

**IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE**

ROBOTICVISIONTECH, INC.

Plaintiff,

v.

ABB INC.

Defendant.

C.A. No. 22-cv-1257-GBW

DEFENDANT’S INITIAL INVALIDITY CONTENTIONS

Pursuant to Paragraph 3(d) of the Scheduling Order (D.I. 48), Defendant ABB Inc. (“ABB”) hereby provides its Initial Invalidity Contentions.

I. ASSERTED PATENTS AND CLAIMS

Plaintiff RoboticVISIONTech, Inc. (“RVT”) served its Initial Infringement Contentions (“Infringement Contentions”) on November 8, 2023 asserting infringement of the following claims (“Asserted Claims”) of U.S. Patent Nos. 6,816,755 (the “’755 Patent”), 7,336,814 (the “’814 Patent”), and 8,095,237 (the “’237 Patent”) (collectively, the “Patents-in-Suit”):

Patent-In-Suit	Asserted Claim(s)	Invalidity Contention Exhibit	Invalidity Charts
6,816,755	1–15 and 17–19	A	A1–A4
7,336,814	1–39	B	B1–B3
8,095,237	1–5, 7–17, and 20–28	C	C1–C5

As shown in the table above, ABB provides its Initial Invalidity Contentions for each of the Patents-in-Suit in Exhibits A through C, which contain charts identifying examples of where each element in each Asserted Claim identified above is disclosed, described, or taught in the prior art. These contentions are subject to ABB’s reservation of rights as set forth below.

II. RESERVATION OF RIGHTS

ABB hereby provides its Initial Invalidity Contentions pertaining to the Asserted Claims listed in the table above in a good-faith effort to comply with Paragraph 3(d) of the Scheduling Order (D.I. 48). ABB bases these Initial Invalidity Contentions on its current knowledge and understanding of RVT's Infringement Contentions, the prior art, and other facts and information available as of the date of these contentions. Discovery is ongoing and ABB has not yet completed its investigation, collection of information, discovery, or analysis relating to this action. ABB reserves the right to supplement these contentions based on such discovery and to introduce and use such supplemental materials at trial.

The art cited in the claim charts is illustrative and not exhaustive. Further, the citations presented in the claim charts for a claim limitation are for exemplary purposes only and should not be deemed exhaustive. Other portions of the identified prior art may additionally, implicitly, expressly, or inherently, disclose one or more limitations of the Asserted Claims or render one or more limitations of the Asserted Claims obvious. ABB reserves the right to rely on such uncited portions of the identified prior art to establish the invalidity of the Asserted Claims. Similarly, where ABB cites to a patent figure in the charts, ABB incorporates the accompanying specification text describing that figure and vice-versa. Moreover, ABB reserves the right to rely on uncited portions of the identified prior art, other prior art, or expert testimony to provide context to or aid in understanding the identified prior art.

To the extent that prior art identified by ABB as anticipating is found not to anticipate, the prior art establishes that the claimed subject matter was obvious to a person of ordinary skill in the art at the time of the alleged invention. To the extent not anticipated, no Asserted Claim goes

beyond combining known elements to achieve predictable results or does more than choose between clear alternatives known to those of skill in the art.

Even if a particular claim element is not expressly found in one of the charted references, those charted references render the relevant Asserted Claims obvious without the need to combine with any other references, having in mind the information generally known to those skilled in the art, common sense, and/or routine innovation. Accordingly, ABB discloses each of the references cited as rendering obvious the Asserted Claims as shown in the charts referenced above. In addition, the charted references in combination with one or more of the other charted references render obvious the Asserted Claims.

As explained in these Initial Invalidity Contentions, it would have been obvious to a person of skill in the art at the time of the alleged invention of the Asserted Claims (“POSITA”) to combine the various references cited for one of the Patents-in-Suit so as to practice the Asserted Claims. In addition to the specific combinations of prior art and the specific combinations of groups of prior art disclosed, ABB reserves the right to rely on any other combination of prior art references disclosed in these Initial Invalidity Contentions. ABB further reserves the right to rely on combinations disclosed in the prosecution histories of the references cited in these Initial Invalidity Contentions. These obviousness combinations reflect ABB’s present understanding of the potential scope of the Asserted Claims that RVT appears to be advocating and should not be construed as ABB’s acquiescence to RVT’s interpretation of the Asserted Claims.

Any reference or combination of references that anticipates or makes obvious an asserted independent claim also makes obvious any Asserted Claim dependent on that independent claim because every element of each dependent claim was known by a person of ordinary skill in the art at the time of the alleged invention, and it would have been obvious to combine those known

elements with the independent claims at least as a matter of common sense and routine innovation. Accordingly, ABB contends that each Asserted Claim would have been obvious not only by the combinations explicitly defined in these contentions, but also by any combination of references that renders obvious an Asserted Claim.

Numerous prior art references, including those identified in the in the claim charts attached hereto, reflect common knowledge and the state of the art prior to the priority dates of the Patents-in-Suit. As it would be unduly burdensome to create detailed claim charts for the thousands of invalidating combinations, ABB has provided illustrative examples of such invalidating combinations herein and/or in the attached charts. For at least the reasons described herein, as well as in the attached claim charts, it would have been obvious to one of ordinary skill in the art to combine any of a number of prior art references, including any combination of those identified in the attached claim charts for one of the Patents-in-Suit, to meet the limitations of the Asserted Claims of that patent. As such, ABB's inclusion of exemplary combinations does not preclude ABB from identifying other invalidating combinations as appropriate.

To the extent RVT challenges a combination of prior art with respect to a particular element, ABB reserves all rights to supplement these contentions to further specify the motivation to combine the prior art. ABB may rely on cited or uncited portions of the prior art, other documents, and/or expert testimony to establish that a person of ordinary skill in the art would have been motivated to modify or combine the prior art so as to render the Asserted Claims invalid as obvious.

The identification of any patent or patent publication shall be deemed to include any counterpart patent or application filed, published, or issued anywhere in the world. The citation to any specifications published by standard-setting organizations shall be deemed to include any

product that implements such specifications and that would qualify as prior art under 35 U.S.C. § 102.

ABB further relies on and incorporates all prior art references cited in and/or on the covers of the Patents-in-Suit and their respective prosecution histories, including for supporting the anticipation and/or obviousness of any Asserted Claim.

ABB further relies on and incorporates by reference, as if originally set forth herein, all invalidity positions, and all associated prior art and claim charts, disclosed to RVT in the course of any lawsuits or legal proceedings involving any of the Patents-in-Suit, or by potential or actual licensees to any of the Patents-in-Suit. ABB hereby discloses and identifies as if originally set forth herein, all prior art references listed and/or asserted above as invalidating prior art against each of the Asserted Claims. ABB further relies on and incorporates by reference, as if originally set forth herein, all invalidity positions, and all associated prior art and claim charts, disclosed in ABB's Petition for *Inter Partes* Review of the '237 Patent, filed with the Patent Trial and Appeal Board on September 22, 2023 in IPR No. 2023-1426.

ABB reserves the right to identify additional prior art references including patents, non-patent publications, as well as non-patent and non-publication prior art systems that were sold, offered for sale, used, etc. prior to the priority dates of the Patents-in-Suit, to the extent any such prior art becomes known during discovery in this case.

ABB reserves the right to modify, amend, or further supplement its Initial Invalidity Contentions to show the invalidity of any additional claims that the Court may allow RVT to later assert.

To the extent that these Initial Invalidity Contentions reflect or otherwise embody particular constructions of terms or phrases in the Asserted Claims, ABB is not proposing any such

constructions as proper constructions of those terms or phrases. Various positions put forth in these Initial Invalidity Contentions are predicated on RVT's incorrect and overbroad interpretation of its claims as evidenced by the Infringement Contentions it provided to ABB.¹ These Initial Invalidity Contentions are not intended to, and do not necessarily, reflect ABB's interpretation of the true and proper scope of the Asserted Claims. ABB reserves the right to adopt claim construction positions that differ from or even conflict with positions put forth in these Initial Invalidity Contentions. ABB also objects to any attempt to infer any claim constructions from any identification of potential prior art. In those instances where ABB asserts that the Asserted Claims are invalid under 35 U.S.C. § 112 (*e.g.*, no written description, not enabled, and/or indefinite), ABB has applied the prior art in accordance with its assumption that RVT contends such Asserted Claims (1) are definite, (2) have written description support, and (3) are enabled, as evidenced by RVT's Infringement Contentions. As such, ABB's Initial Invalidity Contentions do not represent its agreement or view as to the meaning, definiteness, written description support for, or enablement of any Asserted Claim. These Initial Invalidity Contentions and accompanying documents are not intended to reflect ABB's claim construction contentions, which will be disclosed in accordance with the Court's schedule.

ABB's contentions may change depending on the Court's construction of the Asserted Claims, any findings as to the priority dates of the Asserted Claims, and/or positions that RVT or its experts may take concerning claim construction, infringement, and/or invalidity issues. Prior art not included in this disclosure, whether known or unknown to ABB, may become relevant.

¹ For example, in its Initial Infringement Contentions, RVT asserts that PickMaster infringes the '814 Patent even though PickMaster predates the priority date of the '814 Patent. Accordingly, to the extent RVT's charts show PickMaster infringes the '814 Patent (they do not), PickMaster anticipates the '814 Patent. As another example, RVT includes PatMax functionality in its claim charts, and PatMax predates the Patents-in-Suit. Thus, to the extent RVT's charts show infringement (they do not), they also show anticipation and/or obviousness.

ABB is currently unaware of the extent, if any, to which RVT will contend that limitations of the Asserted Claims are not disclosed in the prior art identified by ABB, or will contend that any of the identified references do not qualify as prior art. To the extent that such an issue arises, ABB reserves the right to identify other references that, *inter alia*, would have made the addition of the allegedly missing limitation to the disclosed device or method obvious.

ABB also reserves the right to challenge the patentability of the Asserted Claims under 35 U.S.C. § 102(f) in the event ABB obtains evidence that the named inventors of the Patents-in-Suit did not invent the subject matter claimed therein. Should ABB obtain such evidence, it will provide the name of the person(s) from whom and the circumstances under which the invention or any part of it was derived. ABB further reserves the right to assert that the Patents-in-Suit are unenforceable due to inequitable conduct.

III. IDENTIFICATION OF PRIOR ART

Subject to ABB's reservation of rights, ABB identifies each item of prior art that at least evidences the obviousness of one or more of the Asserted Claims. RVT has not provided any documentation or corroborating evidence to demonstrate an earlier priority date than the filing date of each of the Patents-in-Suit. Accordingly, without admitting the priority of the Patents-in-Suit, for the purposes of these Initial Invalidity Contentions, ABB uses May 24, 2002 as the priority date for the '755 Patent, July 14, 2004 as the priority date for the '814 Patent, and January 31, 2002 as the priority date for the '237 Patent. Should RVT later assert an earlier priority date for any of the Patents-in-Suit, ABB reserves the right to amend its Initial Invalidity Contentions to reflect such earlier priority date.

In the following sections, Table 1 identifies each prior art patent by its number, first named inventor, filing or priority date, and date of issuance. Table 2 identifies each non-patent prior art

publication by, where possible, its title, date of publication, and author and/or publisher. Table 3 identifies each prior art system currently known to ABB by, where possible, its name and date of sale, use, or knowledge. ABB hereby discloses and identifies as if originally set forth herein, all prior art references listed and/or asserted in below as invalidating prior art against each of the Asserted Claims. ABB reserves the right to identify additional non-patent and non-publication prior art systems that were sold, offered for sale, used, etc. prior to the priority date(s) of the Patents-in-Suit to the extent any such systems become known during discovery of RVT and third parties.

Table 1: Prior Art Patents and Applications

Patent	Inventor	Filing Date/Priority Date	Published/Issue Date	Short Name
4,146,924	Birk et al.	Sep. 22, 1975	Mar. 27, 1979	Birk
4,219,847	Pinkney et al.	Mar. 1, 1978	Aug. 26, 1980	Pinkney
4,402,053	Kelley et al.	Sep. 25, 1980	Aug. 30, 1983	Kelley-053
4,412,293	Kelley et al.	Mar. 30, 1981	Oct. 25, 1983	Kelley-293
4,437,114	LaRussa	Jun. 7, 1982	Mar. 13, 1984	La Russa
4,601,055	Kent	Apr. 10, 1984	Jul. 15, 1986	Kent
4,630,225	Hisano	Sep. 29, 1982	Dec. 16, 1986	Hisano
4,639,878	Day et al.	Jun. 4, 1985	Jan. 27, 1987	Day
4,654,949	Pryor	Mar. 19, 1985	Apr. 7, 1987	Pryor-949
4,672,562	Egli et al.	Dec. 11, 1984	Jun. 9, 1987	Egli-562
4,672,564	Egli et al.	Nov. 15, 1984	Jun. 9, 1987	Egli-564
4,831,549	Red et al.	Jul. 28, 1987	May 16, 1989	Red
4,867,570	Sorimachi et al.	Dec. 22, 1988	Sep. 19, 1989	Sorimachi
4,893,183	Nayar	Aug. 11, 1988	Jan. 9, 1990	Nayar-183
4,942,539	McGee et al.	Dec. 21, 1988	Jul. 17, 1990	McGee
5,160,977	Utsumi	Jan. 19, 1990	Nov. 3, 1992	Utsumi
5,212,738	Chande et al.	Apr. 12, 1991	May 18, 1993	Chande
5,227,985	DeMenthon	Aug. 19, 1991	Jul. 13, 1993	DeMenthon-985
5,297,238	Wang et al.	Aug. 30, 1991	Mar. 22, 1994	Wang-238
5,380,978	Pryor	Jul. 12, 1991	Jan. 10, 1995	Pryor-978
5,388,059	DeMenthon	Dec. 30, 1992	Feb. 7, 1995	DeMenthon-059
5,471,541	Burtnyk et al.	Nov. 16, 1993	Nov. 28, 1995	Burtnyk

Patent	Inventor	Filing Date/Priority Date	Published/Issue Date	Short Name
5,506,682	Pryor	Feb. 16, 1982	Apr. 9, 1996	Pryor-682
5,696,673	Pryor	Oct. 12, 1984	Dec. 9, 1997	Pryor-673
5,729,471	Jain et al.	Mar. 31, 1995	Mar. 17, 1998	Jain-471
5,745,126	Jain et al.	Mar. 31, 1995	Apr. 28, 1998	Jain-126
5,802,201	Nayar et al.	Feb. 9, 1996	Sep. 1, 1998	Nayar-201
5,872,858	Kamada et al.	Sep. 17, 1992	Feb. 16, 1999	Kamada
5,918,196	Jacobson	Nov. 29, 1996	Jun. 29, 1999	Jacobson-196
5,956,417	Pryor	Feb. 16, 1982	Sep. 21, 1999	Pryor-417
5,959,425	Bieman et al.	Oct. 15, 1998	Sep. 28, 1999	Bieman
5,978,521	Wallack et al.	Sep. 25, 1997	Nov. 2, 1999	Wallack-521
5,995,214	Bruckstein et al.	Aug. 13, 1997	Nov. 30, 1999	Bruckstein
6,044,183	Pryor	Feb. 16, 1982	Mar. 28, 2000	Pryor-183
6,044,308	Huissoon	Jun. 13, 1997	Mar. 28, 2000	Huissoon
6,064,759	Buckley et al.	Nov. 8, 1996	May 16, 2000	Buckley
6,115,480	Washizawa	Mar. 27, 1996	Sep. 5, 2000	Washizawa
6,163,946	Pryor	May 11, 1981	Dec. 26, 2000	Pryor-946
6,167,607	Pryor	Jun. 7, 1995	Jan. 2, 2001	Pryor-607
6,173,066	Peurach et al.	May 21, 1997	Jan. 9, 2001	Peurach
6,194,860	Seelinger et al.	Nov. 1, 1999	Feb. 27, 2001	Seelinger
6,222,937	Cohen et al.	Feb. 16, 1996	Apr. 24, 2001	Cohen
6,243,106	Rehg et al.	Apr. 13, 1998	Jun. 5, 2001	Rehg
6,252,974	Martens et al.	Mar. 22, 1995	Jun. 26, 2001	Martens
6,300,974	Viala et al.	Feb. 13, 1998	Oct. 9, 2001	Viala
6,301,763	Pryor	May 17, 1981	Oct. 16, 2001	Pryor-763
6,304,050	Skaar et al.	Jul. 19, 1999	Oct. 16, 2001	Skaar
6,314,631	Pryor	May 11, 1981	Nov. 13, 2001	Pryor-631
6,437,823	Zhang	Apr. 30, 1999	Aug. 20, 2002	Zhang-823
6,526,165	Montillo et al.	Nov. 30, 1998	Feb. 25, 2003	Montillo-165
6,529,852	Knoll et al.	Nov. 12, 1999	May 14, 2001	Knoll
6,584,375	Bancroft et al.	May 4, 2001	Jun. 24, 2003	Bancroft
6,628,819	Huang et al.	Oct. 7, 1999	Sep. 30, 2003	Huang
6,681,151	Weinzimmer et al.	Dec. 15, 2000	Jan. 20, 2004	Weinzimmer
6,697,761	Akatsuka et al.	Sep. 13, 2001	Feb. 24, 2004	Akatsuka
6,789,039	Krumm	Apr. 5, 2000	Sep. 7, 2004	Krumm
7,024,280	Parker et al.	Jun. 14, 2001	Apr. 4, 2006	Parker
7,061,628	Franke et al.	Jun. 27, 2001	Jun. 13, 2006	Franke-628
U.S. Pub. No. 2001/0033685	Ishiyama	Apr. 3, 2001	Oct. 25, 2001	Ishiyama
U.S. Pub. No. 2001/0034481	Horn	Apr. 16, 1999	Oct. 25, 2001	Horn-481

Patent	Inventor	Filing Date/Priority Date	Published/Issue Date	Short Name
U.S. Pub. No. 2001/0055069	Hudson	Mar. 10, 2000	Dec. 27, 2001	Hudson
U.S. Pub. No. 2002/0159628	Matusik et al.	Apr. 26, 2001	Oct. 31, 2002	Matusik
U.S. Pub. No. 2003/0007159	Franke	Jun. 27, 2002	Jan. 9, 2003	Franke-159
U.S. Pub. No. 2004/0233461	Armstrong et al.	Jun. 16, 2000	Nov. 25, 2004	Armstrong-461
U.S. Pub. No. 2010/0040255	Rhoads	May 8, 1995	Oct. 20, 2009	Rhoads
U.S. Pub. No. 2010/0231706	Maguire, Jr.	Mar. 16, 1999	Sep. 16, 2010	Maguire
EP 0318188	Subbarao	Nov. 11, 1988	May 31, 1989	Subbarao-188
EP 0323681	Yuan	Jan. 5, 1988	Jul. 12, 1989	Yuan
EP 0408224	Subbarao	Jun. 29, 1990	Jan. 16, 1991	Subbarao-224
EP 0911603	Ersu	Oct. 22, 1997	Jun. 27, 2001	Ersu
EP 1043642	Watanabe et al.	Apr. 10, 2000	Oct. 11, 2000	Watanabe
JPH0713659	Tsujimura et al.	Jun. 18, 1993	Sep. 30, 2002	Tsujimura
JPH0882505	Yamada et al.	Sep. 12, 1994	Mar. 26, 1996	Yamada
JP2000263482	Kimura et al.	Mar. 17, 1999	Sep. 26, 2000	Kimura
WO 1998/07001	Schaack	Aug. 8, 1997	Feb. 19, 1998	Schaack
WO 2001/35054	Armstrong et al.	Nov. 13, 2000	May 17, 2001	Armstrong-054

Table 2: Non-Patent Prior Art Publications²

Author/Publisher	Title	Publication/Use Date	Short Name
Chen et al.	An Investigation On The Accuracy Of Three-Dimensional Space Reconstruction Using Direct Linear Transformation Techniques	Apr. 1994	Chen
Corke	Visual Control of Robots: High Performance Visual Servoing	1996	Corke
De Ma	A Self-Calibration Technique for Active Vision Systems	Feb. 1996	De Ma
DeMenthon et al.	Model-Based Object Pose in 25 Lines of Code	June 1995	DeMenthon

² The dates in this column are the latest dates on which the publications were publicly available. ABB reserves the right to identify earlier dates should such dates be ascertained through discovery.

Author/Publisher	Title	Publication/Use Date	Short Name
Faugueras et al.	3-D Reconstruction of Urban Scenes from Image Sequences	Mar. 1998	Faugueras
Feddema et al.	Weighted Selection of Image Features for Resolved Rate Visual Feedback Control	Feb. 1991	Feddema
Horn	Tsai's Camera Calibration Method Revisited	2000	Horn-2000
Huang et al.	Uniqueness of 3D Pose Under Weak Perspective: A Geometric Proof	Dec. 1995	Huang
Hutchinson et al.	A Tutorial on Visual Servo Control	Oct. 5, 1996	HHC
Hutchinson et al.	Planning Sensing Strategies in a Robot Work Cell with Multi-Sensor Capabilities	Dec. 1989	Hutchinson-1989
Jacobson	Conjoint Image Representation and Its Application to Viewpoint Invariant Form Recognition and Optical Flow Estimation	1987	Jacobson-1987
Jonalagadda et al.	Viewpoint Selection for Object Reconstruction Using Only Local Geometric Features	Sep. 2003	Jonalagadda
Liu	Determination of Camera Location from 2D to 3D Line and Point Correspondences	1999	Liu
Lu et al.	Fast and Globally Convergent Pose Estimation from Video Images	Jun. 2000	Lu
Lowe	Three-Dimensional Object Recognition from Single Two-Dimensional Images	Mar. 1987	Lowe
Martinet et al.	Robot Control Using Monocular Pose Estimation	Sep. 1997	Martinet
Maver et al.	Occlusions as a Guide for Planning the Next View	May 1992	Maver
Shiu et al.	Calibration of Wrist-Mounted Robotic Sensors by Solving Homogenous Transform Equations of the Form $AX=XB$	Feb. 1989	Shiu
Tarabanis et al.	A Survey of Sensor Planning in Computer Vision	Feb. 1995	Tarabanis
Triggs et al.	Bundle Adjustment – A Modern Synthesis	2000	Triggs
Tsai	An Efficient and Accurate Camera Calibration Technique for 3D Machine Vision	Jun. 1986	Tsai-1986

Author/Publisher	Title	Publication/Use Date	Short Name
Tsai	A Versatile Camera Calibration Technique for High Accuracy 3D Machine Vision Metrology Using Off-the-Shelf TV Cameras and Lenses	Aug. 1987	Tsai-1987
Tsai et al.	A New Technique for Fully Autonomous and Efficient 3D Robotics Hand/Eye Calibration	Jun. 1989	Tsai-1989
Wang	Extrinsic Calibration of a Vision Sensor Mounted on a Robot	1992	Wang
Wei et al.	Active Self-Calibration of Robotic Eyes and Hand-Eye Relationships with Model Identification	Feb. 1998	Wei-1998
Wei et al.	Multisensory Visual Servoing by a Neural Network	Apr. 1999	Wei-1999
Weiss	Dynamic Visual Servo Control of Robots: An Adaptive Image-Based Approach	Apr. 1984	Weiss-1984
Weiss et al.	Dynamic Visual Servo Control of Robots: An Adaptive Image-Based Approach	1985	Weiss-1985
Weiss et al.	Dynamic Sensor-Based Control of Robots With Visual Feedback	1987	Weiss-1987
Yang et al.	Calibrating a Robot Camera	Oct. 1, 1994	Yang
Zhuang	Hand/Eye Calibration for Electronic Assembly Robots	Aug. 1998	Zhuang
Zhang	A Flexible New Technique for Camera Calibration	Dec. 1998	Zhang-1998
Zhang	Camera Calibration	2000	Zhang-2000

Table 3: Prior Art Systems³

System Name	Use/Knowledge/Offer Date	Developer
PatMax ⁴	1997	Cognex
Cognex PatInspect ⁵	At least 2000	Cognex
VisionPro	1995	Cognex

³ ABB anticipates that discovery will yield additional prior art uses and/or systems.

⁴ RVT's contentions concerning Integrated Vision, YuMi, and PickMaster accuse PatMax functionality. ABB disagrees with RVT's contentions, but to the extent RVT's theories apply, the products incorporating the PatMax functionality anticipate the Patents-in-Suit.

⁵ RVT's contentions accuse 3DQI of infringement. ABB disagrees with RVT's contentions, but to the extent RVT's theories apply, part inspection products like PatInspect anticipate and/or render obvious the Patents-in-Suit.

System Name	Use/Knowledge/Offer Date	Developer
Cognex Vision Library	At least 1995	Cognex
Machine vision products and libraries	At least 2002	Radix Controls
Matrox Imaging Library	At least 1993	Matrox Imaging
PickMaster ⁶	1999	ABB
Modular robotic systems ⁷	At least 2003	Svia
Optical 3D Inspection System ⁸	1999	Nub3d
Halcon	1997	MVTech
PhotoModeler	1996	Eos Systems Inc.
Carmen	1996	Carnegie Mellon
Horatio	1995	University of Surrey
VXL	1998	Universities of Oxford and Leuven, and General Electric CRD

IV. INVALIDITY DUE TO ANTICIPATION AND/OR OBVIOUSNESS

The Asserted Claims of the Patents-in-Suit are invalid as anticipated under 35 U.S.C. § 102 and/or obvious under 35 U.S.C. § 103, in view of each of the prior art references identified herein as specified in the claim charts, which identify specific examples of where each limitation of the Asserted Claims is found in the prior art references.

The art cited in the claim charts is illustrative and not exhaustive. Further, these claim charts provide illustrative citations to where each element of each of the Asserted Claims may be found in the prior art references. The cited references may contain other disclosures of each claim element as well, and ABB reserves the right to argue any claim elements of the Asserted Claims

⁶ RVT's contentions accuse PickMaster of infringing the '814 patent. ABB disagrees with RVT's contentions, but to the extent RVT's theories apply, PickMaster anticipates and/or renders obvious the '814 Patent.

⁷ RVT's contentions accuse FlexLoader of infringing the '814 patent. ABB disagrees with RVT's contentions, but to the extent RVT's theories apply, modular robotic systems sold by Svia anticipate and/or render obvious the '814 Patent.

⁸ RVT's contentions accuse 3DQI of infringement. ABB disagrees with RVT's contentions, but to the extent RVT's theories apply, 3D inspection products sold by Nub3D anticipate the Patents-in-Suit.

are disclosed in non-cited portions of these references. Similarly, where ABB cites a patent figure in the charts, it incorporates the accompanying specification text describing that figure and vice versa. In addition, the illustrative disclosure identified for each independent claim is expressly incorporated into each dependent claim; likewise, the illustrative disclosure identified for a given claim limitation is expressly incorporated into each claim limitation following the given limitation within the same claim (as well as all dependent claims).

To the extent that prior art identified by ABB as anticipating is found not to anticipate, the prior art establishes that the claimed subject matter was obvious to a person of ordinary skill in the art at the time of the alleged invention. To the extent not anticipated, no Asserted Claim goes beyond combining known elements to achieve predictable results or does more than choosing between clear alternatives known to those of skill in the art.

Even if a particular claim element is not expressly found in one of the charted references, those charted references render the relevant Asserted Claims obvious without the need to combine with any other references, having in mind the information generally known to those skilled in the art, common sense, and/or routine innovation. Accordingly, ABB discloses each reference cited above in Section III as rendering obvious the Asserted Claims.

In addition, the charted references in combination with one or more of the other charted references render obvious the Asserted Claims. As it would be unduly burdensome to reproduce the disclosures of each and every charted reference across each and every chart, those disclosures are incorporated by reference across each of the charts as if fully set forth therein. As explained herein and/or in the accompanying charts, it would have been obvious to a POSITA at the time of the alleged invention of the Asserted Claims to combine the various references charted or otherwise cited herein to practice the Asserted Claims. In addition to the specific combinations of

prior art and the specific combinations of groups of prior art disclosed, ABB reserves the right to rely on any other combination of any prior art references disclosed herein. ABB further reserves the right to rely on combinations disclosed within the prosecution history of the references cited herein. These obviousness combinations reflect ABB's present understanding of the potential scope of the claims that RVT appears to be advocating and should not be construed as ABB's acquiescence to RVT's interpretation of the Asserted Claims.

One or more combinations of the prior art references identified above would have been obvious because these references would have been combined using: known methods to yield predictable results; known techniques to improve similar devices, methods, and/or systems in the same way; a simple substitution of one known, equivalent element for another to obtain predictable results; and/or a teaching, suggestion, or motivation in the prior art generally. In addition, it would have been obvious to try combining the prior art references identified above because there were only a finite number of predictable solutions and/or because known work in one field of endeavor prompted variations based on predictable design incentives and/or market forces either in the same field or a different one. In addition, the combination of the prior art references identified above would have been obvious because the combination represents the known potential options with a reasonable expectation of success.

Additional evidence that there would have been a motivation to combine the prior art references identified above includes the interrelated teachings of multiple prior art references; the effects of demands known to the design community or present in the marketplace; the existence of a known problem for which there was an obvious solution encompassed by the Asserted Claims; the existence of a known need or problem in the field of the endeavor at the time of the invention(s); and the background knowledge that would have been possessed by a POSITA.

Thus, the motivation to combine the teachings of the prior art references disclosed herein is found in the references themselves and: (1) the nature of the problem being solved, (2) the express, implied, and inherent teachings of the prior art, (3) the knowledge of persons of ordinary skill in the art, (4) the fact that the prior art is generally directed towards use of machine vision for three dimensional (3D) pose estimation, and (5) the predictable results obtained in combining the different elements of the prior art. Additionally, one would be motivated to address at least the alleged problems or achieve the purported objectives identified in the description of the Patents-in-Suit. Any reference or combination of references that anticipates and/or makes obvious an asserted independent claim also makes obvious any Asserted Claim dependent on that independent claim because every element of each dependent claim was known by a person of ordinary skill at the time of the alleged invention, and it would have been obvious to combine those known elements with the independent claims at least as a matter of common sense and routine innovation. Accordingly, ABB contends that each Asserted Claim would have been obvious not only by the combinations explicitly defined in these Initial Invalidity Contentions, but also by any combination of references that renders obvious an Asserted Claim.

Numerous prior art references, including those identified above and in the claim charts, reflect common knowledge and the state of the prior art prior to the priority date of the Patents-in-Suit. The Patents-in-Suit are generally directed to, and claim, methods of and systems for using machine vision for 3D pose estimation that are obvious combinations of such methods and systems existing in the prior art, either without modification or with slight, trivial variations obtainable through the exercise of at most ordinary skill. The prior art contains dozens, if not hundreds, of references that could be put together in several combinations using ordinary skill, routine innovation, and common sense, to arrive at the claimed subject matter.

Accordingly, because the number of permutations of references that could be combined to arrive at the claimed subject matter of the Patents-in-Suit (using only ordinary skill and common sense) are nearly limitless, it would be unduly burdensome to create detailed claim charts for the thousands of invalidating combinations. Thus, ABB has provided illustrative examples of such invalidating combinations in the attached charts. For at least the reasons described above and in the attached claim charts, it would have been obvious to a POSITA to combine any of a number of prior art references, including any combination of those identified in the attached claim charts, to meet the limitations of the Asserted Claims. As such, ABB's inclusion of exemplary combinations does not preclude ABB from identifying other invalidating combinations as appropriate.

In *KSR*, the Supreme Court emphasized that an idea that is the result of ordinary innovation, ordinary skill, or common sense should not be patentable. *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398 (2007). The Supreme Court held that a person of ordinary skill in the art is “a person of ordinary creativity, not an automaton” and “in many cases a person of ordinary skill in the art will be able to fit the teachings of multiple patents together like pieces of a puzzle.” *Id.* at 420–21. Although a patent challenger is not required to show that one of ordinary skill in the art would have had a specific motivation to combine prior art references, such a showing may be helpful to the obviousness analysis. *Id.* at 418; *see also id.* at 402.

One of ordinary skill in the art would have been motivated to combine the references identified herein because, for example, the identified combinations fall into one or more of the following categories:

- A combination of elements known in the prior art according to known methods to yield a predictable result;

- A combination that is a simple substitution of one or more known elements for another to obtain a predictable result;
- A combination that involves using a known technique to improve a similar device or method in the same way;
- A combination that involves applying a known technique to a known device or method ready for improvement to yield a predictable result;
- A combination that results from a finite number of identified, predictable solutions with a reasonable expectation of success, such that the solution was one which was “obvious to try”;
- A combination that results from known work in one field of endeavor prompting variations of it for use either in the same field or a different field based on design incentives or other market forces in which the variations were predictable to one of ordinary skill in the art; and
- A teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill in the art to modify the prior art reference or to combine the teachings of various prior art references to arrive at the claimed invention.

Further, the Federal Circuit has held that a motivation to combine references may be implicit for patents claiming an “improvement”:

[A]n implicit motivation to combine exists not only when a suggestion may be gleaned from the prior art as a whole, but when the “improvement” is technology-independent and the combination of references results in a product or process that is more desirable, for example because it is stronger, cheaper, cleaner, faster, lighter, smaller, more durable, or more efficient. Because the desire to enhance commercial opportunities by improving a product or process is universal—and even commonsensical—we have held that there exists in these situations a motivation to combine prior art references even absent any hint of suggestion in the references themselves. In such situations, the proper question is whether the ordinary artisan possesses knowledge and skills rendering him capable of combining the prior art references.

DyStar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co., 464 F.3d 1356, 1368 (Fed. Cir. 2006). The prior art references identified herein explicitly or implicitly refer to other prior art references, share common authors or inventors, were published in the same journals, presented at the same conferences, were presented as proposals to standards working groups, and/or were developed at common companies, schools, or organizations, all of which would motivate one of skill in the art to combine them. These references are also within the field of the Patents-in-Suit and are directed to similar subject matter within that field. Additionally, any products, devices, and/or processes described in the references existed and/or were invented before or during the period in which the claimed inventions were developed, providing further motivation to combine them. Thus, the motivation to combine the teachings of the prior art references disclosed herein is found in the references themselves and: (1) the nature of the problem(s) being solved, (2) the express, implied, and inherent teachings of the prior art, (3) the knowledge of persons of ordinary skill in the art, (4) the fact that the prior art is generally directed towards use of machine vision for 3D pose estimation, and (5) the predictable results obtained in combining the different elements of the prior art. Additionally, one would be motivated to address at least the alleged problems or achieve the purported objectives identified in the descriptions of the Patents-in-Suit.

To the extent RVT challenges a combination of prior art with respect to a particular element, ABB reserves all rights to supplement these Initial Invalidity Contentions to further specify the motivation to combine the prior art. ABB may rely on cited or uncited portions of the prior art, other documents, and/or expert testimony to establish that a POSITA would have been motivated to modify or combine the prior art to render the Asserted Claims invalid as obvious.

A. Exemplary Motivations to Combine

The Patents-in-Suit are generally directed towards systems and methods for use of machine vision for 3D pose estimation. Such systems and methods are obvious combinations of such

methods and systems existing in the prior art, either without modification or with slight, trivial variations obtainable through the exercise of at most ordinary skill. The cited prior art references are directed to machine vision, calibration, photogrammetry, and/or pose estimation. *See, e.g.*, Corke at 1 (“[V]isual servoing involves the use of one or more cameras and a computer vision system to control the position of the robot’s end-effector relative to the workpiece as required by the task.”); *id.* at 3 (explaining that a key component of visual servoing systems is the use of vision sensing and a closed “feedback” loop through which the system (for each video frame) takes an image of the target object, extracts features from the object, determines the “relative pose between the camera and the target” using that single image and “knowledge of the geometric relationship between several feature points on the target,” and sends the pose estimation to the robot, causing the robot to adjust the position of the robot’s end-effector relative to the object); Hutchinson-1989 at 765 (“[A] sensing system should be able to choose which sensing operations to apply, so that it extracts the minimum number of features required to uniquely identify the object and its pose.”); *id.* at 766 (“[T]he choices of sensing strategies are not limited by the use of a single type of sensor. The sensor types currently incorporated in the system include a 3-D range scanner, 2-D overhead camera, a manipulator held 2-D camera, a force/torque wrist-mounted sensor, and also the manipulator fingers for estimating the grasp width”); *id.* at 770 (“In our application, an experiment consists of extracting features from sensory data and matching those sensed features to features of model objects.”); Triggs at 298–299 (“Bundle adjustment is the problem of refining a visual reconstruction to produce jointly optimal 3D structure and viewing parameter (camera pose and/or calibration) estimates.”); Martinet at 2 (“The aim of this paper is to study how we can introduce 3D visual features in a robot control loop. We consider a camera mounted on the end effector of the manipulator robot to estimate the pose of the target object.”).

Many of the cited prior art references also require intrinsic, extrinsic, and hand-eye calibration. *See, e.g.*, Corke at 136–147 (“In order to determine the 3D relative pose of an object, cx , from 2D image plane coordinates, f , some additional information is **needed**. This data includes knowledge of the relationship between the observed feature points (perhaps from a CAD model) and also the **camera’s intrinsic parameters**.”); HHC at 665 (“camera calibration **must** be performed”); *id.* at 659 (“Least-squares solutions can be found in [44]-[50]. Six or more points always yield unique solutions and allow the camera calibration matrix to be computed. This can then be decomposed [48] to yield the target’s pose.”); Wang at 161 (“A vision sensor is mounted on a robot to detect surrounding objects. Its mounting position and orientation **must** be identified, resulting in an extrinsic calibration problem.”); Tsai-1989 (“In order for a robot to use a video camera to estimate the 3D position and orientation of a part or object relative to its own base within the work volume, **it is necessary** to know the relative position and orientation between the hand and the robot base, between the camera and hand, and between the object and the camera.”); Triggs at 298–299 (“Bundle adjustment is the problem of refining a visual reconstruction to produce jointly optimal 3D structure and viewing parameter (camera pose and/or calibration) estimates.”); *id.* at 364 (defining “Calibration” as “In photogrammetry, this always means internal calibration of the cameras.”); *id.* at 365 (defining “Inner orientation” as “Internal camera calibration, including lens distortion, etc.”); *id.* at 366 (defining “Outer orientation” as “Camera pose (position and angular orientation).”); *id.* at 367 (defining “Self calibration” as “Recovery of camera (internal) calibration during bundle adjustment.”).

Other cited prior art references disclose calibration methods that can be used in pose estimation. For example, Horn-2000 explains that “[i]n calibration, a target of known geometry is imaged. Correspondence between target points and their images are obtained. These form the basic

data on which the calibration is based.” Horn-2000 at 5; *see also id.* at 1 (“Since cameras often have appreciable geometric distortions, camera calibration is often taken to include the recovery of power series coefficients of these distortions. Furthermore, an unknown scale factor in image sampling may also need to be recovered, because scan lines are typically resampled in the frame grabber, and so picture cells do not correspond discrete sensing elements.”); *see also id.* at 2–12 (describing steps for calibration); *see also* Wang at 1 (“Vision sensors capable of finding the position and orientation of an object are mounted on a robot manipulator to enhance tracking accuracy, versatile robot-operator communication, and intelligent task control. However, visual information is of no use unless the sensor is calibrated. The calibration consists of intrinsic and extrinsic calibrations. The intrinsic calibration determines the geometric and optical characteristics of the camera, whereas the extrinsic calibration determines its mounting position.”); De Ma at 114 (“The goal of the current work is to develop a head-eye camera self-calibration technique which determines both the head-eye geometry and the camera intrinsic parameters.”).

Indeed, the Patents-in-Suit point to such calibration reference as ways that “calibration can be done automatically to compute both the camera intrinsic parameters and the hand-eye calibration.” *See, e.g.*, ’237 Patent at 4:43–67 (citing Tsai-1989). The Patents-in-Suit also point to such references as providing a “general explanation of the basic calibration algorithms and descriptions of the variables” that can be used with the patented methods and apparatuses. *See, e.g.*, ’237 Patent at 3:36–54 (citing Tsai-1987, Tsai-1986, and Horn-2000). The Patents-in-Suit also disclose that the calibration and teaching steps can be combined using the methods disclosed in Wei-1998. *See, e.g.*, ’237 Patent at 6:6–19.

A POSITA would have been motivated to combine the teachings of the references that disclose methods and systems that require calibration with those references which provide

calibration methods. For example, a POSITA would have been motivated to combine the teachings of Corke (which disclosed methods and systems that require calibration) with those of Wei-1998 (which provides an advantageous self-calibration method). As noted above, Corke's pose estimation methods require intrinsic, extrinsic, and hand-eye calibration. Corke at 136–147. Similarly, Wei-1998 states that “[i]n order to use cameras for estimating robot motion for object manipulation, it is usually necessary to do the following three calibrations: camera calibration, hand-eye calibration, and robot calibration.” Wei-1998 at 2. Wei-1998 explains that “camera calibration” “determines the camera internal and external parameters.” *Id.*

As described in the Patents-in-Suit, Wei-1998 “propose[s] a complete autonomous approach for self-calibration of hand cameras and hand-eye relationships” that has several advantages over other calibration methods, including (1) no control points (e.g., calibration plates), (2) the initial values of all unknowns are found automatically, (3) it accounts for lens distortion, and (4) it does not rely on any prior calibration. Wei-1998 at 3; *see also, e.g.*, '237 Patent at 8:30–38 (“Further, the calibration and teaching steps a) and b) can be combined by using a self calibration method of robotic eye and hand-eye relationship with model identification as described in ‘Active self-calibration method of robotic eye and hand-eye relationship with model identification’ by Guo-Qing Wei, Klaus Arbter and Gerd Hirzinger. The result of such a method will give camera intrinsic parameters, hand-eye calibration and position of selected features in camera space[.]”). A POSITA would have been motivated to combine the teachings of Corke with those of Wei-1998 because Wei-1998 discloses a way for a system to self-calibrate (using a teaching object) for each of the intrinsic, extrinsic, and hand-eye calibration requirements of Corke. Wei-1998 at 1–3. A POSITA would have understood that Wei-1998 discloses a streamlined way to perform the calibration required by Corke. The combination of Corke with Wei-1998 would

eliminate the need for a calibration plate and would streamline, but not otherwise change, Corke's calibration process.

The Patents-in-Suit also disclose that many of the algorithms described in the cited prior art references can be used for object location and pose estimation. *See, e.g.*, '237 Patent at 8:40–67 (citing Zhang, Tsai-1986, Lu, Liu, Huang, Chen); *see also* Lowe, DeMenthon. A POSITA would have understood that any of these methods/algorithms could be combined with other machine vision methods and systems, and with calibration methods disclosed in the prior art.

The above-described combination is purely exemplary, and the same or similar rationale would apply to a combination of any of the prior art references in the charts above.

B. Secondary Considerations

A patentee bears the burden of production with respect to evidence of secondary considerations of non-obviousness. *ZUP, LLC v. Nash Mfg., Inc.*, 896 F.3d 1365, 1373 (Fed. Cir. 2018). As of the date of these Initial Invalidity Contentions, RVT has not identified any secondary considerations of non-obviousness. ABB reserves all rights to respond to any secondary considerations of non-obviousness raised by RVT, including by updating, modifying, and/or adding to these Initial Invalidity Contentions. ABB is not aware of any unexpected results (none are mentioned in the Patents-in-Suit or their file histories), long felt need, commercial success (or any nexus to any allegedly successful commercial embodiment), or awards for the Patents-in-Suit. Indeed, as shown in these Initial Invalidity Contentions, dozens of other companies and individuals, including ABB, described, built, and/or patented the exact same concepts in the Patents-in-Suit before the inventors of the Patents-in-Suit—often many years before. Even where others' inventions occurred at approximately the same time as the alleged invention in the

Patents-in-Suit, such simultaneous invention further demonstrates the obviousness of the Patents-in-Suit.

V. INVALIDITY UNDER 35 U.S.C. § 112

A. Indefiniteness Under 35 U.S.C. § 112 ¶ 2

Claims are indefinite under 35 U.S.C. § 112(b) (post-AIA) or 35 U.S.C. § 112 ¶ 2 (pre-AIA) when they “fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention.” *Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 901 (2014).

When a claim includes terms of degree, the specification must “provide[] some standard for measuring that degree.” *Datamize, LLC v. Plumtree Software, Inc.*, 417 F.3d 1342, 1351 (Fed. Cir. 2005) (quoting *Seattle Box Co. v. Indus. Crating & Packing*, 731 F.2d 818, 826 (Fed. Cir. 1984)). “The claims, when read in light of the specification and the prosecution history, must provide objective boundaries for those of skill in the art.” *Interval Licensing LLC v. AOL, Inc.*, 766 F.3d 1364, 1371 (Fed. Cir. 2014). “[A] term of degree fails to provide sufficient notice of its scope if it depends ‘on the unpredictable vagaries of any one person’s opinion.’” *Id.* (quoting *Datamize*, 417 F.3d at 1350). For example, a “coined technical term” which is not “clearly define[d] . . . elsewhere in the specification or prosecution history” is indefinite because its meaning “is left to speculation and subjective judgment.” *Acacia Media Techs. Corp. v. New Destiny Internet Grp.*, 405 F. Supp. 2d 1127, 1134 (N.D. Cal. Dec. 7, 2005).

Moreover, a claim term is indefinite where the claims, specification, and prosecution history do not “convey with reasonable certainty the measure of [a given variable] to be used.” *Teva Pharms. USA, Inc. v. Sandoz, Inc.*, 789 F.3d 1335, 1341 (Fed. Cir. 2015) (“having a molecular weight of . . .” was indefinite as there were at least three different ways of measuring molecular weight and the intrinsic record did not convey which measure to use); *see also Honeywell Int’l*,

Inc. v. Int’l Trade Comm’n, 341 F.3d 1332, 1339–40 (Fed. Cir. 2003) (holding indefinite a claim including a numeric limitation, “melting point elevation,” without disclosing which of multiple methods of measuring that number should be used”).

B. Lack of Enablement/Written Description Under 35 U.S.C. § 112 ¶ 1

35 U.S.C. § 112, ¶ 1 requires that the specification contain a written description of the invention. “[T]he hallmark of written description is disclosure.” *Boston Sci. Corp. v. Johnson & Johnson*, 647 F.3d 1353, 1361–62 (Fed. Cir. 2011) (citation omitted). The test for whether a specification adequately describes an invention is “whether the disclosure of the application relied upon reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date. . . . [T]he test requires an objective inquiry into the four corners of the specification from the perspective of a person of ordinary skill in the art. . . . [It] is a question of fact.” *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (en banc); *Boston Scientific*, 647 F.3d at 1362.

The enablement requirement of § 112 demands that the patent specification enable “those skilled in the art to make and use the full scope of the claimed invention without ‘undue experimentation.’” *Genentech, Inc. v. Novo Nordisk A/S*, 108 F.3d 1361, 1365 (Fed. Cir. 1997) (quoting *In re Wright*, 999 F.2d 1557, 1561 (Fed. Cir. 1993)). “[T]he scope of the claims must be less than or equal to the scope of the enablement.” *Nat’l Recovery Tech., Inc. v. Magnetic Separation Sys., Inc.*, 166 F.3d 1190, 1196 (Fed. Cir. 1999). “[T]he more a party claims for itself the more it must enable.” *Amgen Inc. v. Sanofi*, No. 21-757 at 22 (U.S. May 18, 2023).

C. **§ 112 Contentions**

i. '755 Patent

The specification of the '755 Patent fails to enable and/or provide a written description as to the following claim elements, rendering invalid each claim in which the element appears and each claim dependent therefrom. Moreover, claims of the '755 Patent are invalid as indefinite pursuant to 35 U.S.C. § 112, ¶ 2 (pre-AIA) because the following terms “fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention” (*Nautilus*, 572 U.S. at 901):

- “calibrating the camera by finding...c) the position of the camera in a space rigid to the place where the object will be trained (‘Training Space’)” (claim 1, claim 18)
- “[means for] teaching the object features by a) putting the object in the ‘Training Space’ and capturing an image of the object with the robot in the calibration position where the ‘Camera to Training Space’ transformation was calculated” (claim 1, claim 18)
- “calculating the 3D position of each feature in ‘Training Space’” (claim 1, claim 18)
- “defining an ‘Object Space’ aligned with the ‘Training Space’” (claim 1, claim 18)
- “if an insufficient number of selected features are in the field of view, moving the robot until at least 6 features can be located” (claim 1, claim 8, claim 18, claim 19)
- “training the intended operation path relative to the ‘Object Frame’ using the robot” (claim 1, claim 18)
- “[means for] carrying out object finding and positioning by...c) with the positions of features from the image and their corresponding positions in ‘Object Space’ as calculated in the training step, computing the object location as the transformation between the ‘Object Space’ and ‘Camera Space’” (claim 1, claim 18)

- “wherein said 6 visible features comprise at least one anchor feature and at least 5 other visible features, and the position and orientation of said anchor feature is used to compute the position of the remaining set of selected features” (claim 2, claim 9)
- “the position and orientation of the anchor features is first used to estimate the position of the remaining selected features, and the actual position of the remaining selected features is then searched for and determined” (claim 3)
- “the coordinates of the ‘Object Frame’ points, operation path points or other points of interest are transformed using the transformation from tool to robot base and all the coordinates are sent to robot in the robot base coordinate frame” (claim 6)
- “training the intended operation path inside the ‘Object Frame’” (claim 8, claim 19)
- “with the positions of features from the image and their corresponding position in ‘Object Space’ as calculated in the training session, computing the object location as the transformation between the ‘Object Space’ and ‘Camera Space’” (claim 8)
- “computing the object frame memorized at training using the found transformation and ‘Camera to Tool’ transformation” (claim 8)
- “said 3D positions of features is calculated automatically” (claim 12)

The specification of the ’755 Patent, which is entitled Method and Apparatus for **Single Camera** 3D Vision Guided Robotics, disparages “using two or more cameras” as being, among other things, too expensive. (’755 Patent, 1:21–25). Thus, to the extent the claims are read to include methods and apparatuses that use two or more cameras, the claims would be invalid for lack of written description.

Insofar as claim 8 of the '755 Patent is interpreted in a way that does not require capturing an image of a target object as part of “object finding and positioning,” the full scope of Claim 8 of the '755 Patent is not enabled, and the claim lacks written description support.

Insofar as claim 19 of the '755 Patent is interpreted in a way that does not require capturing an image of a target object as part of “object finding and positioning,” the full scope of Claim 19 of the '755 Patent is not enabled, and the claim lacks written description support.

Claims 1–7 and 18 of the '755 Patent are indefinite because “the image” as recited in limitation iii) c) is unclear because there are multiple previously recited images. Claims 8–17 and 19 are indefinite, lack written description, and/or are not enabled because the antecedent basis for “the image” as recited in limitation iii) c) is the image taken during the process of “teaching the object features” (limitation ii)), and thus is not described in the specification as being used for performing the object space to camera space transformation during the “object finding and positioning” procedure (or by the claimed means for performing that function) as described in the specification of the '755 Patent.

Claims 8 and 19 are indefinite because they recite “finding the Object Space to Camera Space’ transformation in the same way as step d),” but step d) relates to calculation of the movement of the robot, not determining the referenced transformation. Moreover, there is no written description or enablement for a process that does not move the robot to a new location before determining the transformation.

All Asserted Claims of the '755 Patent are indefinite, not enabled, and/or lack written description support because they do not describe, claim, or enable the process of “carrying out object finding and positioning.” In addition to the indefiniteness issues raised in the immediately preceding paragraphs, the step of “carrying out object finding and positioning” recited in each of

the claims requires a step (or means that performs a step) of “c) with the positions of features from the image and their corresponding positions in ‘Object Space’ as calculated in the training step, computing the object location as the transformation between the ‘Object Space’ and ‘Camera Space.’” Then another step of “finding the ‘Object Space to Camera Space’ transformation is determined in the same way as in step c) [or d)].” But, applying the “same way as in the earlier steps—insofar as that limitation has a meaning that is reasonably certain to an ordinarily skilled artisan—would entail using “the position of the features from the image and their corresponding position in ‘Object Space’ as calculated” during training and computing the object location as the transformation “between the ‘Object Space’ and the ‘Camera Space.’” As claimed, this would merely repeat the calculation recited in step iii.c on, as best it can be understood, on the exact same image recited in step iii.c, thus providing the same result as in step iii.c.

ii. '814 Patent

The specification of the '814 Patent fails to enable and/or provide a written description as to the following claim elements, rendering invalid each claim in which the element appears and each claim dependent therefrom. Moreover, claims of the '814 Patent are invalid as indefinite pursuant to 35 U.S.C. § 112, ¶ 2 (pre-AIA) because the following terms “fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention” (*Nautilus*, 572 U.S. at 901):

- “training object” (claim 1, claim 7, claim 13, claim 19, claim 22, claim 23, claim 25, claim 26, claim 28, claim 29, claim 33, claim 35, claim 38)
- “consistency of physical relationships” (claim 1, claim 2, claim 3, claim 4, claim 7, claim 8, claim 9, claim 10, claim 13, claim 14, claim 15, claim 16)

- “invariant physical relationship” / “invariant distance” / “invariant area” / “invariant volume” (claim 1, claim 2, claim 3, claim 4, claim 6, claim 8, claim 9, claim 10, claim 13, claim 14, claim 15, claim 16, claim 19, claim 23, claim 33, claim 35)
- “target object[s]” (claim 7, claim 22, claim 28, claim 29, claim 33, claim 38)
- “automatically computationally solving the system of equations” (claim 1, claim 6, claim 7, claim 12, claim 13, claim 18)
- “determining a number of additional views to be obtained includes computationally solving the equation $m \geq (f_2 - f - 2k - 2r + 6(c - c_k)) / (f_2 - 3f) - 1$, where m is the number of views, f the number of features, k the number of known distances between pairs of the features, r is the number of rays with a known distance between a feature and an image sensor, c is the number of image sensors and c_k is the number of known transformation between an imager sensor reference frame and a common reference frame” (claim 5, claim 11, claim 17, claim 20, claim 24, claim 36)
- “at least one image sensor operable to acquire images of a training object and of target objects” (claim 7, claim 33)
- “local model[s]” (claim 23, claim 27, claim 28, claim 33, claim 35, claim 37, claim 38)
- “in at least one of a pre-run time environment or a runtime environment, computationally determining a local model using the identified features in each of a number of respective image sensor coordinate frames” (claim 23, claim 33, claim 35)
- “wherein identifying a number of features of the training object in the acquired at least one image of the first view comprises identifying at least one of a number of inherent structural features of the training object or a number of markers added to the training object” (claim 26)

As a further example, claim 7 of the '814 Patent is invalid as indefinite. Claim 7 discloses a system comprising “at least one image sensor operable to acquire images of a training object and of target objects.” ('814 Patent, claim 7) (emphasis added). While the specification does not explicitly define a “training object” or a “target object,” it does disclose that the “training object” is used prior to runtime and a “target object” is used during runtime. For example:

- “**Training** occurs during setup, prior to the runtime. . . . Pose estimation occurs following setup, during the runtime, for example in production mode. That is during the operation of the system to recognize features of **target objects** during the intended operation.” ('814 Patent, 8:64–9:9) (emphasis added).
- “During the **training process**, images of the **training object** 12a are captured or acquired and various landmark features are selected whose geometrical properties are determined and stored.” ('814 Patent, 9:58–63) (emphasis added).
- “During the operation of the machine-vision system 10, the latter information is used in conjunction with runtime data to compute a 3D pose of a **target object**.” ('814 Patent, 9:66–10:2) (emphasis added).

Claim 7 further discloses a “processor-readable medium storing instructions for facilitating machine-vision for objects having invariant physical relationships between a number of features on **the objects**, by” [1] “acquiring a number of images of a first view of a **training object** from a number of image sensors; [2] identifying a number of features of the **training object** in the acquired at least one image of the first view; [and 3] determining a number of additional views to be obtained based at least in part on the number of image sensors, **the number of features identified, the number of features having an invariant physical relationship associated thereto, and a type of the invariant physical relationship associated with the features,**

sufficient to provide a system of equations and unknowns where the number of unknowns is not greater than the number of equations.” (’814 Patent, claim 7) (emphasis added).

The only antecedent basis for “the objects” is a reference to both the “training object” and the “target objects” referenced previously. Yet the claimed instructions only deal with features from a “training object,” not a “target object.” In other words, the claim does not describe how the instructions for a “target object” would work, especially since the “instructions” are all based on features from a “training object.”

In addition, the inequality/equation recited in claims 5, 11, 17, 20, 24, and 36 of the ’814 Patent is indefinite and/or not enabled. The claimed equation purports to assist in “determining a number of additional views to be obtained,” and recites that:

- m is the number of views;
- f is the number of features;
- k is the number of known distances between pairs of features;
- r is the number of rays with a known distance between a feature and an image sensors;
- c is the number of image sensors; and
- ck is the number of known transformations between an image sensor reference frame and a common reference frame.

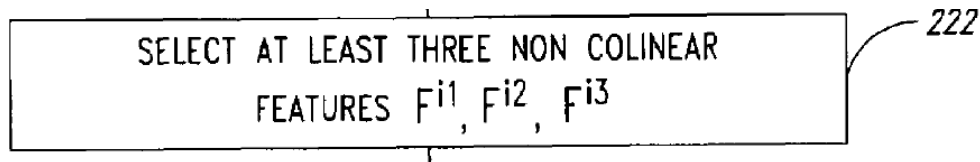
(’814 Patent, claims 5, 11, 17, 20, 24, and 36). The bound on m is written as:

$$m \geq ((f^2 - f - 2k - 2r + 6(c - ck)) / (f^2 - 3f) - 1$$

The inequality above, using standard mathematical conventions, should be interpreted as:

$$m \geq \frac{(f^2 - f - 2k - 2r + 6(c - ck))}{(f^2 - 3f)} - 1$$

In the situation where $f = 3$, the denominator of the above equation is zero, and the bound is either undefined or goes to infinity. Figures 10 and 11 of the '814 Patent disclose using three features:



('814 Patent, Fig. 10). Similarly, the specification recites “[a]t 220, the computing system 18 employs the three-dimensional position information stored at 170 (FIG. 8A), for example retrieving the three-dimensional position information from memory. At 222, the computing system 18 selects **at least three non-colinear features** 42a-42i.” (*Id.*, 16:39–43).

There are many other cases in which this expression results in $m \geq -1$, which is nonsensical since at least one view is always required. For instance, this result is achieved whenever all camera poses are known ($c = ck$), and $f^2 - f = 2k + 2r$. For example, $f = 4, k = 3, r = 3$, or when $f = 5, k = 6, r = 4$ (and many other combinations).

In addition, the equation/inequality recited in claims 5, 11, 17, 20, 24, and 36 of the '814 Patent lacks written description as it appears nowhere in the specification:

$$m \geq ((f^2 - f - 2k - 2r + 6(c - ck)) / (f^2 - 3f) - 1$$

Instead, the specification of the '814 Patent provides two different equations, one of which purportedly can be used when “the relationship between some or all images sensors . . . is known”:

When the relationship between all image sensors **24a-24c** is known (i.e., $c=ck+1$), the equation 0 becomes:

$$m \geq (f^2 - f - 2k - 2r) / (f^2 - 3f) - 1, \text{ where } k \geq 1$$

and one (Equation 0) when “the relationship between all image sensors . . . is known”:

In the general case, when the relationship between some or all image sensors **24a-24c** is known:

$$m \geq (f^2 - f - 2k - 2r + 6(c - ck - 1)) / (f^2 - 3f) - 1 \text{ where } k \geq 1, \\ c \geq 1, ck \geq 0 \quad \text{Equation 0}$$

(’814 Patent, 11:46–57). The specification is unclear as to which inequality/equation should be used when all image sensors are known since it provides two different inequalities/equations for that circumstance in the specification, which are not claimed, and a third in claims 5, 11, 17, 20, 24, and 36. The specification omits the inequality/equation for when the relationship (i.e., transformations) between the image sensors are unknown:

The nonlinear system contains $t_{equations} = t_{nf} \cdot t_m$ equation and $t_{unknowns} = t_{nf} \cdot m$ unknowns if the cameras to reference frame transformation are known. Otherwise the number of unknowns is:

The nonlinear system contains $t_{equations} = t_{nf} \cdot t_m$ equation and $t_{unknowns} = t_{nf} \cdot m$ unknowns if the cameras to reference frame transformation are known. Otherwise the number of unknowns is:

(’814 Patent, 20:8–18).

Further, the specification of the ’814 Patent disparages methods and apparatuses that use “two or more cameras,” “stereo camera pairs,” “structured light,” “lasers” and “specialized sensors,” as being, among other things, inaccurate, expensive, and cumbersome. ’814 Patent, 1:26–2:34. Thus, to the extent the claims are read to include methods and apparatuses that use “two or more cameras,” “stereo camera pairs,” “structured light,” “lasers” and “specialized sensors,” the claims would be invalid for lack of written description.

iii. ’237 Patent

The specification of the ’237 Patent fails to enable and/or provide a written description as to the following claim elements, rendering invalid each claim in which the element appears and

each claim dependent therefrom. Moreover, claims of the '237 Patent are invalid as indefinite pursuant to 35 U.S.C. § 112, ¶ 2 (pre AIA) because the following terms “fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention” (*Nautilus*, 572 U.S. at 901):

- “determining by a processor an object space-to-camera space transformation for the target object based at least in part on a position of at least some of the located features using only the single captured image” (claim 1)
- “training space” (claim 2, claim 9, claim 20, claim 25)
- “wherein positioning the camera with respect to the calibration object comprises positioning the camera with respect to a sample of a type of object the robot will manipulate, the sample having a number of features, where a known or determinable physical relationship exists between at least some of the features” (claim 5)
- “tool space” (claim 10, claim 11, claim 15, claim 19)
- “determining a camera space-to-tool space transformation based on single one of the number of images captured by the camera of the calibration object and on a number of physical coordinates of at least one feature of the calibration object” (claim 11)
- “capturing an image of a teaching object of a type of object that will be manipulated by the robot” (claim 12, claim 21)
- “adjusting a position of the movable portion of the robot if the number of features located in the captured image of the target object is determined to be an insufficient number of features” (claim 17, claim 24, claim 28)
- “determining an object space-to-camera space transformation based at least in part on a position of at least some of the located features in solely the captured image using an

algorithm that employs a known or determinable physical relationship between at least some of the located features” (claim 20)

- “determining an object space-to-camera space transformation based at least in part on a position of at least some of the located features using the captured image without any additional captured images and an algorithm that employs a known or determinable physical relationship between at least some of the located features” (claim 25)

As a further example, claim 11 of the '237 Patent is invalid for lack of written description/enableness. More specifically, claim 11 recites a method for determining a camera space-to-tool space transformation “based on a single one of the number of images” and on “at least one feature.” ('237 Patent, claim 11). There is no support in the specification for determining a camera space-to-tool space transformation using a **single** image and **one** feature, and based on this lack of disclosure, one of ordinary skill in the art would not be able to carry out the claimed method without undue experimentation. (*See, e.g., id.*, 4:37–42 (“To calculate the ‘Camera→Tool’ transformation manually, the operator first touches 3 identifiable points on the grid having known coordinates with the tool. Next the operator **stores images of the grid from at least 2 and preferably 4 measured heights above the grid.**”); 4:43–47 (Alternatively, the calibration can be done automatically to compute both the camera intrinsic parameter and the hand-eye calibration. The technique **requires** the camera to observe a planar pattern **shown at a plurality of (at least two) different orientations.**”); 4:56–67 (“The following steps are carried out to perform the automatic calibration . . . b) the robot is moved to a **plurality of stations** in a predefined manner so that the calibration pattern is in the field of view at each station.”); 6:41–44 (“**At least two stations are needed** for the linear system to have unique solutions, but a set of **at least 3 stations** is used in order to compensate for the noise in the images and other perturbation factors that may

occur.”); 9:44–56 (“Where the camera is mounted on the robot, the calibration step is accomplished by: 1) the operator moving the ‘Calibration Model’ relative to the camera and **capturing images at multiple positions** to determine the camera intrinsic parameters . . . iv) calculating the ‘Robot-Eye Calibration’ using results of i), ii), iii).”); 10:21–27 (when “the camera is attached onto the robot . . . the calibration step is accomplished by . . . **capturing images at multiple known robot positions**”); 11:3–11 (when “the camera is attached onto another robot . . . the calibration step is accomplished by . . . **capturing images at multiple known robot positions**”)).

Further, the specification of the ’237 Patent disparages “using two or more cameras,” “lasers” and specialized sensors as being, among other things, too expensive and cumbersome. (’237 Patent, 1:25–37). Thus, to the extent the claims are read to include methods and apparatuses that use two or more cameras, lasers, or specialized sensors, the claims would be invalid for lack of written description.

Additionally, claim 14 of the ’237 Patent is invalid under 35 U.S.C. 112, Fourth Paragraph for failing to further limit the claim(s) upon which it depends.

Claims 20–21 and 23–24 of the ’237 Patent are invalid as indefinite and/or for claiming non-statutory subject matter insofar as they are not limited to a means that includes “at least one programmed computer.”

Insofar as it is limited to at least one programmed computer, claim 22 of the ’237 Patent is invalid under 35 U.S.C. 112, Fourth Paragraph for failing to further limit the claim(s) upon which it depends.

Claims 25 and 27–28 of the ’237 Patent are invalid as indefinite and/or for claiming non-statutory subject matter insofar as they are not limited to a means that includes “at least one programmed computer.”

Insofar as it is limited to at least one programmed computer, claim 26 is invalid under 35 U.S.C. 112, Fourth Paragraph for failing to further limit the claim(s) upon which it depends.

Additionally, claim 21 of the '237 Patent is invalid as indefinite because, as written, it claims both an apparatus and method steps of using the apparatus.

VI. INVALIDITY UNDER 35 U.S.C. § 101

All the Asserted Claims of the Patents-in-Suit are invalid because they are not directed to subject matter eligible for patenting pursuant to 35 U.S.C. § 101. ABB reserves the right to advance additional and/or different arguments regarding invalidity of any of the Patents-in-Suit or to pursue relief in the form of dispositive motions directed to other or different claims of any of the Patents-in-Suit.

Whether an invention is eligible for patent protection under 35 U.S.C. § 101 is a “threshold test.” *See Bilski v. Kappos*, 561 U.S. 593, 602 (2010). Under this “threshold test,” the court “must first determine whether the claims at issue are directed to [a] patent-ineligible concept[],” such as an abstract idea. *Alice Corp. Pty. Ltd. v. CLS Bank Int’l*, 573 U.S. 208, 217 (2014). If so, the court must then “consider the elements of each claim both individually and “as an ordered combination” to determine whether the additional elements “‘transform the nature of the claim’ into a patent-eligible application.” *See id.* (quoting *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66, 78 (2012)).

In *Alice*, the Supreme Court set forth a two-part test to analyze patent eligibility: (1) determine whether the claims are directed to an abstract idea or other patent-ineligible concept; and (2) if so, determine whether the claim amounts to “significantly more” than the abstract idea. If the claim does not recite “significantly more” than the abstract idea, it is invalid. *Id.*

The first step of the *Alice* test requires the Court to ask whether the claim is “directed to [a] patent-ineligible concept[,]” such as an abstract idea. *Id.* An idea is abstract if it has “no particular concrete or tangible form.” *Ultramercial, Inc. v. Hulu, LLC*, 772 F.3d 709, 715 (Fed. Cir. 2014). A claim is directed to an abstract idea if its “character as a whole,” *i.e.*, its “focus,” is an abstract idea. *Elec. Power Grp., LLC v. Alstom S.A.*, 830 F.3d 1350, 1353 (Fed. Cir. 2016). This inquiry asks whether the claims are “directed to a result or effect that itself is the abstract idea and merely invoke generic processes and machinery” (*e.g.*, adding a conventional processor or other electronic hardware to carry out well-known functions), or whether the claims instead “focus on a specific means or method that improves the relevant technology.” *McRO, Inc. v. Bandai Namco Games Am. Inc.*, 837 F.3d 1299, 1314 (Fed. Cir. 2016). In other words, “a claimed invention must embody a concrete solution to a problem having ‘the specificity required to transform a claim from one claiming only a result to one claiming a way of achieving it.’” *Interval Licensing LLC v. AOL, Inc.*, 896 F.3d 1335, 1343 (Fed. Cir. 2018) (quoting *SAP Am., Inc. v. InvestPic, LLC*, 890 F.3d 1016, 1021–22 (Fed. Cir. 2018)).

If the answer to the first question is “yes,” then the second step of the *Alice* framework requires the Court to determine whether there are “additional elements [that] ‘transform the nature of the claim’ into a patent-eligible application.” *Alice*, 573 U.S. at 217 (quoting *Mayo*, 566 U.S. at 78). The second step entails a search for an “inventive concept” “that is sufficient to ensure that the patent in practice amounts to significantly more than a patent upon the ineligible concept itself.” *Id.* at 218 (quotation omitted). “Simply appending conventional steps, specified at a high level of generality, [is] not enough to supply an inventive concept” needed to make this transformation. *Id.* at 222 (quotation omitted). “Merely reciting the use of a generic computer or adding the words ‘apply it with a computer’ cannot convert a patent-ineligible abstract idea into a

patent-eligible invention.” *Two-Way Media Ltd. v. Comcast Cable Commc’ns*, LLC, 874 F.3d 1329, 1339 (Fed. Cir. 2017). The inventive concept must be clearly “evident in the claims.” *RecogniCorp, LLC v. Nintendo Co.*, 855 F.3d 1322, 1327 (Fed. Cir. 2017). Where the additional elements are “‘well-understood, routine, conventional activit[ies]’ previously known to the industry,” the claim is not patent-eligible. *Alice*, 573 U.S. at 222 (quoting *Mayo*, 132 S. Ct. at 72).

In determining patent eligibility under § 101, courts must focus on the claims. Disclosures in the specification will not save an otherwise abstract claim. *Dealertrack, Inc. v. Huber*, 674 F.3d 1315, 1334 (Fed. Cir. 2012). Moreover, adding one abstract idea to another abstract idea “does not render the claim non-abstract.” *RecogniCorp.*, 855 F.3d at 1327.

The Asserted Claims lack an inventive concept, either in the individual limitations themselves or in their ordered combination, sufficient to impart patent-eligibility. The claims recite, at a high level of generality, well-known, conventional electronic components (*e.g.*, cameras, image sensors, computer-readable medium, processor-readable medium, robot, processor) that perform well-understood and routine activity at a purely functional level. The claims can also be performed by a human. (*See, e.g.*, ’814 Patent at 10:23–25 (“The process of selecting object features . . . suitable for pose determination may range from fully automatic to strictly user driven.”); *id.* at 15:32–33 (“the path may be generated through manual robot path training by a human operator or user”); ’755 Patent at claims 4, 13 (“step ii) h) and i) are carried out by allowing the user to select the desired operation path points interactively”); *id.* at 5:24–27 (“To calculate the ‘Camera → Tool’ transformation manually, the operator first touches 3 identifiable points on the grid having known coordinates with the tool.”); ’237 Patent at 4:37–40 (same); *id.* at 9:28–32 (“The creation of the Object Model may be accomplished by using the relative heights of features and the ‘Robot—Eye Calibration’ or by the operator entering the 3D

position of each feature manually from a CAD model, measurement or other source”); *id.* at 9:62–65 (“The step of creating the Object Model is accomplished by the operator entering the 3D position of each feature manually from a CAD model, measurement or other source.”)).

As a further example, the “invention” of the ’814 Patent purports to be “set[ting] up a series of equations” and solving for them by locating features in a number of images of an object and examining the relationships between those features. (’814 Patent, 2:38-65). Sometimes, this “series of equations” may be used to determine how many additional images should be obtained, for instance, to determine the pose of the object. (*Id.*).

As of the priority date, many mathematical theories/formulas existed that allowed a human to use features extracted from at least one image of an object to set up a series of equations. Sometimes these series of equations were used to determine how many other images are needed to determine the pose of the object. One of those theories is bundle adjustment, which “is the problem of refining a visual reconstruction to produce . . . 3D structure and viewing parameter (camera pose and/or calibration) estimates.” (Triggs at 298). “The term refers to the ‘bundles’ of light rays leaving each 3D feature and converging on each camera centre, which are ‘adjusted’ optionally with respect to both feature and camera positions.” (*Id.* at 298–99). “Bundle adjustment is really just a large sparse geometric parameter estimation problem . . . Classically, bundle adjustment and similar adjustment computations are formulated as nonlinear least squares problems.” (*Id.* at 299). These problems can all be solved manually by a human. (*Id.* at 325–326 (“For all of these automatic ordering methods, it often pays to do some of the initial work by hand, *e.g.*, it might be appropriate to enforce the structure / camera division beforehand and only order the reduced camera system. If there are nodes of particularly high degree such as inner gauge constraints, the ordering calculation will usually run faster and the quality may also be improved

by removing these from the graph and placing them last by hand.”); *id.* at 351 (“The variables can usually be ordered by hand for regular networks.”); *id.* (“For all of the automatic variable ordering methods, try to order any especially highly connected variables last by hand, before invoking the method.”); *id.* at 355 (“All of the above [image processing] developments originally used manually extracted image points.”)). Another mathematical theory that can be used to determine how many other images are needed to determine the pose of the object based on image features is the four-point theorem. None of these theories are patentable.

The claims of ’814 Patent only recite conventional elements such as cameras, sensors, images, training objects, and a processor-readable medium.

The Asserted Claims are analogous to many patent claims that courts have held to be directed to abstract ideas. *See, e.g., New Millennium Software Int’l, L.L.C. v. Phantom Auto Inc.*, No. 23-cv-3278-VC, 2023 U.S. Dist. LEXIS 201784, at *1–3 (N. D. Cal. Nov. 9, 2023) (finding patent directed to a user and a camera-equipped robot communicating through networked servers abstract where the patent “describe[d] a chain of conventional computing components—a robot, a video camera, a personal mobile device, computer servers, and so on—that ‘behave exactly as expected according to their ordinary use.’”) (citations omitted); *Fuzzysharp Techs., Inc. v. Intel Corp.*, No. 12-cv-4413, 2013 U.S. Dist. LEXIS 160689, at *39–40 (N.D. Cal. Nov. 7, 2013) (finding abstract a patent claiming mathematical formulas were the “patent specification indicates that the applications of the formula are numerous and would include any process that requires visible surface detection, such as... ‘Hidden Surface Computations’ for ‘computer animation, flight simulation or dynamic graphics,’ ‘Ray Tracing Computations,’ ‘Computer Vision,’ ‘virtual reality applications,’ and the ‘processing and display of scientific data such as energy spectra data.’”) (citations omitted); *In the Matter of Certain Mach. Vision Software, Mach. Vision Sys., & Prod.*

Containing Same Initial Determination, Inv. No. 337-TA-680, 2010 WL 4778782, at *49–50 (USITC Jul. 16, 2010) (finding patents claiming “algorithms that perform calculations on digital images,” including the steps of “generating a low-resolution model pattern using a training image,” “generating a high-resolution model pattern using the training image,” “receiving a starting pose,” “receiving a run-time image,” “using the low-resolution model pattern,” and “using the high-resolution model pattern” directed to an abstract idea where the algorithms did not “effect[] any real-world result.”), *aff’d on other grounds*, *Cognex Corp. v. ITC*, 550 F. App’x 876, 877 (Fed. Cir. 2013); *In re Warmerdam*, 33 F.3d 1354, 1355 (Fed. Cir. 1994) (affirming patent examiner’s rejection of claims under § 101 where claims were directed to a “method and apparatus for controlling the motion of objects and machines, such as robotic machines, to avoid collision with other moving or fixed objects.”).

For the reasons above, and for additional reasons not stated herein, the Patents-in-Suit are directed to patent-ineligible subject matter and invalid under 35 U.S.C. § 101.

VII. INVALIDITY DUE TO OBVIOUSNESS TYPE DOUBLE PATENTING

The Asserted Claims of the ’237 Patent are invalid for obviousness-type double patenting. See Exhibit D. The Asserted Claims of the ’237 Patent are not patentably distinct from the claims of the ’755 Patent. The ’755 Patent expired before the ’237 Patent, RVT did not file a terminal disclaimer as to either of those patents before their expiration and thus enjoyed an improperly lengthened patent term to the detriment of the public. *Gilead Scis., Inc. v. Natco Pharma Ltd.*, 753 F.3d 1208, 1214 (Fed. Cir. 2014) (“[I]t is a bedrock principle of our patent system that when a patent expires, the public is free to use not only the same invention claimed in the expired patent but also obvious or patentably indistinct modifications of that invention”). Thus, the Asserted

Claims of the '237 Patent are invalid. *See, e.g., Logic Devices Inc. v. Apple Inc.*, No. 13-cv-02943-WHA, 2014 WL 5305979 (N.D. Cal. Oct. 16, 2014).

“Obviousness-type double patenting is a judicially-created doctrine designed to prevent claims in separate applications or patents that do not recite the ‘same’ invention, but nonetheless claim inventions so alike that granting both exclusive rights would effectively extend the life of patent protection.” *In re Hubbell*, 709 F.3d 1140, 1145 (Fed. Cir. 2013) (quotations omitted). Under this doctrine, the court must determine “whether the claimed invention in the application for the second patent would have been obvious from the subject matter of the claims in the first patent, in light of the prior art.” *In re Longi*, 759 F.2d 887, 893 (Fed. Cir. 1985).

To do so, the court applies a two-step analysis: “First, the court construes the claim[s] in the earlier patent and the claim[s] in the later patent and determines the differences. Second, the court determines whether those differences render the claims patentably distinct.” *Abbvie Inc. v. Mathilda & Terence Kennedy Inst, of Rheumatology Trust*, 764 F.3d 1366, 1374 (Fed. Cir. 2014) (quotations omitted). “A later claim that is not patentably distinct from . . . an earlier claim is invalid for obviousness-type double patenting.” *Id.* (quotations omitted). “For a patent to qualify as an obviousness-type double patenting (‘ODP’) reference, its expiration date must fall before that of the challenged patent.” *Allergan USA, Inc. v. MSN Labs. Priv. Ltd.*, No. 19-1727-RGA, 2023 U.S. Dist. LEXIS 172641, at *11 (D. Del. Sep. 27, 2023) (quoting *Gilead Scis., Inc. v. Natco Pharma Ltd.*, 753 F.3d 1208, 1215–17 (Fed. Cir. 2014)).

As shown in the attached **Exhibit D**, the claims from the earlier issued '755 Patent are patentably indistinct from the Asserted Claims of the '237 Patent. Insofar as there are differences between the Asserted Claims of the '237 Patent and the '755 Patent claims, those differences reflect only obvious variations on the claims of the '755 Patent using routine and/or known

techniques to perform obvious steps as part of camera calibration, training, and pose estimation.

Each of the Asserted Claims are invalid for obviousness type double patenting.⁹

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⁹ RVT treats these method claims interchangeably in its Initial Infringement Contentions. Specifically, RVT, citing to the same evidence, asserts that four different ABB products (FlexVision, Integrated Vision, YuMi, and 3DQI) infringe the method claims of both the '237 Patent and '755 Patent.

CERTIFICATE OF SERVICE

I hereby certify that on December 15, 2023 I caused the foregoing to be served on the following counsel of record by electronic mail:

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