

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Amazon.com, Inc. and Amazon.com Services LLC,
Petitioner

vs.

LightGuide, Inc.,
Patent Owner

IPR2024-00130
U.S. Patent No. 9,658,614

PETITION FOR *INTER PARTES* REVIEW

Mail Stop Patent Board
Patent Trial and Appeal Board
U.S. Patent and Trademark Office
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PETITIONER’S EXHIBIT LIST

Petitioner Ex. No.	Description
1001	U.S. Patent No. 9,658,614 (cited as “’614 patent”)
1002	File history to ’614 patent
1003	Declaration of Dr. William Singhose (technical expert) re: ’614 patent (cited as “Singhose”)
1004	<i>Curriculum Vitae</i> of Dr. William Singhose
1005	Japanese Patent Publication No. 2007-087251A (cited as “Yokota”)
1006	English Translation of Japanese Patent Publication No. 2007-087251A (cited as “Yokota”)
1007	Machino <i>et al.</i> , <i>Remote Collaboration System Using Mobile Robot with Camera and Projector</i> , Proc. IEEE Int’l Conf. on Robotics and Automation (May 2006) (cited as “Machino”)
1008	Kroenke & Auer, <i>Database Processing Fundamentals, Design, and Implementation</i> (2009) (cited as “Kroenke”)
1009	U.S. Patent Application Publication No. 2004/0195320 (cited as “Ramsager”)
1010	U.S. Patent Application Publication No. 2009/0105866 (cited as “Fontanot”)
1011	Claudio Pinhanez <i>et al.</i> , <i>Ubiquitous Interactive Graphics</i> (dated May 17, 2002, downloaded from https://web.archive.org/web/20060208095408/http://www.research.ibm.com/ed/publications/rc22495.pdf) (cited as “Pinhanez”)
1012	Declaration of James Mullins (library practices and public availability expert) re: availability of prior art
1013	U.S. Patent No. 7,515,981 (cited as “Ryznar”)

1014	<i>serial number</i> , Am. Heritage Dictionary (3rd ed. 1992)
1015	<i>serial number</i> , Wikipedia (January 10, 2011)
1016	Intentionally omitted
1017	U.S. Patent Application Publication No. 2011/0178627 (cited as “Wechter”)
1018	Declaration of Gwen Snorteland (translator) re: translation of Yokota
1019	U.S. Patent No. 7,664,461
1020	Declaration of Nathaniel E. Frank-White of the Internet Archive
1021	Declaration of Rick Kjeldsen (co-author of Pinhanez)
1022	<i>Programmable Logic Controller</i> , Wikipedia (Sept. 30, 2010)
1023	<i>Memory Address</i> , Wikipedia (October 21, 2023)

I. INTRODUCTION

Petitioners Amazon.com, Inc. and Amazon.com Services LLC (collectively, “Amazon”) request *inter partes* review of Claims 1–25 of U.S. Patent No. 9,658,614 (“’614 patent,” EX1001), assigned to LightGuide, Inc. (“LightGuide”). The ’614 patent is entitled “Light Guided Assembly System and Method” and has an earliest application date of February 11, 2011.

The ’614 patent recites a system for projecting visual instructions to individuals, such as assembly line workers, by using a sequence of input signals to “*dynamically control projection of any sequence of ... visual indicators.*” During prosecution, the Examiner found all but one of the claim limitations obvious. See EX1002 (“’614 File History”), 358–393. The single missing limitation was “*a combination of the sequence of input signals resulting in a creation of a dynamic, real-time projection of visual indicators.*” *Id.*, 398–404, 445–449.

Japanese Patent Publication No. 2007-087251A (“Yokota”) (EX1005/EX1006) renders obvious the ’614 patent independent claims and was not before the Examiner. Yokota discloses *creation of a dynamic, real-time projection of visual indicators* for use in product manufacturing. Yokota ¶¶ 29, 35, Figs. 3, 4(a)–(c). Yokota uses the same dynamic, real time visual projection technique claimed in the ’614 patent for the same reason: to reduce “the likelihood that a worker will mistake the assembly sequence of multiple components.” *Id.* ¶ 35.

Yokota thus renders obvious several of the '614 patent's claims including both independent claims. The '614 patent claims are also rendered obvious by Yokota in combination with other references. Amazon accordingly requests that the Board institute review of the '614 patent and find all claims unpatentable.

II. IDENTIFICATION OF CHALLENGES AND REQUESTED RELIEF

<u>Challenge</u>	<u>Claims</u>	<u>Basis</u>	<u>References</u>
1A	1–2, 9, 17	103	Yokota
1B	10–11, 15–16	103	Yokota, Ramsager
1C	12, 13	103	Yokota, Pinhanez
1D	13–14, 24–25	103	Yokota, Pinhanez, Ryznar
2A	1, 3–8, 17–22	103	Yokota, Fontanot
2B	2, 9–16, 23–25	103	Yokota, Fontanot with Ramsager, Pinhanez, or Ryznar
3A	1, 17	103	Yokota, Machino
3B	2–16, 18–25	103	Yokota, Machino, with Fontanot, Ramsager, Pinhanez, or Ryznar

Challenge 1A: Claims 1–2, 9, and 17 are rendered obvious under (pre-AIA) 35 U.S.C. §103 by Yokota, read in light of the general knowledge of a POSITA regarding database technology. A certified copy of Yokota is attached as Exhibit 1005. A certified translation of Yokota is attached as Exhibit 1006, with the translator's declaration attached as Exhibit 1018. Yokota was published in 2007, more than a year before the '614 patent's earliest filing date (February 11, 2011). EX1006, 1. Thus, it is prior art under (pre-AIA) 35 U.S.C. §102 (a) and (b). This ground also relies on the general knowledge of a POSITA regarding database

technology and concepts, as shown by Kroenke & Auer, *Database Processing Fundamentals, Design, and Implementation* (2009) (EX1008, “Kroenke”) As shown by the declaration of librarian James Mullins, Kroenke was publicly available no later than September 2009 and thus is prior art under (pre-AIA) 35 U.S.C. §§ 102 (a),(b). EX1012 ¶¶ 105–119.

Challenge 1B: Claims 10–11 and 15–16 are obvious under (pre-AIA) 35 U.S.C. §103 based on Yokota in combination with Ramsager (U.S. Patent Application Publication No. 2004/1955320, EX1009).

Ramsager was published in 2004, more than a year before the ’614 patent’s earliest filing date. Ramsager, 1. Thus, Ramsager is prior art under (pre-AIA) 35 U.S.C. §102(a) and (b).

Challenge 1C: Claims 12 and 23 are obvious under (pre-AIA) 35 U.S.C. §103 based on Yokota in combination with Pinhanez (Pinhanez *et al.*, *Ubiquitous Interactive Graphics* (dated May 17, 2002), EX1011).

As shown by accompanying declarations of librarian James Mullins (EX1012 ¶¶ 76–97), co-author Rick Kjeldsen (EX1021 ¶¶ 2–4), and from an Internet Archive representative (EX1020, 1-2, 52-62); Pinhanez was published in 2002, more than a year before the ’614 patent’s earliest filing date. Thus, Pinhanez is prior art under (pre-AIA) 35 U.S.C. §102(a) and (b).

Challenge 1D: Claims 13–14 and 24–25 are obvious under (pre-AIA) 35 U.S.C. §103 based on the combination of Yokota, Pinhanez, and Ryznar (U.S. Patent No. 7,515,981, EX1013).

Ryznar was published in 2009, EX1013, 1, and thus is prior art under (pre-AIA) 35 U.S.C. §102(a) and (b).

Challenge 2A: Claims 1, 3–8 and 17–22 are obvious under (pre-AIA) 35 U.S.C. §103 based on Yokota in combination with Fontanot (U.S. Patent Application No. 2009/0105866, EX1010).

Fontanot was published in 2009, EX1010, 1, and thus is prior art under (pre-AIA) 35 U.S.C. §102 (a) and (b).

Challenge 2B: Claims 2, 9–16, and 23–25 are obvious under (pre-AIA) 35 U.S.C. §103 based on the combination of Yokota, Fontanot, and the prior art of Challenges 1B–1D.

Challenge 3A: Claims 1 and 17 are obvious under (pre-AIA) 35 U.S.C. §103 over the combination of Yokota and Machino.

Machino (EX1007, titled *Remote-Collaboration System Using Mobile Robot with Camera and Projector*) was published in the Proceedings of the IEEE International Conference on Robotics and Automation in May 2006, more than a year before the '614 patent's earliest filing date. EX1007, 4063; EX1012 ¶¶ 43–75. Thus, Machino is prior art under (pre-AIA) 35 U.S.C. §102(a) and (b).

Challenge 3B: Claims 2–16 and 18–25 are obvious under (pre-AIA) 35 U.S.C. §103 based on the combination of Yokota, Machino, and the prior art of Challenges 1B–1D and 2A.

III. LEVEL OF ORDINARY SKILL IN THE ART

A POSITA for the '614 patent would have at least a four-year degree in electrical or mechanical engineering, computer science, or a closely related field, and one years' work experience with interactive applications. Lack of work experience can be remedied by additional education, and vice versa. Specific experience with projected light is not required since, by 2011, projecting light was routine and used essentially the same tools as other display outputs. EX1003, Declaration of Dr. William Singhose ("Singhose") ¶¶ 61–65. Additionally, given that the '614 patent claims concern storing, addressing, and retrieving information, a POSITA would know at least the conventional knowledge of data storage in tables and databases. Singhose ¶ 63. Dr. Singhose qualifies as at least a POSITA for the '614 patent. Singhose ¶¶ 66, 6–21.

IV. CLAIM CONSTRUCTION

The issues presented in this IPR¹ require construction of only the following claim terms (Singhose ¶¶ 67–68):

¹ Additional constructions may be required in related district court litigations.

A. “address identifier”

The term “address identifier” in the ’614 patent refers to an identifier such as the lookup table identifiers “A1” or “F6” in the figure below that provide the location of a data element such as a visual display feature:

	A	B	C	D	E	F	G	H
1	Select 1	Select 2	Select 3	Select 4	Select 5	Select 6	Select 7	Select 8
2	←	↑	↓	→	← Left	↑ Up	↓ Down	→ Right
3	Inspect	Align	Mask	Torque	Gage	Assemble	Rework	Pick
4	[Video 1]	[Video 2]	[Video 3]	[Video 4]	[Video 5]	[Video 6]	[Video 7]	[Video 8]
5	[Drawing 1]	[Drawing 2]	[Drawing 3]	[Drawing 4]	[Drawing 5]	[Drawing 6]	[Drawing 7]	[Drawing 8]
6	Part 1	Part 2	Part 3	Part 4	Part 5	Part 6	Part 7	Part 8
7	Part 9	Part 10	Part 11	Part 12	Part 13	Part 14	Part 15	Part 16

’614 patent, Figure 3A. In this figure, “the textual VDF [Visual Display Feature] ‘Select 1’ is associated with the address identifier A1 (i.e., column A, row 1), and the textual VDF ‘Part 6’ is associated with the address identifier F6.” *Id.*, 15:33–36. In other words, visual display features such as “Select 1” or “Inspect” are data elements and identifiers such as A1 or F6 are address identifiers. Thus, an “address identifier” is an identifier that provides the location of a data element. Singhose ¶¶ 69–71.

Currently, there is no district court construction and LightGuide has asserted that these terms should be given their plain meaning.

B. “a combination of the sequence of input signals resulting in a creation of a dynamic, real time projection of visual indicators”

The term “a combination of the sequence of input signals resulting in a creation of a dynamic, real time projection of visual indicators” means that a projection of visual indicators must be *created* dynamically and in real time in response to a sequence of input signals. Singhose ¶¶ 72–74.

Amazon’s construction is supported by the specification, which contains two passages that discuss dynamic projection. First:

[G]uide system 200 **may be dynamically used to project selected VDFs [visual display features] onto particular locations of an object** by selecting a VDF via its associated VDF address identifier 287 and directing a projector 266 to project the selected VDF by a positional identifier 288.

’614 patent, 17:20–28. This passage describes making dynamic projections by using an address identifier (to identify the VDF) and a positional identifier (to identify where to display the VDF). Despite not using the phrase “creation” or “real time,” this passage describes creating a projection by first selecting a VDF using an address identifier, and then combining the VDF information with the positional information. This dynamically creates a projection because it combines information (the VDF and the positional identifier) to create a new projection (a selected visual indicator in a specific place). Singhose ¶ 75.

The specification also explains how a separate “operational software system” can facilitate the projection of visual indicators in real time:

[O]perational systems 205 may include detailed information regarding production processes, including the location and status of particular objects being assembled, as well as the parts required to be assembled. For example, operational software systems 205 can track the model and location of a vehicle on an assembly line and thereby interact with guide system 200 in the manner described above to coordinate the providing of the appropriate components and assembly actions ... Interfacing guide system 200 with operational software system 205 ... **enables real time or dynamic creation of visual indicators** or display images 209 for guiding the activities of an individual.

’614 patent, 17:60–18:10.² This passage describes an “operational software system 205” controlling the guide system and interacting with it based on the “model and location of a vehicle on an assembly line.” This system dynamically creates projections because it uses information—like vehicle model and location—to identify necessary assembly actions, which are then converted in real time into a projection of visual indicators at the appropriate locations. Singhose ¶ 76.

During prosecution, LightGuide argued that handling “any sequence” of input signals to dynamically control projection distinguished from the prior art. *See, e.g.,* ’614 File History, 226–230, 298, 304, 311–312, 314, 396. But the claims were

² All emphasis added unless otherwise noted.

not allowed until LightGuide amended them to require the “creation of a dynamic, real time projection of visual indicators.” *Id.*, 398–400, 405–412, 445–449.

LightGuide added the “creation” limitation to distinguish the claims from Wechter (EX1017). *Id.*, 396, 398. Wechter discloses a manufacturing/assembly system that uses part numbers to identify which instructions to display next. The Examiner found Wechter, combined with other references, satisfied the dynamic “any sequence” limitation, but not the dynamic “creation” limitation. *Id.*, 366–368 (Wechter ¶¶ 32–34), 396–404. Wechter could only dynamically provide lists of pre-defined instructions for different products; Wechter could not create instructions or instruction lists dynamically or in real time. Wechter thus provided the same type of fixed instructions that a previous LightGuide patent taught. *Compare* Wechter ¶¶ 8–10 *with* Ryznar, Fig. 5. Because Wechter did not disclose the dynamic *creation* of instructions, it did not render obvious the dynamic, real-time creation of projections. Singhose ¶¶ 77–79.

Thus, the Board should construe “a combination of the sequence of input signals resulting in a creation of a dynamic, real time projection of visual indicators” to require the projection of visual indicators be *created* dynamically and in real time in response to a sequence of input signals.

LightGuide may oppose this construction, arguing the claims merely require the *sequence* of projections be created dynamically and in real time. However, this

argument would violate the principle that constructions should, where possible, give meaning to all claim terms because the independent claims also require *dynamically control[ing] projection of any sequence of said visual indicators*. *Merck & Co. v. Teva Pharms. USA, Inc.*, 395 F.3d 1364, 1372 (Fed. Cir. 2005). Notably, the claims were *rejected* when they merely required dynamically projecting any sequence of visual indicators. EX1002, 260–264, 298, 304, 366–368.

V. IDENTIFICATION OF HOW THE CLAIMS ARE UNPATENTABLE

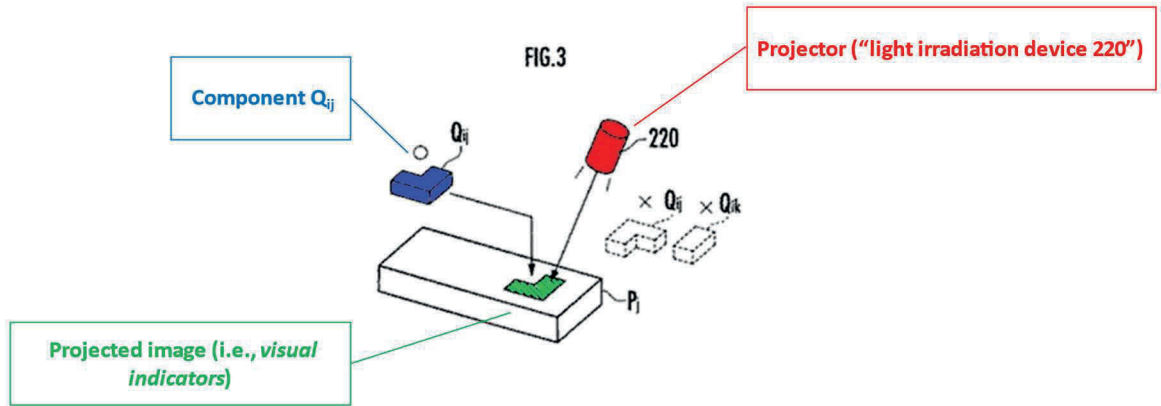
A. Challenge 1A: Claims 1–2, 9, and 17 are rendered obvious by Yokota

Claims 1–2, 9, and 17 are rendered obvious by Yokota, considering the general knowledge of a POSITA regarding databases. Singhose ¶¶ 80–84.

1. Claim 1

[1.0] A method of projecting visual indicators to guide actions of an individual for a particular guided operation, said method comprising:

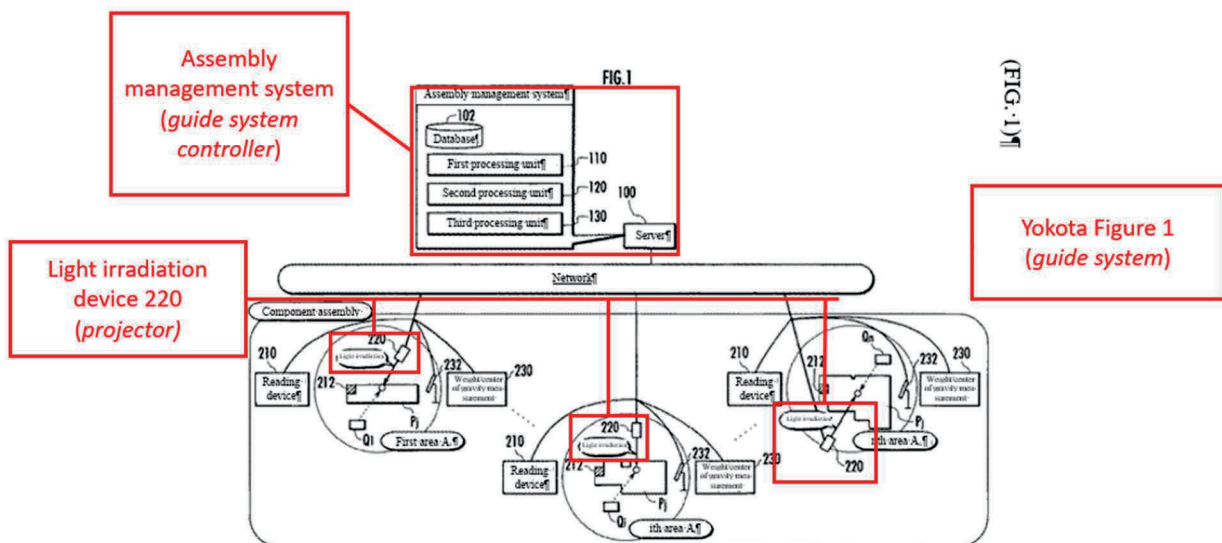
Yokota describes a light-guided manufacturing system that creates projections of where a component should be placed, as shown below:



Yokota ¶ 3 (annotated). Yokota explains that “visible light is irradiated onto the assembly location of a component to be assembled onto a semi-finished product ... so the person in charge of the operation can reliably assemble the component to the appropriate assembly location for the given component.” *Id.* ¶ 6; *see also id.* ¶¶ 32–33. Yokota thus discloses [1.0]. Singhose ¶¶ 85–86.

[1.1] providing a guide system having a guide system controller and a projector,

Yokota discloses [1.1]. As shown below, Yokota uses *projector[s]* at manufacturing workstations:



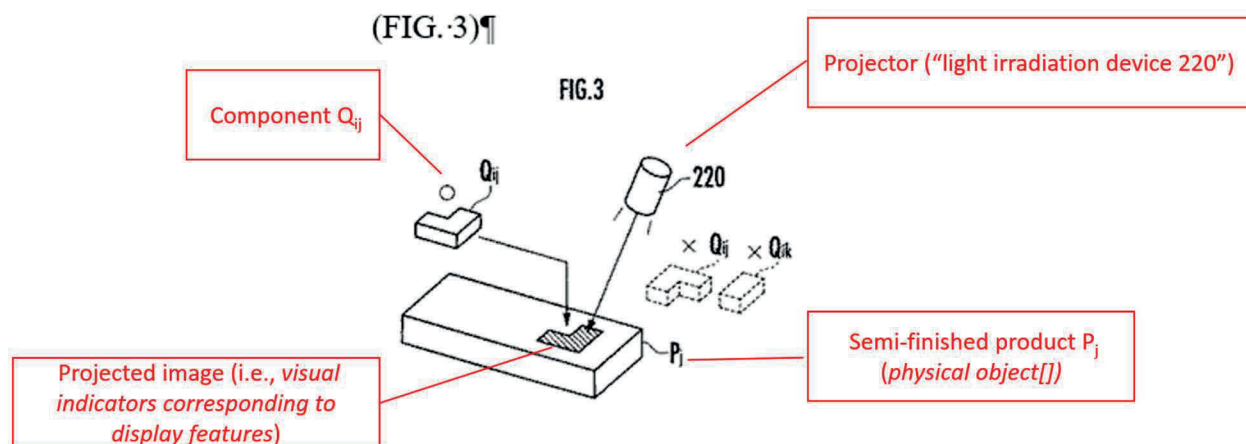
Yokota, Fig. 1 (annotated); Singhose ¶ 87. Yokota’s “assembly management system” is a *guide system controller* because it controls the shape and position of the projections. *See, e.g.*, Yokota ¶ 8 (the “assembly management system ... recognizes component identification information, component shape or assembly orientation ... [and] causes a light irradiation device to adjust the irradiation state of visible light such that the component identification information, component shape or assembly orientation ... is projected onto a semi-finished product.”); ¶¶ 28–29. Singhose ¶ 88.

Yokota’s light irradiation device(s) 220 are *projector[s]*. *See* Yokota ¶ 33 (“the ‘shape’ and ‘assembly orientation’ of the component Q_{ij} are projected by ... light irradiation device 220”); *see also id.* Figs. 1–4; ¶¶ 8–9, 20, 25, 29–30. Singhose ¶ 89.

Thus, Yokota discloses [1.1].

[1.2] said guide system controller including a plurality of selectable addressed display features with each said addressed display feature having a unique pre-programmed individual address identifier within said guide system controller;

Yokota renders obvious [1.2] in view a POSITA's general knowledge regarding conventional database technology. Yokota's "assembly management system comprises a database 102" that includes "component identification [and/or] component shape." Yokota ¶¶ 21–22, 8; *see also id.* ¶¶ 9, 29–33. As shown below, the component shapes are *display features* that are projected onto a semi-finished product.



Id., Fig. 3. Component identification information is also a *display feature* projected by Yokota's light irradiation device. *Id.* ¶ 8 ("[T]he second processing means causes a light irradiation device to adjust the irradiation state of visible light such **that the component identification information, component shape or assembly orientation** recognized by the first processing means **is projected** onto the semi-finished product

....”); *id.* ¶ 29 (“component identification information ... may also be projected”). Singhose ¶¶ 90–91.

Yokota’s “component shape” and “component identification information” are *selectable addressed display features* because they are stored in database 102. Component shape and identification information are selected from the database using, among other things, “product identification information”:

[T]he first processing unit 110 recognizes the component Qij to be assembled onto the semi-finished product Pj ... the assembly location thereof, the assembly orientation, weight, etc., **through lookup in a database 102 based on the product identification information.**

Yokota ¶ 28. Thus, Yokota’s database 102 uses “product identification information” to look up and select corresponding component information. Because component shape and identification information (*display features*) are accessible via database lookup, they are *selectable* and *addressed*. Singhose ¶¶ 91–92.

Yokota does not disclose the complete structure of its database or its specific database lookup mechanism. However, Yokota’s teachings, combined with the general knowledge of a POSITA regarding conventional database practices, render obvious that each *display feature[] [has] a unique pre-programmed individual address identifier within said guide system controller*. Singhose ¶¶ 93–94.

As discussed in Section III, a POSITA reading Yokota would have general knowledge of databases and conventional database practices. Singhose ¶¶ 63, 65–

66. This general knowledge can be determined using expert testimony and contemporaneous texts. *Koninklijke Philips N.V. v. Google LLC*, 948 F.3d 1330, 1337–1339 (Fed. Cir. 2020) (affirming PTAB finding of obviousness based on specific evidence of “the general knowledge of a skilled artisan”). This Petition relies on specific examples from Kroenke (EX1008) and the testimony of technical expert William Singhose to establish the general knowledge of a POSITA regarding conventional database practices at the time of the alleged invention. Singhose ¶¶ 93–108.

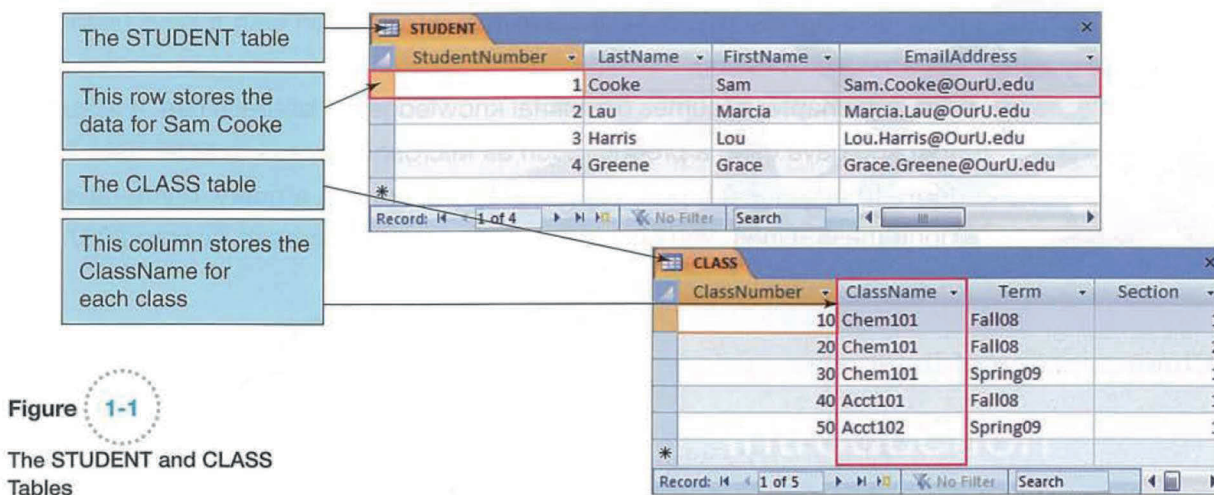
A POSITA’s general knowledge regarding conventional database practices would include the following. Yokota’s disclosure of “database 102” would be read in light of the general knowledge that “the most commonly used type of database is the relational database.” Kroenke, 3. Such a database “stores data in tables” of “rows and columns, like those in a spreadsheet.” *Id.* “Each row of a table has data about a particular occurrence or instance of the thing of interest” (for example, each row might contain related data about a product). *Id.* “Each column of a table stores a characteristic common to all rows” (for example, a row might contain product ID, its corresponding product name, etc.). *Id.* A POSITA would also understand that “[a] database usually has multiple tables, and each table contains data about a different type of things.” *Id.*; Singhose ¶ 97.

This general database knowledge would also inform a POSITA that structured tables use row and column identifiers as *unique pre-programmed individual address identifier[s]*. For example, the '614 patent uses a simple spreadsheet table to illustrate how unique row and column identifiers provide addresses for corresponding *display features*.

	A	B	C	D	E	F	G	H
1	Select 1	Select 2	Select 3	Select 4	Select 5	Select 6	Select 7	Select 8
2	←	↑	↓	→	← Left	↑ Up	↓ Down	→ Right
3	Inspect	Align	Mask	Torque	Gage	Assemble	Rework	Pick
4	[Video 1]	[Video 2]	[Video 3]	[Video 4]	[Video 5]	[Video 6]	[Video 7]	[Video 8]
5	[Drawing 1]	[Drawing 2]	[Drawing 3]	[Drawing 4]	[Drawing 5]	[Drawing 6]	[Drawing 7]	[Drawing 8]
6	Part 1	Part 2	Part 3	Part 4	Part 5	Part 6	Part 7	Part 8
7	Part 9	Part 10	Part 11	Part 12	Part 13	Part 14	Part 15	Part 16

'614 patent, Fig. 3A. As shown, the '614 patent uses unique column and row identifiers to locate specific *display features*. The '614 patent explains that “[s]elect 1’ is associated with the address identifier A1, and the textual VDF ‘Part 6’ is associated with the address identifier F6.” '614 patent, 15:33–35; Singhose ¶ 98.

A POSITA would similarly understand that the use of row/column *unique pre-programmed individual address identifier[s]* applies generally to database tables, and not just to the spreadsheet shown in the '614 patent. This is illustrated by Figure 1-1 of Kroenke:



Kroenke, 4. As shown, column identifiers (e.g., StudentNumber, LastName, etc.) uniquely identify each column. *Id.*, 97 (“each column has a unique name.”); Singhose ¶ 99. A POSITA would further understand that each row also has a unique identifier, called a “primary key,” such as 1, 2, 3 or 4 in the StudentNumber column. Kroenke, 5 (“Each row in a table is uniquely identified by a primary key, and the values of these keys are used to create the relationships between the tables. For example, in the STUDENT table, StudentNumber serves as the primary key. Each value of StudentNumber is unique, and uniquely identifies on student.”) Singhose ¶ 99.

A POSITA would also understand that, in conventional databases, these unique column and row identifiers (i.e., column name and primary key) provide a *unique pre-programmed individual address identifier* for each stored data element. In the example above, the last name of student number 2 is “Lau,” which can be easily determined by looking at the “StudentNumber” columns for the number 2,

and then identifying the corresponding name in the LastName column. Singhose ¶ 99. This means that the row number “2” and the column identifier “LastName” are a *unique pre-programmed individual address identifier* for the last name “Lau” because they are address identifiers that uniquely identify where “Lau” is located within the table. Singhose ¶ 99.

A POSITA would read Yokota in light of this general knowledge of databases, tables, and basic row/column unique identifiers. Thus, when Yokota discloses that “assembly management system comprises a database 102” (Yokota ¶ 21) a POSITA would understand that, conventionally, database 102 would store data in rows and columns, where each individual data value has a *unique pre-programmed individual address identifier*, as in the tables shown above. Singhose ¶¶ 99, 104. This data would be *within the guide system controller* (because Yokota’s database 102 is part of its assembly management system/*guide system controller*). Yokota ¶ 21; Singhose ¶ 104.

Yokota also discloses that its system “recognizes component identification information, component shape or assembly orientation for identifying a component to be assembled onto a semi-finished product in an ith area through lookup in a database.” Yokota ¶ 8. Applying a POSITA’s general knowledge of databases, this statement would be conventionally understood as Yokota disclosing a database

having columns for storing “component identification information,” and “component shape” data (which are the claimed *display features*). Singhose ¶ 100.

Yokota further discloses that “database 102 stores and retains ‘product identification information’ for identifying a finished product or semi-finished product in association with an “assembly location,” etc. of components to be assembled in the i th area A_i ($i = 1, 2, \dots, n$) on a component assembly line.” Yokota ¶ 22. A POSITA would understand from this passage that, conventionally, Yokota’s database tables would include rows of “product identification information” and that those rows would include stored (i.e., *pre-programmed*) information about the “components to be assembled” for that semi-finished product in each “area A_i ($i = 1, 2, \dots, n$).” *Id.*; Singhose ¶ 100.³

³ A POSITA would also understand that Yokota’s “product identification information” would be suitable for use as a unique primary key. Yokota’s product identification information is described as a “serial number,” Yokota ¶ 28, which implies uniqueness. Singhose ¶¶ 100, 105 fn. 7 (explaining that serial numbers suggest uniqueness). A POSITA would understand the conventional knowledge that product identification information is frequently used as a unique primary key. Kroenke, 194 (“[T]here are good data keys, such as ProductID. If such a key exists, it should be used.”)

Finally, Yokota discloses that its system “recognizes the component Q_{ij} to be assembled onto the semi-finished product P_j in the ith area A_i, the assembly location thereof, the assembly orientation, weight, etc., through lookup in a database 102 based on the product identification information” read by an RFID reader. Yokota ¶ 28. A POSITA would understand this as using row and column identifiers described above as *unique pre-programmed individual address identifier[s]* for the desired information. Specifically, a POSITA would understand that, conventionally, database 102 would retrieve the desired information (i.e., component information corresponding to a specific “product identification information”) by (1) using “product identification information” to identify which row to read; and (2) retrieving the corresponding component information from each desired column. Singhose ¶¶ 103–104. Yokota identifies the information retrieved by a database lookup as including “the component Q_{ij} to be assembled onto the semi-finished product P_j in the ith area A_i, the assembly location thereof, the assembly orientation, weight, etc.” Yokota ¶ 28. Yokota further explains that the information retrieved regarding “the component Q_{ij}” includes “component identification information” and “component shape,” which are the claimed *display features*. *Id.* ¶¶ 8, 29. Thus, Yokota, when read in view of the general knowledge of a POSITA regarding tables and databases, renders obvious *each display feature* (i.e., component shape and component identification information, *id.* ¶¶ 8, 29) *having a unique pre-programmed individual*

address identifier (i.e., a conventional row/column address as in Kroenke) *within said guide system controller* (i.e., Yokota’s assembly management system, including database 102, *id.* ¶ 21). Singhose ¶¶ 100–105.

That is not to say that Yokota’s database *inherently* satisfies the claim limitation. Of course, there are multiple ways to implement Yokota’s database. However, a POSITA would understand that the *conventional* structures and methods used in databases, including using rows, columns, and tables to store and look up the desired information as described above render [1.2] obvious. One notable obvious and conventional way to implement Yokota would be to structure Yokota’s database 102 into multiple tables, one of which would include component identification information (as primary key⁴) and component shape information. Singhose ¶¶ 106–107. Such a table is both disclosed in Kroenke (*see* p. 33) and would be the natural result of applying conventional database structuring practices to the data described in Yokota. *See* Singhose ¶ 106. Such a table structure would satisfy the requirement of *each display feature* (i.e., component shape and component identification information, Yokota ¶¶ 8, 29) *having a unique pre-programmed individual address identifier* (i.e., a conventional row/column address as in Kroenke) *within said guide*

⁴ As noted in the preceding footnote, product ID is a well-known conventional primary key. Singhose ¶ 100; Kroenke, 194.

system controller (i.e., Yokota’s assembly management system, including database 102, Yokota ¶ 21). Singhose ¶ 107.

Thus, Yokota, read in light of the general knowledge of a POSITA regarding conventional database implementations, as disclosed in Kroenke, renders obvious [1.2]. Singhose ¶ 108.

[1.3] receiving a sequence of one or more input signals at said guide system controller, with the input signals being provided to said guide system controller by a separate computer system or controller to cause said guide system to project visual indicators for a particular guided operation

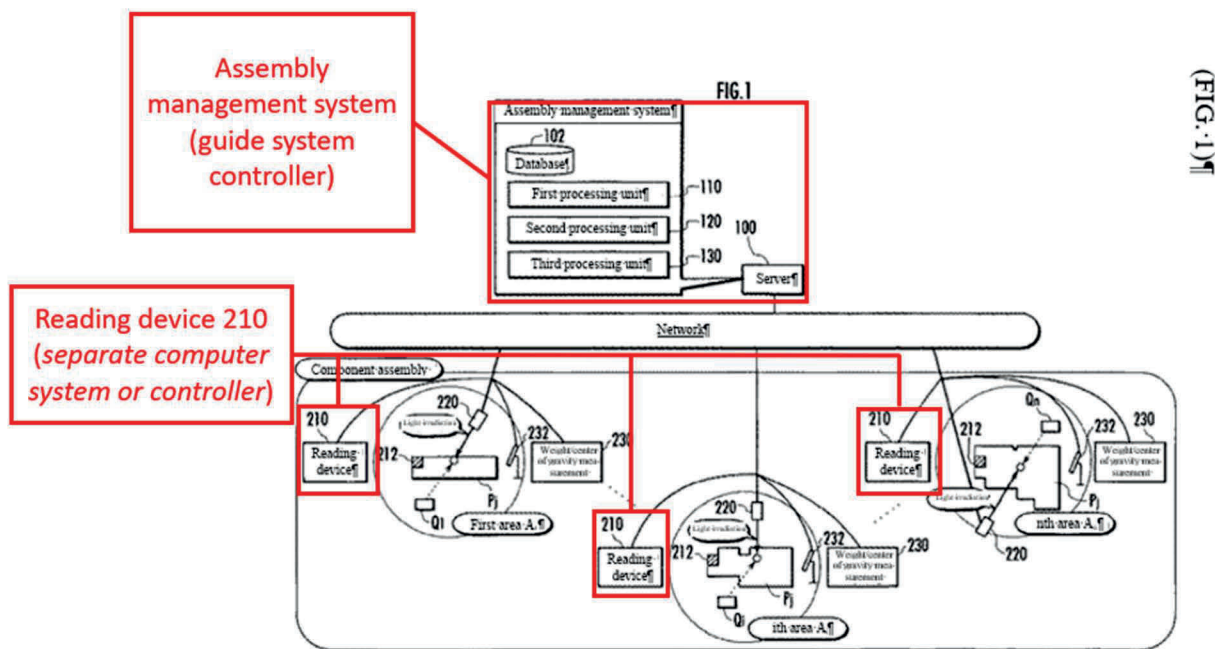
As discussed above, Yokota’s assembly management system is a *guide system controller*. See [1.1], *supra*. Yokota’s system *receives a sequence of one or more input signals at [the] guide system controller* when the assembly management system receives “product identification information” read by RFID reading device 210:

Next, the ‘product identification information’ ***is transmitted from the reading device 210 to the server 100*** ... Specifically, the first processing unit 110 recognizes the component Q_{ij} to be assembled onto the semi-finished product P_j ... through lookup in a database 102 based on the product identification information.

Yokota ¶ 28. Both server 100 and processing unit 110 are parts of the assembly management system. See *id.* ¶¶ 20–21; see also *id.*, Fig. 1. This process is repeated

for each product on the assembly line. *Id.* ¶ 20 (“The assembly management system ... is intended for managing the assembly of a component Q_i onto a semi-finished product P_j ($j = 1, 2, \dots$)”). Thus, Yokota discloses *receiving a sequence of one or more input signals* (i.e., product identification information) *at said guide system controller* (assembly management system). Singhose ¶ 109.

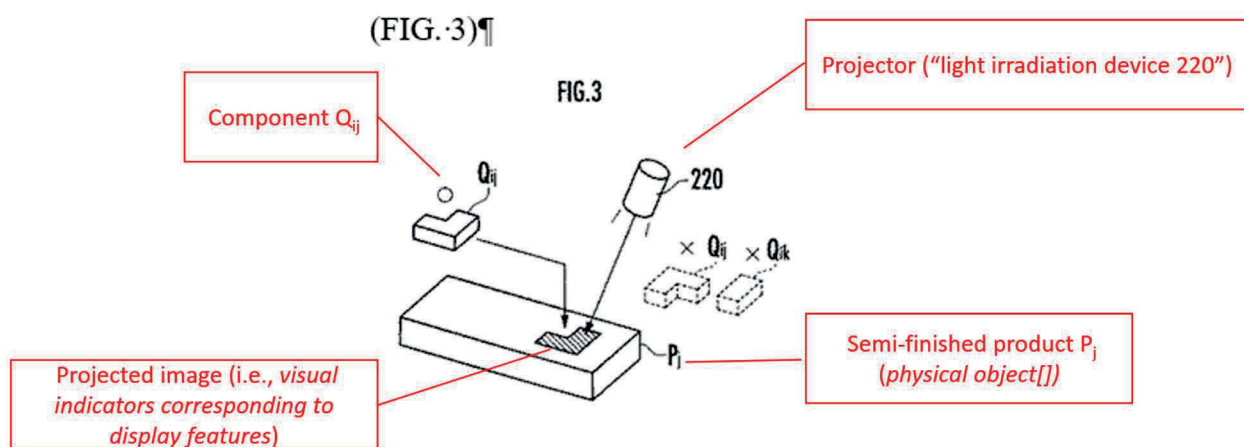
Yokota also teaches *the input signals being provided to said guide system controller by a separate computer system or controller*. The input signals are provided by RFID reading device 210, which is a *separate computer system or controller* from the assembly management system, as shown in Figure 1 below:



Yokota Fig. 1. Reading RFID tags using reading device 210 requires a separate computer system or controller. Singhose ¶ 112; *see also* EX1019 (U.S. Patent No. 7,664,461 (issued Feb. 16, 2010, priority to March 16, 2006)), Fig. 2A (showing an

RFID reader, including protocol processing module 40); *id.*, 4:48–56 (explaining that “processing module 40 ... may be a microprocessor, micro-controller, ... microcomputer, [or] central processing unit.”.)

Finally, Yokota discloses *the input signals ... cause said guide system to project visual indicators for a particular guided operation*. Yokota ¶ 29 (“second processing unit 120 transmits, to the light irradiation device 220 ... a ‘light irradiation instruction signal’ [T]he second processing unit 120 causes the light irradiation device 220 to irradiate visible light towards the assembly location of the component Q_{ij} on the semi-finished product P_j such that the ‘shape’ and ‘assembly orientation’ of this component Q_{ij} are projected thereon.”)



Id., Fig. 3 (annotated). The *project[ed]* visual indicators are for a particular guided operation where “the person in charge of the operation can reliably assemble the component to the appropriate assembly location.” *Id.* ¶ 6; see also *id.* ¶¶ 32–33 (“the

person in charge of work is able to assemble a component Qij of appropriate shape in the appropriate orientation onto the semi-finished product Pj.”); Singhose ¶ 111.

Thus, Yokota discloses [1.3]. Singhose ¶¶ 109–117.

[1.4] selecting one or more particular addressed display features by said guide system controller from the plurality of said addressed display features based on said input signals, wherein said input signals control selection of said addressed display features based on the address identifier for the said addressed display feature; and

As discussed above, Yokota discloses *addressed display features, input signals, guide system controller, and address identifier[s]*. See [1.1]–[1.3], *supra*. Yokota also discloses *selecting one or more particular addressed display features by said guide system controller from the plurality of said addressed display features based on said input signals*. The *input signals* from reading device 210 include product identification information used to perform a lookup in database 102, which contains *the plurality of said addressed display features* and is part of Yokota’s *guide system controller*. This lookup identifies corresponding component identification and component shape information for display (*addressed display features*). Singhose ¶¶ 118–119.

Similarly, Yokota discloses *said input signals control selection of said addressed display features based on the address identifier for the said addressed*

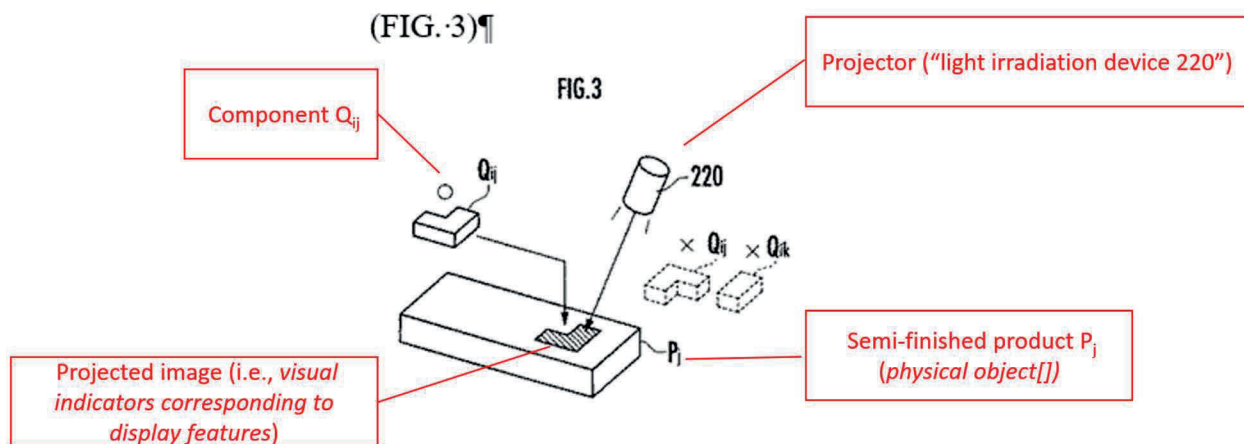
display feature. The *input signals* are the signals that convey the product identification information to the assembly management system / database 102. Yokota ¶ 28. As discussed above in [1.2], the product identification information conveyed in the *input signals* causes Yokota's database to locate the corresponding component shape and component identification information within database 102. Accordingly, Yokota discloses that its *input signals* (from the reading device) *control selection of said addressed display features* (component identification and shape information) *based on the address identifier* (product identification information) *for the said addressed display feature.* Singhose ¶¶ 120–121.

Thus, Yokota discloses [1.4].

[1.5] projecting one or more visual indicators corresponding to said selected particular addressed display features onto one or more physical objects associated with the particular guided operation, with said guide system controller configured to control operation of said projector to project said visual indicators based on said input signals;

Yokota discloses [1.5]. As shown below, Yokota teaches projecting images (*projecting one or more visual indicators corresponding to display features*) via a “light irradiation instruction signal ... corresponding to the component Qij and its assembly position and assembly orientation, etc.” that “causes the light irradiation device 220 to irradiate visible light towards the assembly location of the component

Q_{ij} on the semi-finished product P_j,” (*onto one or more physical objects associated with the particular guided operation*) “such that the shape and assembly orientation of the component Q_{ij} are projected thereon.” Yokota ¶ 29 (internal quotation marks omitted).



Id., Fig. 3 (annotated); see also Fig. 4.

Accordingly, Yokota discloses that a *visual indicator* corresponding to the shape information (*display feature*) of component Q_{ij} is projected onto semi-finished product P_j (*physical object*). Singhose ¶¶ 122–123. Semi-finished product P_j is *associated with the particular guided operation* because the projected light guides the operator to assemble components onto semi-finished product P_j. See Yokota ¶¶ 6, 32–33. The component identification information may also be projected onto the semi-finished product P_j. See *id.* ¶ 29.

Moreover, Yokota discloses *said guide system controller [is] configured to control operation of said projector to project said visual indicators based on said*

input signals. As discussed above in [1.1], Yokota’s assembly management system is the *guide system controller*. As discussed above in [1.3]–[1.4], the assembly management system retrieves component identification and shape information based on *input signals* from reading device 210, before transmitting a “light irradiation instruction signal” corresponding to the retrieved component information to light irradiation device 220. Accordingly, the *guide system controller* (assembly management system) *[is] configured to control operation of said projector* (light irradiation device 220) *to project said visual indicators based on said input signals*. Singhose ¶¶ 124–125.

Thus, Yokota discloses [1.5].

[1.6] wherein said guide system controller is operative to receive any sequence of input signals from the separate computer system or controller to dynamically control projection of any sequence of said visual indicators corresponding to respective said addressed display features based on said input signals corresponding to desired visual indicators for the particular operation with a combination of the sequence of input signals resulting in a creation of a dynamic, real time projection of visual indicators.

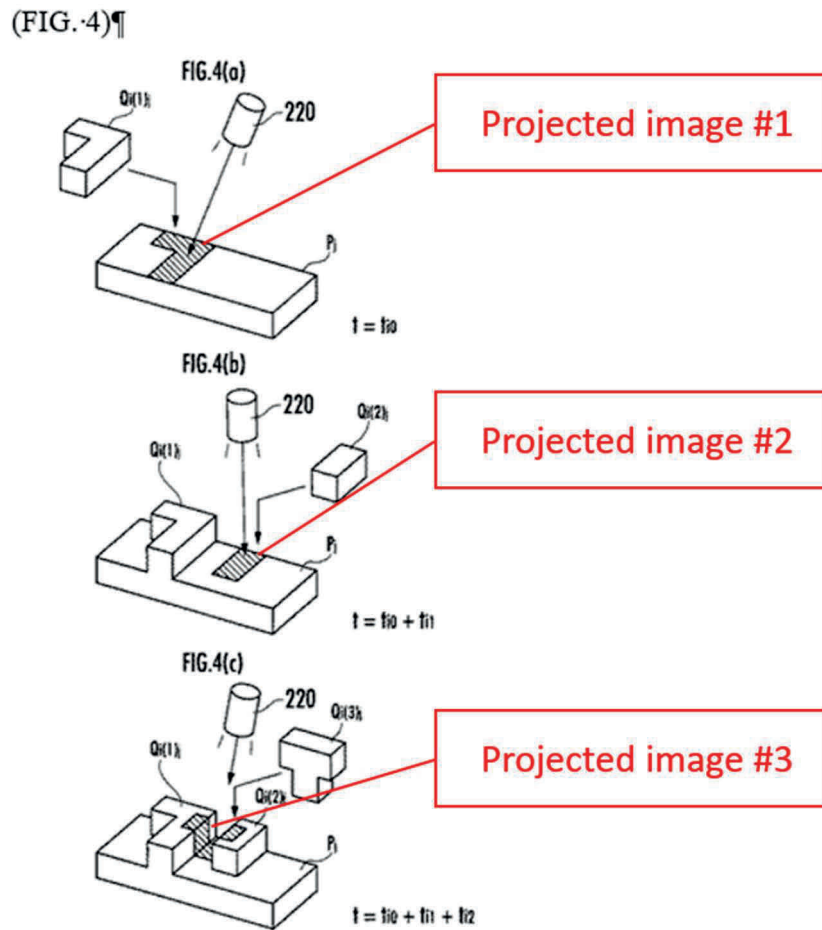
Yokota discloses [1.6]. Yokota teaches a system for customizing consumer products where components are assembled onto semi-finished products. Yokota, Abstract, ¶ 2. In each of these products, “the components that need to be assembled

for each finished product on the product assembly line become different.” *Id.* ¶ 2. As discussed above in [1.3], Yokota’s reading device 210 identifies semi-finished products on the assembly line via RFID tags. Reading device 210 then sends the product identification information to the assembly management system (which uses the product identification information for a database lookup to “recognize[] the component Q_{ij} to be assembled onto the semi-finished product P_j”). *Id.* ¶ 28. These *input signals*, including the product identification information, can be *any sequence*, because the identity and sequence of the semi-finished products on the assembly line is not known in advance. *Id.* ¶ 2 (explaining that in Yokota, “the components that need to be assembled for each finished product on the product assembly line [are] different.”); Singhose ¶ 126.

The assembly management system *dynamically control[s] projection of any sequence of said visual indicators corresponding to respective said addressed display features based on said input signals corresponding to desired visual indicators for the particular operation*. As discussed above in [1.3], the assembly management system controls projection of at least component shape and identification based on *input signals* from reading device 210. Because Yokota’s products “have different variations or combinations of options depending on the user,” “the components that need to be assembled for each finished product on the product assembly line [are] different.” Yokota ¶ 2. Thus, Yokota’s *input signals*

allow the assembly management system to *dynamically control projection of any sequence of said visual indicators* (component information or shape data) *based on said input signals* (product identification information from the RFID reader) *corresponding to desired visual indicators for the particular operation* (the specifically required component shape and identification information). Singhose ¶ 127.

As shown below in Figures 4(a)–4(c), Yokota also discloses that reading product identification information can lead to a sequence of projections that results from recognizing a product identifier, and leads to the assembly of a sequence of components at a single station:



Yokota, Fig. 4; *id.* ¶ 34 (“visible light is irradiated successively onto the assembly location of each product $Q_i(m)_j$ on the semi-finished product P_j in accordance with the assembly sequence thereof.”) This is an example of a *sequence of one or more input signals* (here, a single product ID) leading to *projection of [a] sequence of said visual indicators*. And a sequence of more than one *input signals* (i.e., multiple product IDs read as products travel along a component assembly line, Yokota ¶ 2) would result in a different sequence of projections, each corresponding to the shape of the required components. Singhose ¶ 128.

Yokota also discloses *a combination of the sequence of input signals resulting in a creation of a dynamic, real time projection of visual indicators*. As noted above in the claim construction section, this phrase is separate from the “any sequence” language and requires the projection of visual indicators be created dynamically and in real time in response to a sequence of input signals. Yokota creates projections dynamically and in real time by combining information on component shape, component location, and component orientation to create “light irradiation instruction signal[s].” Yokota ¶ 29 (“the second processing unit 120 transmits, to the light irradiation device 220 ... a ‘light irradiation instruction signal’ corresponding to the ‘component Q_{ij}’ and its ‘assembly position’ and ‘assembly orientation,’ etc. in relation to the semi-finished product P_j”). The component ID and color (“wavelength of visible light”) of the projection are also inputs to the creation of the projection. *Id.* Yokota also teaches that the length of time that a projection is shown is also based on a database lookup. *Id.* ¶ 35; Singhose ¶ 129. Thus, Yokota satisfies this element by creating a new projection in real time based on the data stored in database 102.

This element is satisfied even if the plain language of the claim is applied instead of Amazon’s construction. Whatever the combination of the sequence of products coming down the assembly line is, Yokota’s system will receive the corresponding sequence of *input signals* and dynamically and in real time create a

projection of visual indicators in response to that set of input signals. Singhose ¶ 130.

The assembly management system is thus operable to *dynamically control projection of ... visual indicators* (by second processing unit 120) *corresponding to respective said addressed display features* (component identification and shape information) *based on said input signals* (data-processed RFID tags including product identification information) *corresponding to desired visual indicators* (projected images corresponding to component identification, shape, and assembly orientation information) *for the particular operation with a combination of the sequence of input signals resulting in a creation of a dynamic, real time projection of visual indicators* (e.g., projections corresponding to the sequence of semi-finished products as they pass down the assembly line that are created by combining component information, shape information, position, orientation, etc. to create a dynamic real time projection of visual indicators.) Singhose ¶¶ 127–130.

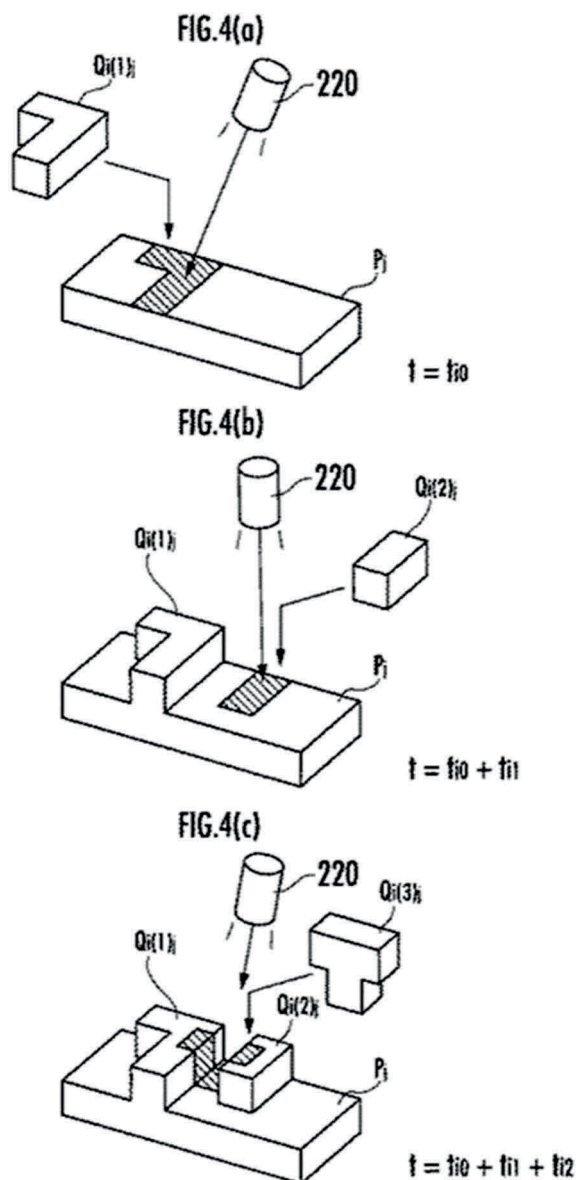
Thus, Yokota discloses [1.6] and, based on the above, renders obvious claim 1. Singhose ¶ 131.

2. Claim 2

[2.0] The method of claim 1, wherein said guide system controller further includes a plurality of positional identifiers and said method further comprises selecting positional identifiers based on said input signals, and

Yokota discloses [2.0]. As discussed above in [1.1], Yokota’s assembly management system is the *guide system controller*. It includes database 102, which contains the “assembly position” of each component. Yokota ¶ 23; *see also id.* ¶ 28. Because the same database contains assembly position information for each assembly component of the semi-finished products at issue, database 102 contains *a plurality of positional identifiers*. *See, e.g., id.* ¶ 22 (database 102 containing assembly locations of “components to be assembled onto the semi-finished product” at multiple workstations). Yokota Figure 4 also illustrates different assembly positions for components $Q_i(1)_j$, $Q_i(2)_j$, and $Q_i(3)_j$ on a semi-finished product (P_j):

(FIG. 4)¶



Id., Fig. 4.

As discussed above in [1.2]–[1.4], the assembly management system retrieves component information from database 102 based on product identification information transmitted from reading device 210 (*input signals*). See *id.* ¶ 28. The

retrieved component information also includes an assembly location *positional identifier*. See, e.g., *id.* (“first processing unit 110 recognizes the component Qij to be assembled” and “the ***assembly location*** thereof ... through lookup in a database 102 based on the product identification information”) (emphasis added.)⁵ Accordingly, Yokota discloses *selecting positional identifiers based on said input signals*.

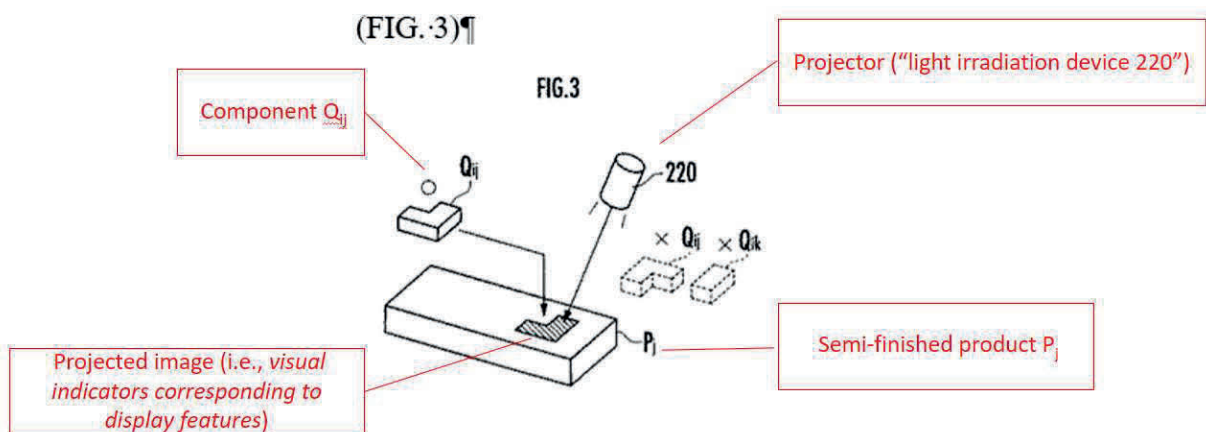
Thus, Yokota discloses [2.0]. Singhose ¶¶ 132–133.

[2.1] wherein said projecting visual indicators further comprises projecting visual indicators corresponding to said selected addressed display features onto a physical object at a location corresponding to said selected positional identifiers.

As discussed above in [1.2] and [1.5], Yokota discloses *projecting visual indicators corresponding to [] selected addressed display features onto a physical object*.

As discussed for [2.0] and as shown below, Yokota also discloses *projecting visual indicators (projected images) ... at a location corresponding to said selected positional identifiers (assembly locations from database 102)*:

⁵ Dr. Singhose explains that further positional information comes from the position of the semi-finished product. Singhose ¶ 133.



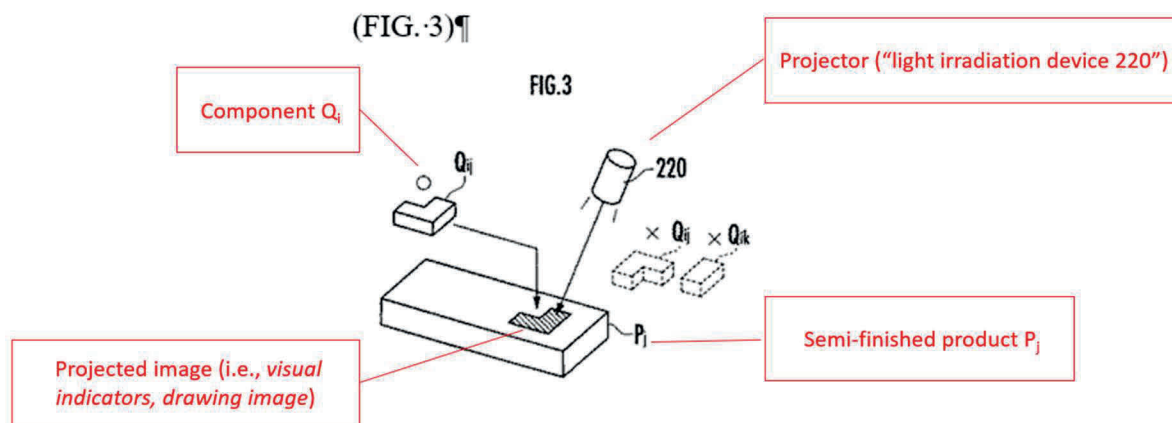
Yokota, Fig. 3; *see also id.* ¶ 29 (“the second processing unit 120 transmits, to the light irradiation device 220 ... a ‘light irradiation instruction signal’ corresponding to the ‘component Q_{ij} ’ and its ‘assembly position’ and ‘assembly orientation’”), Fig. 4.

Thus, Yokota discloses [2.1] and, based on the above, renders obvious claim 2. Singhose ¶¶ 134–137.

3. Claim 9

The method of claim 1, wherein said visual indicators comprise at least one selected from the group consisting of numbers, words, alphanumeric characters, a drawing image and a video image.

Yokota discloses projecting a visual indicator including a picture of the component (*drawing image*), as shown in Figure 3 below:



Yokota, Fig. 3. Yokota also discloses *visual indicators compris[ing] at least ... alphanumeric characters* when it states that “an identification number ... of component Q_{ij} may also be projected onto the semi-finished product P_j .” *Id.* ¶ 29; *see also id.* ¶ 8. Singhose ¶ 138.

Thus, Yokota renders obvious claim 9. Singhose ¶ 139.

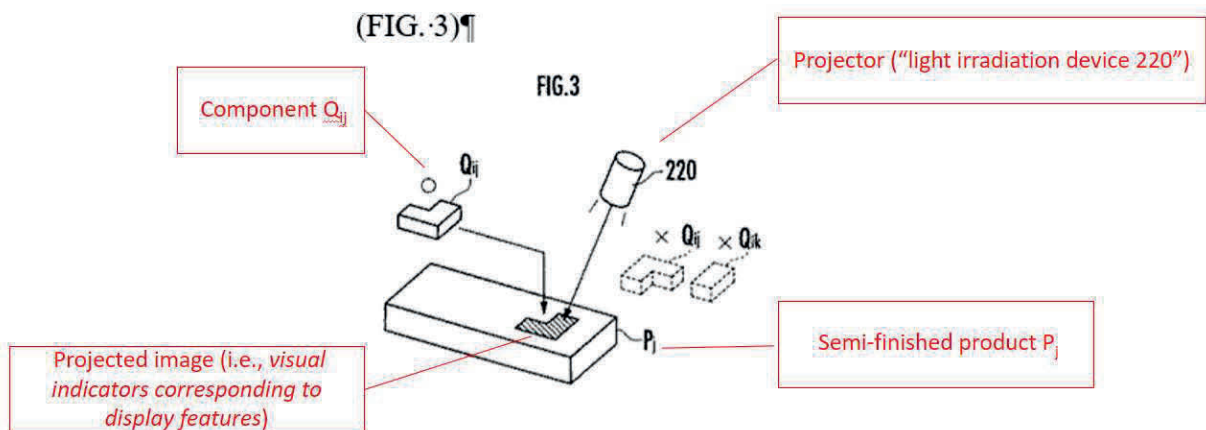
4. Claim 17

[17.0] A guide system adapted to provide visual indicators to an individual to guide actions, said guide system comprising:

Yokota discloses [17.0]. *See* [1.0], *supra*. Singhose ¶ 140.

[17.1] at least one directional light device, said at least one directional light device being selectively operable to project and target at least one indicating light;

Yokota discloses light irradiation device 220, which is the claimed *at least one directional light device*. *See* Yokota ¶ 29. Light irradiation device 220 is *selectively operable to project and target at least one indicating light*, as shown below:



Id., Fig. 3, ¶ 29 (“the second processing unit 120 causes the light irradiation device 220 to irradiate visible light toward the assembly location of the component Q_{ij} on the semi-finished product P_j such that the ‘shape’ and ‘assembly orientation’ of this component Q_{ij} are projected thereon”). Singhose ¶ 141. This passage also discloses aiming the light projection device at the location of component Q_{ij} , particularly since Yokota discloses using a laser as a light projection device. Yokota ¶ 25; Singhose ¶ 131.

Thus, Yokota discloses [17.1].

[17.2] a guide system controller, said guide system controller including a plurality of programmed selectable addressed display features and a plurality of programmed positional identifiers with each said addressed display feature having a unique pre-programmed individual address identifier within said guide system controller;

As discussed above in [1.1], Yokota discloses an assembly management system—the claimed *guide system controller*. As discussed above in [1.2], Yokota, read in view of the knowledge of a POSITA regarding databases, renders obvious that the Yokota assembly management system includes a plurality of *selectable addressed display features*, with each *addressed display feature* having a *unique pre-programmed individual address identifier within said guide system controller*. As discussed in claim 2, the assembly management system further includes a *plurality of [] positional identifiers*. Both the *addressed display features* and *positional identifiers* are *programmed* because they are stored in database 102. See analysis above for [1.2], [2.0]; Yokota ¶¶ 8–9, 22, 28–29 (explaining that the shape and position of the projections are read from a database); Singhose ¶ 142.

Thus, Yokota discloses [17.2].

[17.3] said guide system controller configured to receive a sequence of one or more input signals from a separate computer system or controller to cause said guide system to project visual indicators for a particular guided operation,

Yokota discloses this limitation. See [1.3], *supra*. Singhose ¶ 143.

[17.4] wherein said guide system controller is configured to select one or more particular addressed display features from the plurality of addressed display features based on the input signals, and wherein the input signals control selection

of said addressed display features based on the address identifier for the said addressed display feature,

Yokota discloses this limitation. *See* [1.4], *supra*. Singhose ¶ 144.

[17.5] with said guide system controller causing said directional light device to project visual indicators corresponding to an addressed display feature onto one or more physical objects at a location corresponding to a positional identifier based on said input signals,

Yokota discloses this limitation. *See* [2.1], *supra*. Singhose ¶ 145.

[17.6] wherein said guide system controller is operative to receive any sequence of input signals from the separate computer system or controller to dynamically project any sequence of visual indicators corresponding to respective said addressed display features based on said input signals corresponding to desired visual indicators with a combination of the sequence of input signals resulting in a creation of a dynamic, real time projection of visual indicators.

Yokota discloses this limitation. *See* [1.6], *supra*.

Thus, Yokota renders obvious claim 17. Singhose ¶¶ 146–147.

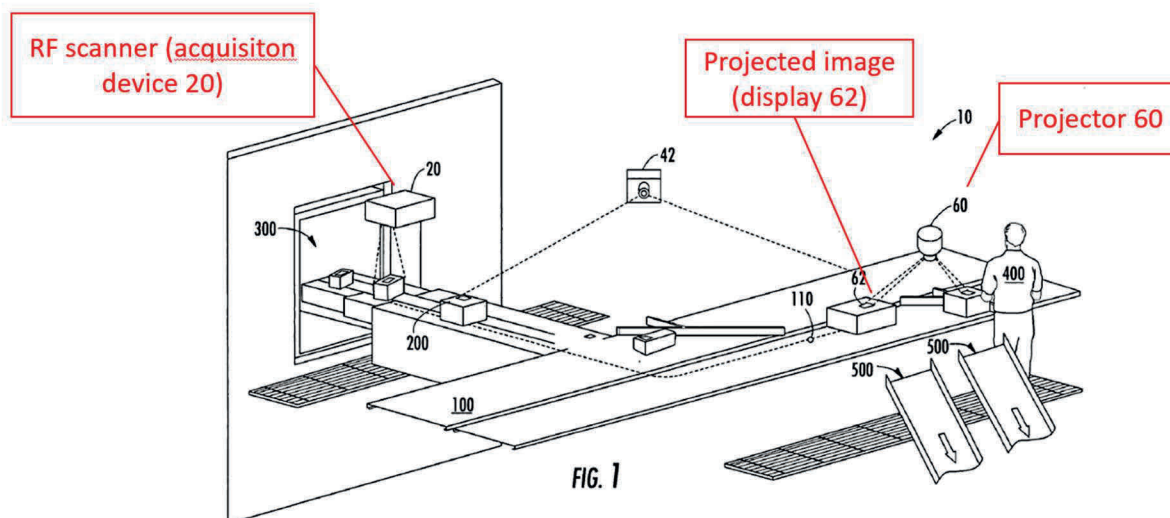
B. Challenge 1B: Obviousness of Claims 10–11 and 15–16 based on Yokota and Ramsager

1. Claim 10

The method of claim 1 further comprising providing a confirmation signal to said guide system controller in response to completion of an action by an individual based on one or more of said visual indicators.

The Yokota/Ramsager combination renders obvious claim 10. Yokota first measures “the ‘weight’ and ‘center of gravity’ of the semi-finished product Pj ... after the component Qi has been assembled.” Yokota ¶ 31. Yokota then “determin[es] if the error is within the allowable range for one of the weight or the center of gravity” and displays the determination (a *confirmation signal*). *Id.*

Ramsager discloses providing the claimed *confirmation signal to said guide system controller*. As shown below, Ramsager, like Yokota, uses projected images to guide human tasks. In Ramsager, the task is processing packages:



Ramsager, Fig. 1 (annotated). Ramsager’s system first detects package information using “acquisition device 20.” *Id.* ¶ 61 (“an acquisition device 20 may acquire,

capture, scan, or otherwise read a label or indicia 30 ... on each of one or more parcels 200.”) Like Yokota, Ramsager’s “acquisition device 20 may be ... an RFID reader.” *Id.* ¶ 62. Ramsager uses the scanned information to “project a display 62 adjacent or near a parcel 200 or directly onto a surface of a parcel 200.” *Id.* ¶ 81. This may “include a handling instruction 130 correlated to or specifically tailored for a particular parcel 200.” *Id.* ¶ 75; Singhose ¶¶ 148–150.

Ramsager also includes “computer 45”—a *guide system controller*—that is “linked to one or more [s]canners or acquisition devices 20, tracking systems 40, and projectors 60.” Ramsager ¶ 52. Computer 45 is a *guide system controller* because, as illustrated below, it provides instructions to the projector:

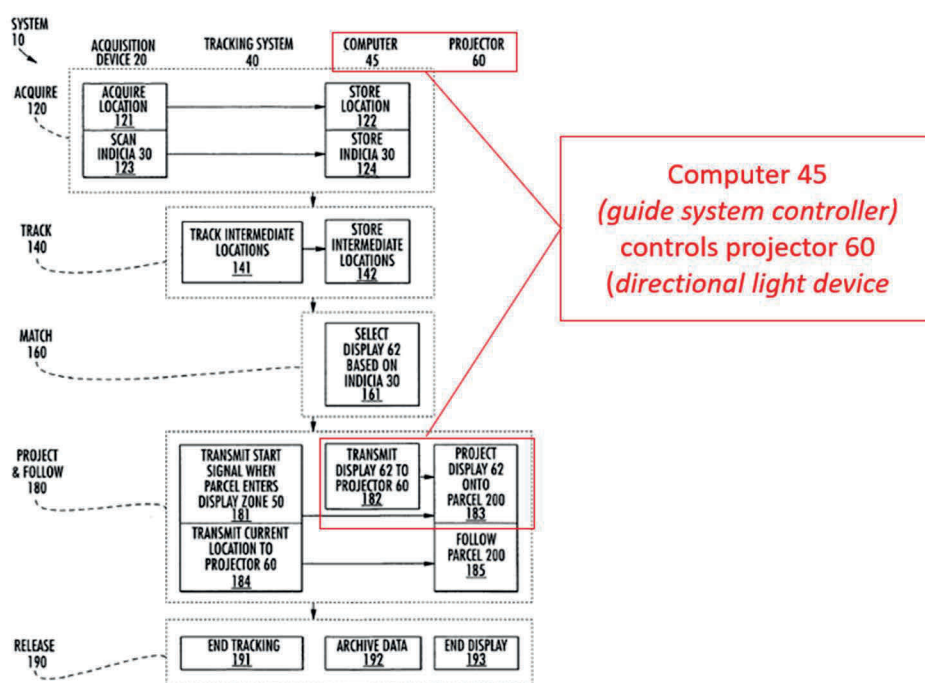
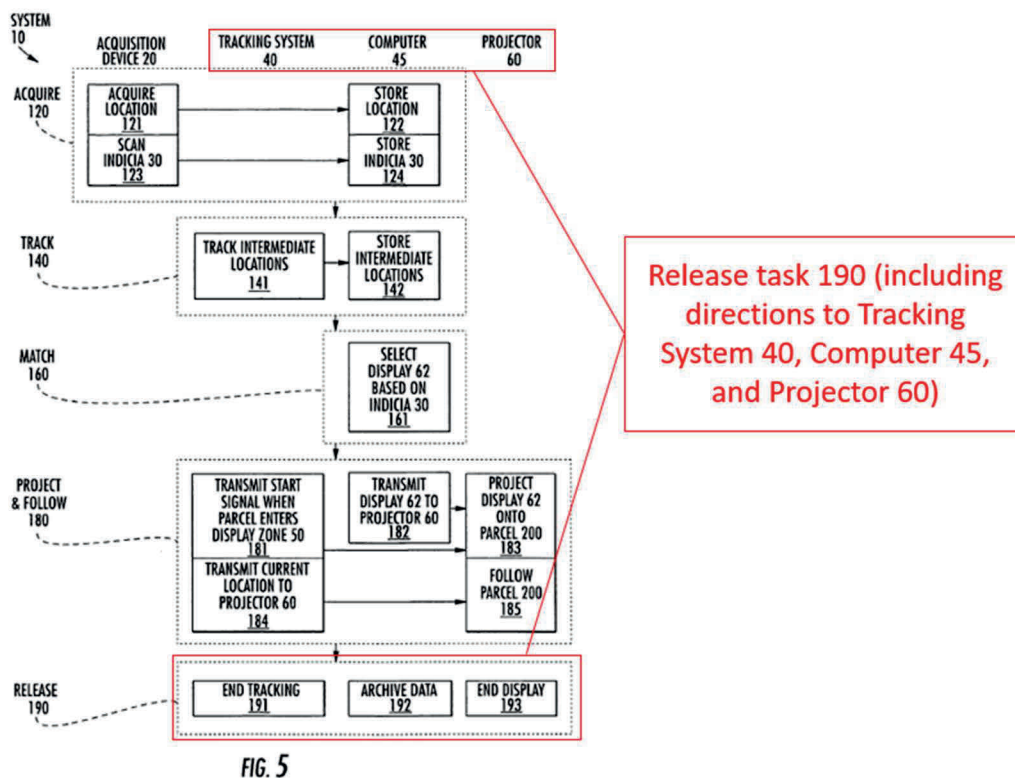


FIG. 5

Id., Fig. 5 (annotated). Singhose ¶¶ 150, 158. Ramsager teaches projecting “packing instruction[s] or packing list[s] onto a parcel 200 The projectors 60 may also display a series of item names and quantities onto the parcel 200, in order to provide real-time instruction to the person picking the items and packing the parcel.” Ramsager ¶ 98.

Ramsager also discloses *providing a confirmation signal* based on a “bar code scanner or other sensors to confirm the correct selection and packing of each item.” *Id.* ¶ 99. The *confirmation signal* is provided *to the guide system controller* as part of “release task 190,” which occurs because Ramsager’s system is “configured to release each parcel 200 (task 190) when it has been processed.” *Id.* ¶ 94; Singhose ¶ 159. As shown below, “release task 190” includes sending a signal (a message) for “clearing the data stored in computer 45” (to the *guide system controller*):



Ramsager, Fig. 5 (annotated). Singhose ¶ 160.

Ramsager’s release task 190 is performed *in response to completion of an action by an individual based on one or more of said visual indicators* because it occurs “when each parcel 200 has been processed or otherwise handled ... according to the handling instruction 130.” Ramsager ¶ 94. For example, when “a bar code scanner ... [confirms] the correct selection and packing of each item.” *Id.* ¶ 99. Thus, Ramsager discloses [10.0]. See Singhose ¶¶ 156–162.

It would have been obvious to a POSITA to combine Ramsager and Yokota. Yokota’s *confirmation signal is provided by the guide system control*; Ramsager’s *confirmation signal is provided to the guide system controller*. A POSITA would

have recognized this difference is insignificant, and both approaches have the same result: a *confirmation signal* at the *guide system controller* informing the system when to move to another operation. Singhose ¶ 151. Similarly, this combination would have merely combined prior art elements according to known methods to achieve predictable results, or used a known technique to improve a similar device in the same way. Because Ramsager discloses steps Yokota's system would need to take to prepare for the next assembly operation (e.g., instructing the projector to stop displaying the current image), a POSITA would know how to substitute or supplement Yokota's confirmation system with Ramsager's. Singhose ¶ 152.

A POSITA would have a reasonable expectation of success with this combination because both references discuss similar systems for displaying instructions to human operators, and both involve: (1) identifying target items (either assembly or package components) using RFID tags; and (2) projecting corresponding instructions on the items. Singhose ¶¶ 153–154. Both references are also analogous to the '614 patent: they are reasonably pertinent to the problem addressed by the '614 patent and within the same field of invention: light-guided systems. Singhose ¶ 155.

Thus, the Yokota/Ramsager combination renders obvious claim 10.

2. Claim 11

The method of claim 10 further comprising providing a sensor apparatus, wherein said sensor apparatus is operable to detect completion of the action and wherein said sensor apparatus generates said confirmation signal.

Ramsager discloses that “a bar code scanner or other sensor[] [is used] to confirm the correct selection and packing of each item.” Ramsager ¶ 99. Notably, Ramsager gives several examples of “bar code scanners or other sensors” under the rubric of an “acquisition device.” *Id.* ¶ 62. Ramsager’s acquisition devices create signals after they read information. *Id.* ¶¶ 100 (“acquisition device 20 may then transmit the data”); 61 (“indicia 30 read by the acquisition device 20 may be transmitted to a computer 45”). Thus, Ramsager also discloses or renders obvious that *said sensor apparatus* (i.e., a bar code scanner or other sensor / “acquisition device”) *generates said confirmation signal* (i.e., “confirm[ing] the correct selection and packing of each item”). *Id.* ¶ 99. The Yokota/Ramsager combination accordingly renders obvious claim 11. Singhose ¶¶ 163–164.

3. Claim 15

[15.0] The method of claim 1, further comprising receiving a display feature input signal at said guide system controller provided by said separate computer system or controller,

Ramsager’s computer 45 (*guide system controller*) receives information to be displayed by the projector (a *display feature input signal*). Ramsager discloses

reading “indicia 30,” and “transmitt[ing] [it] to a computer 45.” Ramsager ¶ 61. “[I]ndicia 30” may include an embedded packing list, which is then projected onto a parcel 200. *See id.* ¶ 100 (“acquisition device 20 may include a scanner to optically read the packing list data embedded within the indicia 30”); ¶ 98 (“projector[] 60 [] display[ing] a ... packing list onto a parcel 200 ... [t]he projector[] 60 may also display a series of item names and quantities.”); Singhose ¶¶ 165–167. Indicia 30’s data is a *display feature input signal* because Ramsager projects it onto the package. Ramsager ¶ 54 (“the display 62 chosen to be projected onto each parcel 200 is correlated to the data contained in the indicia 30”)

Further, because a POSITA would understand acquisition device 20 requires an independent controller to “acquire, capture, scan, or otherwise read a label or indicia 30,” Ramsager teaches *[a] separate computer system or controller*. Singhose ¶ 168.

As described, it would have been obvious for a POSITA to apply Ramsager’s teachings to Yokota’s system. The references concern the same general subject matter (projecting instructions). Projecting information read from an RFID tag is a standard technique that is easily applied to Yokota. *Compare* Yokota ¶ 28 (reading product identification information “from the RFID tag 212”) *with* Ramsager ¶ 16 (“The indicia may include an RFID tag and the acquisition device may include an

RFID reader.”) A POSITA would also have a reasonable expectation of success in this combination as stated for claim 10. Singhose ¶¶ 169, 153–155.

Thus, Yokota/Ramsager discloses [15.0].

[15.1] said display feature input signal including information to be projected by said projector with said guide system controller operatively receiving said display feature input signal and controlling said projector to project a visual indicator including the information to be projected that is included in said display feature input signal.

As discussed above for [15.0], the *display feature input signal* (indicia 30) includes information *to be projected by said projector* (Ramsager ¶ 54) and *said guide system controller* (computer 45) *operatively receiv[es] said display feature input signal* from acquisition device 20 (see discussion above for Ramsager ¶¶ 98, 100). Lastly, Ramsager discloses *said guide system controller ... control[s] said projector to project a visual indicator including the information to be projected that is included in said display feature input signal*, because “projector[] 60 ... may project a display 62 including packing instructions 103” via computer 45. See Ramsager ¶100; see also *id.* ¶¶ 74–78 (describing computer 45 matching and transmitting display 62 to projectors 60).

Thus, Yokota/Ramsager discloses [15.1] and renders obvious claim 15. Singhose ¶¶ 170–175.

4. Claim 16

The method of claim 15, wherein the information to be projected included in said display feature input signal comprises at least one selected from the group consisting of numbers, words, alphanumeric characters and a drawing image.

As discussed above for claim 15, Ramsager discloses computer 45 receiving *display feature input signal[s]* including the *information to be projected* (the packing list). The projected packing list *comprises at least one selected from the group consisting of numbers, words, alphanumeric characters and a drawing image*, because indicia 30 may include “text, icon, symbol, or combinations thereof,” (*numbers, words, alphanumeric characters [or] a drawing image*). Ramsager ¶ 86; Singhose ¶¶ 176–179. Thus, Yokota/Ramsager renders obvious claim 16.

C. Challenge 1C: Obviousness of Claims 12 and 23 based on Yokota and Pinhanez

1. Claim 12

The method of claim 1 wherein said guide system further includes a camera operable to image at least one of actions of an individual guided by said visual indicators and said visual indicators, and wherein said method comprises recording images while an operator is guided by said guide system.

Using cameras in projection-guided assembly systems, like Yokota’s, was known in the art. For example, the 2002 IBM Research Report *Ubiquitous Interactive Graphics* (EX1011, “Pinhanez”) describes an Everywhere Displays

Projector (“ED-projector”) that combines a projector and a camera into one device.

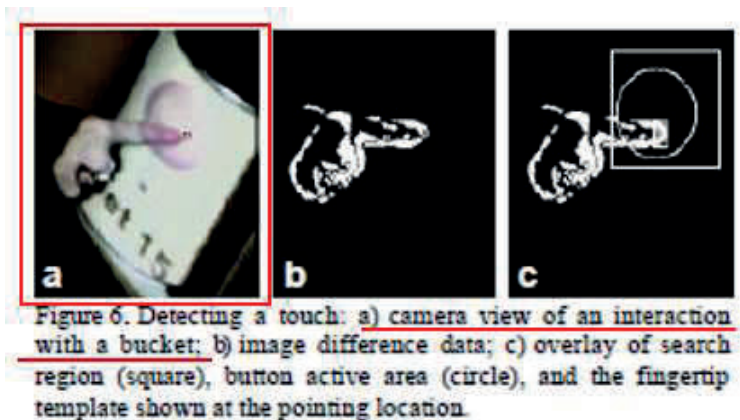
See Pinhanez, 6–7.



Figure 3. Prototype of the ED-projector: a) ED-projector without the camera mounted; b) a detail of a complete prototype, including the pan/tilt camera.

Id., Fig. 3.

Pinhanez’s camera is *operable to image at least one of actions of an individual guided by said visual indicators and said visual indicators*. Pinhanez discloses “*the ED-projector employs a pan/tilt/zoom camera and a motion-based computer vision system to track the user’s hand and touch-like gestures.*” *Id.*, Abstract. For example, Figure 6 shows a picture taken by the ED-projector camera that captures both a projected image (*visual indicator*) and the hand of *an individual being guided by said visual indicators*.



Id., Fig. 6; *see also* Fig. 5. This picture was recorded in the context of an *individual being guided* in an assembly task (assembling pictures using M&M’s as pixels). *See id.*, 8–9. Singhose ¶¶ 180–181, 185–187.

The ED-projector also *record[s] images while an operator is guided by said guide system*. For example, Pinhanez Figure 6(a)–6(c) shows the ED-projector recording images (in a “video stream”) and examining “the differences between adjacent images in the video stream ... [to] detect the shape of a moving object.” Pinhanez, 6; Singhose ¶¶ 188–189. Moreover, Figures 5 and 6 were created by *recording images while an operator is guided by said guide system*. Singhose ¶¶ 180, 187–188.

It would have been obvious to combine Yokota and Pinhanez because both systems use light to guide assembly operations. *Compare* Pinhanez, 8–9 and Yokota ¶¶ 1–4. A POSITA would understand that adding Pinhanez’s camera and computer vision systems to Yokota would improve Yokota by allowing an operator to confirm completion of an assembly step via a virtual “button press” on a projected image,

thus simplifying the system by eliminating the need for a physical confirmation button. Singhose ¶ 182. Additionally, the camera would help study repeated operations for potential process improvements or for determining the cause of errors. Singhose ¶ 182.

The combination also joins known prior art elements (Pinhanez's camera/vision system with Yokota's projection system) according to known methods to yield predictable results. Similarly, the combination is the use of a known technique (Pinhanez's camera/vision system) to improve a similar device (Yokota's assembly system) in the same way. The combination is also applying a known technique (Pinhanez's camera/vision system) to a known system (Yokota) ready for improvement. Singhose ¶¶ 182, 190. Thus, a POSITA would have expected this combination to succeed. Singhose ¶ 183. Both references are also analogous to the '614 patent: they are in the same field of invention and reasonably pertinent to the problem of guiding an individual's actions using light. Singhose ¶ 184.

Thus, Yokota/Pinhanez renders obvious claim 12. Singhose ¶ 191.

2. Claim 23

The guide system of claim 17 further including a camera operable to image at least one of actions of an individual guided by said visual indicators and said visual indicators.

Pinhanez discloses this limitation as discussed for claim 12. Thus, Yokota/Pinhanez renders obvious claim 23. Singhose ¶¶ 192–193.

D. Challenge 1D: Obviousness of Claims 13–14 and 24–25 based on Yokota, Pinhanez, and Ryznar

3. Claim 13

The method of claim 12 further comprising recording the time duration while an operator is guided by said guide system.

U.S. Patent No. 7,515,981 (EX1013, “Ryznar”)—which is owned by LightGuide—discloses *recording the time duration while an operator is guided by said guide system*. Ryznar discloses “record[ing] cycle times of the individual operational steps at a work station 16 and/or the combined cycle time of operations at a work station 16.” Ryznar, 15:58–63; *see also id.*, 5:16–19 (“control module 20 may also be used to monitor cycle times of the individual operational steps and combined operations undertaken at the work station 16”), 15:24–36 (displaying running times and cycle times), 16:8–11 (“control module 20, or another such computational device, may record and provide charts or reports regarding ... cycle times.”); Singhose ¶¶ 194–196, 200–204. Thus, Yokota/Pinhanez/Ryznar discloses claim 13.

It would have been obvious to combine Yokota, Pinhanez, and Ryznar, all of which project light to guide assembly actions. Additionally, Yokota and Ryznar both use display screens to provide information to operators. Yokota, Figs. 1, 2,

¶ 20; Ryznar, 15:24–16:19. Combining Yokota with Ryznar’s monitoring/program screen joins prior art elements according to known methods to yield predictable results. Combining Yokota and Ryznar also uses a known technique (Ryznar’s monitoring/program screens) to improve a similar device (Yokota’s assembly system) in the same way. It also applies a known technique (Ryznar’s monitoring/program screens) to a known system (Yokota) ready for improvement (to allow managers to remotely monitor the efficiency and actions of their workers). Singhose ¶ 197. Accordingly, the combination is obvious and a POSITA would have a reasonable expectation of success. Singhose ¶ 198.

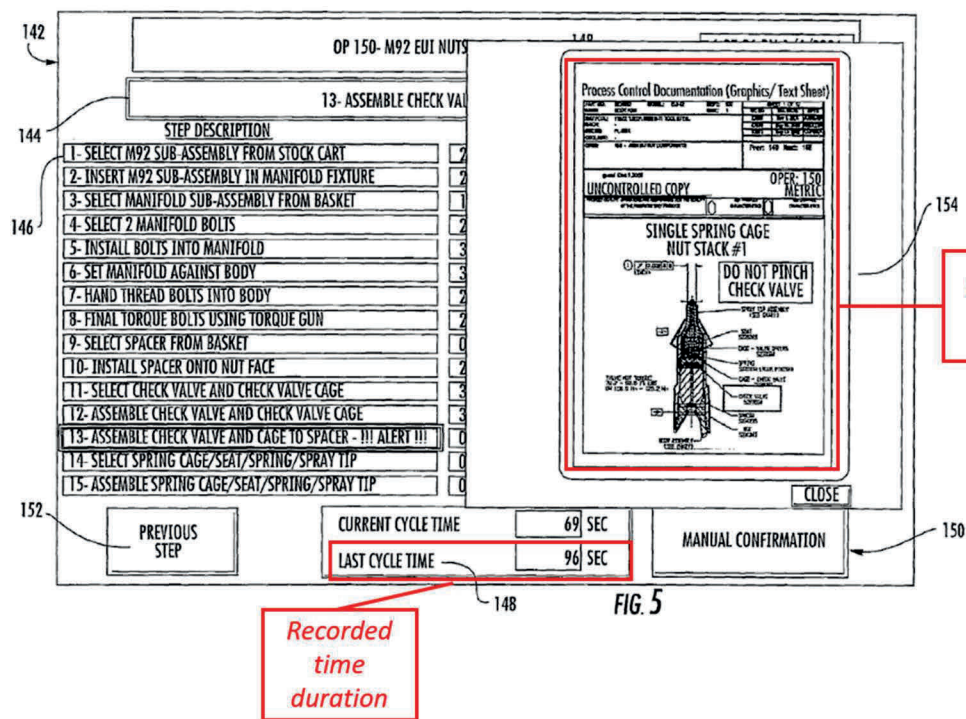
Yokota and Pinhanez are analogous as discussed above for Challenge 1D. The ’614 patent shows that Ryznar is reasonably pertinent to the problem the ’614 patent was attempting to solve (i.e., because it provides the baseline for the ’614 patent). ’614 patent, 5:43–14:12; Singhose ¶ 199.

4. Claim 14

The method of claim 13 further comprising displaying a recorded image and recorded time duration on a display device.

Both Yokota and Ryznar disclose a display device. Yokota, Figs. 1, 2, ¶ 20 (describing image displaying device 232); Ryznar, Figs. 1, 2, and 11:15–20 (describing display device 36). Singhose ¶¶ 205–206. Ryznar further describes displaying *recorded time durations on [the] display device* including “the cycle time

to perform one or more ... operational steps” and “the cycle time of the preceding and current operational step.” Ryznar, 15:24–36. Ryznar’s display device also may “be used to show or provide instructional videos, display running cycle times, desired cycle times, and/or alerts” *Id.*, 11:35–38. Ryznar Figure 5 demonstrates displaying a *recorded image* and a *recorded time duration* simultaneously:



See *id.*, 15:45–55; see also *id.*, 4:32–36 (using “display device 36 to provide and relay information to operator 12 such as ... **images of a work piece, [or] videos.**”); Singhose ¶ 206.

Thus, Yokota/Pinhanez/Ryznar renders obvious claim 14. Singhose ¶¶ 205–208.

5. Claim 24

The guide system of claim 23 wherein said guide system controller records images and time durations while an operator is guided by said guide system.

As discussed for claim 12, Pinhanez discloses *said guide system controller record[ing] images while an operator is guided by said guide system*. As discussed for claim 13, Ryznar discloses its control module (*the guide system controller*) *recording the time duration while an operator is guided by said guide system*. Thus, Yokota/Pinhanez/Ryznar renders obvious claim 24. Singhose ¶¶ 209–210.

6. Claim 25

The guide system of claim 24 further comprising a monitor interfaced with said guide system controller, and wherein recorded images and time durations are viewable on said monitor.

As discussed in Challenge 1D, claim 14, Ryznar discloses a display device that “may be constructed as a conventional touch screen ... [or] a conventional monitor.” Ryznar, 15:38–43; *see also id.*, Fig. 1, 11:51–20. The display device is also *interface[d] with said guide system controller*. *Id.* Moreover, Ryznar discloses displaying both *recorded images and [recorded] time durations* on the same display device. *See* Challenge 1D, claim 14; Singhose ¶¶ 211–212, 205–208. Thus, Yokota/Pinhanez/Ryznar renders obvious claim 25.

E. Challenge 2A: Obviousness of Claims 1, 3–8 and 18–22 based on Yokota and Fontanot

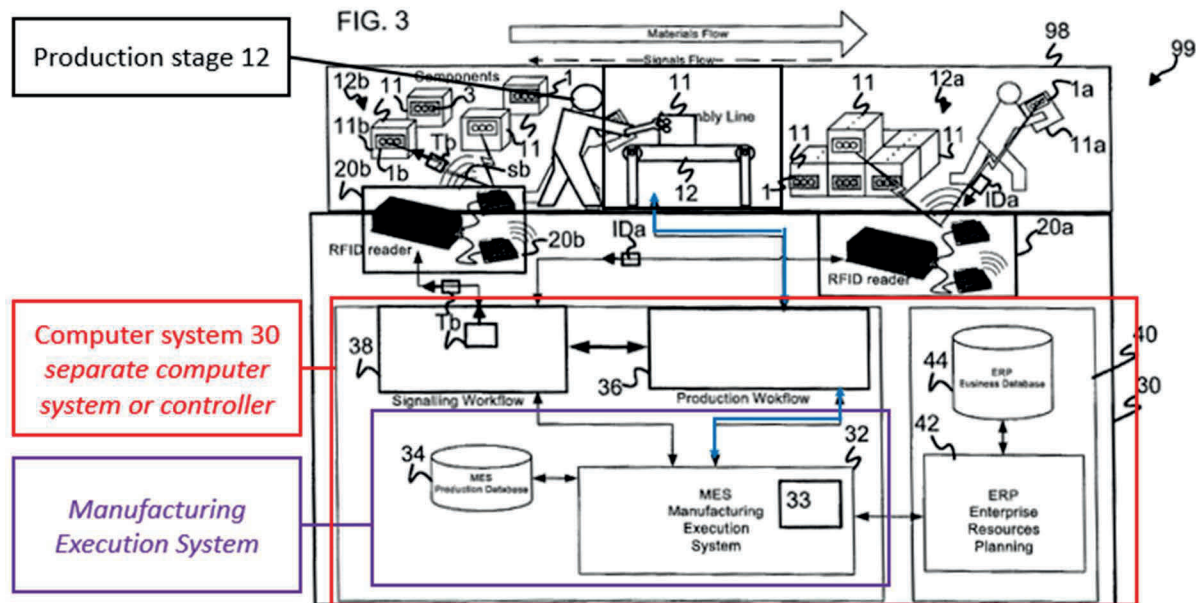
1. Claim 1

As discussed in Challenge 1A, [1.3], Yokota discloses *a separate computer system or controller* (RFID reading device 210) that *provides input signals to the guide system controller* (assembly management system). U.S. Patent Application Publication No. 2009/0105866 (EX1010, “Fontanot”) additionally discloses a *separate computer system* that includes (a) a *manufacturing execution system* (“MES”) and (b) a *programmable logic controller* (“PLC”), as claimed in the challenged dependent claims. As explained below, it would have been obvious to use Yokota’s workstation in Fontanot’s manufacturing environment under the control of Fontanot’s MES or PLC.

Fontanot describes a system for “controlling a production process with a manufacturing execution system” (MES), especially for “complex manufacturing cases with bill of materials often made by hundreds of different sub-assemblies and components.” Fontanot ¶¶ 2, 15. Fontanot describes how materials can be tracked and moved through a manufacturing facility.

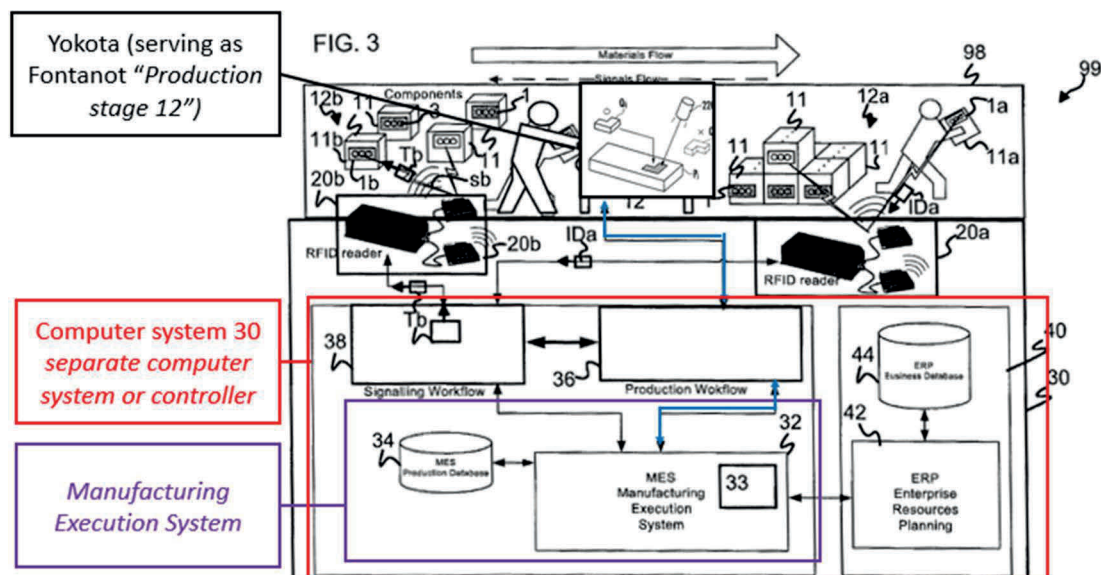
Like Yokota, Fontanot uses RFID readers to track the flow of materials. Fontanot also teaches a manufacturing execution system “MES 32 is responsible for the overall production control and the data collection tasks related to all activities involved in the manufacturing process.” *Id.* ¶ 46. Fontanot’s “production system 98 contains production stages 12, for example workstations and apparatuses for

processing items 11.” *Id.* ¶ 44. Fontanot also has a “computer system 30” that directs the production system 98 using MES 32, as illustrated below:



Id., Fig. 3 (annotated); Singhose ¶¶ 213–215.

Challenge 2A is based on using Yokota's workstation as one of Fontanot's production stages. As shown, in this combination Yokota's workstation receives inputs from Fontanot computer system 30 via the production workflow 36:



Singhose ¶¶ 215–217 (combining Fontanot Fig. 3 with Yokota Fig. 3).

This combination would have been obvious to a POSITA. Fontanot describes a system where “each production stage ... in a shop floor is capable to produce a great number of different items.” Fontanot ¶ 52. And Yokota provides a workstation (production stage) designed for that purpose. Yokota ¶ 2 (explaining how its production stage creates products that “may be specified to have different variations or combinations”). Thus, Yokota’s flexible workstation is a natural fit for Fontanot. Singhose ¶¶ 218–222.

Using Fontanot’s MES to provide *input signals* to Yokota’s workstation would also have been obvious. Singhose ¶ 219. Fontanot’s MES sends signals to its production stages. Fontanot ¶ 54 (“signals are backward propagated by the MES to all the upstream production stages.”); *see also id.* ¶¶ 57–58.

It would also have been obvious that the messages sent by Fontanot's MES to Yokota's workstation would include the product ID for the material being produced. Each product in Fontanot contains an "electronic device 1" that "is equipped with an RFID transponder (also called an RFID tag)." *Id.* ¶ 45. "Each RFID transponder contains an identification in order to identify the electronic device and with it the item the electronic device is attached to." *Id.* Moreover, "a software module of the MES 32 is dedicated to manage, under control of the appropriate workflow, the data I/O from/to the RFID reader units 20." *Id.* ¶ 48; Singhose ¶¶ 218, 222.

Finally, it would be obvious that adding Yokota's projected instructions would provide additional needed functionality to Fontanot. Fontanot's MES provides instructions on *which* components are needed for an assembly operation. Fontanot ¶¶ 54, 58 steps 10–15. Yokota's projection system and guide system controller provide additional instructions on *how* the components should be assembled. It would be obvious to configure Fontanot's MES to use Yokota's database 102 to provide information such as "material requirements and information of the routing between production stages for each item" or vice-versa. *Compare* Fontanot ¶ 28 with Yokota ¶¶ 22–23. Singhose ¶ 221.

Thus, using Yokota's workstation as a Fontanot production stages is a substitution of Yokota's workstation in place of Fontanot's generic production stage. This combines prior art elements (Fontanot and Yokota) according to known

methods (using Yokota's workstation as a production stage) to yield predictable results (a more specific implementation of Fontanot's system). The combination presents a known technique (Yokota's projection-driven workstation) to improve a similar system (Fontanot) in the same way. And it would have been obvious to try one of Yokota's workstations as a Fontanot production stage. Thus, the Yokota/Fontanot combination is obvious. Singhose ¶¶ 218–222.

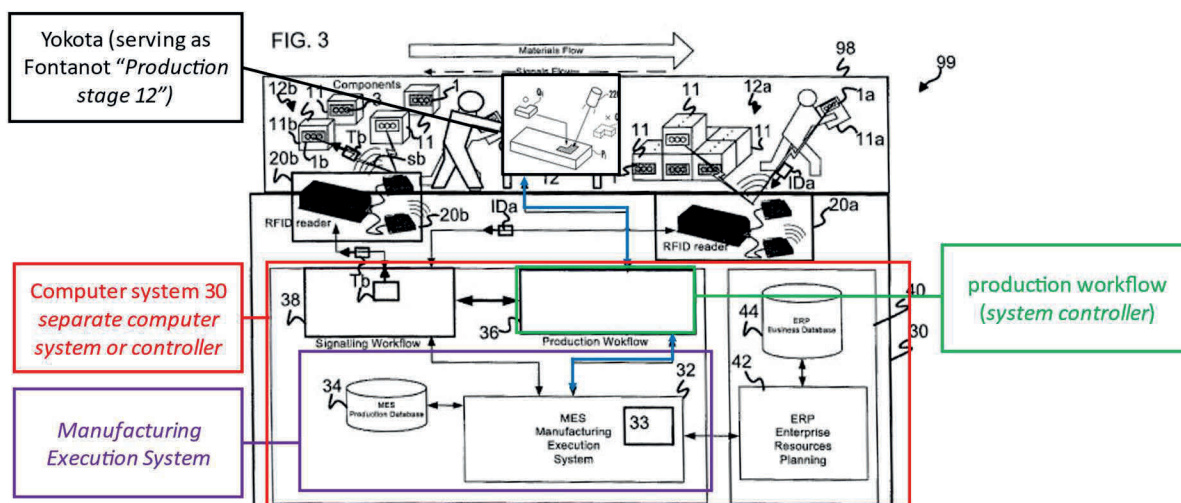
Likewise, a POSITA would have a reasonable expectation of success in combining Yokota and Fontanot. Both references concern manufacturing and Fontanot places no limits that would exclude Yokota's production equipment. Singhose ¶ 223.

Yokota and Fontanot are analogous to the '614 patent because they are reasonably pertinent to the problem addressed by the '614 patent and are within the same field of invention of using light to guide operations. Fontanot ¶ 50; Singhose ¶ 224.

[1.3] receiving a sequence of one or more input signals at said guide system controller, with the input signals being provided to said guide system controller by a separate computer system or controller to cause said guide system to project visual indicators for a particular guided operation

In Yokota/Fontanot, the only element different from Challenge 1A concerns the phrase *the input signals being provided to said guide system controller by a separate computer system or controller*. Singhose ¶ 225.

In the combination, Fontanot’s “computer system 30” contains the MES and the production workflow components provides *input signals* to the Yokota production stage:



Singhose ¶ 226 (combining Fontanot Fig. 3 with Yokota Fig. 3). As shown, the MES and production workflow components are part of “computer system 30,” which is a *separate computer system or controller* from the production stages. Fontanot ¶ 46. In Fontanot, “the MES 32 is responsible for the overall production control and the data collection tasks related to all activities involved in the manufacturing process. ... [T]he production workflow 38 controls the material processing and the flow of materials.” *Id.* Accordingly, in Yokota/Fontanot, *the input signals [are]*

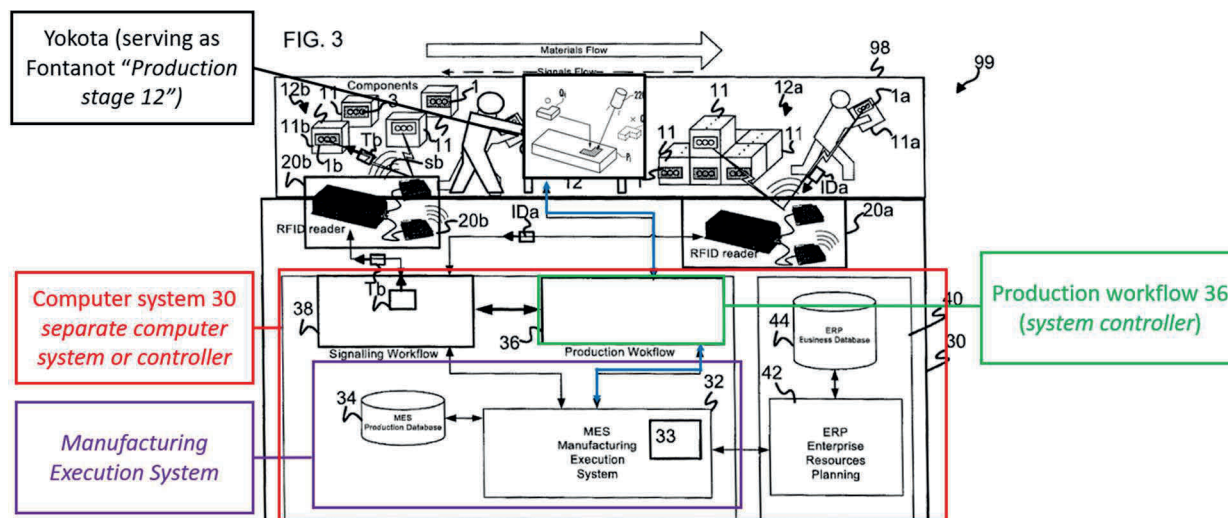
provided to said guide system controller (Yokota's assembly management system) by a separate computer system or controller (Fontanot's computer system 30).

Challenge 1A addresses how Yokota discloses the remaining elements of claim 1. Thus, Yokota/Fontanot renders claim 1 obvious. Singhose ¶¶ 227–228.

2. Claim 3

The method of claim 1, wherein the separate computer system or controller comprises a manufacturing execution system, and wherein said guide system controller is interfaced with said manufacturing execution system, and wherein said input signals are provided to said guide system controller from said manufacturing execution system.

As discussed in Challenge 2A, [1.3], Fontanot's computer system 30 is a *separate computer or controller*. Computer system 30 *comprises a manufacturing execution system*. Fontanot ¶ 46 (“The computer system 30 contains an MES 32 [and] an MES production database 34.”) This is illustrated below:



Id., Fig. 3 (annotated); see also *id.*, 46.

Fontanot's MES provides *input signals to said guide system controller* (Yokota's assembly management system) via production workflow 36. Singhose ¶¶ 229–231. Fontanot's "MES 32 is responsible for the overall production control and the data collection tasks related to all activities involved in the manufacturing process." Fontanot ¶ 46. Thus, when Fontanot's system produces an item, "signals are backward propagated by the MES to all the upstream production stages," including Yokota's production stage (in the combination). *Id.* ¶ 54; Singhose ¶¶ 231–232.

Thus, Yokota/Fontanot renders claim 3 obvious.

3. Claim 4

The method of claim 3, wherein said manufacturing execution system receives signals from a sensor apparatus, and wherein said input signals are provided to

said guide system controller based on said signals received by said manufacturing execution system from said sensor apparatus.

As discussed for claim 3, Fontanot discloses a *manufacturing execution system*. Fontanot's MES receives signals from multiple sources, including RFID sensors (*a sensor apparatus*). Fontanot ¶ 48 ("A software module of the MES 32 is dedicated to manage, under control of the appropriate workflow, the data I/O from/to the RFID reader units 20."). Fontanot's MES uses RFID to: (1) authorize movement of components (¶ 50); (2) locate an item that is requested for processing (¶ 53); and (3) locate and authorize movement of components for producing replacement items (¶ 54). After the components are located, "signals are backward propagated by the MES to all the upstream production stages 12, 12a of the supply chain, on the basis of the JIT 'pull' requests coming from the downstream production stages." *Id.* ¶ 54. The *input signals* provided to Fontanot's production stages are accordingly *based on signals received by said manufacturing execution system from said sensor apparatus* (RFID readers).

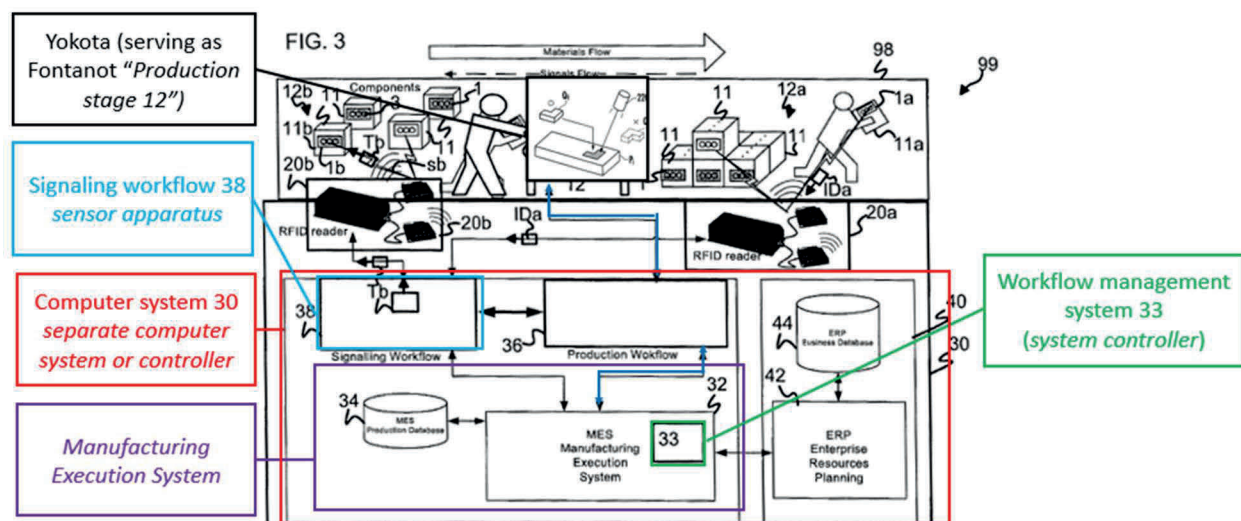
Because Fontanot's *input signals* (as discussed above for claims 1 and 3) *are provided to said guide system controller (Yokota) based on said signals received by said manufacturing execution system from said sensor apparatus* (Fontanot RFID reader), Yokota/Fontanot renders obvious claim 4. Singhose ¶¶ 233–237.

4. Claim 5

The method of claim 1, wherein the separate computer system or controller comprises a system controller that controls the operation of an automated process, and wherein said guide system controller is interfaced with said system controller, and wherein said input signals are provided to said guide system controller from said system controller.

As discussed for Challenge 2A, [1.3], Fontanot includes computer system 30, which is a *separate computer system*. Computer system 30 *comprises a system controller*—the “workflow management system 33”—that *controls the operation of an automated process* because it “provides the execution logic for the workflows for production and for signaling.” Fontanot ¶ 47.⁶ In Yokota/Fontanot, the *guide system controller* (Yokota’s assembly management system) *is interfaced with said system controller* (workflow management system 33) via the MES and the production workflow, as shown:

⁶ As discussed for claim 7, Fontanot’s computer system 30 (which includes workflow management system 33) is also a *system controller*. Singhose ¶ 238.



Id. Fig. 3 (annotated).

Additionally, in Fontanot/Yokota, *said input signals are provided to said guide system controller from said system controller* as discussed for claim 3. The “workflow management system 33” is “embedded in the MES layer [and] provides the execution logic for the workflows for production and for signaling” and is thus responsible for the MES sending *input signals*. *Id.* ¶ 47; Singhose ¶ 239.

Thus, Yokota/Fontanot renders claim 5 obvious. Singhose ¶¶ 238–240.

5. Claim 6

The method of claim 5, wherein said system controller receives signals from a sensor apparatus, and wherein said input signals are provided to said guide system controller based on said signals received by said system controller from said sensor apparatus.

As discussed for Challenge 2A, claim 5, Fontanot’s workflow management system 33 is a *system controller*. Moreover, as discussed above for claim 4, Fontanot’s RFID readers are a *sensor system*. Fontanot’s workflow management system 33 *receives signals from a sensor apparatus* because it “is used for coordinating and synchronizing both the material flow and the signal flows,” including information from RFID readers. Fontanot ¶¶ 47–48. Additionally, because “workflow management system 33 [is] embedded in the MES layer [and] provides the execution logic for the workflows,” *input signals are provided to said guide system controller based on said signals received by said system controller from said sensor apparatus* as stated regarding Fontanot’s MES satisfying claim 4 (which requires an MES to perform this step). *Id.*; Singhose ¶¶ 241–242.

Thus, the Yokota/Fontanot combination renders obvious claim 5.

6. Claim 7

The method of claim 5, wherein said system controller comprises a programmable logic controller.

Fontanot’s workflow management system 33 comprises a *programmable logic controller* because it is part of computer system 30. Singhose ¶¶ 243–245; *see also* Fontanot ¶ 46. As of 2010/2011, the term programmable logic controller was generally understood to refer to a “digital computer used for automation of electromechanical processes,” and Fontanot’s computer system 30 (including

workflow management system 33) fits that definition. Singhose ¶ 243 (citing EX1022). Thus, the Yokota/Fontanot combination renders obvious claim 7.

7. Claim 8

The method of claim 5, wherein said system controller is interfaced with a manufacturing execution system.

Fontanot discloses that “[a] workflow management system 33 embedded in the MES layer provides the execution logic for the workflows for production and for signaling.” Fontanot ¶ 47. Thus, the *system controller* (workflow management system 33) *is interfaced with a manufacturing execution system* and the Yokota/Fontanot combination renders claim 8 obvious. Singhose ¶¶ 246–247.

8. Claim 17

The Yokota/Fontanot combination renders claim 17 obvious for the same reasons as claim 1. [17.3] is disclosed by Yokota/Fontanot for the reasons discussed above for Yokota/Fontanot [1.3]. The remaining elements are disclosed by Yokota alone as discussed for Challenge 1A. Singhose ¶ 248.

9. Claim 18

The guide system of claim 17, wherein the separate computer system or controller comprises a manufacturing execution system, and wherein said guide system controller is interfaced with said manufacturing execution system, and wherein

said input signals are provided to said guide system controller from said manufacturing execution system.

Yokota and Fontanot disclose this limitation as described for claim 3, and thus render claim 18 obvious. Singhose ¶ 249.

10. Claim 19

The guide system of claim 17, wherein the separate computer system or controller comprises a system controller that controls the operation of an automated process, and wherein said guide system controller is interfaced with said system controller, and wherein said input signals are provided to said guide system controller from said system controller.

Yokota and Fontanot disclose this limitation as described for claim 5, and thus render claim 19 obvious. Singhose ¶ 250.

11. Claim 20

The guide system of claim 19, wherein said system controller receives signals from a sensor apparatus, and wherein said input signals are provided to said guide system controller based on said signals received by said system controller from said sensor apparatus.

Yokota and Fontanot disclose this limitation as described for claim 6, and thus render claim 20 obvious. Singhose ¶ 251.

12. Claim 21

The guide system of claim 20, wherein said system controller comprises a programmable logic controller.

Yokota and Fontanot disclose this limitation as described for claim 7, and thus render claim 21 obvious. Singhose ¶ 252.

13. Claim 22

The guide system of claim 21, wherein said system controller is interfaced with a manufacturing execution system.

Yokota and Fontanot disclose this limitation as described for claim 8, and thus render claim 22 obvious. Singhose ¶ 253.

F. Challenge 2B: Claims 2, 9–16, and 23–25 are obvious based on the Yokota/Fontanot combination and the prior art of Challenges 1A–1D

As discussed in Challenges 1A–1D, claims 2, 9–16, and 23–25 are either rendered obvious by Yokota (claims 2, 9) or rendered obvious by Yokota in combination with Ramsager (claims 10–11, 15–16), Pinhanez (claims 12, 23) or Pinhanez/Rynzar (claims 13–14, 24–25). Pinhanez and Rynzar’s disclosures also apply to the Yokota/Fontanot combination. The dependent claims’ additional elements only impact the Yokota workstation and would not be affected by the workstation receiving input signals from an MES instead of an RFID reader. Singhose ¶¶ 254–256. Thus, claims 2, 9–16, and 23–25 are obvious when the art of Challenges 1A–1D is combined with Fontanot.

G. Challenge 3A: Claims 1–2, 9, and 17 are obvious based on the combination of Yokota and Machino.

LightGuide may argue that Yokota does not adequately disclose the “dynamic” limitations of the ’614 patent. Even if such arguments succeed (they should not), claims 1–2, 9, and 17 are still obvious in view the combination of Yokota and Machino. Singhose ¶¶ 257–258.

14. Summary of Machino (EX1007)

Machino describes a remote collaboration system, called “SCOPE,” that combines a projector, a camera, and a remote monitor to facilitate communications between on-site personnel and remote supporters. Machino, 1. Both projector and camera are connected to an on-site, network-enabled PC, allowing video and other information to be shared with a remote user. *Id.*, 2. A remote supporter can assist an on-site worker in a task, such as the assembly of a machine, by interfacing with a remote display to cause images or words to be projected at the on-site location. *Id.*, 3. The projection of images in the SCOPE system are “dynamic” because the remote worker chooses, via an interface, what to project and when. *Id.*; *see also* Fig. 12 (showing support’s PC screen). Additionally, the local worker can manipulate the system using a laser pointer as a “mouse.” *Id.*, 2, 3. Singhose ¶¶ 259–263.

15. Combination rationale

Combining Yokota with Machino would have been obvious. Yokota and Machino both use projectors to display information to individuals working with real-

world objects. Machino permits collaboration between a “veteran operator” and “on-site workers by augmenting the communication ability of a remote support person.” Machino, 1. Adding Machino’s functionality to Yokota provides a POSITA with obvious benefits including permitting enhanced remote assistance to on-site workers. Singhose ¶¶ 264–266. Moreover, Machino discloses that a remote collaborator can manipulate what is displayed to the local worker, including still images, video, shapers, and program administration information. Machino, §§ II(B)(3)–(4). Yokota’s database would enable the remote worker’s actions to select what shapes to project using an address identifier (or a user input that is converted into an address identifier) rather than transmitting the entire shape from the remote worker’s computer. Additionally, adding Machino’s remote support technology involves applying a known improvement (Machino) to a known system (Yokota) ready for the improvement (because Yokota already projected instructions to guide workers). The combination is also obvious to try, as a finite number of ways exist to provide remote instructions to a local worker—i.e., telephone, traditional flat-panel display, or projection. Singhose ¶ 266.

Moreover, a POSITA would also have had a reasonable expectation of success in combining Yokota and Machino to achieve the ’614 patent’s intended purpose. Moreover, the references are analogous to the ’614 patent because they are within the same field of invention and are reasonably pertinent to the problem the inventors

intended to solve: using visual indicators to improve how workers perform actions. '614 patent, 1:15–18; Singhose ¶ 267.

16. Disclosure of Yokota

As discussed above for Challenge 1A, Yokota, combined with the general knowledge of a POSITA, discloses or renders obvious all elements of claims 1–2, 9, and 17. This challenge relies on the Challenge 1A arguments, except for the “creation of a dynamic, real time projection of visual indicators” limitation, which is disclosed by Machino. Singhose ¶¶ 268–269, 272.

17. Obviousness of “creation of a dynamic, real time projection of visual indicators”

The Yokota/Machino combination renders this limitation obvious. As discussed in Machino, p. 3, Machino’s projections are controlled in part by a remote user, who watches the local workspace and provides instructions to the projector using the interface below:

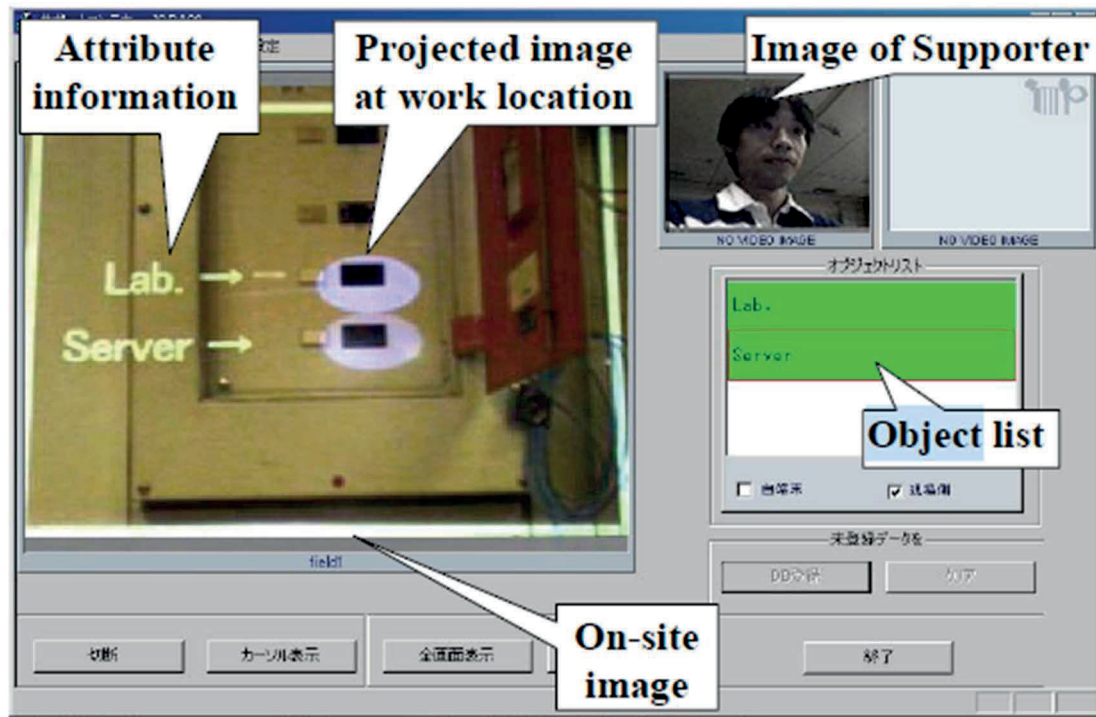


Fig. 12 Screen shot (supporter's location).

Machino, Fig. 12. This is *creation of a dynamic, real time projection of visual indicators*. The remote supporter or the local user can manipulate the projection, causing SCOPE to create a projection dynamically and in real time. *Id.*, 3 (“At the on-site worker’s location, the laser pointer is used to manipulate the projected image. At the supporter’s location, the projected image is shown ... and manipulated using the PC’s mouse.”) Singhose ¶¶ 269–271.

The on-site worker then sees an image created in real-time, such as shown below:

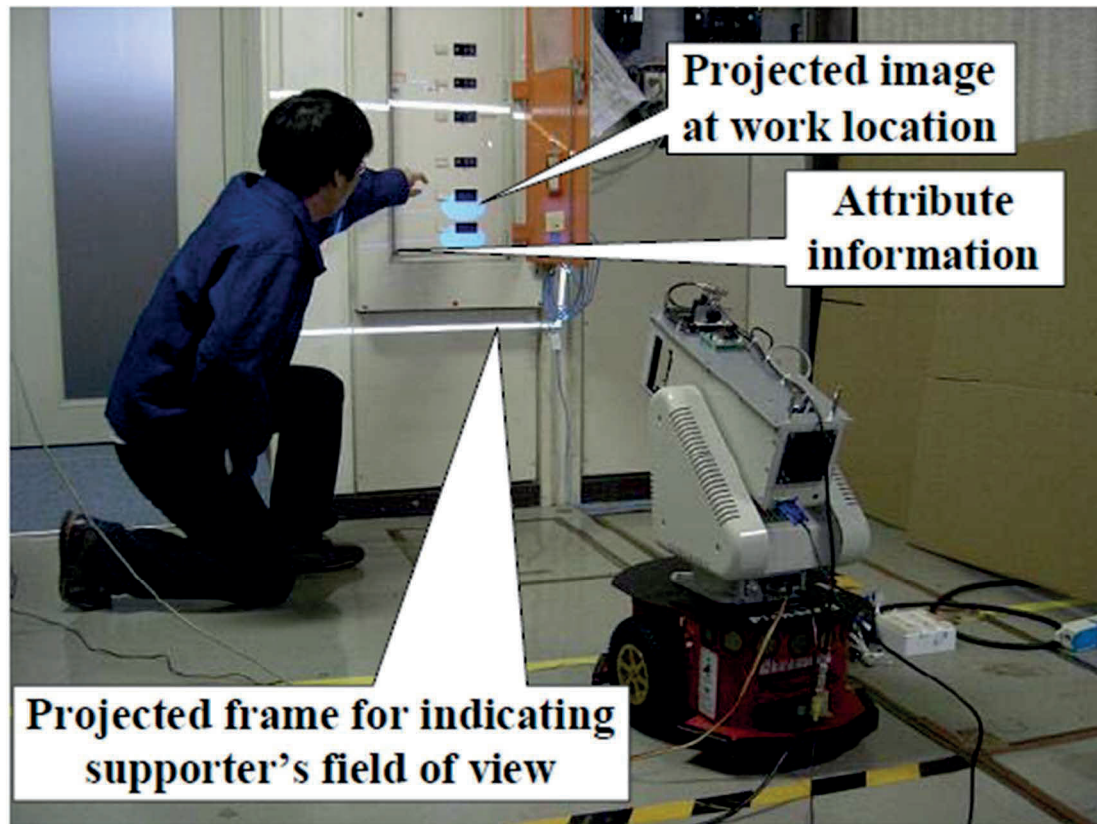


Fig. 11 Mobile SCOPE (on-site location).

Machino, Fig. 11. Further, in Yokota/Machino, it would have been obvious that some images displayed by SCOPE would be stored near the projector (such as still images, videos, and oval highlights), so that a remote user could display them quickly without needing to upload them from the remote computer. Machino, 3 (§ II(B)(3)–(4)); Singhose ¶ 271. Thus, integrating Machino’s remote support functionality into Yokota further discloses *creation of a dynamic, real time projection of visual indicators*, because the remote user sending *input signals* creates the projections. Singhose ¶¶ 271–272.

H. Challenge 3B: Claims 2–16 and 18–25 are obvious based on the Yokota/Machino combination and the prior art of Challenges 1A–1D and Challenges 2A–2B

Claims 2–16 and 18–25 are invalid as stated in Challenges 1A–1D and 2A–2B. If Machino is required to satisfy the *a combination of the sequence of input signals resulting in a creation of a dynamic, real time projection of visual indicators* limitation, then the dependent claims are unpatentable based on Yokota/Machino in combination with the other references discussed above. Adding Machino solely impacts Yokota’s internal workings and does not interfere with Yokota’s combination with Fontanot, Ramsager, Pinhanez, or Ryznar. Singhose ¶ 273. Accordingly, claims 2–16 and 18–25 are obvious if Machino is combined with Yokota.

VI. DISCRETIONARY DENIAL IS INAPPROPRIATE

Amazon stipulates that, if review is instituted, it will not argue at trial that any claim of the ’614 patent is invalid on any ground that Amazon raised or reasonably could have raised during this IPR. Accordingly, applying Director Vidal’s Memorandum, there is no basis to deny institution under *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019 (PTAB Mar. 20, 2020) (precedential).

This Petition also presents materially different references (Yokota, Fontanot, Machino, etc.) from those in the file history. Although Ryznar is cited in the file history, Yokota is materially different because it discloses projecting visual

indicators dynamically and in real time; Ryznar does not. To the extent that Yokota or any other reference relied on in this Petition are found cumulative of prior art considered during prosecution, the examiner materially erred by failing to reject the challenged claims on the grounds of this Petition that establish unpatentability of the challenged claims. Accordingly, there is no basis to decline institution under 35 U.S.C. § 325(d).

VII. MANDATORY NOTICES

A. Real Party-in-Interest

The Petitioner is Amazon.com, Inc. and Amazon.com Services LLC, both of whom are the real parties-in-interest.

B. Judicial Matters

As of the filing date of this petition and to the best knowledge of the Petitioner, the '614 patent is or has been involved in the following litigations:

- *LightGuide, Inc. v. Amazon.com, Inc. and Amazon.com Services LLC*, 2:22-cv-00433 (E.D. Tex. 2022); and
- *Amazon.com, Inc. and Amazon.com Services LLC v. LightGuide, Inc.*, 2:23-cv-00053 (W.D. Wash. 2023).

C. Administrative Matters

Petitioner has filed a petition for *inter partes* review against U.S. Patent No. 10,528,036, which concerns similar technology. LightGuide has asserted this and one other patent (U.S. Patent No. 7,515,981) against Petitioner in the above-recited

litigation in the Eastern District of Texas, and Amazon has requested declaratory judgment of non-infringement as to those two other patents in the above-recited litigation in the Western District of Washington.

D. Designation of Lead and Back-up Counsel and Service Information

With this petition, Petitioner is filing a power of attorney appointing the lead and back-up counsel designated herein. Petitioner designates the following lead and back-up counsel:

Lead Counsel:

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Please direct all correspondence to lead and back-up counsel at the addresses listed above. Amazon consents to electronic service at the email addresses listed above, with cc: to amazon-lightguide@hueston.com.

VIII. FEES

Petitioner is concurrently electronically submitting the required fees for this Petition. The board is authorized to charge any overages to Hueston Hennigan's deposit account used to file this Petition.

IX. GROUNDS FOR STANDING

Petitioner certifies that the '614 patent is available for *inter partes* review and that Petitioner is not barred or estopped from requesting review challenging the claims on the grounds identified herein.

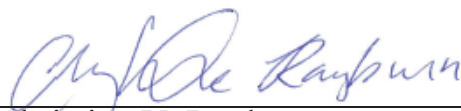
X. CONCLUSION

Petitioner has established a reasonable likelihood of prevailing and asks that the Patent Office order an *inter partes* review trial and cancel the challenged claims.

Respectfully submitted,

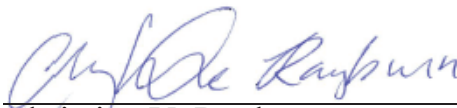
Dated: November 1, 2023

HUESTON HENNIGAN LLP

By: 
Christina V. Rayburn
Lead Counsel for Petitioner

CERTIFICATE OF WORD COUNT

Pursuant to 37 C.F.R. § 42.24, the undersigned attorney for the Petitioner, declares that the argument section of this Petition (Sections I–VI, XIII–X) has a total of 13,873 words, according to the word count tool in Microsoft Word™.



Christina V. Rayburn
Lead Counsel for Petitioner

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF SERVICE

The undersigned certifies, in accordance with 37 C.F.R. § 42.205, that service was made on the Patent Owner as detailed below.

Date of service	November 1, 2023
Manner of service	U.S. Express Mail
Documents served	Petition for <i>Inter Partes</i> Review; Exhibits 1001-1023
Persons served	Karl Ondersma Gardner, Linn, Burkhardt & Ondersma LLP 2900 Charlevoix Dr., SE, Suite 300 Grand Rapids, MI 49546 LightGuide, Inc. 48443 Alpha Drive, Suite 175 Wixom, MI USA 48393


Christina V. Rayburn
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