UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TESLA, INC.,
Petitioner
v.

AUTONOMOUS DEVICES, LLC,
Patent Owner

Case: IPR2023-01172 and IPR2023-01173
U.S. Patent No. 11,055,583

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 8

1. Overview 8
2. Patent Claims 9
3. Burden of Proof for Invalidity 10
4. Claim Construction 10
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 ’583 PATENT 16

1. Existing Technology 17
2. Advantages Provided by the ’583 Patent 17

VII. CLAIM CONSTRUCTION 19

1. “connections” (Claim 23) 20
2. “means for receiving or generating”; “means for learning” (claim 34) 24

VIII. OVERVIEW OF ALLEGED PRIOR ART REFERENCES 24

1. Grotmol 24
2. Hickman 26
3. Hoffman 29

IX. 583.1 PETITION: THE ALLEGED PRIOR ART DOES NOT DISCLOSE OR SUGGEST CERTAIN CLAIMS OF THE ’583 PATENT 31

1. Ground 1 Fails 31

A. Claim 7: Grotmol Does Not Disclose Detecting Objects and Comparing Detected Objects for Matching 31

B. Claim 9: Grotmol Does Not Disclose the Claimed

Second Learning Process 33

C. Claim 14: Grotmol Does Not Disclose the Claimed Modified and Applied Instruction Set and that the Second Device Performs an Operation Defined by the Modified Instruction Set 35

D. Claim 15: Grotmol Does Not Disclose the Claimed Modifying Instruction Sets, Determining the Modified Instruction Sets, and Causing Operations Based on the Modified Instruction Sets.....37

E. Claim 16: Grotmol Does Not Disclose the Claimed Modifying of Digital Pictures and Matching Using the Modified Digital Pictures.....41

F. Claim 17: Grotmol Does Not Disclose the Claimed Modifying Digital Pictures, Learning the Modified Digital Pictures, and Determining Instruction Sets Using the Modified Digital Pictures.....43

G. Claim 18: Grotmol Does Not Disclose the Claimed Modifying Instruction Sets, Learning the Modified Instruction Sets, Determining the Modified Instruction Sets, and Causing Operations based on the Modified Instruction Sets.....45

H. Claim 23: Grotmol Does Not Disclose the Claimed Connections.....49

I. Claim 29: Grotmol Does Not Disclose the Claimed Detecting of Objects, Generating Representations of the Detected Objects, and Generating New Digital Pictures From the Representations of the Detected Objects.....51

J. Claim 31: Grotmol Does Not Disclose the Claimed One Instruction Set Being a Representation of Another Instruction Set 54

X. 583.2 PETITION: THE ALLEGED PRIOR ART DOES NOT DISCLOSE OR SUGGEST CERTAIN CLAIMS OF THE ’583 PATENT 55

1. Ground 1 Fails 56

A. Claim 10: Grotmol Does Not Disclose or Suggest the Claimed Second Learning Process and Second User 56

B. Claim 11: Grotmol Does Not Disclose or Suggest the Claimed Second Learning Process and Third Device 60

2. Ground 2 Fails 64

A. Claims 25 and 27: It Would Not Have Been Obvious to Combine Grotmol and Hickman to Arrive At the Claimed Inventions 64

B. Claim 25: Grotmol and Hickman Do Not Disclose or Suggest the Claimed Second Device Performing Operations Defined by Instruction Sets for Operating a First Device Involving a Server 68

C. Claim 27: Grotmol and Hickman Do Not Disclose or Suggest the Claimed Knowledgebase Including Mixed Correlations, Second Correlation Including Instruction Sets for Operating a Third Device, Determining the Instruction Sets for Operating the Third Device, and Causing a Fourth Device to Perform Operations Defined by the Instruction Sets for Operating the Third Device.....70

3. Ground 3 Fails 77

A. Claim 30: It Would Not Have Been Obvious to Combine Grotmol and Hoffman to Arrive At the Claimed Invention 77

B. Claim 30: Grotmol and Hoffman Do Not Disclose or Suggest Several Limitations of Claim 29, From Which Claim 30 Depends 79

C. Claim 30: Grotmol and Hoffman Do Not Disclose or Suggest Detecting Locations and the New Digital Picture Including a Top-Down View of the One or More Representations of the One or More Objects.....82

XI. CONCLUSION.....85

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. 11,055,583 ("the '583 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

[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 '583 patent (IPR2023-01172 and IPR2023-01173). In this declaration, I refer to the Petition in IPR2023-01172 as the "583.1 Petition" and the Petition in IPR2023-01173 as the "583.2 Petition."

disclose or suggest the features recited in certain claims of the ’583 patent (claims 7, 9, 14-18, 23, 29, and 31 for IPR2023-01172 and claims 10, 11, 25, 27, and 30 for IPR2023-01173), which I understand Tesla, Inc. (“Petitioner” or “Tesla”) has challenged in these IPRs. In my view, the alleged prior art references do neither. 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 course 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. I am currently working to develop a graduate course titled: "Advanced Neural Networks and Deep Learning: Theory, Mathematics and Algorithms." The course is intended to provide an in-depth comprehensive study of the theory, mathematics and algorithms for advanced neural networks and their usage in deep learning. It is primarily targeted for upper graduate students that are planning to pursue advanced studies/research in the field. The course provides a thorough study of shallow and deep neural networks architectures and algorithms, activation functions, backpropagation, initialization, optimization strategies, etc. It then progresses to convolutional and recurrent style neural networks and, if time permits, will provide an overview of attention mechanisms/transformers and deep reinforcement learning. The course is being taught for the first time in Spring 2024.

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

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

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

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

on multiple U.S. and foreign patents.

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

18. A complete statement of my industrial and academic records including a listing of the above publications and patents is included with my curriculum vitae in Exhibit 2015.

III. MATERIALS REVIEWED AND TIME OF ALLEGED INVENTION

19. The opinions contained in this declaration are based on the documents that I reviewed, my professional judgment, as well as my education, experience, and knowledge regarding technologies related to the ’583 patent.

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

- the ’583 patent (Ex. 1001);
- the file history of the ’583 patent (Ex. 1002);
- the declaration of Dr. Jason Janet (Ex. 1003);
- U.S. Patent No. 9,604,359 to Grotmol, et al. (“Grotmol” – Ex. 1005);
- U.S. Patent No. 8,639,644 to Hickman, et al. (“Hickman” – Ex. 1007);
- U.S. Patent No. 9,283,674 to Hoffman, et al. (“Hoffman” – Ex.

1009);

- The Parties' papers and exhibits in these cases (IPR2023-01172 and IPR2023-01173); and
- any other materials that I refer to in this declaration in support of my opinions.

21. I have been asked to consider the time of the alleged invention to be around November 26, 2017, which I understand is the filing date of the application (U.S. Patent Application No. 15/822,150) to which the '583 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 '583 patent, the prior art to the patent, and the state of the art, at the time of the alleged invention.

22. As I discuss in detail below, it is my opinion that the claims of the '583 patent that I discuss below are not disclosed or suggested by the prior art references cited by Petitioner in these *Inter Partes* Reviews.

IV. LEGAL STANDARDS

1. Overview

23. I am not an attorney or a legal expert. The legal standards I applied in reaching the conclusions expressed throughout this declaration were provided to me by counsel. In preparing this declaration, I have endeavored to faithfully

apply these legal standards. I do not intend to offer opinions on the law. Below, I describe the law I applied in considering whether the claims of the Challenged Patent are patentable.

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

2. Patent Claims

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

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

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

claims to which it refers.

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

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

3. Burden of Proof for Invalidity

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

4. Claim Construction

31. I understand that the first step in determining validity is to properly construe the claims. I further understand that, in this proceeding, the Board must

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

5. Person of Ordinary Skill in the Art

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

6. Prior Art

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

34. In this declaration, I may use the phrase "prior art" when describing

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

7. Anticipation

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

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

reference. I understand that for a reference to be anticipatory, the reference must contain an enabling disclosure. I understand that merely naming or describing the subject matter is insufficient if it cannot be produced without undue experimentation.

8. Obviousness

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

38. To be obvious in light of a single prior art reference or multiple prior

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

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

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

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

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

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

44. I understand that some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness must be made. For example, I understand that there may be no rational underpinning to support the legal conclusion of obviousness where systems are already complete and the party challenging validity seeks to mix and match components, which each exist in the

separate systems, from these complete systems.

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

45. Based on my review of the ’583 patent, the types of problems encountered in the art at and prior to the time of the alleged invention, prior solutions to those problems, the pace with which innovations were made during the relevant time period, the sophistication of the technology, and the educational level of active professionals in the field, I believe that a person of ordinary skill in the art (POSA), at the time of the alleged invention, would have had at least a Bachelor’s degree in electrical engineering, computer engineering, computer science, systems engineering, or a similar technical field, with at least three years of experience in the field of computer vision, image/video processing, and/or machine learning. Alternatively, a POSA, at the time of the alleged invention, could have had a Master’s degree in electrical engineering, computer engineering, computer science, systems engineering, or equivalent course work with a focus in computer vision, image/video processing, and/or machine learning.

46. All of my opinions in this declaration are from the perspective of a person of ordinary skill in the art, as I have defined it above and during the relevant time frame (e.g., late 2017, including November 26, 2017). During this time frame, I possessed at least the qualifications of a POSA, as defined above.

VI. THE ’583 PATENT

47. The ’583 patent, titled “Machine Learning for Computing Enabled Systems and/or Devices,” discloses systems for machine learning for computing systems and/or devices. Ex. 1001, Abstract, 1:43-65. The ’583 patent discloses systems for capturing “one or more digital pictures, receiv[ing] one or more instruction sets, and learn[ing] correlations between the captured pictures and the received instruction sets.” *Id.*, Abstract.

1. Existing Technology

48. Prior to the innovations described in the ’583 patent, “[a] machine learning solution [was] needed for computing enabled systems and/or devices to be less dependent on or fully independent from user input.” *Id.*, 1:37-39. The ’583 patent solved this problem by utilizing a sophisticated system for “learning and/or using visual surrounding for autonomous device operation” comprising “learning one or more digital pictures of a device’s surrounding along with correlated instruction sets for operating the device, storing this knowledge in a knowledgebase (i.e. neural network, graph, sequences, etc.) and autonomously operating a device.” *Id.*, 59:11-12, 14-18.

2. Advantages Provided by the ’583 Patent

49. The ’583 patent is directed to artificially intelligent devices, systems, and methods that store a knowledgebase that includes digital pictures of at least a portion of a device’s surroundings correlated with device operating instruction

sets, receive or generate new captured digital pictures, match the new pictures with stored pictures in the knowledgebase, and cause the device that captured the new pictures to autonomously execute an instruction set correlated to the matched pictures. *Id.*, 1:43-2:7, 152:33-153:63. Referring to Figure 37 (shown below) and the specification's description of Figure 37, for example, Computing-enabled machine 98a (a loader) includes Picture Capturing Apparatus 90, which captures digital pictures 525 of Computing-enabled machine 98a's surroundings. *Id.*, 152:33-153:63. Computing-enabled machine 98a learns User 50-directed collecting, moving, maneuvering, lifting, and/or unloading in Computing-enabled machine's 98a visual surrounding that includes a pile of material, truck, and/or other objects. *Id.* In the future, when Computing-enabled machine 98a encounters visual surroundings that include the same or similar objects, or detects the same or similar objects, Computing-enabled machine 98a autonomously implements collecting, moving, maneuvering, lifting, and/or unloading using previously learned instruction sets 526 correlated with previously learned digital pictures 525. *Id.*, 153:59-63.

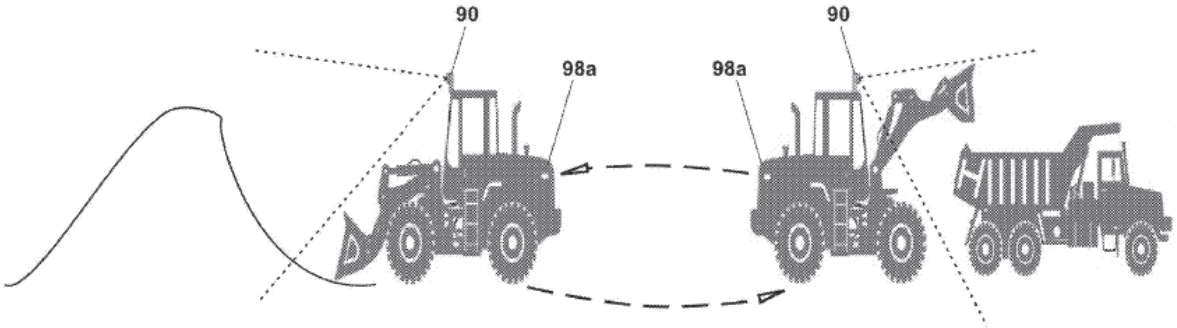

FIG. 37

Ex. 1001, Fig. 37.

50. The ’583 patent describes and claims systems implementing its innovative techniques for autonomous operation. For example, one such method is claimed in claim 1, which is directed to a method implemented by a computing system that uses learning digital pictures to implement autonomous operation. Several other dependent claims provide additional details regarding systems for autonomous operation.

51. 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 ’583 patent provides novel and innovative techniques for autonomous operations.

VII. CLAIM CONSTRUCTION

52. I understand that claim terms are typically given their ordinary and customary meaning, as would have been understood by a person of ordinary skill in the art at the time of the alleged invention. In considering the meaning of the claims, I also understand that one must consider the claim language, specification, prosecution history, and the knowledge of a person of ordinary skill in the art at the relevant time. I believe the term "connections" as recited in claim 23 requires construction, as explained in more detail below. I understand that Petitioner has proposed claim terms for claim construction, which I discuss below.

1. **"connections" (Claim 23)**

53. Claim 23 recites "connections" between a digital picture and an instruction set. Claim 23 recites in part:

> wherein the first one or more digital pictures correlated with the first one or more instruction sets for operating the first device include the first one or more digital pictures connected, using at least one or more ***connections***, with the first one or more instruction sets for operating the first device.

Ex. 1001, Claim 23 (emphasis added).

54. In the context of claim 23 of the '583 patent, including in light of the claims, specification, and drawings, a "connection" should be construed as a "relationship that includes a link" in my opinion. This construction is supported by the claims, specification, drawings, and intrinsic record as a whole in my opinion. Figure 16 of the '583 patent makes clear that a connection is a

relationship that includes a link:

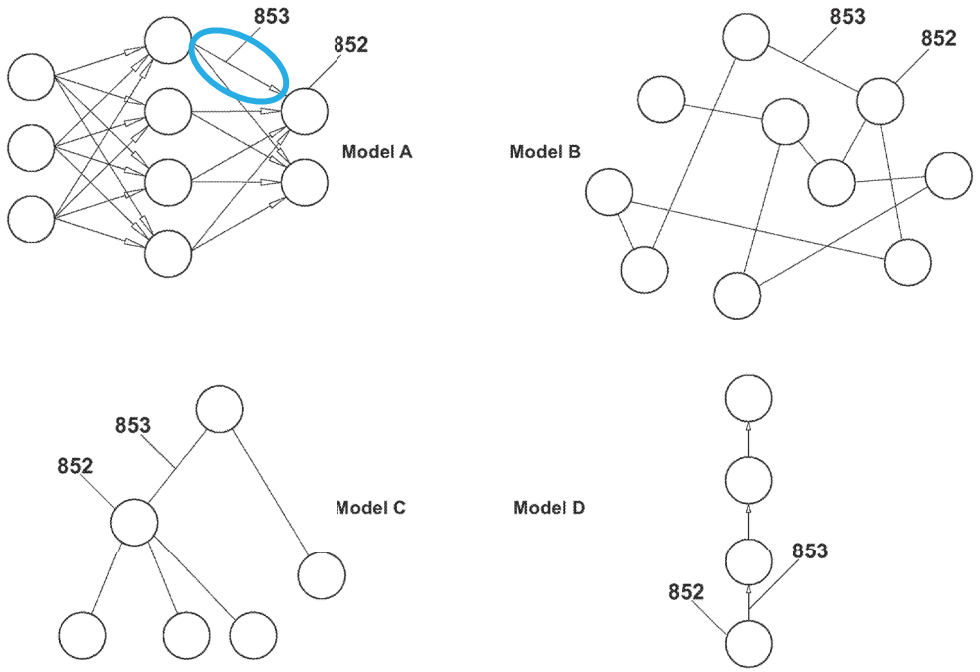

FIG. 16

Ex. 1001, Figure 16 (annotated to show Connection 853 in blue).

55. In describing Figure 16, in this particular use of connections, the ’583 patent states that “machine learning, knowledge structuring or representation, decision making, pattern recognition, and/or other artificial intelligence functionalities may include a network of Nodes 852 (also referred to as neurons, etc.) and Connections 853 similar to that of a brain. Node 852 can store any data, object, data structure, and/or other item, or reference thereto.” Ex. 1001, 96:2-8. For example, a node may include at least a portion of a digital

picture while another node may include at least a portion of an instruction set, and the two nodes may be in a relationship that includes a connection or link. As shown for example in Model A in Figure 16, in this particular use of connections, Connections 853 are included in connecting or linking Nodes 852. *Id.*, 95:65-96:59. Connections are included as some of the elements connecting those nodes and showing relationships between those nodes. Further, "Connection 853 may include or be associated with a value such as a symbolic label or numeric attribute (i.e. weight, cost, capacity, length, etc.)." Exhibit 1001, 96:19-22.

56. In this particular use of connections, Figure 17A of the '583 patent also makes clear that a connection is a relationship that includes a link:

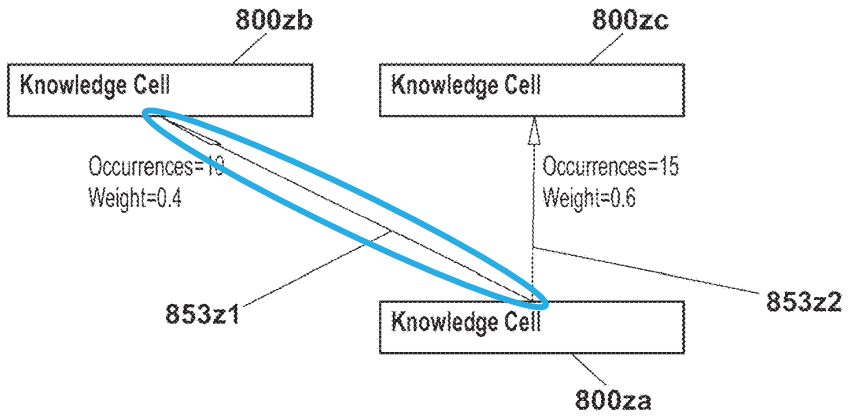

FIG. 17A

Ex. 1001, Figure 17A (annotated to show Connection 853z1 in blue).

57. The specification further explains that, in this particular use, connections between correlations (each knowledge cell depicted in Fig. 17A

includes a correlation, *see* Figs. 12-15) "may include or [be] associated with at least one of: an occurrence count, a weight, a parameter, or a data." Ex. 1001, 15:12-14. In addition, Figure 17A discloses "that Knowledge Cell 800za is connected to Knowledge Cell 800zb and Knowledge Cell 800zc by Connection 853zl and Connection 853z2, respectively. Each of Connection 853zl and Connection 853z2 may include or be associated with occurrence count, weight, and/or other parameter or data." *Id.*, 98:31-37. This also supports Patent Owner's construction, as the connections are relationships that include links.

58. The '583 patent further provides that "[k]nowledge cells [including correlations] may be connected, interrelated, or interlinked into knowledge structures using statistical, artificial intelligence, machine learning, and/or other models or techniques." Ex. 1001, 144:13-18. In this particular use, Connections are used to indicate and track relationships including links to enable more efficient autonomous device operation. *Id.*, 144:1-51. Further, connections are used to create paths through the knowledgebase for efficient storage and autonomous operation (see '583 patent Fig. 21 for example). This disclosure confirms that, with respect to claim 23, connections are relationships that include links.

59. I confirm that a POSA would construe connection as a "relationship that includes a link" based on my review of the specification, claims, and other

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

2. "means for receiving or generating"; "means for learning" (claim 34)

60. I understand that Petitioner has proposed constructions for certain "means" terms in claim 34. I also understand that for the purpose of this stage of the proceeding only, Patent Owner does not dispute Petitioner's construction of these "means . . ." terms of claim 34.

VIII. OVERVIEW OF ALLEGED PRIOR ART REFERENCES

61. In its Petitions, Tesla presents four grounds challenging claims 1-34 using Grotmol, Hickman, and Hoffman. These references are described briefly below.

1. Grotmol

62. Grotmol discloses a method for training and operating a robotic device to follow a trajectory. Ex. 1005, Abstract. The robotic device follows a simple trajectory based on a simple sequence (i.e., an ordered buffer). The robotic device functions based on training, and should the robotic device of Grotmol encounter an object or scenario it had not been trained for, it would result in a

collision as there is no way to account for new scenarios.

63. Grotmol discloses using a camera to store a sequence of images of a scene, and then following a trajectory during training in an ordered buffer. Ex. 1005, Abstract. The specification provides detail on the training, including that a train issues motor commands which correspond to "time instances when the images are acquired may be stored." *Id.,* 39:17-19. Then, during operation, the robot compares newly acquired images with those from the training buffer in order to "determine the most likely match." *Id.*, Abstract. Once matched, the best matched can be used to predict a motor command for the robot operation. *Id.*, 27:57-58.

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

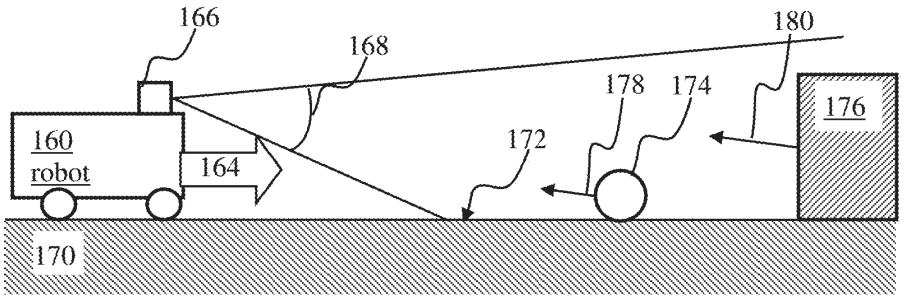

FIG. 1

Ex. 1005, Fig. 1.

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

2. **Hickman**

66. Hickman is directed to "shared robot knowledge bases for use with cloud computing systems." Ex. 1007, Abstract. The "cloud computing system collects data from a robot about an object the robot has encountered in its environment, and stores the received data in the shared robot knowledge base. In another embodiment, the cloud computing system sends instructions for interacting with an object to a robot, receives feedback from the robot based on its interaction with the object, and updates data in the shared robot knowledge

base based on the feedback. In yet another embodiment, the cloud computing system sends instructions to a robot for executing an application based on information stored in the shared robot knowledge base. In the disclosed embodiments, information in the shared robot knowledge bases is updated based on robot experiences so that any particular robot may benefit from prior experiences of other robots." *Id.* In other words, Hickman discloses a basic method for storing and sharing information associated with an object.

67. Figure 4 of Hickman, reproduced below, shows a message flow diagram between multiple robots and a cloud computing system having a shared robot knowledge base. Robot 404 may obtain single object information via one or more sensors. Ex. 1007, 25:14-19. That single object information is transmitted to cloud computing system 401, where it is stored and can be used by second robot 413. *Id.,* 25:24-27:26. In operation, "the robot 404 obtains identification information associated with an object 405 via one or more sensors associated with the robot 404." Ex. 1007, 25:14-16. The "cloud processing engine 401 may query an object knowledge base component of the shared robot knowledge base 403 similar to the general object knowledge base 308 or the unique object knowledge base 307." *Id.* at 25:41-46. In other words, as shown in Figure 4, the identification information (once transmitted to the cloud computing system) is stored and can be acquired/used by a second robot.

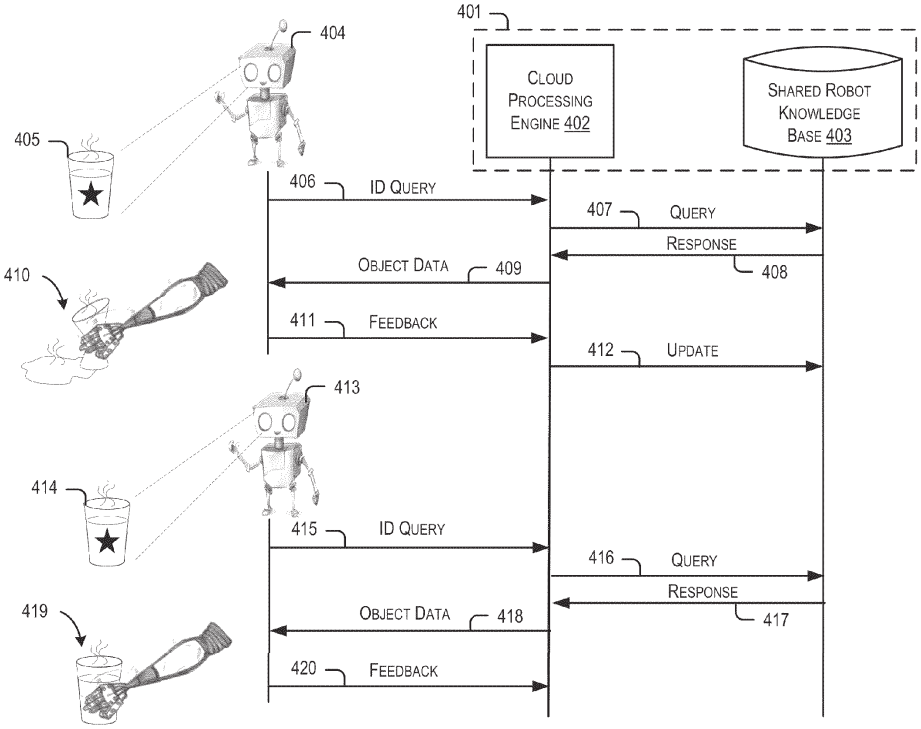

FIGURE 4

Ex. 1007, Fig. 4.

68. Other than this disclosure, Hickman does not teach how this information is stored together. For example, as shown in Figure 3, reproduced below, Hickman discloses separate knowledgebases for unique objects (307), general objects (308), and tasks (309). *See also* Ex. 1007 at 10:57-58 ("The shared robot knowledge base 306 may include multiple component and/or sub-component knowledge bases.") The information disclosed by Hickman is not stored together in a single knowledgebase, but in multiple component knowledge bases. A POSA would understand that Hickman discloses obtaining object data from a sensor of a

robot, storing it in a specific component knowledgebase, and providing the information to a second robot when queried.

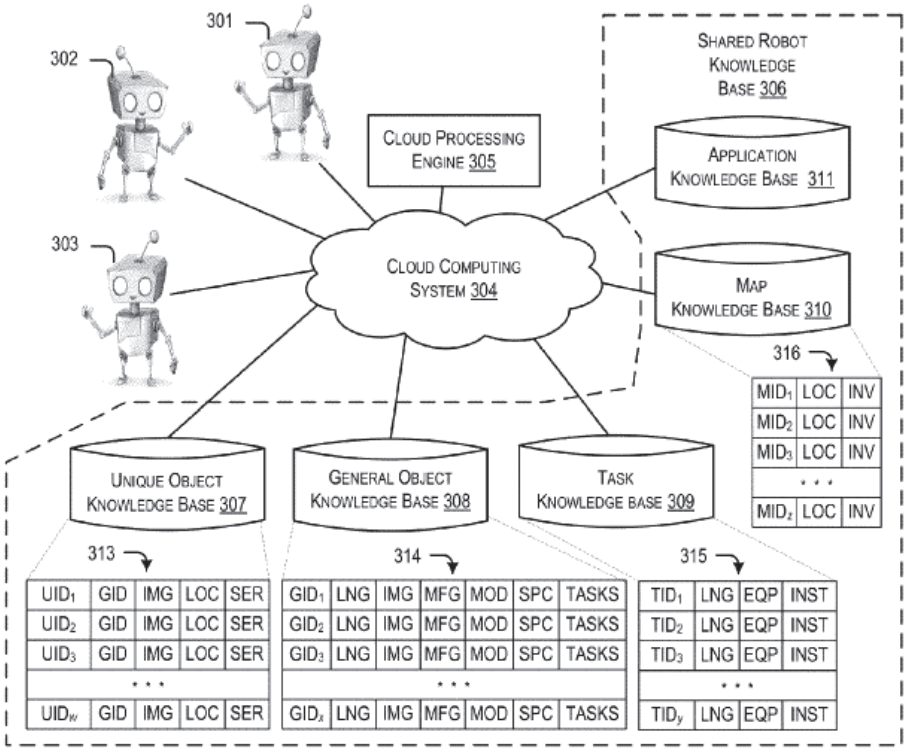

FIGURE 3

Ex. 1007, Figure 3.

3. **Hoffman**

69. Hoffman is titled "Remotely operating a mobile robot," and relates to "operating a robot . . . electronically receiving images and augmenting the images by overlaying a representation of the robot on the images." Ex. 1009, Abstract. The method in Hoffman involves "electronically displaying the

augmented images and receiving an indication of a selection of at least one user-selectable portion of the robot representation." *Id.* The robot is user operated, and a user can input a command to the robot based on interacting with the user-selectable portion of the robot representation. Ex. 1009, Abstract.

70. Figure 1 from Hoffman, shown below, discloses a user interacting with a screen to provide commands to a robot. Ex. 1009, Fig. 1. As shown in Figure 1, "cloud service 22 executes an application outputting data 23 that may be communicated to the robot 200." *Id.*, 8:3-5. Hoffman discloses that the controller 400 "may issue drive commands to the drive 10 system 215 based on the received processed data set 23 for maneuvering about an area." *Id.*, 8:9-11.

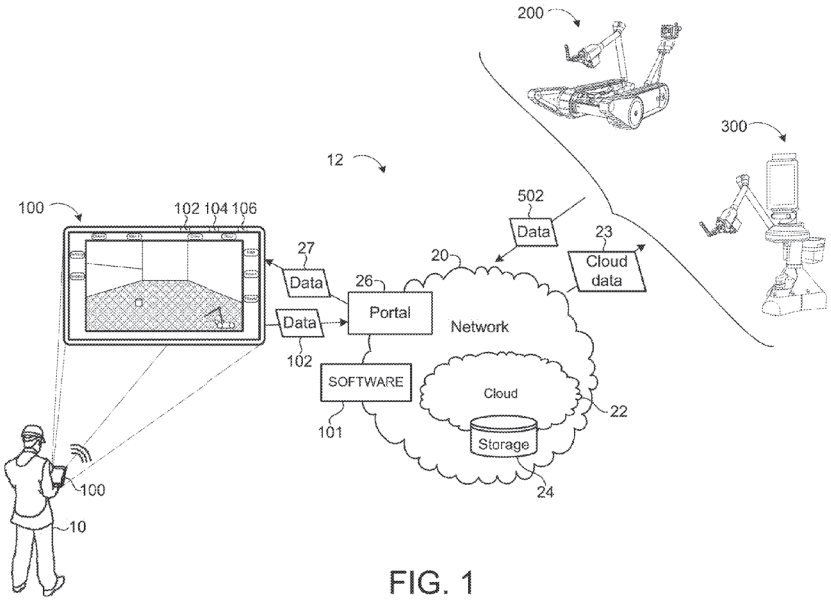

FIG. 1

Ex. 1009, Fig. 1.

IX. 583.1 PETITION: THE ALLEGED PRIOR ART DOES NOT DISCLOSE OR SUGGEST CERTAIN CLAIMS OF THE '583 PATENT

71. In my opinion, the alleged prior art fails to disclose or suggest to a POSA all of the elements of claims 7, 9, 14-18, 23, 29, and 31 of the '583 Patent under the ground presented in the 583.1 Petition.

1. Ground 1 Fails

72. Grotmol does not disclose the limitations of claims 7, 9, 14-18, 23, 29 and 31 of the '583 Patent. Specifically, Grotmol fails to disclose numerous limitations present in these claims.

A. Claim 7: Grotmol Does Not Disclose Detecting Objects and Comparing Detected Objects for Matching

73. Claim 7 depends from claim 4 and requires:

> wherein the determining the first one or more instruction sets for operating the first device based on the at least partial match between the new one or more digital pictures and the first one or more digital pictures includes ***determining at least partial match between one or more objects detected in the new one or more digital pictures and one or more objects detected in the first one or more digital pictures.***

Ex. 1001, Claim 7 (emphasis added).

74. Grotmol fails to disclose "determining at least partial match between

one or more objects detected in the new one or more digital pictures and one or more objects detected in the first one or more digital pictures" in my opinion. Grotmol discloses comparing images or portions (i.e., features) thereof and does not disclose detecting objects and then comparing the detected objects. Once the objects are detected in pictures as claimed in claim 7, they are separate from the pictures themselves, and are therefore, different than images or portions thereof in Grotmol. Grotmol does not disclose comparing anything detected in images that is separate from the images, and only discloses comparing images or portions (i.e., features) thereof in my opinion.

75. Petitioner relies on Grotmol's comparison based on a similarity measure, which does not disclose the matching of objects in claim 7. 583.1 Petition, 28-29. Using detected objects in the claimed matching ***involves object detection and matching of the detected objects***, and Grotmol does not disclose any matching using detected objects.

76. Petitioner points to Grotmol's disclosure that "the similarity measure may characterize similarity between features of the subset and features of the given training set and features may be used to 'describe one or more integer or floating point values characterizing the input, e.g., the presence or absence of an edge, corner, shape, texture, color, object, at particular locations in the image, values of pixels in an image, patches of color texture, brightness in the image,

and/or in the image as a whole.'" 583.1 Petition, 28-29 (quoting Ex. 1005, 28:19-24). But this disclosure provides that a similarity measure may characterize similarity between features, and not that any object detection occurs, much less that detected objects are compared or matched, as required by claim 7. Furthermore, an image feature is a portion of an image (i.e., each image feature is a collection of pixels of the image), not a detected object, hence, comparing image features is different than comparing objects detected in an image in my opinion.

77. Petitioner has not shown and Grotmol does not disclose how the similarity measure for images or portions thereof in Grotmol uses detected objects in the claimed matching. Using Grotmol's similarity measure to characterize differences between images is different than using detected objects for comparison and matching, as claimed in claim 7. Petitioner has failed to show that Grotmol anticipates claim 7 due to the difference between the compared images or portions (i.e. features) thereof in Grotmol and the claimed matching of detected objects that are separate (once they are detected) from the images.

B. Claim 9: Grotmol Does Not Disclose the Claimed Second Learning Process

78. Claim 9, which depends from claim 4, states, in part:

> wherein the knowledgebase further includes a second one or more digital pictures correlated with a second

> one or more instruction sets for operating the first device, wherein at least a portion of the first one or more digital pictures or at least a portion of the first one or more instruction sets for operating the first device is learned in a first learning process that includes operating the first device at least partially by a first user, and wherein at least a portion of the second one or more digital pictures or at least a portion of the second one or more instruction sets for operating the first device ***is learned in a second learning process*** that includes operating the first device at least partially by the first user.

Ex. 1001, Claim 9 (emphasis added).

79. Grotmol fails to disclose the claimed "second learning process" in my opinion. Grotmol only discloses ***one*** user operating ***one*** device in ***one*** learning process, and therefore fails to disclose any second learning process and the claimed "at least a portion of the second one or more digital pictures or at least a portion of the second one or more instruction sets for operating the first device ***is learned in a second learning process*** that includes operating the first device at least partially by the first user."

80. Petitioner states that "Grotmol describes that multiple training processes can be conducted to learn multiple tasks." 583.1 Petition, 31. Petitioner is wrong since claim 9 specifically recites a knowledgebase that includes one

correlation learned in one learning process and an additional correlation learned in another learning process. Since Grotmol discloses only a single learning process, multiple tasks are learned in the single learning process. Nothing in Grotmol suggests that multiple tasks are learned in multiple learning processes as claimed in claim 9. Petitioner's contention that Grotmol teaches claim 9 is an unjustified leap given that Grotmol does not even mention another learning process in my opinion.

81. Further, I understand that the Board noted in an IPR involving similar claim limitations in another patent owned by Patent Owner, that Grotmol discloses nothing "more than loading a trained configuration from a first robot to a second robot." Ex. 2010, 35 (Institution Decision in IPR2023-01054) (Board's discussion regarding claim 4 of U.S. Patent No. 10,452,974 (Ex. 2011)). The Board also questioned whether Petitioner had sufficiently shown that "Grotmol discloses . . . another learning process." *Id.*, 35-36. I agree with the Board, and Grotmol's disclosure of loading a trained configuration from a first robot to a second robot does not constitute another learning process.

C. Claim 14: Grotmol Does Not Disclose the Claimed Modified and Applied Instruction Set and that the Second Device Performs an Operation Defined by the Modified Instruction Set

82. Claim 14 depends from claim 4 and requires:

> wherein the first one or more instruction sets for operating the

> first device or a copy of the first one or more instruction sets for operating the first device ***are modified and applied to the second device***, and wherein the second device is caused ***to perform one or more operations defined by: the modified the first one or more instruction sets for operating the first device***, or the modified the copy of the first one or more instruction sets for operating the first device.

Ex. 1001, Claim 14 (emphasis added).

83. Grotmol first fails to disclose that a first one or more instruction sets is "modified." Grotmol only discloses correcting device behavior by issuing new commands and does not disclose that any instruction sets are modified. Petitioner points to controlling a robot's trajectory to compensate for position and orientation mismatch and that new commands may be issued based on shifted images, 583.1 Petition 36 (citing Ex. 1005, 42:46-43:3). But issuing new commands based on shifted images does not disclose modifying instruction sets, as required by claim 14, in my opinion. Grotmol does not modify the new commands, and issuing new unmodified commands is different than modifying existing instruction sets in claim 14.

84. Next, Petitioner has also not established that Grotmol discloses that the modified instruction set is applied to the second device, where the second device performs an operation defined by the modified instruction set, as required by claim 14. As I just discussed, given that Grotmol does not disclose that the

instruction sets are modified at all, Grotmol does not disclose that a modified instruction set is applied to a second device, let alone that the second device performs an operation defined by the modified instruction set, as required by claim 14.

85. Petitioner's argument that "when a training configuration is loaded into a second physical device . . . and the second robot encounters 'position mismatch' or 'orientation mismatch' from the first robot, the instruction set is shifted," 583.1 Petition, 36, is wrong in my opinion. Grotmol discloses shifting images, including where "FIG. 20B illustrates using image shift and/or crop for determining image match," Ex. 1005, 6:26-28, not modifying instruction sets. As I discussed above, Grotmol never discloses modifying any instruction sets.

D. Claim 15: Grotmol Does Not Disclose the Claimed Modifying Instruction Sets, Determining the Modified Instruction Sets, and Causing Operations Based on the Modified Instruction Sets

86. Claim 15 depends from claim 4 and requires:

> ***modifying: the first one or more instruction sets for operating the first device,*** or a copy of the first one or more instruction sets for operating the first device . . . ***determining the modified the first one or more instruction sets for operating the first device*** based on the at least partial match between the new one or more digital pictures and the first one or more digital pictures . . . ***causing the first device or the second device to***

perform one or more operations defined by the modified the first one or more instruction sets for operating the first device.

Ex. 1001, Claim 15 (emphasis added).

87. Grotmol first fails to disclose "modifying: the first one or more instruction sets for operating the first device" Grotmol only discloses correcting device behavior by issuing new commands in certain instances and does not disclose that any instruction sets are modified. Petitioner points to Grotmol's disclosure of controlling a robot's trajectory to compensate for position and orientation mismatch and that new commands may be issued based on shifted images, 583.1 Petition, 37 (citing Ex. 1005, 42:46-43:3). But issuing ***new*** commands based on shifted images does not disclose modifying instruction sets, as required by claim 15 in my opinion. Grotmol does not modify the new commands, and issuing new unmodified commands is fundamentally different than modifying existing instruction sets in claim 14.

88. Petitioner next points to Grotmol's disclosure that commands from the training sets may be combined with the output from a PID controller as disclosing the claimed modifying instruction sets. 583.1 Petition, 38 (quoting Ex. 1005, 43:9-11). But Grotmol's disclosure of combining motor commands with the output of a PID controller to stabilize the robot does not disclose modifying instruction sets. The motor commands, or instruction sets, are never themselves

modified but instead are only combined with the output of a PID controller in Grotmol. Combining two distinct elements is different than modifying either element itself in my opinion.

89. Grotmol further fails to disclose "determining the modified the first one or more instruction sets for operating the first device based on the at least partial match between the new one or more digital pictures and the first one or more digital pictures," as required by claim 15. As I just discussed, given that Grotmol does not disclose that the actual instruction sets are modified, Grotmol does not disclose that a modified instruction set is determined as required by claim 15.

90. Petitioner contends that "Grotmol discloses that the motor commands at a given time step may be obtained by taking the stored motor commands from the training buffer that may correspond to the best matching stored image and the motor commands may be modified to compensate for, e.g., position mismatch and orientation mismatch." 583.1 Petition, 38. This statement is not supported by Grotmol's disclosure and is conclusory in my opinion. Also, Petitioner is wrong since this statement asserts modifying motor commands after they are determined, which is different than the claimed determining a previously modified instruction set. Grotmol fails to disclose that any instruction sets are modified, much less that an instruction set is modified and then the modified

instruction set determined based on matching of images as claimed in claim 15.

91. Grotmol further fails to disclose "causing the first device or the second device to perform one or more operations defined by the modified the first one or more instruction sets for operating the first device." Petitioner's only argument that Grotmol discloses this limitation is that the device's actual operation can be modified. 583.1 Petition, 39. But the device's operation is based on unmodified instructions. As I discussed above, since Grotmol never discloses modifying an instruction set, Grotmol must also fail to disclose that any operation defined by the modified and determined instruction set was performed.

92. Petitioner's citations to its expert's declaration to support its position regarding the "determining the modified the first one or more instruction sets" and "causing operations defined by the modified instruction sets" claim limitations are not helpful in my opinion. 583.1 Petition, 37-39. Petitioner cites to Paragraphs 262-267 of its expert's declaration, but in my opinion these paragraphs argue that a POSA would have known that the modified instruction set would be determined and caused to be performed without any explanation or support. Ex. 1002, ¶¶262-267. Petitioner's bare assertions regarding what a POSA would have understood fail to show that Grotmol discloses the claimed invention.

93. Further, since Grotmol merely discloses changing a device's

operation by executing alternate, whole, unmodified instructions, a POSA reading Grotmol's disclosure would not have understood that the modified and determined instruction set was used to cause an operation defined by that modified instruction set. Grotmol never discloses modifying any instruction sets, and thus nothing in Grotmol would have led a POSA to understand that an instruction that Grotmol fails to disclose as modified is somehow determined as modified, and that an operation defined by that instruction set that Grotmol fails to disclose as modified would be performed, as required by claim 15.

E. Claim 16: Grotmol Does Not Disclose the Claimed Modifying of Digital Pictures and Matching Using the Modified Digital Pictures

94. Claim 16 depends from claim 4 and requires, among other things:

> ***modifying at least one of: the first one or more digital pictures***, a copy of the first one or more digital pictures, the new one or more digital pictures, or a copy of the new one or more digital pictures . . . wherein the at least partial match between the new one or more digital pictures and the first one or more digital pictures includes: ***(i) at least partial match between the modified the new one or more digital pictures and the first one or more digital pictures***.

Ex. 1001, Claim 16 (emphasis added).

95. Grotmol fails to disclose "modifying at least one of: the first one or more digital pictures" and matching using the modified digital picture as required

by claim 16 in my opinion. Petitioner points to Grotmol's disclosure of preprocessing images and scaling pixels. 583.1 Petition, 39-40 (citing Ex. 1005, 39:13-22 and 4:18-22). But this disclosure and Grotmol's disclosures cited in the Petition only disclose that an instance of an image may be scaled or transformed, and not that the scaled or transformed image is used in a matching. Claim 16 requires both: (i) modifying a digital picture, and (ii) using this modified digital picture in a matching, and Grotmol fails to disclose the latter.

96. Petitioner has not pointed to anything in Grotmol to show a modified digital picture used in a matching process. Petitioner claims that "Grotmol discloses determining whether there is a partial match between the new image and modified first image," 583.1 Petition, 40. This is not supported in Grotmol, and is conclusory. In my opinion, Grotmol itself never discloses matching using ***any*** modified images as required by claim 16.

97. Petitioner's citations to its expert's declaration to support its position regarding the "modifying" and "matching" claim limitations do not help its position. 583.1 Petition, 39-40. Petitioner cites to Paragraphs 268-270 of its expert's declaration, but these paragraphs simply repeat Petitioner's argument that a modified image could be used in a matching procedure without support or explanation. Ex. 1002, ¶¶ 268-270. Petitioner's bare assertions fail to show that Grotmol discloses the claimed invention.

F. Claim 17: Grotmol Does Not Disclose the Claimed Modifying Digital Pictures, Learning the Modified Digital Pictures, and Determining Instruction Sets Using the Modified Digital Pictures

98. Claim 17 depends from claim 4 and requires, among other things:

> ***modifying: the first one or more digital pictures,*** or a copy of the first one or more digital pictures, and wherein the learning the first one or more digital pictures correlated with the first one or more instruction sets for operating the first device includes:
>
> ***learning the modified the first one or more digital pictures correlated with the first one or more instruction sets for operating the first device,*** or learning the modified the copy of the first one or more digital pictures correlated with the first one or more instruction sets for operating the first device . . .
>
> ***determining*** the first one or more instruction sets for operating the first device based on at least partial match between the new one or more digital pictures and ***the modified the first one or more digital pictures***.

Ex. 1001, Claim 17 (emphasis added).

99. Grotmol fails to disclose "modifying: the first one or more digital pictures," learning the modified digital picture, and determining an instruction set using the modified digital picture. Petitioner points to Grotmol's disclosure of preprocessing images and scaling pixels. 583.1 Petition, 39-40 (citing Ex. 1005,

39:13-22 and 4:18-22). But this disclosure and Grotmol's disclosures cited in the Petition only disclose that an instance of an image may be scaled or transformed, and not that the scaled or transformed image is learned and then used in a matching. Claim 17 requires (i) modifying a digital picture, (ii) learning the modified digital picture, and (iii) using this modified digital picture in a matching, and Grotmol fails to disclose the latter two elements.

100. Petitioner claims that "Grotmol discloses modifying digital pictures, including the first one or more digital pictures that are received during the training process," 583.1 Petition, 40. Petitioner's argument only alleges modifying images. Grotmol itself never discloses ***learning any modified image and then matching using the modified image*** as required by claim 17. Petitioner has not pointed to anything in Grotmol and nothing in Grotmol discloses that a modified image correlated with an instruction set is learned, and then the modified image is used in the matching procedure.

101. Petitioner's reliance upon the alleged understanding of a POSA regarding this claim limitation is circular in my opinion, and Petitioner has not explained how a POSA would have understood that the modified image is learned and used in the matching process. Petitioner's sole argument that Grotmol discloses using the modified image in the matching process is that "[a] POSITA would understand that where the first one or more digital pictures stored during

the learning process had been modified, the partial match would be determined using the current image (i.e., new one or more digital pictures) and the modified stored image (i.e., modified first one or more digital pictures)." 583.1 Petition, 43. This argument is incorrect. Grotmol itself never discloses matching using the modified image.

102. Petitioner's citations to its expert's declaration to support its position regarding the "matching using the modified image" claim limitation are unavailing. 583.1 Petition, 42-43. Petitioner cites to Paragraphs 278-280 of its expert's declaration, but these paragraphs simply repeat Petitioner's argument that a POSA would have known that a modified image could be used in a matching procedure. Ex. 1002, ¶¶278-280.

G. Claim 18: Grotmol Does Not Disclose the Claimed Modifying Instruction Sets, Learning the Modified Instruction Sets, Determining the Modified Instruction Sets, and Causing Operations based on the Modified Instruction Sets

103. Claim 18 depends from claim 4 and requires:

> ***modifying: the first one or more instruction sets for operating the first device,*** or a copy of the first one or more instruction sets for operating the first device ***. . . learning the first one or more digital pictures correlated with the modified the first one or more instruction sets for operating the first device . . . determining the modified the first one or more instruction sets for operating the first device*** based on the at least partial match

> between the new one or more digital pictures and the first one or more digital pictures . . . ***causing the first device or the second device to perform one or more operations defined by the modified the first one or more instruction sets for operating the first device***.

Ex. 1001, Claim 18 (emphasis added).

104. Grotmol first fails to disclose "modifying: the first one or more instruction sets for operating the first device" in my opinion. Grotmol only discloses correcting device behavior by issuing new commands and does not disclose that any instruction sets are ***modified.*** Petitioner points to Grotmol's disclosure of controlling a robot's trajectory to compensate for position and orientation mismatch and that new commands may be issued based on shifted images, 583.1 Petition 43-44 (citing Ex. 1005, 42:46-43:3). But issuing new commands based on shifted images does not disclose modifying instruction sets, as required by claim 18. Grotmol does not modify the new commands, and issuing new unmodified commands is fundamentally different than modifying existing instruction sets in claim 18.

105. Petitioner next points to Grotmol's disclosure that commands from the training sets may be combined with the output from a PID controller as disclosing the claimed modifying instruction sets. 583.1 Petition, 44 (quoting Ex. 1005, 43:5-11). But Grotmol's disclosure of combining motor commands with

the output of a PID controller to stabilize the robot does not disclose modifying instruction sets. The motor commands, or instruction sets, are never themselves modified but instead are only combined with the output of a PID controller in Grotmol. Combining two distinct elements is different than modifying either element itself in my opinion.

106. Petitioner next points to Grotmol's disclosure of an override mode and argues that "[w]hen the robot remembers the new command, overriding the previous one, the robot learns the first digital picture correlated with the modified instruction set." 583.1 Petition, 44-45. Petitioner is wrong because Grotmol never discloses that the actual instruction set is modified during override mode. Instead, Grotmol discloses that the robot will "try to remember" a user-initiated, whole, unmodified command, Ex. 1005, 23:20-22, but Grotmol never shows that this process involves modifying any command. Grotmol is replacing an original, whole, unmodified command with another (i.e., overridden), whole, unmodified command. Replacing an element with another element is fundamentally different than modifying the original element.

107. Grotmol next fails to disclose the claimed "learning the first one or more digital pictures correlated with the modified the first one or more instruction sets for operating the first device." Since Grotmol fails to disclose modifying an instruction set as discussed above, it also fails to disclose learning the modified

instruction set, and especially learning the modified instruction set correlated with a digital picture as required by claim 18. Grotmol does not disclose learning any modified instruction set and Petitioner does not point to anything in Grotmol that discloses this element of claim 18.

108. Grotmol further fails to disclose "determining the modified the first one or more instruction sets for operating the first device." As I just discussed, since Grotmol does not disclose that the learned instruction sets are modified, Grotmol does not disclose that a learned modified instruction set is determined as required by claim 18.

109. Petitioner contends that "Grotmol discloses that the motor commands at a given step may be obtained from the training buffer based on the best matching image, and motor commands may be modified to compensate for, e.g., 'position mismatch' and 'orientation mismatch.'" 583.1 Petition, 46. Petitioner's statement that "motor commands may be modified to compensate for, e.g., position mismatch and orientation mismatch" is conclusory and not supported by Grotmol. Petitioner is also wrong because the modifying of motor commands in Petitioner's statement occurs after obtaining (i.e. determining) the motor commands from the training buffer, whereas the instruction sets in claim 18 are modified before they are learned, and especially before they are determined. Nothing in Grotmol even contemplates, let alone discloses, such

modifying of instruction sets, learning them as modified, and determining them after they have been modified and learned.

110. Grotmol finally fails to disclose "causing the first device or the second device to perform one or more operations defined by the modified the first one or more instruction sets for operating the first device." Petitioner's only argument that Grotmol discloses the claimed causing operations defined by the modified instruction sets is that the device's actual operation can be modified. 583.1 Petition, 46. But the device's operation is based on unmodified instructions that Grotmol actually discloses. As I discussed above, since Grotmol never discloses modifying an instruction set, learning the modified instruction set, and determining the learned modified instruction set, Grotmol also fails to disclose that any operation defined by the modified, learned, and determined instruction set was performed.

H. Claim 23: Grotmol Does Not Disclose the Claimed Connections

111. Claim 23 depends from claim 4 and requires:

> wherein the first one or more digital pictures correlated with the first one or more instruction sets for operating the first device include the ***first one or more digital pictures connected, using at least one or more connections, with the first one or more instruction sets*** for operating the first device.

Ex. 1001, Claim 23 (emphasis added).

112. Grotmol fails to disclose the claimed "first one or more digital pictures connected, using at least one or more connections, with the first one or more instruction sets" under Patent Owner's proposed construction of "connection." When properly construed, each claimed connection is a relationship that includes a link. *Supra* Section VII.1. Grotmol does not disclose such connections in my opinion. Grotmol's disclosure of mere associations between images and instruction sets fails to disclose the claimed connections under Patent Owner's construction of that claim term in my opinion.

113. As I discussed above, in the context of the '583 patent, including in light of the claims, specification, and drawings, a "connection" should be construed as a "relationship that includes a link." Petitioner's argument that "[a]n association between a digital picture and an action (i.e., instruction set) constitutes a 'connection' between the two," 583.1 Petition, 53, is wrong in my opinion. The connections disclosed in the '583 patent are not simply associations but are relationships that include links to connect two elements. In Grotmol, an image is only associated with the motor control command, not connected including a specific connection (even under that term's plain and ordinary meaning), let alone connected in a relationship that includes a link. As a result, Grotmol fails to disclose the claimed connections and, therefore claim 23.

I. Claim 29: Grotmol Does Not Disclose the Claimed Detecting of Objects, Generating Representations of the Detected Objects, and Generating New Digital Pictures From the Representations of the Detected Objects

114. Claim 29 depends from claim 4 and requires, among other things:

> wherein the ***generating the new one or more digital pictures includes***: ***detecting one or more objects*** in the first device's surrounding or the second device's surrounding; ***generating one or more representations of the one or more objects***; and ***generating the new one or more digital pictures that include the one or more representations of the one or more objects***.

Ex. 1001, Claim 29 (emphasis added).

115. First, in my opinion Grotmol fails to disclose "generating the new one or more digital pictures includes: detecting one or more objects in the first device's surrounding or the second device's surrounding." Grotmol discloses simply capturing images (that happen to have some objects depicted therein) by a camera and not the specifically recited detecting of objects outside of or in addition to capturing the image to then use the detected objects in generating the new image. While Petitioner points to Grotmol's generic disclosure of object detection and recognition, 583.1 Petition, 59, and that images may generally comprise representations of objects, *id.*, object detection and recognition and object representations are not used to generate a new digital picture as required

by claim 29. The detected objects in claim 29 are separate entities from the new generated digital picture (as recited in claim 29) and are detected prior to the generating of the new digital picture in order to then be used to generate the new digital picture, whereas objects in Grotmol are depicted in and are a part of the image captured by a camera and are never detected to be used to generate the image. Nothing in Grotmol discloses that the new digital picture is generated using the separate previously detected objects recited in the first step of claim 29.

116. Grotmol also fails to disclose "generating the new one or more digital pictures includes: generating one or more representations of the one or more objects." "Generating one or more representations of the one or more objects" in claim 29 refers to the "one or more objects" detected in the prior step of "detecting one or more objects in the first device's surrounding or the second device's surrounding," which Grotmol does not disclose as I discussed above. Thus, Grotmol does not disclose generating one or more representations of the detected one or more objects that Grotmol has not disclosed. Petitioner's assertion that "autonomous operation of a robot may be based in part on recognized objects and their characteristics and that the images may include representations of the objects detected in the device's surroundings," 583.1 Petition, 60, talks about operation of a robot that may be based in part on recognized objects, not that a new digital picture is generated using detected objects and using generated

representations of the detected objects as claimed in claim 29. Grotmol captures images by a camera but never detects objects in those images in order to generate representations of the detected objects in order to then generate a new digital picture as required by claim 29.

117. Finally, Grotmol fails to disclose "generating the new one or more digital pictures includes: generating the new one or more digital pictures that include the one or more representations of the one or more objects." "Generating the new one or more digital pictures that include the one or more representations of the one or more objects" refers to the "one or more representations of the one or more objects" generated in the prior step of "generating one or more representations of the one or more objects," which Grotmol does not disclose as discussed above. Thus, Grotmol does not disclose generating the new one or more digital pictures that include the one or more representations of the detected one or more objects that Grotmol has not disclosed. Grotmol captures images by a camera but never detects objects in those images in order to generate representations of the detected objects in order to then generate a new digital picture based on those representations of the detected objects as required by claim 29.

118. Claim 29 provides a specific method for generating a new digital picture that is different than simply capturing images (that happen to have some

objects depicted therein) by a camera in my opinion. First, an object is detected in the first device's or second device's surroundings through processing of information from one or more sensors including, in some embodiments, images from a camera. Next, also through processing, a representation of the detected object is generated that is separate from the sensory information (i.e. original image, etc.) in which the object is detected. Finally, also through processing, the new digital picture is generated to include the representations of the detected objects. This is in contrast to Grotmol's disclosure of capturing an image by a camera that happens to have some objects depicted in the captured image. Nothing in Grotmol discloses a process of detecting objects, generating representations of the detected objects, and then generating a new picture based on the representations of the detected objects.

J. Claim 31: Grotmol Does Not Disclose the Claimed One Instruction Set Being a Representation of Another Instruction Set

119. Claim 31 depends from claim 4 and requires, among other things:

> wherein the generating the first one or more instruction sets for operating the first device includes ***generating the first one or more instruction sets for operating the first device as one or more representations of a second one or more instruction sets for operating the first device***.

Ex. 1001, Claim 31 (emphasis added).

120. Grotmol fails to disclose "generating the first one or more instruction sets for operating the first device as one or more representations of a second one or more instruction sets for operating the first device." Petitioner points to the fact that the "system may be configured to remove a learned behavior," and that "[w]hen the system then uses the reloaded configuration, the system is generating the first instruction set as a representation of a second instruction set." 583.1 Petition, 61-62. This statement is conclusory. Petitioner is also wrong since "remove a learned behavior," and "reloaded configuration" are vastly different concepts than the first instruction set being generated as a representation of a second instruction set in my opinion. In fact, Petitioner's "remove a learned behavior," and "reloaded configuration" do not mention anything about one instruction set that represents another instruction set. For example, an instruction set that represents another instruction set in claim 31 includes a more generalized instruction set that can be used more flexibly on multiple different types of devices in my opinion. Grotmol's disclosure of simply obtaining an instruction set executed by the robot does not disclose another instruction set that is a representation of the original instruction set.

X. 583.2 PETITION: THE ALLEGED PRIOR ART DOES NOT DISCLOSE OR SUGGEST CERTAIN CLAIMS OF THE '583 PATENT

121. In my opinion, the alleged prior art fails to disclose or suggest to a

POSA all of the elements of claims 10, 11, 25, 27 and 30 of the ’583 Patent under the three grounds presented in the 583.2 Petition. Each ground is addressed individually below.

1. Ground 1 Fails

122. Regarding Ground 1, in my opinion Petitioner fails to show that Grotmol in view of the knowledge of a POSA renders claims 10 and 11 of the ’583 patent obvious. Petitioner fails to show that Grotmol discloses or suggests multiple limitations in these claims, and Petitioner’s attempt to rely on the knowledge of a POSA to fill in the gaps in Grotmol’s disclosure is ineffective in my opinion.

A. Claim 10: Grotmol Does Not Disclose or Suggest the Claimed Second Learning Process and Second User

123. Claim 10, which depends from claim 4, states, in part:

> wherein the knowledgebase further includes a second one or more digital pictures correlated with a second one or more instruction sets for operating the first device, wherein at least a portion of the first one or more digital pictures or at least a portion of the first one or more instruction sets for operating the first device is learned in a first learning process that includes operating the first device at least partially by a first user, and wherein at least a portion of the second one or more digital pictures or at least a portion of the second one or more instruction sets

> for operating the first device ***is learned in a second learning process that includes operating the first device at least partially by a second user.***

Ex. 1001, Claim 10 (emphasis added).

124. In my opinion, Grotmol in view of the knowledge of a POSA fails to disclose or suggest the claimed "second user" and "second learning process." Grotmol only discloses ***one*** user operating ***one*** device in ***one*** learning process, and therefore fails to disclose any second learning process or second user. Grotmol fails to disclose or suggest the claimed "at least a portion of the second one or more digital pictures or at least a portion of the second one or more instruction sets for operating the first device is learned in a second learning process that includes operating the first device at least partially by a second user." Ex. 1001, Claim 10 (emphasis added).

125. Petitioner contends that "it would be obvious based on Grotmol in view of the knowledge of a POSITA to have a second user perform an additional training resulting in an additional correlation stored in the knowledgebase." 583.2 Petition, 25. Petitioner is wrong and provides no reasoned basis for its obviousness argument. Claim 10 claims a second user and a second learning process, and nothing in Grotmol even suggests these elements or provides a POSA a basis for implementing them. Further, in my opinion Petitioner has failed to provide a reason to modify Grotmol in view of the knowledge of a POSA to

achieve the claimed invention and has failed to provide evidence of a reasonable expectation of success in the proposed modification.

126. Petitioner contends that "Grotmol does not limit the number of users that can train the multiple behaviors for the robot, and a POSITA would have understood that different users can train different behaviors, particularly given that Grotmol describes the training of both simple and complex tasks." 583.2 Petition, 25. However, this argument is conclusory. Grotmol discloses only a single user, thus this single user performs the "training of both simple and complex tasks." Nothing in Grotmol suggests that one user trains the robot for simple tasks and another user trains the robot for complex tasks. Petitioner's contention that Grotmol in view of the knowledge of POSA would teach or suggest the above features of claim 10 is an unjustified leap, given that Grotmol does not even mention a second user, let alone a second learning process involving the second user.

127. I understand that the Board noted in an IPR involving similar claim limitations in another patent owned by Patent Owner that Grotmol discloses nothing "more than loading a trained configuration from a first robot to a second robot." Ex. 2010, 35 (Institution Decision in IPR2023-01054) (Board's discussion regarding claim 4 of U.S. Patent No. 10,452,974 (Ex. 2011)). The Board also questioned whether Petitioner had sufficiently shown that "Grotmol

discloses [an additional] correlation learned in another learning process . . . that is included as part of the knowledgebase along with the first and second correlations learned by the first robot." *Id.*, 35-36. I agree with the Board. The Board noted correctly that Grotmol's disclosure of loading a trained configuration from a first robot to a second robot does not constitute a second learning process. Grotmol fails to disclose or suggest anything that would make it obvious to a POSA that at least a portion of a second digital picture or at least a portion of the second one or more instruction sets is learned in a second learning process, and especially one that involves a second user.

128. Petitioner also contends that "[i]t would have been obvious to a POSITA that different trainers could be used to train behaviors involving different levels of complexity in order to take advantage of the varying skills and knowledge of trainers." 583.2 Petition, 25. But this is an unsupported assertion with no obviousness analysis provided. Also, since Grotmol discloses only a single user, this single user trains behaviors involving different levels of complexity. Nothing in Grotmol suggests that one user trains the robot for a task of one level of complexity and another user trains the robot for a task of another level of complexity. Thus, given that Grotmol does not even mention a second user, let alone a second learning process involving the second user, Grotmol in view of the knowledge of POSA does not disclose claim 10.

129. In my opinion, moreover, using different users with a device in different learning processes to learn mixed knowledge into a single knowledgebase would not have been straightforward or unusually simple to a POSA due to the complexities of combining the mixed knowledge into a single knowledgebase.

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

B. Claim 11: Grotmol Does Not Disclose or Suggest the Claimed Second Learning Process and Third Device

131. Claim 11 depends from claim 4 and requires, among other things:

> wherein the knowledgebase further includes a second one or more digital pictures correlated with a second one or more ***instruction sets for operating a third device***, and wherein at least a portion of the first one or more digital pictures or at least a portion of the first one or more instruction sets for operating

> the first device is learned in a first learning process that includes operating the first device at least partially by a first user, and wherein at least a portion of the second one or more digital pictures or at least a portion of the second one or more ***instruction sets for operating the third device*** is learned ***in a second learning process*** that includes operating ***the third device*** at least partially by: the first user, or a second user.

Ex. 1001, Claim 11 (emphasis added).

132. In my opinion, Grotmol fails to disclose or suggest the claimed second correlation including a "second one or more instruction sets for operating a third device" and "second learning process that includes operating the third device." Petitioner contends that loading trained configurations trained on other robots would be obvious. 583.2 Petition, 26. Petitioner is wrong and provides no basis for its obviousness argument. As discussed above with respect to claim 10, Grotmol only discloses ***one*** user operating ***one*** device in ***one*** learning process. The knowledge gained from this process in Grotmol, when loaded into another device, is still knowledge of one user operating one device in one learning process, which is about loading the knowledge previously learned on one robot into another robot and not about learning at least a portion of a second digital picture or at least a portion of the second instruction set for operating the third device in a second learning process that includes operating the third device, as required by claim 11.

133. Petitioner refers to the knowledge of a POSA as providing the claimed second learning process, but I disagree. 583.2 Petition, 26. Petitioner's statements lack the required explanation or support. Further, I understand that the Board noted in an IPR involving similar claim limitations in another patent owned by Patent Owner that Grotmol discloses nothing "more than loading a trained configuration from a first robot to a second robot." Ex. 2010, 35 (Institution Decision in IPR2023-01054) (Board's discussion regarding claim 4 of U.S. Patent No. 10,452,974 (Ex. 2011)). The Board also questioned whether Petitioner had sufficiently shown that "Grotmol discloses [an additional] correlation learned in another learning process by a second robot that is included as part of the knowledgebase along with the first and second correlations learned by the first robot." *Id.*, 35-36. I agree with the Board and the Board noted correctly that loading a trained configuration from a first robot to a second robot does not constitute another learning process. In my opinion Grotmol fails to disclose anything that would make it obvious to a POSA that at least a portion of a second digital picture or at least a portion of the second one or more instruction sets is learned in a second learning process, and especially one that involves operating a third device.

134. Petitioner contends that "a POSITA would have recognized the advantages of training across multiple robots" using multiple configurations.

583.2 Petition, 26. Petitioner's contention is conclusory. Petitioner describes a situation involving trained configurations each stored and learned on a different robot, whereas claim 11 specifically recites a single knowledgebase (as opposed to multiple configurations) that includes mixed knowledge of one correlation learned in one learning process (as recited in claim 1 from which claim 11 ultimately depends) involving one device and an additional correlation learned in a second learning process involving a third device (as recited in claim 11). Further, in my opinion Petitioner has failed to provide a reason to modify Grotmol in view of the knowledge of a POSA to achieve the claimed invention and has also failed to provide evidence of a reasonable expectation of success in the proposed modification.

135. In addition, using multiple learning processes to learn mixed knowledge involving different devices into a single knowledgebase would not have been straightforward or unusually simple to a POSA due to the complexities of combining the mixed knowledge involving different devices into a single knowledgebase.

136. Enabling a system to learn mixed autonomous operation knowledge from multiple learning processes involving different devices and integrate such knowledge into a single knowledgebase is an approach not disclosed or suggested in Grotmol and not obvious to a POSA in my opinion. For example, this approach

may involve combining the learned knowledge into a coherent knowledge structure, combining the learned knowledge from the different learning processes, combining the learned knowledge from the different devices, and/or other issues not found in Grotmol and not obvious to a POSA.

2. Ground 2 Fails

137. Regarding Ground 2, in my opinion Petitioner fails to show that Grotmol in view of Hickman renders claims 25 and 27 obvious. Petitioner has failed to show that Grotmol's training sets and Hickman's shared robot knowledgebase would have been predictably combined by a POSA to arrive at the claimed inventions, as I explain below.

A. Claims 25 and 27: It Would Not Have Been Obvious to Combine Grotmol and Hickman to Arrive At the Claimed Inventions

138. Combining Hickman's shared knowledgebase with Grotmol's training sets would not have been predictable or obvious because Hickman specifically teaches away from or discourages using the claimed correlations (as recited in claims 25 and 27 and discussed below) in my opinion. Hickman discloses storing instruction sets and images separately in separate knowledgebases (images in Unique Object Knowledge Base 307 and instructions in Task Knowledge Base 309, *see* Ex. 1005, Fig. 3), which a POSA would have found to be incompatible with Grotmol's disclosure of training sets or

correlations with images and instruction sets correlated and stored together.

139. Petitioner has not adequately explained how the correlations disclosed by Grotmol would have been combined with the knowledgebase in Hickman to arrive at the claimed invention of claims 25 and 27 in my opinion. Since correlations of images and instruction sets are fundamental to the operation of the system info Grotmol, Hickman must disclose correlations in order to be combinable with Grotmol at all for Petitioner's proposed combinations regarding claims 25 and 27. However, Hickman teaches away from the correlations in Grotmol by disclosing images and instructions in separate knowledgebases that are not correlated. Petitioner is using improper hindsight analysis and speculation to pick and choose high level concepts from each reference without mapping each reference to each specific claim element to arrive at the claimed invention and explaining why a POSA would have found the combination of these references to be predictable and operable with a reasonable expectation of success.

140. In my opinion, the specific claim language of claims 25 and 27 cannot be carved up and then stitched back together using the broad concepts disclosed in Grotmol and Hickman. As I mentioned, Grotmol discloses one user operating one device in one learning process. The knowledge gained from this process in Grotmol, when loaded into a second device, is still knowledge of one user operating one device in one learning process. Further, Hickman's simple

cloud storage of instances of single object information does not contemplate using correlations to learn knowledge for autonomous operation as required by claims 25 and 27. Petitioner's obviousness analysis is also deficient because it fails to explain what specific claim limitation is missing from Grotmol and how Hickman discloses the missing claim limitation.

141. Petitioner's use of impermissible hindsight to arrive at the claimed invention is highlighted in its statement that "it would have been obvious to combine Hickman's shared robot knowledge base with Grotmol's autonomous robot system such that the shared knowledgebase includes the training of multiple robots by multiple users." 583.2 Petition, 35. In my opinion, Petitioner is using the claimed use of correlations, multiple users, and multiple devices as a roadmap for its obviousness combination. This is impermissible hindsight, as neither Grotmol nor Hickman, alone or in combination, discloses or suggests the claimed inventions. And it would not have been obvious to a POSA to use Hickman's simple cloud storage method – disclosing no correlations – with Grotmol's single-device training sets to arrive at the claimed inventions. Further, in my opinion Petitioner has failed to provide a reason to modify or combine the prior art to achieve the claimed invention and has also failed to provide evidence of a reasonable expectation of success in the proposed combination.

142. Petitioner's proposed combination would also not have been

obvious because Hickman teaches away from the claimed invention of claims 25 and 27. Specifically, as shown in Figure 3 from Hickman below, Hickman teaches that images are stored in one knowledgebase 307 while instruction sets are stored separately (i.e. uncorrelated***)*** in another knowledgebase 309. Ex. 1005, 13:64-21:39. In light of this storage structure, and that Grotmol allegedly discloses that training sets stored in memory include ***correlated*** images and instruction sets that are ***stored together***, Ex. 1005, 3:35-49, a POSA would have found that Hickman teaches away from Grotmol's approach, and a POSA would not have been motivated to combine Grotmol and Hickman in the manner proposed by Petitioner.

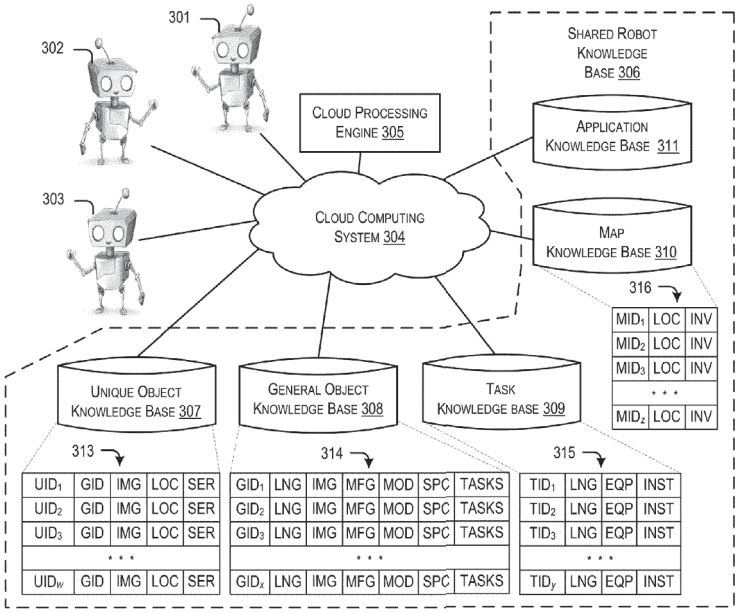

FIGURE 3

Ex. 1007, Fig. 3.

B. Claim 25: Grotmol and Hickman Do Not Disclose or Suggest the Claimed Second Device Performing Operations Defined by Instruction Sets for Operating a First Device Involving a Server

143. Claim 25 depends from claim 4 and requires, among other things:

> a server that receives from the first device at least one of: the first one or more digital pictures, or the first one or more instruction sets for operating the first device, and wherein ***the second device receives from the server*** at least one of: the first one or more digital picture or the first one or more ***instruction sets for operating the first device***, and wherein the ***second device is caused to perform*** the one or more operations defined by the first one or more ***instruction sets for operating the first device***.

Ex. 1001, Claim 25 (emphasis added).

144. Hickman's failure to disclose and teaching away from fundamental elements including the claimed correlation of the claimed digital picture with the claimed instruction set as I discussed above confirms that the Grotmol-Hickman combination proposed by Petitioner is deficient and that Hickman cannot be used to provide any missing elements from Grotmol to arrive at claim 25.

145. Petitioner's attempt to stitch together high level concepts from Grotmol and Hickman to arrive at the claimed invention is improper in my opinion and fails to adequately and properly explain how each claimed element of claim 25 is disclosed by either reference. Petitioner's contention that Grotmol's

training sets could be combined with Hickman to arrive at the claimed invention is not correct. 583.2 Petition, 30-33. The claimed second device must receive from the server either the first digital picture or the first one or more instruction sets, and the second device must perform operations defined by the instruction set for operating the first device. The simple knowledgebase that includes uncorrelated images and instructions in Hickman never mentions or discloses anything like the concept of a correlation with an instruction set for operating a first device that is used to operate a second device involving a server.

146. While the Petition is unclear in my opinion, if Petitioner relies on Hickman to teach the use of a shared knowledgebase with learned multiple behaviors from multiple robots and on Grotmol to disclose digital pictures correlated with the various instruction sets, then this combination of high level concepts fails to disclose or suggest the invention as claimed. In my opinion, claim 25 encompasses more than simply the combination of an additional correlation for a second device in a shared knowledgebase. The specific limitations of claim 25 require that ***the second device must receive*** the first digital picture or first instruction set for the first device and then ***perform operations defined by that instruction set***. This requires a sophisticated approach where knowledge is stored and processed using instruction sets correlated with a digital picture in a specific manner and ultimately transferred from one device to be used

on another device. While Hickman discloses additional devices performing certain functions and Grotmol discloses training sets, neither reference discloses the specifically claimed devices operating using correlations in the claimed manner.

147. Although I understand that Hickman discloses a cloud system that can generally learn from multiple devices, it does not disclose the claimed digital picture used with instruction sets in the claimed correlation involving the second device. Hickman fails to disclose any correlations at all and teaches away from correlations, as images and instruction sets in Hickman are stored separately in separate knowledgebases.

C. Claim 27: Grotmol and Hickman Do Not Disclose or Suggest the Claimed Knowledgebase Including Mixed Correlations, Second Correlation Including Instruction Sets for Operating a Third Device, Determining the Instruction Sets for Operating the Third Device, and Causing a Fourth Device to Perform Operations Defined by the Instruction Sets for Operating the Third Device

148. Claim 27 depends from claim 4 and requires, among other things:

> wherein ***the first one or more digital pictures correlated with the first one or more instruction sets for operating the first device are included in a knowledgebase***, and wherein the ***knowledgebase further includes a second one or more digital pictures correlated with a second one or more instruction sets for operating a third device***, and wherein the machine

> readable code, when executed by the one or more processors, causes the one or more processors to further perform at least:
>
> receiving or generating an additional one or more digital pictures;
>
> ***determining the second one or more instruction sets for operating the third device*** based on at least partial match between the additional one or more digital pictures and the second one or more digital pictures; and
>
> at least in response to the determining the second one or more instruction sets for operating the third device, ***causing a fourth device to perform one or more operations defined by the second one or more instruction sets for operating the third device***.

Ex. 1001, Claim 27 (emphasis added).

149. Hickman's failure to disclose and teaching away from fundamental elements including the claimed correlation of the claimed digital picture with the claimed instruction set as discussed above confirms that the Grotmol-Hickman combination proposed by Petitioner is deficient and that Hickman cannot be used to provide any missing elements from Grotmol to arrive at claim 27.

150. In my opinion, Grotmol and Hickman first fail to disclose or suggest "wherein the first one or more digital pictures correlated with the first one or more instruction sets for operating the first device are included in a knowledgebase,

and wherein the knowledgebase further includes a second one or more digital pictures correlated with a second one or more instruction sets for operating a third device." As I discussed above with respect to claims 10 and 11 in Ground 1 and claim 25 in Ground 2, Grotmol discloses one user operating one device in one learning process and even when loaded into a second device, this is still knowledge of one user operating one device in one learning process that fails to even contemplate the specifically recited single knowledgebase that includes mixed knowledge of one correlation including instruction sets for operating a first device and an additional correlation including instruction sets for operating a third device. On the other hand, Hickman discloses storing images and instructions separately in separate knowledgebases (see Ex. 1005, Fig. 3) that is not a correlation. Hence, Hickman does not disclose or suggest (and further teaches away from) ***any*** correlations including ***any*** digital pictures correlated with ***any*** instruction sets, let alone the claimed correlations in the single knowledgebase as required by claim 27.

151. Next, in my opinion Grotmol and Hickman fail to disclose or suggest a "second one or more digital pictures correlated with a second one or more instruction sets for operating a third device." As I discussed above, Grotmol discloses one user operating one device in one learning process and even when loaded into a second device, this is still knowledge of one user operating one

device in one learning process that does not disclose a correlation that includes instruction sets for operating a third device. On the other hand, Hickman does not disclose or suggest ***any*** correlations (images and instructions are stored in separate uncorrelated knowledgebases [see Ex. 1005, Fig. 3]), let alone the claimed correlation that includes instruction sets for operating a third device.

152. Next, Grotmol and Hickman fail to disclose or suggest "determining the second one or more instruction sets for operating the third device based on at least partial match between the additional one or more digital pictures and the second one or more digital pictures." Petitioner argues that Grotmol discloses determining instructions for a third device using a partial match. 583.2 Petition, 36-37. This argument is conclusory and not supported by Grotmol. Grotmol discloses one user operating one device in one learning process. On the other hand, Hickman does not disclose or suggest ***any*** correlations (images and instructions are stored in separate uncorrelated knowledgebases [see Ex. 1005, Fig. 3]), let alone the claimed use of correlations ***used in the matching for the determining step*** (note that the determining the second instruction set is based on its correlation with the second digital picture recited in claim 27).

153. Finally, in my opinion, Grotmol and Hickman fail to disclose or suggest that "in response to the determining the second one or more instruction sets for operating the third device, causing a fourth device to perform one or more

operations defined by the second one or more instruction sets for operating the third device." First, since Grotmol and Hickman fail to disclose or suggest the determining of the second instruction set for operating the third device based on the matching as particularly claimed and discussed above, they must also fail to disclose the claimed performance of operations defined by those determined instruction sets. Second, regardless of the determining, Grotmol and Hickman do not teach or suggest the particular claimed limitations involving instruction sets for operating the specific third device and causing a specific fourth device to perform operations defined by the instruction sets for operating the specific third device. As discussed above, (i) Grotmol discloses one user operating one device in one learning process that does not disclose instruction sets for operating a third device that are used on a fourth device, (ii) Hickman does not disclose or suggest any correlations including any instruction sets (images and instructions are stored in separate uncorrelated knowledgebases [see Ex. 1005, Fig. 3]), and (iii) both references do not mention third and fourth devices at all, let alone the multiple recited elements that incorporate the third and fourth devices.

154. Petitioner's discussion of high level concepts from Grotmol and Hickman again fails to adequately and properly explain how each claimed element of claim 27 is disclosed by either reference in my opinion. Petitioner's contention that Grotmol's training sets could be combined with Hickman to arrive

at the claimed correlated digital picture is not correct. 583.2 Petition, 35-37. The simple knowledgebase that includes uncorrelated images and instructions in Hickman never mentions, let alone discloses, anything like the concept of a correlation with an instruction set for operating a third device and the other specifically claimed elements of the additional correlations.

155. If Petitioner relies on Hickman to teach the use of a shared knowledgebase and on Grotmol to disclose digital pictures correlated with the various instruction sets, then this combination of high level concepts fails to disclose or suggest the invention as claimed. Claim 27 recites more than simply the combination of an additional correlation in a shared knowledgebase in my opinion. The specific limitations of claim 27 require that the correlation must include one or more instruction sets specifically "for operating the third device," the system must generate or receive an additional "digital picture," the system must determine "instruction sets [specifically] for operating the third device based on at least partial match between the additional one or more digital pictures and the second one or more digital pictures," and must "caus[e] a [specific] fourth device to perform one or more operations defined by the second one or more instruction sets for operating the [specific] third device." While Hickman generally discloses additional devices performing certain functions and Grotmol discloses training sets, neither reference discloses or suggests the specifically

claimed devices operating using correlations, instruction sets, and other recited elements in the claimed manner.

156. Petitioner's statement that "[i]n the combination of Grotmol and Hickman any number of robots would be autonomously operated using the shared knowledgebase," 583.2 Petition, 36, highlights Petitioner's failure to map specific disclosures of the references to the actual language of claim 27. Petitioner does not explain how the references disclose the sharing of the knowledgebase or how this sharing reads on the specific elements as claimed. Petitioner's statement that "[t]he combination discloses a knowledge base that includes digital pictures correlated with instructions for operating a first robot, and digital picture correlated with instructions for operating a second robot," 583.2 Petition, 35, is conclusory and also fails to map the disclosure of the references to the specifically claimed elements.

157. Petitioner has failed to carry its burden to show which specific claim elements are disclosed by which prior art reference. Petitioner's argument that Hickman's general disclosure of the storage of "robot experiences" reads on the claimed invention is not persuasive and oversimplifies the claimed invention. 583.2 Petition, 35. Claim 27 requires that the correlation must include one or more instruction sets specifically "for operating the third device," the system must generate or receive an additional "digital picture," the system must

determine "instruction sets [specifically] for operating the third device based on at least partial match between the additional one or more digital pictures and the second one or more digital pictures," and "causing a [specific] fourth device to perform one or more operations defined by the second one or more instruction sets for operating the [specific] third device."

3. Ground 3 Fails

158. Regarding Ground 3, in my opinion Petitioner has not established that Grotmol in view of Hoffman renders claim 30 of the '583 patent obvious. Grotmol and Hoffman fail to disclose or suggest certain limitations of claim 30, as discussed below, and it would not have been obvious to combine the teachings of the references to arrive at the invention of claim 30.

A. Claim 30: It Would Not Have Been Obvious to Combine Grotmol and Hoffman to Arrive At the Claimed Invention

159. In my opinion, it would not have been obvious to combine Grotmol with Hoffman to arrive at the claimed invention because Grotmol discloses a system for ***autonomous*** robot operation, whereas Hoffman is a system for ***user-controlled (i.e. manual)*** robot operation. As I discussed above, Grotmol uses training sets and matching to achieve autonomous operation, while Hoffman discloses a simple user-operated robot. A POSA would not have been motivated nor would have looked to the augmented map in the user-controlled system of

Hoffman to modify the autonomous system in Grotmol to arrive at the claimed invention because both references disclose vastly different systems.

160. While Petitioner provides highly general obviousness arguments regarding combining Grotmol and Hoffman, 583.2 Petition, 37-40, Petitioner provides no specific obviousness analysis to justify the combination of Grotmol and Hoffman to arrive at the invention of claim 30. For example, Petitioner fails to explain how the map in Hoffman would be used with the digital pictures claimed in Grotmol to arrive at the claimed invention and thus fails to show any likely results of the combination of these references. Further, in my opinion Petitioner has failed to provide sufficient reasoning to modify Grotmol with Hoffman to achieve the claimed invention and has also failed to provide evidence of a reasonable expectation of success in the proposed modification.

161. Petitioner argues that it would have been obvious to combine Grotmol and Hoffman "in order to provide more detailed information about the robot's surroundings to the user," 583.2 Petition, 40, but in my opinion Petitioner fails to specifically explain why it would have been obvious to a POSA to modify Grotmol's system with Hoffman's map. Further, Petitioner's use of impermissible hindsight to arrive at the claimed invention is highlighted in its obviousness argument in my opinion. Petitioner is using the claimed use of locations and a top-down view as a roadmap for its obviousness combination.

B. Claim 30: Grotmol and Hoffman Do Not Disclose or Suggest Several Limitations of Claim 29, From Which Claim 30 Depends

162. Claim 30 depends from claim 29, and claim 29 requires, among other things:

> wherein the ***generating the new one or more digital pictures includes***: ***detecting one or more objects*** in the first device's surrounding or the second device's surrounding; ***generating one or more representations of the one or more objects***; and ***generating the new one or more digital pictures that include the one or more representations of the one or more objects***.

Ex. 1001, Claim 29 (emphasis added). Petitioner contends that Grotmol discloses claim 29, 583.2 Petition, 40-42, but Grotmol fails to disclose or suggest several limitations of claim 29. Because Grotmol fails to disclose or suggest such elements of claim 29, and because claim 30 depends from claim 29, Grotmol and Hoffman fail to disclose or suggest all of the limitations of claim 30.

163. First, in my opinion Grotmol fails to disclose or suggest "generating the new one or more digital pictures includes: detecting one or more objects in the first device's surrounding or the second device's surrounding," as required by claim 29. Grotmol discloses simply capturing images (that happen to have some objects depicted therein) by a camera and not the specifically recited detecting of objects outside of or in addition to capturing the image to then use the detected

objects in generating the new image. While Petitioner points to Grotmol's generic disclosure of object detection and recognition, 583.2 Petition, 40-42, and that images may generally comprise representations of objects, *id.*, object detection and recognition and object representations are not used to generate a new digital picture as required by claim 29. The detected objects in claim 29 are separate entities in my opinion from the new generated digital picture (as recited in claim 29) and are detected prior to the generating of the new digital picture in order to then be used to generate the new digital picture, whereas objects in Grotmol are depicted in and are a part of the image captured by a camera and are never detected to be used to generate the image. Nothing in Grotmol discloses or suggests that the new digital picture is generated using the separate previously detected objects recited in the first step of claim 29.

164. Grotmol also fails to disclose or suggest "generating the new one or more digital pictures includes: generating one or more representations of the one or more objects." "Generating one or more representations of the one or more objects" in claim 29 refers to the "one or more objects" detected in the prior step of "detecting one or more objects in the first device's surrounding or the second device's surrounding," which Grotmol does not disclose or suggest as I discussed above. Petitioner's assertion that "autonomous operation of a robot may be based in part on recognized objects and their characteristics and that the images may

include representations of the objects detected in the device's surroundings," 583.2 Petition, 42, mentions operation of a robot that may be based in part on recognized objects, not that a new digital picture is generated using detected objects and using generated representations of the detected objects as claimed in claim 29. Grotmol captures images by a camera but never detects objects in those images in order to generate representations of the detected objects in order to then generate a new digital picture as required by claim 29.

165. Finally, in my opinion Grotmol fails to disclose or suggest "generating the new one or more digital pictures includes: generating the new one or more digital pictures that include the one or more representations of the one or more objects." "Generating the new one or more digital pictures that include the one or more representations of the one or more objects" refers to the "one or more representations of the one or more objects" generated in the prior step of "generating one or more representations of the one or more objects," which Grotmol does not disclose or suggest as I discussed above. Grotmol captures images by a camera but never detects objects in those images in order to generate representations of the detected objects in order to then generate a new digital picture based on those representations of the detected objects as required by claim 29.

166. In my opinion, claim 29 requires a specific method for generating a

new digital picture that is different than simply capturing images (that happen to have some objects depicted therein) by a camera. First, an object is detected in the first device's or second device's surroundings through processing of information from one or more sensors including, in some embodiments, images from a camera. Next, also through processing, a representation of the detected object is generated that is separate from the sensory information (i.e. original image, etc.) in which the object is detected (note that detected objects and their generated representations are specifically recited as separate from the new digital picture being generated from them in claim 29). Finally, also through processing, the new digital picture is generated to include the representations of the detected objects. This is in contrast to Grotmol's disclosure of capturing an image by a camera that happens to have some objects depicted in the captured image. Nothing in Grotmol discloses or suggests this process. Grotmol fails to disclose or suggest all of the limitations of claim 29, and thus Petitioner's argument that Grotmol and Hoffman disclose or suggest claim 30 fails, because claim 30 depends from claim 29.

C. Claim 30: Grotmol and Hoffman Do Not Disclose or Suggest Detecting Locations and the New Digital Picture Including a Top-Down View of the One or More Representations of the One or More Objects

167. Claim 30 states in part:

> wherein the detecting the one or more objects in the first device's

> surrounding or the second device's surrounding includes ***detecting at least one or more locations of the one or more objects***, and wherein the ***new one or more digital pictures include a top-down view of the one or more representations of the one or more objects***.

Exhibit 1001, Claim 30 (emphasis added).

168. Grotmol and Hoffman first fail to disclose or suggest the claimed "detecting at least one or more locations of the one or more objects." Petitioner contends that "Grotmol discloses detecting one or more objects in the first device's surrounding, which would include detecting the locations of the one or more objects," 583.2 Petition, 42, as required by claim 30, but this contention is wrong. None of the portions of Grotmol cited by Petitioner actually discloses that Grotmol's system detects the locations of one or more objects. In fact, the Petition makes no mention of Grotmol's detecting the locations of those objects, as Grotmol only discloses detecting objects. Further, I understand that Petitioner never contends that Hoffman discloses this limitation. Because Grotmol and Hoffman fail to disclose or suggest detecting locations of objects, Grotmol in view of Hoffman fails to disclose claim 30 in my opinion.

169. Grotmol and Hoffman next fail to disclose or suggest the claimed "new one or more digital pictures include a top-down view of the one or more representations of the one or more objects." Petitioner concedes that "Grotmol

does not expressly disclose that the new one or more digital pictures include a top-down view of the one or more representations of the one or more objects," 583.2 Petition, 42-43, but then makes the unsupported assertion that "this would have been obvious in view of Hoffman's augmented map of a robot's surroundings" *Id.*, 43. Hoffman's augmented map cannot be the claimed "new one or more digital pictures" because the new digital picture in claim 30 is not a general picture that includes some objects like a map in Hoffman, but a picture generated by a picture generation process specifically defined in claim 29.

170. Hoffman's augmented map cannot be the claimed "new one or more digital pictures" because the map is not a picture generated by the picture generation process specifically defined in claim 29. The picture generation process of claim 29 specifically includes:

> (i) detecting one or more objects in the first device's surrounding or the second device's surrounding;
>
> (ii) generating one or more representations of the one or more objects; and
>
> (iii) generating the new one or more digital pictures that include the one or more representations of the one or more objects.

Ex. 1001, Claim 29. Petitioner contends that Grotmol discloses this process, 583.2 Petition, 40-42, but as discussed above that is not correct. Hoffman must therefore

disclose this picture generation process in order to disclose the new digital picture in claim 30 that is the result of this process and that includes "a top-down view of the one or more representations of the one or more objects." But in my opinion no such picture generation process is even contemplated in Hoffman at all to enable generation of the claimed new digital picture.

XI. CONCLUSION

171. 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.

172. 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: April 15, 2024

Dr. Eli Saber