petition maps Buibas's "sensory inputs" and a generated "encoded signal" to the claimed "circumstance representations." Petition, 32-33. The Petition maps Sinyavskiy's "partitioned network" and relies on Figure 6 to the claimed "correlation between the one or more inputs and the one or more instruction sets for operating" a device. Petition, 24-26, 34-36. But the Buibas-Sinyavskiy combination does not disclose the features added by amendment to substitute claim 85, including:

A. The added "generating a stream of circumstance representations"

step/limitation that further requires that each generated circumstance (i) include multiple object representation data structures (comprised of an object type label, object location coordinates, and an object size computer model) and (ii) represent multiple objects detected at a first and second time;

B. The added “determining one or more instruction sets for operating” each of a second and third devices by inputting the multiple object representation data structures into the newly claimed one or more input neurons and using correlations between the input neurons and one or more instruction sets.

140. Regarding (A), the combination of Ground 1A (Buibas-Sinyavskiy) does not disclose or suggest multiple object representation data structures for multiple objects in each of the circumstance representations in a stream of circumstance representations detected at a first and second time. Thus, the asserted prior art combination does not disclose or suggest multiple object representation data structures that each comprise a label for object type, coordinates for object location, and a computer model for object size. Nor does the combination disclose or suggest multiple object representation data structures and generated circumstance representations that represent multiple objects at a first and/or second time.

141. Regarding (B), the Buibas-Sinyavskiy combination does not disclose or suggest the claimed “determining ... one or more instruction sets for operating” a second and/or third device. The combination does not disclose inputting multiple generated circumstance representations (object representation data structures) into the one or more input neurons; nor does the combination disclose “using a correlation between the one or more input neurons and the one or more instruction sets for operating” the second and/or third device. The Petition alleges that an original “determining the one or more instruction sets for operating the second device” limitation (from original claim 45) is disclosed by the combination. Petition, 34-36. However, the combination (a) does not disclose or suggest determining instruction sets for operating a third device and (b) does not disclose or suggest determining instruction sets for operating a second device by inputting multiple object representation data structures (with the designated and detailed fields claims in Substitute Claim 85) into input neurons.

142. With regard to Ground 2A, the Petition asserts anticipation by Grotmol to meet the limitations of original claim 45. *See* Petition, 54-68. The Petition maps Grotmol’s “adaptive controller” to the claimed “knowledgebase.” Petition, 56-57.

143. However, Grotmol does not disclose any of the narrowing features added to Substitute Claim 85. As was the case with Ground 1A, Grotmol does

not disclose generating a stream of generated circumstance representations that each “(i) include[] multiple object representation data structures” with their attendant features/fields and “ii) represent[] multiple objects detected at a first [and second] time”) ([85.11, 85.12]). Grotmol does not disclose determining instruction sets by inputting multiple specifically-described object representation data structures into input neurons of a neural network and using a correlation between the input neurons and one or more instruction sets to determine instruction sets for operating a second and/or third device. At most, Grotmol discloses “stored input features ... correlated with specific outputs.” Petition, 58. But this generic disclosure does not meet the claim limitations added to Substitute Claim 85.

144. With regard to Ground 2C, the Petition asserts that Grotmol in view of Buibas renders original claim 45 obvious. Petition, 80-82. However, the Petition merely states that “[t]he Grotmol-Buibas combination ... renders obvious all limitations of claim[] 45 ... for each of the reasons discussed [] in Ground 2A.” Petition, 80. Then, the Petition alleges that Buibas is necessary to be combined with Grotmol to meet the original “one or more instruction sets for operating the second device.” Petition, 82. However, the Grotmol-Buibas combination does not disclose or suggest the added limitations in their claimed configuration according to Substitute Claim 85. A POSA would not have been

motivated to combine these references nor find it predictable to modify Grotmol in view of Buibas to arrive at the each of the added limitations (and Substitute Claim 85 as a whole). It is my opinion that nothing in Grotmol or Buibas disclose or suggest a modification of Grotmol's system in view of Buibas as proposed by the Petition to arrive at Substitute Claim 85.

145. Each of Substitute Claims 86-91 are narrower than Substitute Claim 85, since they each rewrite challenged dependent claims 46, 47, 51, 56, 57, and 60 to depend from Substitute Claim 85. Therefore, for the reasons discussed regarding claim 85, it is my opinion that neither Grotmol, Grotmol-Buibas, nor Buibas-Sinyavskiy discloses or suggests all the features of these substitute dependent claims.

146. I also note that proposed Substitute Claims 92-93, which are the same as claims 56/57, but rewritten in independent form, are also patentable over the asserted prior art. I understand that the Board will only consider these claims in the event that the Board finds that either of original claims 56/57 are patentable. Thus, since Substitute Claims 92-93 merely rewrite 56/57 into independent form and include the limitations of original claims 45 and 46 from which they depend, claims 92 and 93 are also patentable for at least the same reasons that I discussed above in Section IX.

XI. CONCLUSION

147. 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.

148. 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: January 16, 2025



Dr. Eli Saber