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Filed on behalf of Daifuku Co., Ltd.

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

DAIFUKU CO., LTD.
Petitioner

v.

CLX ENGINEERING
Patent Owner

IPR2024-00475

**PETITION FOR *INTER PARTES* REVIEW OF
U.S. PATENT 11,386,602**

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I. MANDATORY NOTICES

A. Real Party-in-Interest

Pursuant to 37 C.F.R. § 42.8(b)(1), Daifuku Co., Ltd. (“Daifuku” or “Petitioner”) certifies that Daifuku is the real party-in-interest. Daifuku’s wholly-owned subsidiaries Daifuku Oceania Limited and Daifuku Airport America Corporation participated in preparation of this Petition and are also real parties in interest with respect to this Petition. Daifuku certifies that no other party exercised control or could exercise control over Daifuku’s participation in this proceeding, filing this petition, or conduct in any ensuing trial.

B. Related Matters

According to assignment records, U.S. Patent 11,386,602 (“the ’602 patent” (EX1001)) is owned by ControLogix (“PO”). The spelling of ControLogix’s name was corrected via a November 22, 2022 Certificate of Correction. According to the website of CLX Engineering, ControLogix Inc., was renamed CLX Engineering. (<https://clxengineering.com/about-us/>)

As of the filing date of this petition, the ’602 patent is not the subject of any district court proceedings.

C. Counsel

Brian C. Park (Reg. No. 45519) will act as lead counsel; Mika Ito (Reg. No. 71201) will act as back-up counsel.

D. Service Information, Email, Hand Delivery and Postal

Daifuku consents to electronic service at Brian.Park@stoel.com and Mika.Ito@stoel.com. Petitioner can be reached at Stoel Rives LLP, 600 University St., Suite 3600, Seattle, WA 98101, Tel: 206-386-7542, Fax: 206-386-7500.

II. CERTIFICATION OF GROUNDS FOR STANDING

Petitioner certifies pursuant to Rule 42.104(a) that the patent for which review is sought is available for *inter partes* review and Petitioner is not barred or estopped from requesting *inter partes* review challenging the patent claims on the grounds identified herein.

III. OVERVIEW OF CHALLENGE AND RELIEF REQUESTED

Pursuant to Rules 42.22(a)(1) and 42.104(b)(1)–(2), Petitioner challenges claims 1-18 of the '602 Patent based on the specific grounds identified below.

A. Prior Art Patents and Printed Publications

The following references were published and filed before July 30, 2019, the '602 patent's earliest claimed priority date.¹ All are prior art under at least 35 U.S.C. §§ 102(a)(1) or 102(a)(2).

¹ The '602 patent issued from a patent application filed after enactment of the America Invents Act ("AIA"). The AIA statutory framework applies.

1. Cavada et al., “A simulation approach to modelling baggage handling systems at an international airport,” *Simulation Modelling Practice and Theory*, 75, 146-164 (2017) (“Cavada” (EX1002-Cavada)) (released online April 25, 2017, *see* EX1012 (foundational declaration)).

2. International Publication WO2019/077750 (Filed October 20, 2017; published April 25, 2019) (“Orito” (EX1003-Orito)).

3. International Publication WO2007/089362 (Earliest priority date November 7, 2005, published August 9, 2007, in English designating the United States) (“Sommer” (EX1004-Sommer)).

4. U.S. Patent Application Publication 2018/0130260 (Earliest priority date November 8, 2016, published May 10, 2018) (“Schmirler (EX1005-Schmirler)).

5. Korean Patent 101400169 (Filed February 6, 2014, published on May 28, 2014) (“Kang” (EX1006-Kang)).

6. U.S. Patent Application Publication 2009/0112541 (Filed October 26, 2007, published April 30, 2009) (“Anderson” (EX1007-Anderson)).

7. U.S. Patent Application Publication 2019/0266806 (Earliest priority date February 27, 2018, published August 29, 2019) (“Aluru” (EX1008-Aluru)).
Aluru was recognized as prior art by the examiner in the December 15, 2021 office action during prosecution of the application that issued as the ’602 patent. While

Aluru (EX1008) was published after July 30, 2019, Aluru claims priority back to non-provisional application 16/204,883 (EX1010). A review of that non-provisional application and the prosecution history of that application (EX1011) confirms that all of the teachings for which Petitioner relies on Aluru were present in the non-provisional application, which is substantively the same as EX1008. *See* EX1013-Janét, ¶131. No amendments to the specification, drawings, or claims were made between the non-provisional application’s filing date and the publication (as reflected in EX1011).

Cavada, Orito, and Sommer are not of record in the prosecution of the ’602 patent. Schmirler, Kang, Anderson and Aluru were cited in rejecting claims 3, 5-8, 11, and 13, during the prosecution of the ’602 patent, but are presented in a new context in combination with, *inter alia*, Cavada.

B. 35 U.S.C. § 103 Grounds for Challenge (Obviousness)

Ground:	Claims:	References:
1	1-2, 4, 9-10, 12, 14, 15 and 17	Cavada, Orito, and Sommer
2	3, 6, 11 and 16	Cavada, Orito, Sommer and Schmirler
3	5, 13 and 18	Cavada, Orito, Sommer, and Kang
4	7	Cavada, Orito, Sommer, Schmirler, and Anderson

5	8	Cavada, Orito, Sommer, and Aluru
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This Petition, supported by Dr. Jason Janét’s declaration (“EX1013- Janét”), demonstrates a reasonable likelihood Petitioner will prevail in cancellation of at least one claim. *See* 35 U.S.C. § 314(a). Petitioner requests institution on all the challenged grounds.

IV. U.S. 11,386,602

The technology purportedly invented in the '602 patent was actually conventional many years earlier, and was in no way novel, let alone patentably inventive as of the 2019 earliest possible priority date of the '602 patent. Indeed, the technology described in the '602 patent had existed for many years, and even the specific intended use added to the claims was in no way novel.

Monitoring, control and visualization of material handling systems, including conveyor-based systems, pre-date the earliest possible priority date of the '602 patent in 2019 by, in many cases, decades. EX1013-Janét, ¶32. Distributed Controls based on networked control architectures such as Supervisory Control and Data Acquisition (SCADA) had been taught in schools around 1995-1999. EX1013-Janét, ¶32. Material handling systems including telemetry systems and graphical user interface (GUI)-based visualization and simulation tools were available before 2010. EX1013-Janét, ¶33. Dr. Janét himself had worked with numerous systems incorporating these technologies over many years, beginning in 1992 and well before 2019, including intelligent material handling systems for the manufacturing of batteries, APU assemblies, engine starters, prescription medications, and intelligent material handling and inspection systems for nuclear reactors, including working on material handling systems with GUI-based visualizations. EX1013-Janét, ¶¶32-33; *see also id.* ¶¶6-28. Even specific to the airport environment, which is not

inventively distinct from intelligent material handling systems for similar applications such as manufacturing, complete intelligent conveyor-based baggage handling systems were available from multiple companies, as discussed in a contemporaneous blog discussion. EX1013-Janét, ¶70 &n.6.

Indeed, and as discussed in more detail below, the Examiner recognized in a final office action during prosecution of the application that became the '602 patent, that every claim of the patent application, as then written, was obvious over a combination of prior art references. EX1015-FOA. The patentee did not dispute that all elements of the claims as then written were well established in the prior art, but instead amended all three independent claims to recite a specific intended use: – using the system described in the rest of the claim to detect and display information about whether a specific bag has passed through security screening. EX1016-Response. For example, claim 1 was amended to add requirements of “at least some of the sensors being configured to determine whether the objects have passed through a security screening” and “the status annotations including security status information to indicate whether respective objects have passed through the security screening.” *Id.* These claim amendments adding this intended use language directed to security screening information were the sole distinction over the prior art that led the '602 patent claims being allowed. EX1017-NOA.

However, other art not of record before the Examiner demonstrates that even this specific use case was well known and established for intelligent baggage handling systems years before the '602 patent's earliest priority date. For example, Cavada shows a baggage handling system that tracks and plays back an animated simulation on a GUI that identifies whether bags pass through, or are rejected by security screening and diverted for further screening, EX1002, and Sommer describes a baggage handling system that tracks whether and where bags have cleared security screening and displays annotations showing that security screening information in a GUI. EX1004. Thus, even the intended use language added to the '602 patent claims in an effort to distinguish the prior art was in no way novel.

A. Summary

The '602 patent discloses a “system” that includes “a plurality of conveyors configured to move objects throughout a facility.” EX1001, Abstract, 3:53-55. The “system” includes a plurality of sensors for collecting telemetry data associated with travel of the objects along the conveyors. *Id.*, 3:56-4:3. “At least some of the sensors” are configured to determine whether the objects have passed through security screening. *Id.*, 5:64-6:2. The “system” includes a computing device configured to store the telemetry data from the sensors in a database, (*id.*, 4:4-19 and 57-61) and generate an animation of the conveyors and the objects based upon the telemetry data (*id.*, 3:15-51, 4:4-14, 19-33, 6:3-18). The animation includes status annotations

that follow at least some of the objects as they switch between different conveyors. *Id.*, 5:60-6:18. The status annotations include security status information indicating whether objects have passed through security screening. *Id.* The computing device is configured to play the animation on a display via a GUI. *Id.*, 4:12-13, 19-33.

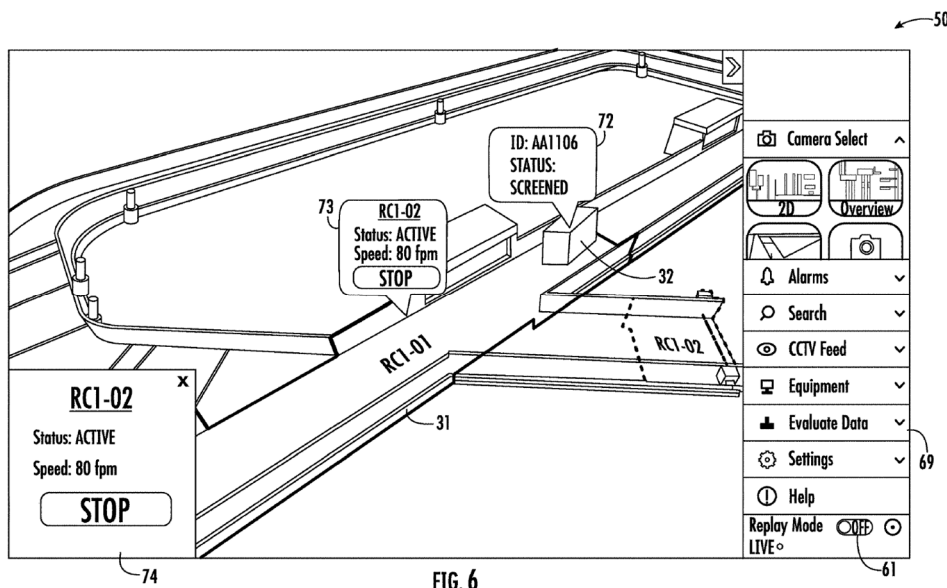


FIG. 6

EX1001, FIG. 6

B. Prosecution History

A non-final office action (“OA”) (August 25, 2021) (“EX1014-NFOA”) and a final OA (December 15, 2021) (“EX1015-FOA”) were mailed during prosecution of the ’602 patent. In the final OA, the Examiner rejected claims 1-4, 6, 7, 10-13 and 15-19 over Schmirler, U.S. Patent 10,689,240 (“Schultz”), and U.S. Patent Application Publication 2020/0218899 (“Lamont”). EX1015-FOA, 3-25. Claims 5, 14 and 20 were rejected over Schmirler, Schultz, Lamont and Kang. *Id.*, 25-30.

Claim 8 was rejected over Schmirler, Schultz, Lamont and Anderson. *Id.*, 30-32. Claim 9 was rejected over Schmirler, Schultz, Lamont and Aluru. *Id.*, 32-33. The applicant filed a response including amendments to independent claims 1, 10 and 16 to recite “at least some of the sensors being configured to determine whether the objects have passed through a security screening” and “the status annotations including security status information to indicate whether respective objects have passed through the security screening” to obtain allowance. Response to Final OA (February 23, 2022) (“EX1016-Response”), 2, 4, 6-7. In the Notice of Allowance (March 16, 2022) (“EX1017-NOA”), the Examiner stated reasons for allowance as “[t]he prior art, however fails to disclose the combination of elements recited in the claims as a whole.” EX1017-NOA, 2. The Examiner stated that the prior art teaches a plurality of sensors positioned at different locations within a facility for collecting telemetry data associated with travel of the objects along the conveyors, storing the telemetry data from the sensors in a data base, and generating an animation of the conveyors within the facility based upon the telemetry data stored in the database, and playing the animation on a display via a graphical user interface. *Id.*, 2. However, the Examiner stated that the prior art failed to disclose the combination of elements of claim 1, involving a plurality of conveyors configured for moving objects throughout a facility, with sensors positioned at different locations in the facility, *at least some sensors being configured to determine whether objects have*

passed through a security screening, and generating an animation of the conveyors and the objects traveling along the conveyors within the facility based on telemetry data stored in the data base, and including status annotations that follow at least some of the objects as they switch between different conveyors, where the status annotations include security status information to indicate whether respective objects have passed through the security screening.” Id., 2-3.

C. Level of Ordinary Skill in the Art

A person of ordinary skill in the art (“POSITA”) as of the earliest claimed priority date of the ’602 patent would have had at least a bachelor’s degree in electrical or computer engineering or an equivalent field, and at least two years of academic or industry experience in automated handling and monitoring systems including sensors, telemetry, augmented reality, computer vision and security. More education can supplement practical experience and vice-versa. EX1013-Janét, ¶46.

V. CLAIM CONSTRUCTION

Each claim term should be given its plain and customary meaning as understood by a POSITA, just as in a civil action for patent infringement. 37 C.F.R. § 42.100(b) (Nov. 13, 2018); *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc).

Petitioner submits no construction is necessary. Claim terms should take their plain and ordinary meaning. Petitioner reserves the right to respond to any construction proposed by PO.

VI. SPECIFIC GROUNDS FOR PETITION

Pursuant to Rule 42.104(b)(4)–(5), the following sections detail the grounds of unpatentability, limitations of the challenged claims, and how these claims were obvious in view of the prior art. EX1013-Janét, ¶¶51-134.

A. Ground 1: Cavada, Orito, and Sommer render Claims 1-2, 4, 9-10, 12, 14, 15 and 17 obvious

1. Cavada

Cavada is an article describing a system then in use at the Santiago International Airport. It was published beginning at page 146 of volume 75 of Simulation Modeling Practice and Theory. Exhibit 1002 is a true and correct copy of the print copy of Cavada stored at the Library of Congress that was obtained by Dr. Hall Ellis. As Dr. Hall-Ellis describes, the MARC records attached to her declaration demonstrate that the journal in which Cavada appears was appropriately cataloged and indexed (first by the University of Michigan Libraries) including with the subject matter descriptors “Computer simulation \$v Periodicals” and “Simulation methods \$v Periodicals.” Print copies of the journal with the Cavada article, of which Exhibit 1002 is a true and correct copy, were also available to the public from many libraries in addition to the Library of Congress, all as of April 25,

2017. EX1012-Hall-Ellis ¶¶44-51. As such, Cavada (EX1002) was publicly available at least as of April 25, 2017 and is prior art to all claims of the '602 patent.

Cavada discusses a simulation model of a baggage handling system (“BHS”) that integrates airport operation systems, including tracking the passage of baggage through security screening (N2 and N3). EX1002-Cavada, 146-148, FIG. 1.

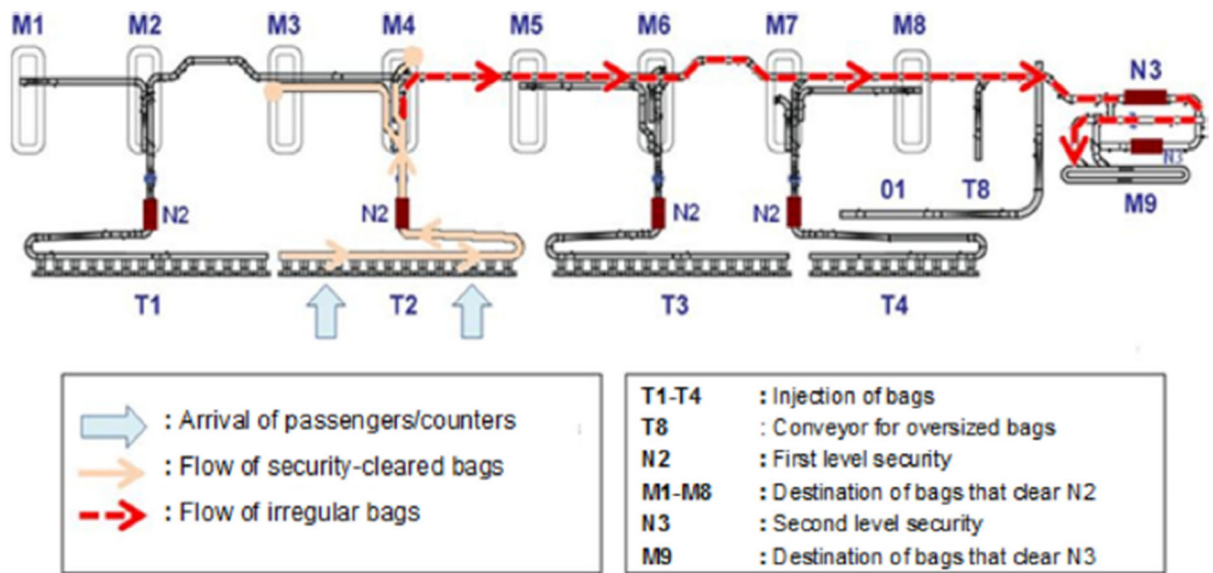


Fig. 1. Schematic diagram of BHS conveyor network, Santiago International Airport.

EX1002-Cavada, FIG. 1

An example BHS includes a set of conveyors, diverters and carrouseles that move passengers’ bags. *Id.*, 148. Upon entering the collector, a bag is carried along to the security screening scanner (N2) and then on to the baggage loading area. *Id.*

If anything suspicious is detected, including if the N2 security screening flags the bag as suspicious, the bag is sent directly to a higher security area (carrousel M9) (*id.*, 148-49, 154, FIG. 7). Bags flagged by the N2 security screening are tracked and

checked by a more powerful scanner (N3). *Id.*, 149, 155. Checked-in bags are individually deposited in trays on the conveyor belt by the counter agent, who inputs the bags to the BHS controller system using a barcode gun. *Id.*, 148. Then, the system knows the position of the bag and also which loading area carrousel it is destined for, determined by the counter where it was checked in. *Id.*

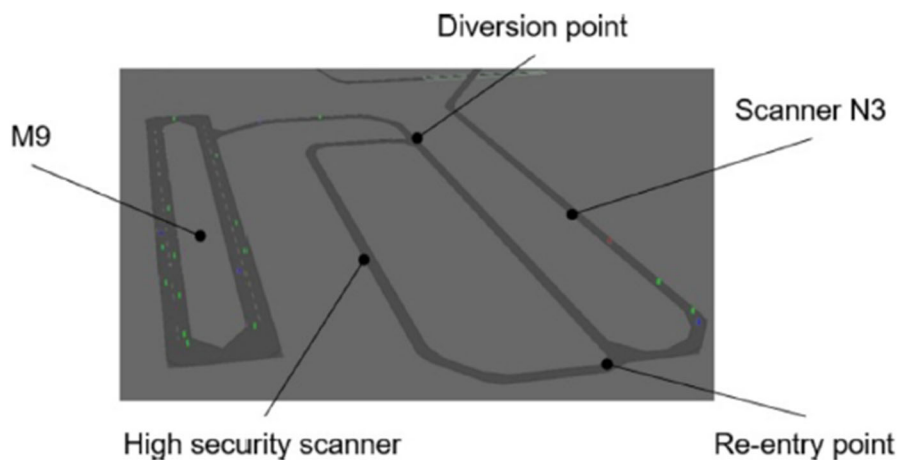


Fig. 7. High security scanner and M9 carrousel.

EX1002-Cavada, FIG. 7

Cavada describes the BHS simulation performed by a computer, either on historical data or in real time, using the same database (*id.*, 147, 150-53, 157). Historical data is used for computation of various system parameters in the animation, including an stoppage on a given section of a conveyor caused by a bag. *Id.*, 152-153.

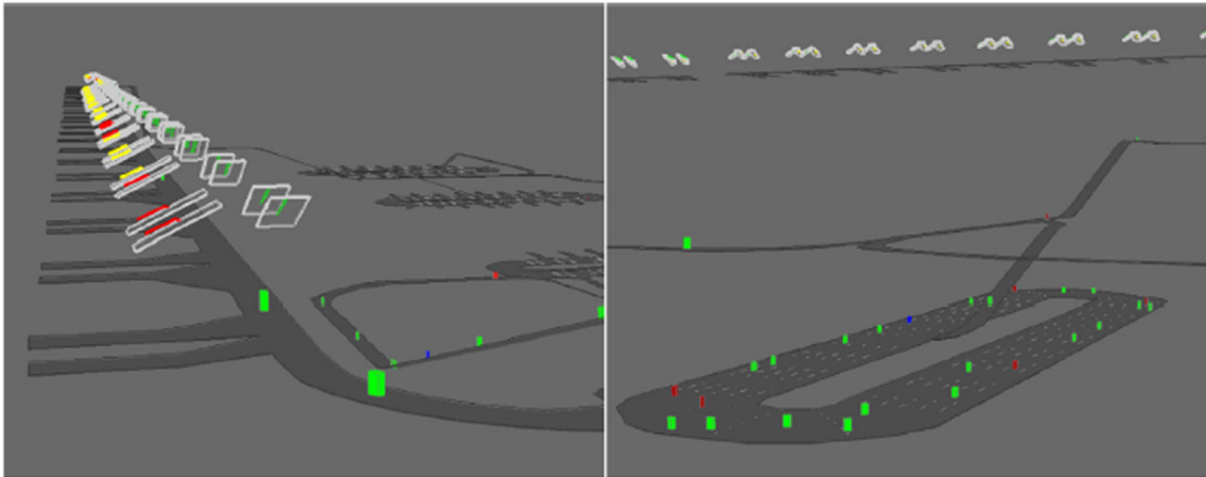


Fig. 2. Paramics 3D animation of the check-in counter area and one of the carousels.

EX1002-Cavada, FIG. 2

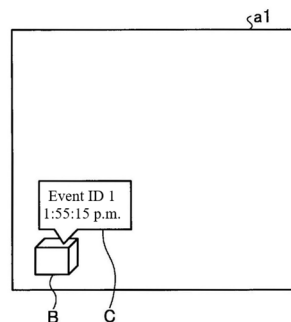
Cavada describes generation of animation. *Id.*, 149. For example, Cavada shows three-dimensional (3D) animation snapshots of the simulation, highlighting the counter area and one carousel. *Id.*, FIG. 2. The color of the bags represent different categories *Id.*, 153, FIG. 2 and Table 1. Furthermore, Cavada describes that the movement of bags can be represented accurately and based on real distances, features that were very useful for modelling semiautomatic systems such as the one coded in this work. *Id.* Indicators associated with the use of capacity in carousels are also easy to obtain from the available application programming interface (API) functions. *Id.*

2. Orito

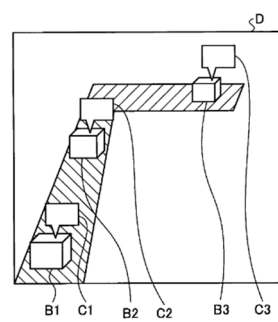
Orito describes a data processing apparatus that monitors an object conveyed by belt conveyors by sensors and provides video data of the object with event

information. EX1003-Orito, Abstract, [0018]-[0022]. Orito describes a system including an external device 2, such as a sensing device for testing products and a camera device 3 for monitoring products. *Id.*, [0018]-[0026]. The sensing device inspects a product, generates sensor information that is the result of the inspection, and outputs the generated sensor information to the data processing device 1, including the test results and the time of the test. *Id.*, [0020].

Orito's data processing apparatus 1 is a computer that includes a storage unit for storing data. *Id.*, [0011], [0014], [0103], FIGS. 1, 23. The storage unit 15 stores event information in association with video data and feature image(s), including the device ID, the alarm information, and sensor information from the sensing device. *Id.*, [0021], [0034]. The event information includes the movement state of the product being conveyed, including when the product has passed through a predetermined location. *Id.* When the instruction is “adding the event information image to the top of the subject to be monitored,” an addition unit 25 adds the event information image C above the subject to be monitored B. *Id.*, [0067], FIG. 8.



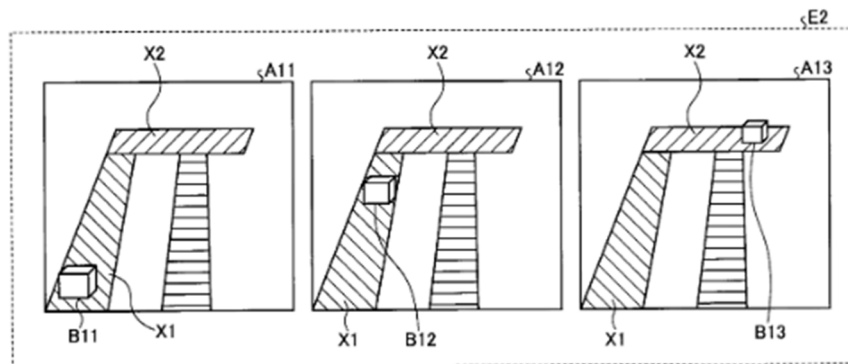
EX1003-Orito, FIG. 8

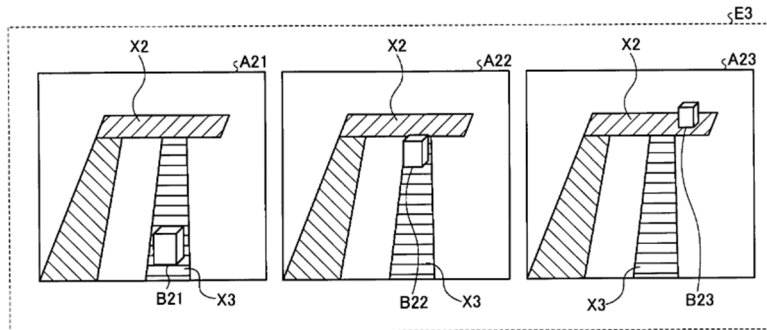


EX1003-Orito, FIG. 15

A display generation unit 16 generates a synthesized image D by combining feature images a11-a13 and the image displaying a background of the subjects to be monitored. *Id.*, [0086], FIG. 15. In the synthesized image D, as shown in FIG. 15, event information images C1-C3 with their respective annotations (event information in text data converted into images) are added to monitoring objects B1-B3. *Id.*, [0065], [0086], FIG. 15.

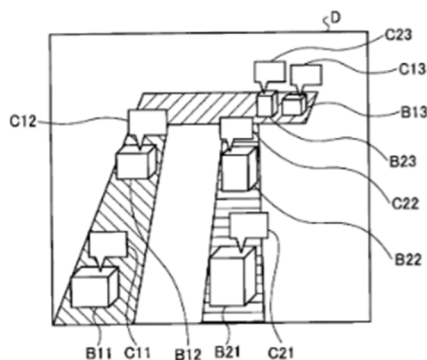
Belt conveyors X1, X2, X3 are connected as shown in FIGS. 16-17 and 22. *Id.*, [0089]-[0090]. The video data E2 includes images A11-A13, and the video shows the subjects to be monitored B11-B13 conveyed from belt conveyor X1 to belt conveyor X2. *Id.*, [0089], FIG. 16. The video data E3 includes images A21-A23, and the video shows the subjects to be monitored B21-B23 conveyed from belt conveyor X3 to belt conveyor X2. *Id.*, [0090], FIG. 17.





EX1003-Orito, FIGs. 16-17

FIG. 22 also shows a synthesized image D including all the feature images of subjects to be monitored B11-B13 and B21-B23 with their respective annotations (event information images C11-C13 and C21-C23) on the conveyors. *Id.*, [0095], FIG. 22.

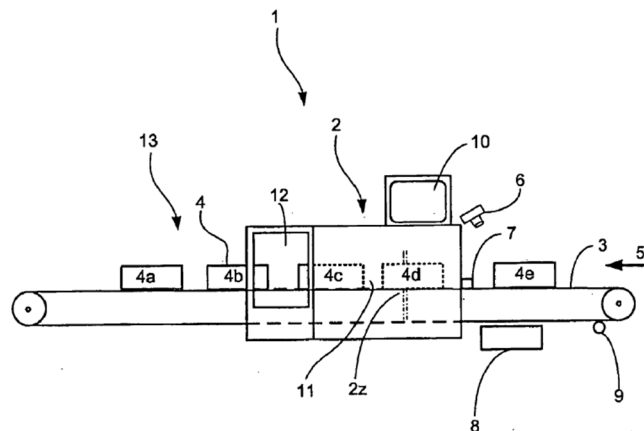


EX1003-Orito, FIG. 22

3. Sommer

Sommer's article sensing and tracking system performs real-time tracking of airport passenger luggage passing a security check. EX1004-Sommer, [0008] and [0010]. A scanner data and conveyed article sensing, tracking, and data handling system provides information to security personnel on the physical location of articles

passing through a scanner, to maintain physical control of articles until they are cleared through inspection of their x-ray images. *Id.*, [0008]. Sommer uses an article tracking sensor system integrated with a computer and software to present visual information on the physical location of articles that are being passed through the scanner. *Id.*, [0010]. Sensors determine presence and position of articles 4 as they approach, enter into, and are within the scanner 2. *Id.*, [0036]-[0037]; FIG. 1. The sensors may include, for example, an X-ray scanner 2, trigger system 7 such as a photocell system (or another type proximity sensor system), article location systems such as an radio frequency identification (RFID) tracking system, a video tracking system, or machine vision system. *Id.*



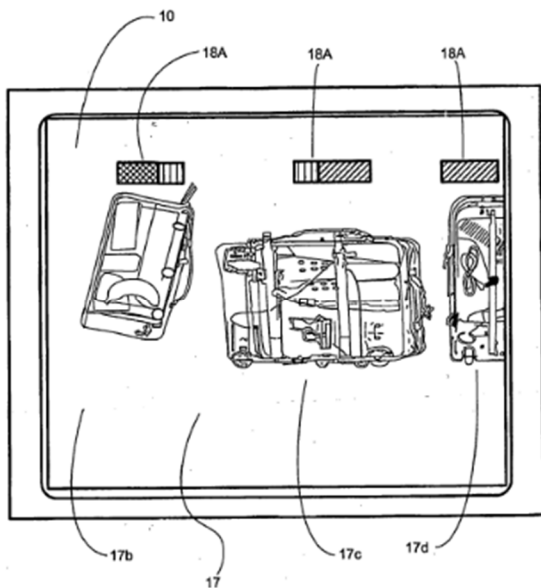
EX1004-Sommer, FIG. 1

Sommer describes visual display of the article location information on the display screen 10 or other display screens along with display of x-ray images 17. *Id.*, [0039]. A color, shading, or pattern code, or other visual representation may show

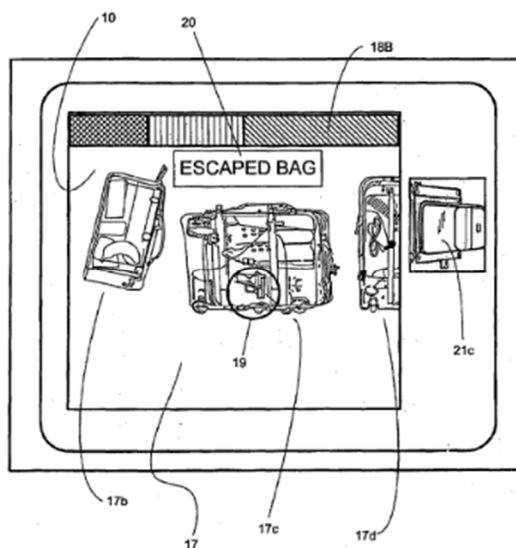
these regions on display screen 10, although names, numbers, other codes, visual schematics, etc. could be easily used to identify these regions. *Id.*

Sommer describes annotations in the form of article location indicators 18A that are displayed above each x-ray image 17 and are shaded to indicate the region or regions within which the articles 4 are located. *Id.*, [0043], FIG. 4. In this example, if an article 4 overlaps two regions then the corresponding article location indicator 18a is painted in two colors, patterns, or shades to represent the relative amount of the article 4 within each region. *Id.*

Sommer describes another annotation in the form of notification 20. *Id.*, [0049]. Upon selection of an article 4 for further inspection or search, software running in computer 8 registers the selection, and the computer 8 tracks physical locations of the article 4 and the motion of conveyor 3. *Id.* If conveyor 3 is in motion or if selected article 4 is moving into cleared article access region 13 then a notification, such as notification 20, is displayed on display screen 10 to inform security personnel that article 4 is in danger of moving into cleared article access region 13 before inspection of article 4. *Id.* In FIG. 11, the notification 20 is displayed in the form of the words ESCAPED BAG, denoting that article 4 is in danger of "escaping" into cleared article access region 13 before security inspection is completed, although other forms of notification could be used. *Id.*



EX1004-Sommer, FIG. 4



EX1004-Sommer, FIG. 11

4. Analogous Art

Cavada, Orito, and Sommer are analogous art to the '602 patent; they are from the same field of endeavor as the '602 patent (systems including conveyor) and pertinent to the particular problems the '602 patent was trying to solve (*see* Cavada and Orito: visual representation of objects on conveyors in a system for monitoring the system; Sommer: visual representation of locations of objects passing through *security* screening). *See sections* VI.A.1-VI.A.3; EX1013-Janét, ¶¶61-66.

Orito is from the same field of endeavor as the '602 Patent (material handling using a “belt conveyor” system with sensors-based feedback to monitor and track objects moved by, for example, conveyors). EX1013-Janét, ¶64. Orito is pertinent to the particular problem the '602 Patent was trying to solve (collecting telemetry

data associated with the travel of the objects along the conveyors with a computing device that stores the telemetry data from the sensors). *Id.*

Sommer is from the same field of endeavor as the '602 Patent, specifically a BHS. EX1013-Janét, ¶¶66. Sommer is also pertinent to the particular problem the '602 Patent was trying to solve, specifically tracking bags on a conveyor-based BHS comprising a plurality of sensors, and through animations on a graphical user interface. *Id.*

5. Motivation to Combine

A POSITA would have been motivated to combine Cavada, Orito, and Sommer's teachings to meet the '602 patent's claims. EX1013-Janét, ¶¶67-77.

- *Combining prior art elements according to known methods to yield predictable results*

The prior art included each claimed element.

The claim by claim analysis below shows that the combinations of Grounds 1-5 each disclose all elements of each claim challenged in each ground. *See infra* Sections VI.A.6-12, VI.B.3-5, VI.C.3-4, VI.D.3 and VI.E.3; EX1013-Janét, ¶¶78-109, 116, 122, 129 and 135.

A POSITA would have combined elements by known methods and each combination discloses each element of the '602 Patent using known methods.

A POSITA would have combined Cavada, Orito, and Sommer's teachings to meet the claimed elements by known methods due to the substantial overlap of teachings, improvements provided by the combination, and nature of the technology. EX1013-Janét, ¶¶70-76.

First, there is substantial overlap between the references:

- All references are in the same field: systems including conveyor. EX1002-Cavada, 148 (an example BHS includes a set of conveyors); EX1003-Orito, [0089]-[0090] (system displaying video showing the subject to be monitored conveyed from one belt conveyor to another); EX1004-Sommer, [0010] (an article tracking sensor system that presents on a monitor screen visual information of an article on a conveyor that is being passed through a *security* screening device);
- All references describe monitoring statuses of moving objects on the conveyor. EX1002-Cavada, 148 (“the system knows the position of the bag” once “[c]hecked-in bags are individually deposited in trays on the conveyor belt by the counter agent, who inputs the bags to the BHS controller system using a barcode gun.”); EX1003-Orito, [0089] (“the video shows the subjects to be monitored B11, B12, B13 conveyed from the belt conveyor X1 to belt conveyor X2”); EX1004-Sommer, [0008] (“scanner data and conveyed article sensing, tracking, and data handling

system of the present invention provides information to *security* personnel on the physical location of articles passing through a scanner thereby.”); and

- All references are directed to the same goal: providing a user of a system with information statuses of moving objects. EX1002-Cavada, 149, 153, FIG. 2, and Table 1 (“color[s] of the bags represent different categories” where a color is associated with a probability that each bag generates such an incident, the type of incident generated and the resulting conveyor stoppage time); EX1003-Orito, [0095]-[0098], FIG. 22 (a synthesized image D including all the feature images of subjects to be monitored B11-B13 and B21-B23 with their respective event information images C11-C13 and C21-C23 on the conveyors; “[t]he user can understand the movement status of the subject to be monitored without having to play a plurality of video data by checking the synthesized image, so that the task of verifying the subject to be monitored can be completed in a short time ”); EX1004-Sommer, [0008] (“scanner data and conveyed article sensing, tracking, and data handling system of the present invention provides information to *security* personnel on the physical location of articles passing through a scanner thereby.”)

Thus, all three references disclose conveyor belt-based transportation of objects, sensor-based tracking of transported objects and graphical displays of salient status information to operators. EX1013-Janét, ¶73.

Second, a POSITA would have been motivated to combine the references due to the resulting improvement from incorporating Orito and Sommer's concepts into Cavada's system. The combination would have at least improved Cavada by incorporating Orito's teachings of:

- Event information includes alarm information, sensor information, or a movement state of an item conveyed by a belt conveyor, including when the item has passed through a predetermined location. EX1003-Orito, [0021].
- Addition of an image of event information above a subject to be monitored in a synthesized image. *Id.*, [0067], FIG. 8.
- Generating a synthesized image including all feature images of subjects to be monitored conveyed through a plurality of conveyors, where the subjects to be monitored are shown with respective event information images. *Id.*, [0089]-[0090], [0095], FIGS. 16, 17, 22.

The combination would have utilized Sommer's teachings of

- Real-time tracking of airport passenger luggage passing a *security* check. A computer using sensors tracks physical locations of an article

passing through the *security* screening device and the motion of conveyor carrying the article. EX1004-Sommer, [0039].

- An article tracking sensor system integrated with software and a computer system to present visual information on the physical location of articles that are being passed through a *security* screening device on a monitor screen. *Id.*, [0010].
- Providing article location information visually through display of the information or representations of the information on a display screen. *Id.*, [0039]. For example, visual representation may use color code, shading code, pattern code, or other visually distinct representation or text such as names, numbers, other codes, visual schematics, etc. *Id.* A computer using sensors tracks physical locations of an article passing through the *security* screening device and the motion of conveyor carrying the article. *Id.* Sommer describes displaying a notification in the form of the words, denoting that article's state about passing the *security* screening device responsive to the tracked physical location of the article. *Id.*, FIG. 11; par. [0049].

As a result, Cavada's system would have been enhanced to monitor a status of a moving object traveling on a set of conveyors passing through a predetermined location, such as a *security* screening device, responsive to a tracked physical

location of the moving object or motion of a conveyor carrying the moving object. EX1002-Cavada, 149, 153, FIG. 2; EX1004-Sommer, [0008].

Cavada's system would have been further enhanced by adding an event information image near a moving object in an image to be displayed, based on stored event information associated with an image of the moving object traveling from one conveyor to another conveyor. EX1002-Cavada, 149, 153, FIG. 2; EX1003-Orito, [0021], [0034], [0095]-[0098], FIG. 22. The event information image may include alarm information, sensor information, or a movement state of the item conveyed by a belt conveyor, when the object has passed through a predetermined location, such as a *security* screen device. EX1003-Orito, [0021], EX1004-Sommer, [0036]-[0037], [0049]. Such displayed information may be a notification based on physical locations of the moving item and motion of the conveyor tracked by the sensor(s). EX1004-Sommer, [0049]; FIG. 11.

These aspects taken from Orito and Sommer, and integrated into Cavada's system, would have made a BHS including conveyors, *security* screening scanners, and animation to monitor moving objects on conveyors, as they passed a *security* screening device. EX1013-Janét, ¶¶74-75.

Orito and Sommer's concepts would have been readily applicable to Cavada's system because Cavada already discloses a BHS that knows a position of a bag. EX1002-Cavada, 148. Cavada further discloses a computing device, such as a

simulator, that stores telemetry data that represent accurate physics behind movement of bags based on real distances. *Id.*, 149, FIG. 2. Cavada further discloses generating an animation of the conveyors and the objects traveling along the conveyors within the facility based upon the telemetry data (“in Fig. 2, two 3D animation snapshots of the simulation are shown, highlighting the counter area and one carrousel.”) *id.* The compatibility and ease of incorporating features between references lends them to combination, and a POSITA would have readily combined their teachings to arrive at the claimed invention. EX1013-Janét, ¶¶74-75.

Third, the disclosed technology readily provided the combination to meet the claimed invention, and routine software editing using known programming methods would have been available to implement the combination on the system of Cavada, because Cavada, Orito, and Sommer’s systems use software on a computing device. EX1002-Cavada, 149, 163, 0063; EX1004-Orito, [0036], [0038]; EX1005-Sommer, [0102], FIG. 23. Cavada demonstrates adaptation of a simulation software for vehicle traffic into a BHS. EX1002-Cavada, 149, 163. The combination, and enhancements provided to Cavada’s system from Orito and Sommer, would have only required routine software/application development knowledge and would have been well-within a POSITA’s capabilities. EX1013-Janét, ¶76.

A POSITA would have recognized the results of the combination were predictable.

A POSITA would have recognized the results of combining Cavada, Orito, and Sommer were predictable and there would have been a reasonable expectation of success in making the combination. Practically, the combination would have only required the straightforward implementation of Cavada's BHS to the specific application of tracking and displaying security status of bags already tracked, including as they pass through security, in Cavada's disclosure. It would have been straightforward to implement Cavada's BHS to monitor a status of the moving object passing through a *security* screening device, responsive to a tracked physical location of the moving object or motion of a conveyor carrying the moving object, and to display event information following the moving object traveling from one conveyor to another conveyor, wherein the event information includes the status of the moving object passing through the *security* screening device. *See* discussion regarding "A POSITA would have combined elements by known methods and each combination discloses each element of the '602 Patent using known methods." *See supra* pp. 22-24. These known, routine, and predictable results would have occurred from enhancing Cavada's system with the teachings of Orito and Sommer, and therefore provide a reasonable expectation of success in combining the references. *Id.* A POSITA would have further known **how** to combine the teachings of the references exercising independent judgement due to the straightforward nature of the disclosed systems. EX1013-Janét, ¶77.

6. Claim 1

a) *[1a-preamble]: “A system comprising:”*

To the extent limiting, Cavada describes² a system comprising, the Santiago airport BHS and its modelling using traffic micro simulation. EX1002-Cavada, 148.

b) *[1b] “a plurality of continuous conveyors configured for moving objects throughout a facility;”*

Cavada alone, or Cavada and Orito, describe limitation [1b]. Cavada discloses that the BHS includes “a set of conveyors,” diverters and carrousel that move passengers’ bags from check-in counters to baggage carts, and onto aircraft. EX1002-Cavada, 148.

Orito also discloses belt conveyors X1-X3 connected to one another and moving objects including B1-B3. EX1003-Orito, [0089]-[0090]; FIGS. 16, 17, 22.

c) *[1c] “a plurality of sensors positioned at different locations within the facility for collecting telemetry data associated with travel of the objects along the conveyors, at least some of the sensors being configured to determine whether the objects have passed through a security screening; and”*

Cavada alone, or Cavada and Sommer, describe limitation [1c].

² “Describes” herein encompasses “discloses or at least renders obvious.”

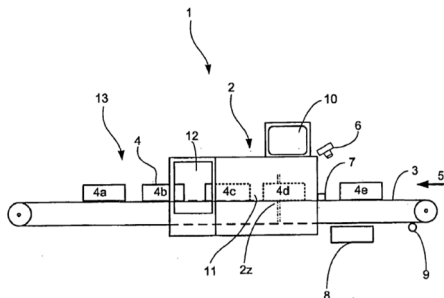
The ‘602 patent describes sensors 34, including optical code readers, positioned at different locations within the facility 33 for collecting telemetry data associated with objects 32 traveling along conveyors. EX1001, 3:56-60.

Cavada discloses that the system knows *the position of the bag* and the destination loading area carrousel, since the counter determines that the bag was checked in and the counter agent who loads the bag on the conveyor inputs the bag(s) to the BHS controller system using a barcode scanner. EX1002-Cavada, 148. Thus, Cavada teaches a plurality of sensors positioned at different locations within the facility for “collecting telemetry data associated with travel of the objects along the conveyors.”

The ‘602 patent also describes “sensors 34” that may monitor other components associated with the conveyors 31, such as baggage pushers, diverters, scanning devices (e.g., X-ray machines), etc. EX1001, 3:67-4:3. Cavada discloses security screening scanners N2, and a bag is carried along to one of the N2s. EX1002-Cavada, 148; FIG. 1. Cavada’s simulator includes a behavior module including a routine of “Security screening,” with respect to the security screening scanners N2 and N3. *Id.*, 150, 154-155; FIG. 3. Because Cavada’s system knows *the position of the bag* that is carried along to and through scanners N2, Cavada discloses “at least some of the sensors being configured to determine whether the objects have passed through a security screening.” EX1013-Janét, ¶80.

Even if Cavada failed to disclose the “sensors,” Orito describes a system that includes an external device 2, such as a sensing device for testing products and a camera device 3 for monitoring products. EX1003-Orito, [0018]-[0026]. The sensor generates sensor information, including test results and the time of the test. *Id.* Because security screening is one type of test, a POSITA would have therefore understood that Orito also discloses “at least some of the sensors being configured to determine whether the objects have passed through a security screening.” *Id.* EX1013-Janét, ¶81.

Furthermore, Sommer describes sensors that track the *presence and position of articles 4 as they approach, enter into, or are within the scanner 2*, and discloses trigger system 7, photocell systems, proximity sensors, RFID, video tracking, and machine vision as examples. EX1004-Sommer, [0036]-[0037], FIGS. 1 and 2.



EX1004-Sommer, FIG. 1

Because Sommer’s trigger system 7 includes sensor(s) to determine *presence and position of articles 4 as they approach, enter into, or are within the scanner 2*, a security scanner, Sommer also discloses “at least some of the sensors being

configured to determine whether the objects have passed through a security screening.” *Id.*; EX1013-Janét, ¶82.

d) [1d] “a computing device configured to:”

Cavada alone, or Cavada and Orito, describe limitation [1d]. Cavada describes adaptation of a vehicle traffic simulator software to the baggage handling problem and the development of a platform that models baggage handling as an integrated unit. EX1002-Cavada, Abstract, 146. The simulator software includes computations, such as computation of the minimum and maximum stoppage times for the uniform distribution using the database, and necessarily runs on a computing device. *Id.*, 153. A computing device would exist, for example, wherever the system makes adjustments, such as when “the counter stops checking new passengers until one of them has entered the collector,” “implements conveyor stoppages,” “[a] call is made to the bag redirection routine,” and so forth. EX1002, 154; EX1013-Janét, ¶84.

Even if Cavada alone failed to disclose the computing device, Orito describes a data processing device 1 that is a computer. EX1003-Orito, [0102]; FIGS. 1 and 23, EX1013-Janét, ¶85.

e) [1d1] “store the telemetry data from the sensors in a database,”

Cavada alone, Cavada and Orito, or Cavada, Orito and Sommer, describe limitation [1d1]. Cavada discloses the system that knows the position of the bag and

the destination loading area carrousel, since the counter determines that the bag was checked in and the counter agent who loads the bag on the conveyor inputs the bag(s) to the BHS controller system using a barcode gun. EX1002-Cavada, 148. The simulator software includes computations, such as computation of the minimum and maximum stoppage times for the uniform distribution *using the database. Id.*, 153. Thus, a POSITA would have therefore understood that Cavada also discloses a computing device configured to “store the telemetry data from the sensors in a database.” EX1013-Janét, ¶87.

Even if Cavada alone failed to disclose the recitation “store the telemetry data from the sensors in a database,” Orito describes processing apparatus 1 includes a storage unit for storing data. EX1003-Orito, [0011], [0013]-[0015], [0021]-[0034]; EX1013-Janét, ¶88-89. A storage unit 15 is for storing the video data and the feature image. EX1003-Orito, [0014]. The storage unit 15 stores the video data, the feature image, and associated event information. *Id.*, [0034]. The event information includes the device ID, the alarm information, and sensor information from the sensing device. *Id.*, [0021]. The event information may include telemetry data, such as the movement state of the product conveyed by the belt conveyor, including when the product has passed through a predetermined location. *Id.*

Furthermore, Sommer also describes the storage of telemetry data from the sensors in a database. EX1004-Sommer, [0035]-[0036]; EX1013-Janét, ¶90.

- f) *[1d2] “generate an animation of the conveyors and the objects traveling along the conveyors within the facility based upon the telemetry data stored in the database and including status annotations that follow at least some of the objects as they switch between different conveyors, the status annotations including security status information to indicate whether respective objects have passed through the security screening, and”*

Cavada, Orito and Sommer describe limitation [1d2]. EX1013-Janét, ¶¶91-97. For example, Cavada discloses two 3D animation snapshots of the simulation highlighting the counter area and one carrousel. EX1002-Cavada, 149; FIG. 2. Cavada’s teaching includes direct modeling of the movement of bags passing through a section comprising several subsections of different speed and accurate representation of the physics behind the movement of bags based on real distances. *Id.* A POSITA would have understood that Cavada also discloses “generate an animation of the conveyors and the objects traveling along the conveyors within the facility based upon the telemetry data stored in the database.” *Id.*; EX1013-Janét, ¶92.

Even if Cavada alone failed to disclose including in the animation status annotations that follow at least some of the objects as they switch between different conveyors, Orito describes this element in the form of annotations (event information image C, such as a balloon with text,) added above the subject to be monitored B. EX1003-Orito, [0067]; FIGS. 8, 15-17 and 22. These annotations

follow as the video images show subjects to be monitored B11-B13 conveyed from belt conveyor X1 to conveyor X2. *Id.*, [0089] and FIGS. 16 and 22; EX1013-Janét, ¶94.

Cavada further discloses “the status annotations including security status information to indicate whether respective objects have passed through the security screening.” For example, Cavada discloses that the bags were divided into four categories according to the frequency and seriousness of the incidents they might originate, and the color of the bags represent different categories. *Id.*, 153, FIG. 2 and Table 1. Cavada also discloses that bags exhibiting some irregularity are redirected to carrousel M9, if either the system has lost the bag’s identification (a tracking error) or the N2 security screening has flagged it as suspicious. *Id.*, 149. Combining that the system’s ability to identify the error or security screening result, and representing different categories of bags in different colors, a POSITA would have easily reached the limitation “the status annotations including security status information to indicate whether respective objects have passed through the security screening.” EX1013-Janét, ¶93.

Even if Cavada alone failed to disclose the recitation “the status annotations including security status information to indicate whether respective objects have passed through the security screening,” Orito further discloses “the status annotations including security status information to indicate whether respective

objects have passed through the security screening.” EX1013-Janét, ¶95. For example, as previously discussed, a POSITA would understand that “inspection” includes or at a minimum is analogous to “security screening” and that “[t]he alarm information includes the contents of the anomaly or fault and the time at which the anomaly or fault occurred.” *Id.*; EX1003-Orito, [0019].

Sommer also describes article location indicators (e.g., 18A in FIG. 4) that are animations overlayed on the video that follow the objects. EX1004-Sommer, FIG. 4. Sommer describes article location information visually through display of the information or representations of the information on the display screen 10 or other display screens along with display of x-ray images 17. *Id.*, [0039]. Sommer describes a color code, shading code, pattern code, or other visually distinct representation that may visually represent these regions on display screen 10 as well as other means to represent these regions, such as names, numbers, other codes, visual schematics, etc. that could be easily used. *Id.*, [0043]. Sommer describes notification (e.g., 20 “ESCAPED BAG” in FIG. 11) that is status annotation including security information” indicating that the bag fails to pass through the security screening. *Id.*, [0049]; FIG. 11. Thus, a POSITA would have therefore understood that Sommer discloses “status annotations that follow at least some of the objects ..., the status annotations including security status information to indicate

whether respective objects have passed through the security screening.” *Id*; EX1013-Janét, ¶96.

Thus, a POSITA would have therefore understood that Cavada, Orito and Sommer describe the limitation [1d2], “(the computing device configured to:) generate an animation of the conveyors and the objects traveling along the conveyors within the facility based upon the telemetry data stored in the database and including status annotations that follow at least some of the objects as they switch between different conveyors, the status annotations including security status information to indicate whether respective objects have passed through the security screening.”

g) [1d3] “play the animation on a display via a graphical user interface (GUI).”

Cavada, Orito and Sommer describe limitation [1d3]. EX1013-Janét, ¶¶98-103. Cavada discloses 3D animation snapshots of the simulation highlighting the counter area and one carrousel. EX1002-Cavada, 149; FIG. 2. A POSITA would recognize that these animation snapshots are displayed to a user via a GUI. EX1013-Janét, ¶99.

Even if Cavada alone failed to describe “play[ing] the animation on a display via a graphical user interface (GUI),” Orito describes display generator 16 that generates a synthesized image D by combining feature images and event information images for the monitored products and the image of the background. EX1003-Orito,

[0095]; FIG. 22. Orito further describes that a display screen showing event information images associated with a monitored object may be displayed via pop-up when a pointing device, such as a mouse, is operated to have a cursor overlaid on a corresponding feature image of the monitored object in the display screen. *Id.*, [0101]. A POSITA would have therefore understood that Orito describes “(a computer device that is configured to) play the animation, as a sequence of composite images on a display via a graphical user interface (GUI).” *Id.*; EX1013-Janét, ¶¶100-101.

Sommer also describes that article location indicators (e.g., 18A in FIG. 4) that change according to movements of articles are animations overlayed on the video that follow the objects. EX1004-Sommer, FIG. 4. Sommer describes article location information visually through display of the information or representations of the information on the display screen 10 or other display screens along with display of x-ray images 17. *Id.*, [0039]. Thus, a POSITA would have therefore understood that Sommer discloses “(a computer device that is configured to) play the animation, as a sequence of composite images on a display via a graphical user interface (GUI).” *Id.*; EX1013-Janét, ¶102.

Thus, a POSITA would have therefore understood that Cavada, Orito and Sommer describe the limitation [1d3].

7. Claim 2

- a) ***“The system of claim 1 wherein the computing device is configured to generate and display the animation to simulate real-time movement of the objects traveling along the conveyors.”***

Cavada, Orito and Sommer describe claim 1 (see Section VI.A.6), and further describe claim 2. Cavada alone, or Cavada and Orito describe a “computing device configured to generate and display the animation.” See Section VI.A.6.d and f-g.

In addition, Cavada describes a simulation tool that generates evaluations of hypothetical operating scenarios *based on real data* whose results can be used to design operating protocols for both normal conditions and contingencies. EX1002-Cavada, 147. Cavada’s system simulates several days of *real operation* using observed itineraries and baggage loads in which the handling errors were gradually reduced in each successive scenario. *Id.*, 158. Thus, a POSITA would have therefore understood that Cavada also discloses the limitation of claim 2, “wherein the computing device is configured to generate and display the animation to simulate real-time movement of the objects traveling along the conveyors.”

Furthermore, a POSITA would have been motivated to combine Cavada, Orito and Sommer because combining elements of Cavada, Orito and Sommer according to known methods yields predictable results. See Section VI.A.5. Thus, a combination of Cavada, Orito and Sommer describe each and every feature of claim 2. EX1013-Janét, ¶104.

8. Claim 4

- a) “The system of claim 1 wherein the computing device is configured to generate the animation from user-selectable virtual camera views.”*

Cavada, Orito and Sommer describe claim 1 (see Section VI.A.6), and further describe claim 4. Cavada alone, or Cavada and Orito describe a “computing device configured to generate the animation.” See Section VI.A.6.d and f.

Cavada describes two 3D animation snapshots of the simulation, highlighting the counter area and one carrousel, that are virtual camera views. EX1002-Cavada, 149; FIG. 2. Cavada describes flexibility is one positive feature of the Paramics API’s. *Id.* Cavada’s system can control the simulation parameters and variables at any moment in order to achieve the desired representation to obtain a great level of details in the representation of the physics behind the movement of bags. *Id.* Combining Cavada’s system’s ability to display different virtual camera views(, such as views highlighting the counter area and one carrousel), and Cavada’s system’s ability to control the simulation parameters and variables at any moment (in order to achieve the desired representation of the movement of bags), a POSITA would have easily reached the limitation, “the computing device is configured to generate the animation from user-selectable virtual camera views.”

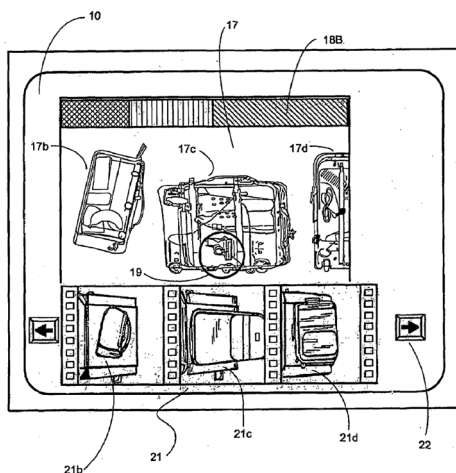


FIG. 12

EX1004-Sommer, FIG. 12

To the extent the Board finds Cavada alone fails to disclose the recitation “the computing device is configured to generate the animation from user-selectable virtual camera views,” Sommer describes displaying user-selectable views. *See* EX1004-Sommer, [0050]; FIG. 12. Sommer further teaches scroll controls 22 or similar to allow the user to select and view photographs of other articles. *Id.*

Combining Cavada’s system’s ability to generate the animation of different views (e.g., counter and carousel) and Sommer’s ability to display multiple views (e.g., photographs) which are selectable by a user using scroll controls, a POSITA would have easily reached the limitation “the computing device is configured to generate the animation from user-selectable virtual camera views.” EX1013-Janét, ¶105.

9. Claim 9

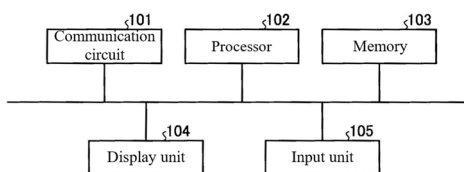
a) [9a-preamble] “A computing device comprising:

If the preamble is limiting, it is described for the reasons explained regarding limitations [1d], *supra*.

b) [9b] “a memory and a processor cooperating with the memory and configured to”

Cavada alone, or Cavada and Orito, describe limitation [9b]. Cavada, Orito, and Sommer describe computing device as explained regarding limitations [1d] and [9a-preamble], *supra*. A POSITA would have easily reached the limitation “the computing device comprising a memory and a processor cooperating with the memory” because a standard, generic computing device is likely to include a memory and a processor cooperating with the memory.

Furthermore, Orito further describes a hardware configuration of the data processing apparatus 1 that is a computer. EX1003-Orito, [0102]; FIG. 23. The computer includes a processor 102 and memory 103. *Id.*



EX1003-Orito, FIG. 23

Thus, a POSITA would have therefore understood that Cavada alone, or Cavada and Orito, describe the limitation [9b], the computing device comprising “a memory and a processor cooperating with the memory.” EX1013-Janét, ¶106.

- c) ***[9b1] “store telemetry data from a plurality of sensors in a database in the memory, the sensors being positioned at different locations throughout a facility and being configured to collect telemetry data associated with travel of objects along conveyors within the facility, at least some of the sensors being configured to determine whether the objects have passed through a security screening,”***

Limitation [9b1] is described for the reasons discussed regarding limitations [1b], [1c] and [1d1], *supra*.

- d) ***[9b2] “generate an animation of the conveyors and the objects traveling along the conveyors within the facility based upon the telemetry data stored in the database and including status annotations that follow at least some of the objects as they switch between different conveyors, the status annotations including security status information to indicate whether respective objects have passed through the security screening, and,”***

Limitation [9b2] is described for the reasons discussed regarding limitation [1d2], *supra*.

- e) ***[9b3] “play the animation on a display via a graphical user interface (GUI).”***

Limitation [9b3] is described for the reasons discussed regarding limitation [1d3], *supra*.

10. Claims 10 and 12

- a) ***Claim 10: The computing device of claim 9 wherein the processor is configured to generate and display the animation to simulate real-time movement of the objects traveling along the conveyors.***

- b) *Claim 12: The computing device of claim 9 wherein the processor is configured to generate the animation from user-selectable virtual camera views.***

Claims 10 and 12 are rendered obvious for the reasons discussed regarding claim 2 (for claim 10), and claim 4 (for claim 12), *supra*. EX1013-Janét, ¶107.

11. Claim 14

- a) *[14a-preamble] “A non-transitory computer-readable medium having computer-executable instructions for causing a computing device to perform steps comprising:***

If the preamble is limiting, it is described for the reasons explained regarding limitations [1d], *supra*.

- b) *[14a1] “storing telemetry data from a plurality of sensors in a database, the sensors being positioned at different locations throughout a facility and being configured to collect telemetry data associated with travel of objects along conveyors within the facility, at least some of the sensors being configured to determine whether the objects have passed through a security screening;”***

Limitation [14a1] is described for the reasons discussed regarding limitations [1b], [1c] and [1d1], *supra*.

- c) *[14a2] “generating an animation of the conveyors and the objects traveling along the conveyors within the facility based upon the telemetry data stored in the database and including status annotations that follow at least some of the objects as they switch between different conveyors, the status annotations including security status information to indicate whether respective objects have passed through the security screening; and,”***

Limitation [14a2] is described for the reasons discussed regarding limitation [1d2], *supra*.

d) [14a3] “playing the animation on a display via a graphical user interface (GUI).”

Limitation [14a3] is described for the reasons discussed regarding limitation [1d3], *supra*. Claim 14 is therefore obvious. EX1013-Janét, ¶108.

12. Claims 15 and 17

- a) Claim 15: The non-transitory computer-readable medium of claim 14 generating comprises generating the animation to simulate real-time movement of the objects traveling along the conveyors.**
- b) Claim 17: The non-transitory computer-readable medium of claim 14 wherein generating comprises generating the animation of the objects from user-selectable virtual camera views.**

Claims 15 and 17 are rendered obvious for the reasons discussed regarding claim 2 (for claim 15), and claim 4 (for claim 17), *supra*. EX1013-Janét, ¶109

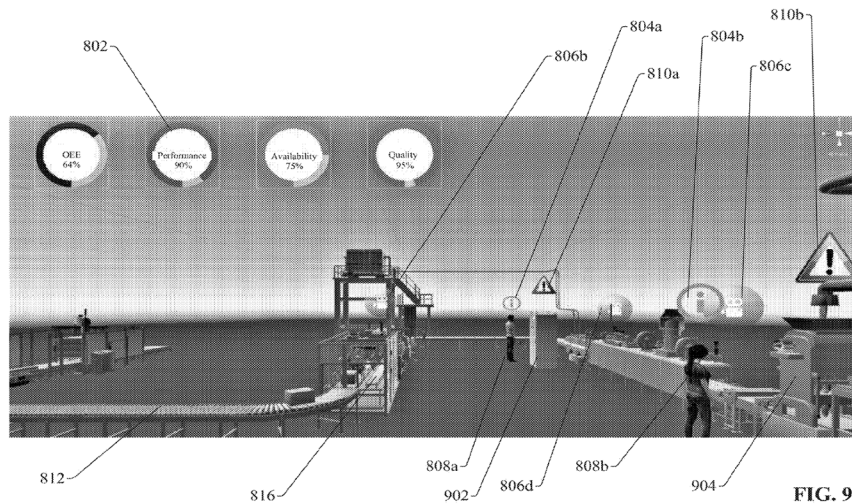
B. Ground 2: Claims 3, 6, 11 and 16 are unpatentable under 35 U.S.C. § 103 over Cavada, Orito, Sommer and Schmirler

1. Schmirler

Schmirler discusses a system to generate and delivery AR or virtual reality presentations. EX1005-Schmirler, Abstract, [0050]; EX1013-Janét, ¶¶112-113.

Schmirler describes an automation system viewed by a user. EX1005-Schmirler, [0056]. The user viewing the automation system, machine or industrial

device wearing virtual reality (VR)/augmented reality (AR) presentation system can determine current status information for devices and/or machines that make up the automation system, or for a process being carried out by the automation system, such as virtualized motor-driven conveyor. *Id.* Schmirler describes generating 3D virtual presentations showing conveyors including a conveyor that is moving boxes. *Id.*, [0073]; FIG. 9.



EX1005-Schmirler, FIG. 9

Schmirler describes video capture devices/cameras installed at one or more locations within the facility. *Id.*, [0051]. Schmirler further discusses determining locations and orientation data which is used by the VR/AR presentation system to control the view of VR/AR presentation as a whole. *Id.*, [0090]-[0091] Schmirler's industrial environment includes sources of industrial data including telemetry devices, presence sensors, and video cameras. *Id.*, [0072].

Schmirler describes an exemplary virtual and augmented reality presentation system 302. *Id.*, [0058]. Aspects of the systems, apparatuses, or processes explained in Schmirler constitute machine-executable components embodied within machine(s), e.g., embodied in one or more computer-readable mediums (or media) associated with one or more machines, for example, computer(s), computing device(s), automation device(s), virtual machine(s), etc., can cause the machine(s) to perform the operations described. *Id.* The system 302 may include one or more processors 320 perform functions, and memory 322 used to store computer executable instructions for performing the functions. *Id.*, [0059]-[0066]; FIG. 3.

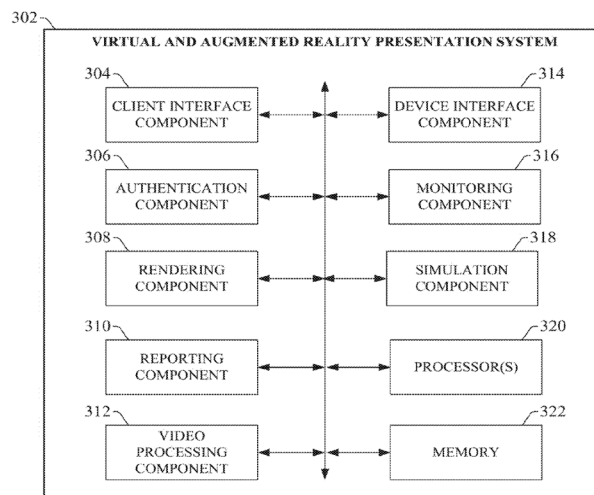


FIG. 3

EX1005-Schmirler, FIG. 3

Schmirler's VR/AR presentation system 302 collects data and formats data for rendering, including generating 3D virtual or augmented reality presentations of areas within industrial facility, including conveyors. *Id.*, [0073]; FIG. 5. For

example, Schmirler's VR/AR presentation system 302 collecting live and historical industrial data from industrial devices and systems 608 distributed across an industrial environment, where collected data items include telemetry and status information relating to operation of the devices or their associated industrial automation systems. *Id.*, [0076]. Schmirler also discusses a database that records relationships between data items, and further records the relationships with tags and classifications and building a search index. *Id.*, [0080]. Schmirler's system generates 3D virtual presentations of areas including machines, control cabinets, conveyors, and industrial devices based on plant models, and superimpose selected subsets of collected industrial data on the virtual presentations on or new graphical representations of the industrial asset. *Id.*, [0073]. Schmirler's system generates VR/AR presentation, such as rednered view including objects on conveyors as shown in FIG. 9, based on the information received and processed by rendering component 308, including a plant model for a given industrial area, including conveyors located within the area, and position animations reflecting movement of an asset. *Id.*, [0085], [0092]; FIG. 9.

Schmirler's VR/AR presentation system 302 renders realistic presentation of factory floor area from point of view of person standing within the environment. *Id.*, [0050]. Schmirler's VR/AR presentation system 302 generates 3D virtual representations including collected industrial data. *Id.*, [0073]. Schmirler's VR/AR

presentation system 302 renders interactive 3D virtual reality presentation on display. *Id.*, [0084]. Schmirler discusses rendering up-to-date external view including machines. *Id.*, [0088], [0092], [0100]; FIGS. 8-9. The system renders production areas to be viewed by user as an animated, interactive scale model, or switches to full-scale rendering of the production area based on user's current orientation). *Id.*, [0100].

Schmirler's monitoring component of the VR/AR presentation system identifies a maintenance issue based on analysis of real-time system data generated by the automation system, and in response deliver notification to technician device, and superimpose graphics on user's view of the technician's environment to guide user to source of the issue. *Id.*, [0057]. Schmirler's teaching includes visualization component 408 configured to render virtual reality or video presentations including graphical overlays that include operational or status data indicators for industrial systems of devices within the user's field of view, indicators that direct a user to a location of an industrial system or device within a plant environment, and guidance indicators for assisting a user in diagnosing and addressing an identified problem with an industrial system or device. *Id.*, [0069]. Schmirler further discusses rendering information including current or historical alarms or faults for industrial machines that are monitored. *Id.*, [0104]. Schmirler discusses VR/AR virtual

presentation based on a variety of operational and diagnostic data (e.g., motor speed data, motor current data, alarm data, etc.). *Id.*, [0111].

Schmirler discloses rendition of example VR/AR reality presentation of industrial area, including objects on conveyor 812. *Id.*, [0017], FIG. 9. Schmirler's VR/AR presentation system generates virtual reality presentations and deliver these presentations, such as graphical or text-based indicators overlaid on the user's field of view, such that each indicator is positioned near the machine or device to which the indicator pertains. *Id.*, [0056]. If the user's current view encompasses a real or virtualized motor-driven conveyor and a motor drive that controls the motor, the presentation system superimposes a current operating status of the motor drive (e.g., a current speed, a fault condition, an operating mode, etc.) near the image or view of the motor drive as perceived by the user. *Id.* Schmirler's rendering component 308 can superimpose asset information icons on or near representations of industrial assets, including identification of devices, e.g. name of cabinet. *Id.*, [0098]. While Schmirler does not explicitly tie the name of the machine to the conveyors, Schmirler discloses displaying the name of an industrial asset in the virtualization on the industrial asset. *Id.*, [0098]. For example, Schmirler describes rendering component 308 can render information windows 1104 that display relevant information about the automation system controlled by the cabinet 1102 (e.g., "Line 4 " in the

illustrated example), as well as the panel-mounted devices within the cabinet. *Id.*, [0101]; FIG. 11.

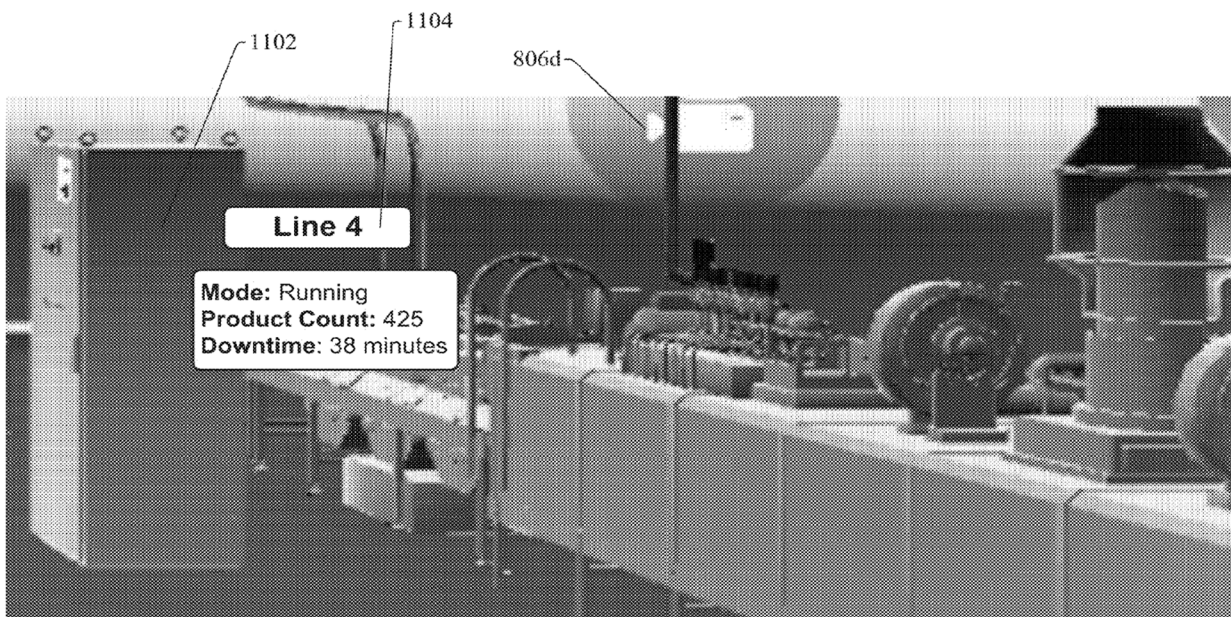


FIG. 11

EX1005-Schmirler, FIG. 11

Schmirler are analogous art to the '602 patent; it is from the same field of endeavor as the '602 patent (systems including conveyor) and reasonably pertinent to the particular problems the '602 patent was trying to solve (Schmirler: visual representation of objects on conveyors in a system for monitoring the system. *See sections IV.A and VI.A.1-VI.A.3.*

2. Motivation to Combine

A POSITA would have been motivated to combine Cavado, Orito and Sommer for the reasons discussed in section VI.A.5, and would have been further

motivated to combine Cavado, Orito and Sommer's combined system ("COS combined system") with Schmirler. EX1013-Janét, ¶¶111-115. All references are directed to a visualization system inside the facility, indicating a status of an object traveling along one or more conveyors collected by sensors. EX1013-Janét, ¶114. Schmirler discloses generating 3D virtual representations of the facility including multiple conveyors conveying boxes and sensors to collect status of the boxes traveling along the conveyors. EX1013-Janét, ¶113.

A POSITA would have recognized the results of combining Cavada, Orito, Sommer, and Schmirler were predictable and there would have been a reasonable expectation of success in making the combination. EX1013-Janét, ¶115.

In case of claims 3, 11, 16, it would have been obvious to one of ordinary skill in the art, before the effective filing date of the claimed invention and with a reasonable expectation of success, to modify the COS combined system by incorporating the method and system for identifying a maintenance issue based on analysis of real-time system data generated by the automation system and providing a user interface for displaying information, such as superimposing graphics on user's view of his or her environment to guide user to source of the issue and/or rendering information including current or historical alarms or faults for industrial machines that are monitored, to describe a computing device that is further configured to detect errors based upon the sensor telemetry data, and in response generate the animation

for corresponding locations at which detected errors occur within the facility.
EX1005-Schmirler, [0057], [0104]. EX1013-Janét, ¶116.

As to claim 6, it would have been obvious to one of ordinary skill in the art, before the effective filing date of the claimed invention and with a reasonable expectation of success, to modify the COS combined system by incorporating the method and system for displaying information on a virtual representation of a conveyor as an industrial asset. One of ordinary skill in the art would have found it obvious, before the effective filing date of the disclosed invention and with a reasonable expectation of success, to modify the display of information on a virtual representation of a conveyor as an industrial asset as provided by Schmirler, with the additional technique of displaying a name on the industrial asset as part of the displayed information provided by Schmirler, combining prior art elements according to known electronic interfacing and programming techniques to yield predictable results of displaying the name of a conveyor to identify the industrial asset to the user, as used for other types of virtualized industrial assets, and providing an improved system and method for visualizing industrial equipment by more clearly identifying the equipment to a user. EX1005-Schmirler, [0098], [0101]; FIG. 11. EX1013-Janét, ¶116.

3. Claim 3

- a) ***“The system of claim 1 wherein the computing device is further configured to detect errors based upon the sensor telemetry data, and in response generate the animation for corresponding locations at which detected errors occur within the facility.”***

Cavada, Orito, and Sommer describe claim 1 (see Section VI.A.6).

Schmirler describes a computing device is further configured to “detect errors based upon the sensor telemetry data, and in response generate the animation for corresponding locations at which detected errors occur within the facility.” Schmirler describes a VR/AR presentation system monitoring including component that can identify a maintenance issue based on analysis of real-time system data generated by the automation system. EX1005-Schmirler, [0057]. In response, Schmirler’s VR/AR presentation system can deliver notification to technician device, and superimpose graphics on user’s view of the technician’s environment to guide user to source of the issue. *Id.* Schmirler further discusses rendering information including current or historical alarms or faults for industrial machines that are monitored. *Id.*, [0104]. Schmirler describes VR/AR virtual presentation based on a variety of operational and diagnostic data (e.g., motor speed data, motor current data, alarm data, etc.). *Id.*, [0111]. Combining the COS combined system and Schmirler’s system’s ability to identify a maintenance issue based on analysis of real-time system data generated by the automation system, and present as virtual reality by superimposing graphics on user’s view of the technician’s environment to

guide user to source of the issue, a POSITA would have easily reached the limitation, “the computing device is further configured to detect errors based upon the sensor telemetry data, and in response generate the animation for corresponding locations at which detected errors occur within the facility.” EX1013-Janét, ¶116.

4. Claim 6

- a) “The system of claim 1 wherein the animation comprises a three-dimensional (3D) animation of the conveyors and objects traveling thereon with conveyor names displayed on respective conveyors within the animation.”*

Cavada, Orito, and Sommer describe claim 1 (see Section VI.A.6).

Schmirler describes “the animation comprises a three-dimensional (3D) animation of the conveyors and objects traveling thereon with conveyor names displayed on respective conveyors within the animation.” Schmirler describes rendition of example VR/AR reality presentation of industrial area, including objects on conveyor together with as graphical or text-based indicators overlaid on the user's field of view, such that each indicator is positioned near the machine or device to which the indicator pertains. EX1005-Schmirler, [0017], [0056]. Schmirler's rendering component 308 can superimpose asset information icons on or near representations of industrial assets, including identification of devices, e.g. name of cabinet. *Id.*, [0098]. While Schmirler does not explicitly tie the name of the machine to the conveyors, Schmirler discloses displaying the name of an industrial asset in the virtualization on the industrial asset. *Id.*, [0098]. For example, Schmirler

describes rendering component 308 can render information windows 1104 that display relevant information about the automation system controlled by the cabinet 1102 (e.g., “Line 4 ” in the illustrated example), as well as the panel-mounted devices within the cabinet. *Id.*, [0101]; FIG. 11.

Combining the COS combined system and Schmirler’s system’s ability to displaying the name of an industrial asset in the virtualization on the industrial asset, a POSITA would have easily reached the limitation, “the animation comprises a three-dimensional (3D) animation of the conveyors and objects traveling thereon with conveyor names displayed on respective conveyors within the animation.” EX1013-Janét, ¶116.

5. Claims 11 and 16

- a) ***Claim 11: The computing device of claim 9 wherein the processor is further configured to detect errors based upon the sensor telemetry data, and in response generate the animation for corresponding locations at which detected errors occur within the facility.***
- b) ***Claim 16: The non-transitory computer-readable medium of claim 14 further having computer-executable instructions for causing the computing device to perform a step of detecting errors based upon the sensor telemetry data; and wherein the generating comprises, in response to the detecting errors, generating the animation for corresponding locations at which the detected errors occur within the facility.***

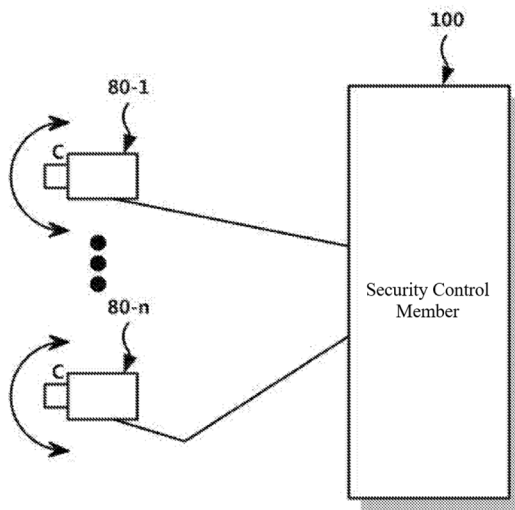
Claims 11 and 16 are rendered obvious for the reasons discussed regarding claim 3, *supra*. EX1013-Janét, ¶116.

C. Ground 3: Claims 5, 13 and 18 are unpatentable under 35 U.S.C. § 103 over Cavada, Orito, Sommer, and Kang

1. Kang

Kang discusses a 3D virtual reality system to generate 3D virtual reality image in security zones. EX1006-Kang, Abstract and claim 1. EX1013-Janét, ¶¶117-118.

Kang describes a 3D virtual reality system that converts 2D images photographed by cameras, such as closed-circuit television (CCTV) cameras, into a 3D virtual reality image. EX1006-Kang, [0001]; FIG. 1. For example, Kang's security control unit includes digital image recorder server that receives 2D images captured from a plurality of cameras, and stores and manages them in 2D image database. *Id.*, [0022]. A plurality of cameras 80 may be installed on patrol path of area such as building, and outputs 2D images photographing an area. *Id.*, [0033]-[0034].



EX1006-Kang, FIG. 1

Kang is analogous art to the '602 patent; it is from the same field of endeavor as the '602 patent (facility monitoring systems) and reasonably pertinent to the particular problems the '602 patent was trying to solve (Kang: a facility monitoring system that provides visual representation of security zones by cameras along a path in a building.) *See section IV.A; EX1013-Janét, ¶119.*

2. Motivation to Combine

A POSITA would have been motivated to combine Cavado, Orito and Sommer for the reasons discussed in section VI.A.5, and would have been further motivated to combine the COS combined system with Kang. All references are directed to a visualization system monitoring inside the facility. EX1013-Janét, ¶120. Kang discloses generating 3D virtual representations of the facility including multiple cameras to monitor areas, such as security zones, in the facility.

A POSITA would have recognized the results of combining Cavada, Orito, Sommer, and Kang were predictable and there would have been a reasonable expectation of success in making the combination.

In case of claims 5, 13 and 18, it would have been obvious to one of ordinary skill in the art, before the effective filing date of the claimed invention and with a reasonable expectation of success, to modify the COS combined system by incorporating a plurality of CCTV cameras for providing the video images in a facility to provide virtual reality presentation as provided by Kang, using known

electronic interfacing and programming techniques. EX1006-Kang, [0001], [0033]-[0034]. The modification simply substitutes one known type of camera for monitoring a facility for use in playback of video images to a user for another known type of camera for monitoring a facility, to obtain predictable results of utilizing CCTV cameras as the cameras for gathering video data from a facility used for playback to a user on a computer device. *Id.* EX1013-Janét, ¶121.

3. Claim 5

- a) “The system of claim 1 wherein a plurality of closed circuit television (CCTV) cameras are positioned within the facility; and wherein the computing device is further configured to initiate CCTV playback of a user-selected CCTV camera via the GUI.”*

Cavada, Orito, and Sommer describe claim 1 (see Section VI.A.6).

Kang describes “a plurality of closed circuit television (CCTV) cameras are positioned within the facility; and wherein the computing device is further configured to initiate CCTV playback of a user-selected CCTV camera via the GUI.” Kang describes a 3D virtual reality system that converts 2D images photographed by cameras, such as closed-circuit television (CCTV) cameras, into a 3D virtual reality image. EX1006-Kang, [0001]; FIG. 1. A plurality of cameras 80 may be installed on patrol path of area such as building, and outputs 2D images photographing an area. *Id.*, [0033]-[0034]. Kang’s system includes a digital image recorder server that receives 2D images captured from a plurality of cameras, and

stores them in 2D image database. *Id.*, [0022]. Kang describes generating 2D image texture for 2D image captured by cameras 80, and using a GUI means for projecting a 3D virtual reality image to generate the display data, where 2D images of 2D image of CCTV cameras are used to provide textured space. *Id.*, [0055]-[0056]. When a patrol request event occurs, the image acquisition unit 11 obtains 2D images of the cameras of the corresponding patrol route from the NVR server 200 through the communication unit 70 and outputs it to the tracking unit 12, then a manual patrol unit 13 sequentially acquires images from the cameras in the traveling direction of the patrol path according to a progress direction of patrol route for playback. *Id.*, [0067]-[0070].

Combining the COS combined system and Kang's system's ability to obtain images from CCTV cameras in traveling direction of a path and convert the images into 3D virtual reality image for projecting the 3D virtual reality image using GUI means, a POSITA would have easily reached the limitation, "a plurality of closed circuit television (CCTV) cameras are positioned within the facility; and wherein the computing device is further configured to initiate CCTV playback of a user-selected CCTV camera via the GUI." EX1013-Janét, ¶122.

4. Claims 13 and 18

- a) Claim 13: The computing device of claim 9 wherein a plurality of closed circuit television (CCTV) cameras are positioned within the facility; and wherein the processor*

is further configured to initiate CCTV playback of a user-selected CCTV camera via the GUI.

- b) Claim 18: The non-transitory computer-readable medium of claim 14 wherein a plurality of closed circuit television (CCTV) cameras are positioned within the facility; and further having computer-executable instructions for causing the processor to perform a step comprising initiating CCTV playback of a user-selected CCTV camera via the GUI.**

Claims 13 and 18 are rendered obvious for the reasons discussed regarding claim 5, *supra*. EX1013-Janét, ¶122.

D. Ground 4: Claim 7 is unpatentable under 35 U.S.C. § 103 over Cavada, Orito, Sommer, Schmirler, and Anderson

1. Anderson

Anderson discusses virtual reality display platforms and/or virtual reality user interaction devices that allow users to experience a simulated environment through a particular perspective. EX1007-Anderson, [0028].

Anderson describes virtual reality simulation generator that generates virtual reality simulation 205 of a given physical environment that includes all the events and actions of simulation participants as recorded by data acquisition systems 210 and presented on virtual reality display platform 110 including animation or simulated video sequence. *Id.*, [0035]. Virtual reality display platform 110 includes an animation or simulated video sequence 215 (viewed using virtual reality simulation viewer 107), virtual reality goggles, gloves and/or headset, etc. 220 , and

an immersive virtual reality environment 225 (e.g., a virtual reality sphere, cave or cube). *Id.* Such a simulation may allow for customized replay of observed events, where events may be replayed at high speeds or decrease speeds to traverse through simulation in between interesting events. *Id.*, [0042]. Virtual reality simulations may be used to identify “hot spots” or trouble areas by viewing a virtual reality replay. *Id.*, [0043]. Simulated environment 550 is presented statically, that is, as a single frame of animation; however, the simulated environment 550 may be part of animated visual sequence that shows avatars representing participants interacting with the environment over time. *Id.*, [0047]; FIG. 5B. EX1013-Janét, ¶¶124-125.

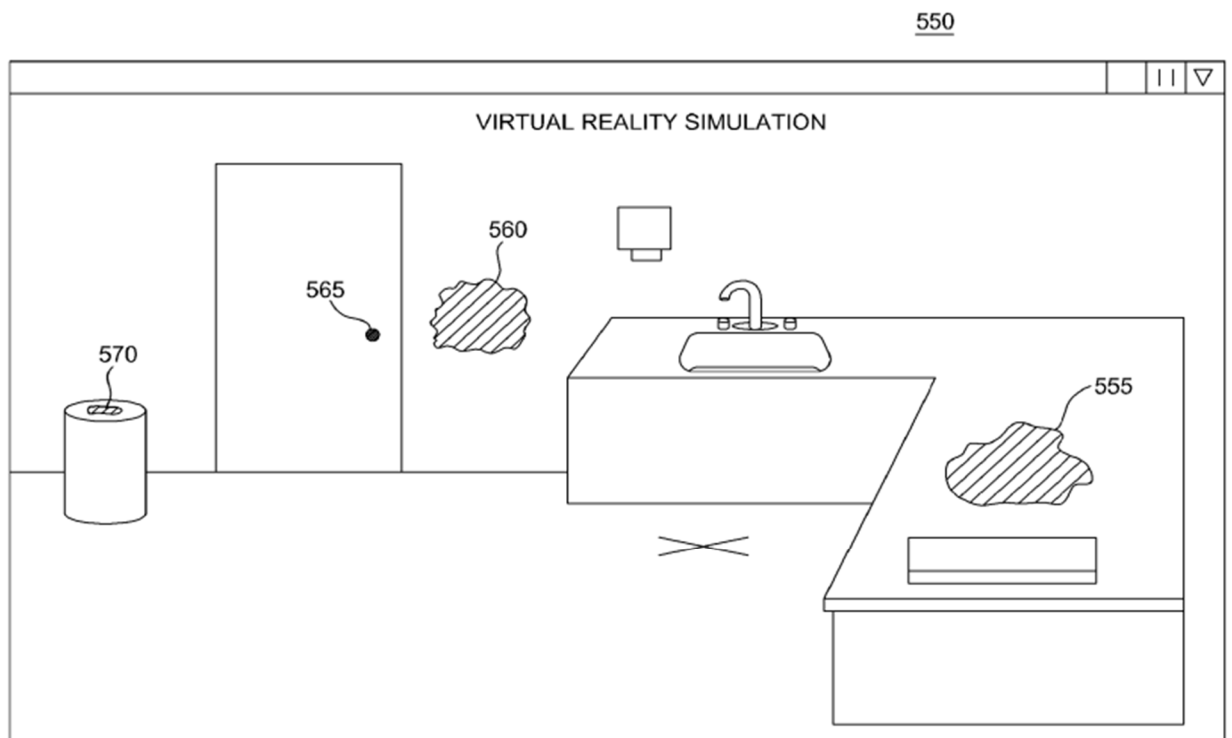


FIG. 5B

EX1007-Anderson, FIG. 5B

Anderson is analogous art to the '602 patent; it is from the same field of endeavor as the '602 patent (monitoring systems using virtual reality including animation) and reasonably pertinent to the particular problems the '602 patent was trying to solve (Anderson: a VR system that provides VR including animation in an environment.) *See section IV.A.* EX1013-Janét, ¶126.

2. Motivation to Combine

A POSITA would have been motivated to combine Cavado, Orito, Sommer and Schmirler for the reasons discussed in section VI.A.5 and VI.B.2, and would have been further motivated to combine Cavado, Orito and Sommer's combined system ("COS combined system") with Schmirler and Anderson. All references are directed to a visualization system monitoring inside the facility. *See section IV.B.2.* EX1013-Janét, ¶¶124-128. Anderson discloses generating virtual reality representations of the facility including allowing a user to perform customized replay of observed events.

A POSITA would have recognized the results of combining Cavada, Orito, Sommer, Schmirler and Anderson were predictable and there would have been a reasonable expectation of success in making the combination.

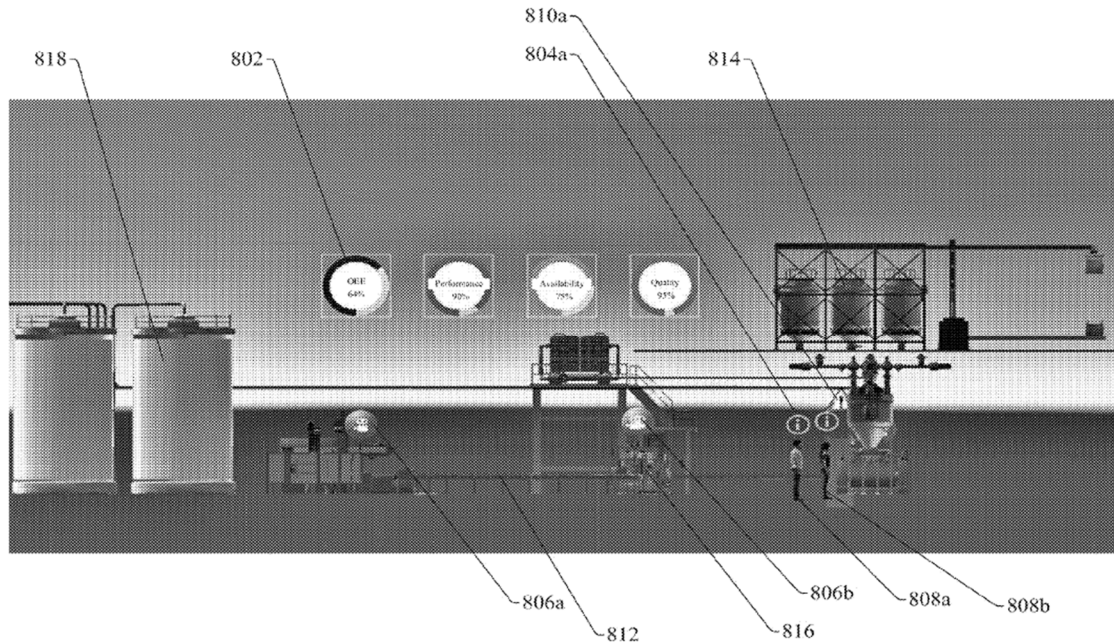
It would have been obvious to one of ordinary skill in the art, before the effective filing date of the claimed invention and with a reasonable expectation of success, to modify the COS combined system by incorporating the technique of

Schmirler for providing a user interface for displaying information related to operation of machine equipment monitored and recorded for playback by a series of cameras in a facility to obtain virtual reality presentation and the technique of Anderson allowing customized playback of event animations, using known electronic interfacing and programming techniques. EX1007-Anderson, [0035], [0042]. The modification results in an improved user interface for reviewing historical events of a facility by allowing the user greater control over the viewing of the animated events, for easier use and greater customization based on user preference. EX1013-Janét, ¶¶124-128.

3. Claim 7

- a) *“The system of claim 1 wherein the computing device is configured to generate the animation based upon a user-selectable time window and play the animation at a user-selectable playback speed.”*

Cavada, Orito, and Sommer describe claim 1 (see Section VI.A.6).



EX1005-Schmirler, FIG. 8

Schmirler describes a presentation system configured to work in conjunction with video capture devices, where the system can deliver on request a live 360 video feed including a 360 live video feed whose angle of view can be changed in accordance with the user's current direction of view or head orientation, including enhanced view superimposed with AR. EX1005-Schmirler, [0051]. Camera icons (e.g., 806a and 806b of FIG. 8) provide user with preview of video, where the user can select camera icons to obtain live interactive video presentation. *Id.*, [0128]. Schmirler's system allows a user to access historical video recordings allowing user to interact with historical video feed by moving head to change perspective. *Id.*, [0134].

Thus, by combining the COS combined system and Schmirler's system's ability to allow a user to interact, such as selecting camera icons to obtain live interactive video presentation, a POSITA would have easily reached the limitation, "wherein the computing device is configured to generate the animation" upon the user's selection.

Anderson describes a virtual reality display platform and/or virtual reality user interaction devices that allow users to experience simulated environment through particular perspective. EX1007-Anderson, [0028]. Anderson's virtual reality simulation generator generates virtual reality simulation 205 of a given physical environment that includes all the events and actions of simulation participants as recorded by data acquisition systems 210 and presented on virtual reality display platform 110 including animation or simulated video sequence. *Id.*, [0035]. Virtual reality display platform 110 includes an animation or simulated video sequence 215 (viewed using virtual reality simulation viewer 107), virtual reality goggles, gloves and/or headset, etc. 220 , and an immersive virtual reality environment 225 (e.g., a virtual reality sphere, cave or cube). *Id.* Such a simulation may allow for customized replay of observed events, where events may be replayed at high speeds or decrease speeds to traverse through simulation in between interesting events. *Id.*, [0042].

Thus, by combining the COS combined system, Schmirler's system and Anderson's system's ability to allow for customized replay of observed events,

where events may be replayed at high speeds or decrease speeds to traverse through simulation in between interesting events, a POSITA would have easily reached the limitation, wherein the computing device is configured to generate the animation based upon a user-selectable time window and play the animation at a user-selectable playback speed. EX1013-Janét, ¶129.

E. Ground 5: Claim 8 is unpatentable under 35 U.S.C. § 103 over Cavada, Orito, Sommer, and Aluru

1. Aluru

Aluru discusses techniques that one or more computing devices may create the virtual representation of the user based on an image. EX1008-Aluru, Abstract.

Aluru describes some examples of creating non-static virtual representations (e.g., virtual representations that can move and be animated). *Id.*, [0139]. Processing circuitry 44 may be configured to generate “pre-rigged” high-polygon 3D virtual representations for various reasons such as advertising products, product recommendations, and VR headset based experiences. *Id.* The promotional videos may be created after putting the virtual representation in any 3D environment with any apparel or accessory combination and applying a motion capture animation sequence. *Id.* Aluru’s teaching includes sequencing the animation in true life-size 3D and creating dynamic motion-based videos using camera views in the true life-size 3D environment, where the animations may also be exported as 360-degree

videos for viewing via a virtual reality headset to experience a life-size immersive experience. *Id.*

Aluru is analogous art to the '602 patent; it is from the same field of endeavor as the '602 patent (systems using 3D virtual reality including animation) and reasonably pertinent to the particular problems the '602 patent was trying to solve (Aluru: a virtual reality system that provides virtual reality including animation in an environment.) *See section IV.A. EX1013-Janét, ¶134.*

2. Motivation to Combine

A POSITA would have been motivated to combine Cavado, Orito, and Sommer for the reasons discussed in section VI.A.5, and would have been further motivated to combine the COS combined system with Aluru. All references are directed to a visualization system. *See section IV.B.2, and EX1013-Janét, ¶¶132-34.* Aluru discloses creating non-static virtual representations (e.g., virtual representations that can move and be animated), including creating a video after putting the virtual representation in any 3D environment and applying a motion capture animation sequence. *Id.*, [0139].

A POSITA would have recognized the results of combining Cavada, Orito, Sommer, and Aluru were predictable and there would have been a reasonable expectation of success in making the combination. EX1013-Janét, ¶¶132-134.

It would have been obvious to one of ordinary skill in the art, before the effective filing date of the claimed invention and with a reasonable expectation of success, to modify the COS combined system by incorporating the technique by Aluru, exporting the animations as video using known electronic interfacing and programming techniques. EX1008-Aluru, [0035], [0042]. EX1013-Janét, ¶¶132-134. The modification results in an improved video-based system by allowing for easier transfer of data and allowing for a distributed system for greater versatility and usability.

3. Claim 8

- a) “The system of claim 1 wherein the computing device is further configured to export the animation in a video format.”*

Cavada, Orito, and Sommer describe claim 1 (see Section VI.A.6).

Aluru discloses creating non-static virtual representations (e.g., virtual representations that can move and be animated), including creating a video after putting the virtual representation in any 3D environment and applying a motion capture animation sequence. *Id.*, [0139]. Aluru’s teaching includes creating of videos after putting the virtual representation in any 3D environment with any apparel or accessory combination and applying a motion capture animation sequence. *Id.* Aluru’s teaching includes sequencing the animation in true life-size 3D and creating dynamic motion-based videos using camera views in the true life-

size 3D environment, where the animations may also be exported as 360-degree videos for viewing. *Id.* EX1013-Janét, ¶133.

Thus, by combining the COS combined system and Aluru's system's ability to create non-static virtual representations such as virtual representations that are animated, where a video may be created after putting the virtual representation in any 3D environment and applying a motion capture animation sequence, where the animations are exported as 360-degree videos for viewing, a POSITA would have easily reached the limitation, "wherein the computing device is further configured to export the animation in a video format." *Id.* EX1013-Janét, ¶135.

VII. CONCLUSION

Petitioner requests institution of *inter partes* review to cancel the Challenged Claims.

Respectfully Submitted,

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Table of Exhibits for U.S. Patent 11,386,602 Petition for *Inter Partes* Review

Exhibit	Description
1001	U.S. Patent 11,386,602 (“the ’602 patent”)
1002	Cavada et al., “A simulation approach to modelling baggage handling systems at an international airport,” <i>Simulation Modelling Practice and Theory</i> , 75, 146-164 (2017) (“Cavada”)
1003	International Publication WO 2019/077750 (“Orito”)
1004	International Publication WO 2007/089362 (“Sommer”)
1005	U.S. Patent Application Publication 2018/0130260 (“Schmirler”)
1006	Korean Patent 101400169 (“Kang”)
1007	U.S. Patent Application Publication 2009/0112541 (“Anderson”)
1008	U.S. Patent Application Publication 2019/0266806 (“Aluru”)
1009	Curriculum vitae of Dr. Hall-Ellis
1010	U.S. Patent Publication 2019/0266806 – Original Application 16/204883 dated November 29, 2018
1011	File History List of U.S. Patent Application Publication 2019/0266806 on U.S. Patent Center (obtained November 12, 2023)
1012	Declaration of Dr. Hall-Ellis
1013	Declaration of Dr. Janét
1014	A Non-final Office Action (August 25, 2021) of U.S. Patent Application 16/942,272
1015	A Final Office Action (December 15, 2021) of U.S. Patent Application 16/942,272
1016	Response to Final Office Action (February 23, 2022) of U.S. Patent Application 16/942,272
1017	Notice of Allowance (March 16, 2022) of U.S. Patent Application 16/942,272

CERTIFICATION OF COMPLIANCE REGARDING WORD COUNT

I hereby certify that the foregoing Petition for Inter Partes Review of U.S. Patent No. 11,386,602 contains 13,167 words as measured by the word processing software used to prepare the document, in compliance with 37 CFR § 42.24(d).

Respectfully submitted,

Dated: January 19, 2024

/Brian C. Park/
Brian C. Park
Reg. No. 45519

CERTIFICATE OF SERVICE

I hereby certify that on January 19, 2024, I caused a true and correct copy of the foregoing materials:

- Petition for Inter Partes Review of U.S. Patent No. 11,386,602
- Fee Authorization
- Exhibit List
- Exhibits for Petition for Inter Partes Review of U.S. Patent No. 11,386,602
- Power of Attorney
- Certificate of Compliance Regarding Word Count Under 37 CFR §42.24(d)

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