

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TESLA, INC.,
Petitioner,

v.

AUTONOMOUS DEVICES, LLC
Patent Owner

**PETITION FOR *INTER PARTES* REVIEW
OF U.S. PATENT NO. 11,113,585**

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- a. [16.1] The system of claim 1, wherein the system further comprising: a neural network that includes the first one or more digital pictures connected with the first one or more instruction sets for operating the first object of the first application program using at least one of: one or more connections, or one or more nodes, and 57
- b. [16.2] wherein the determining the first one or more instruction sets for operating the first object of the first application program based on the at least partial match between the new one or more digital pictures and the first one or more digital pictures includes applying the new one or more digital pictures to the neural network. 58
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 - b. [17.2] wherein the one or more processors include: one or more microcontrollers, one or more computing devices, or one or more electronic devices, and.....58
 - c. [17.3] wherein the one or more memories include: one or more non-transitory machine readable media, one or more volatile memories, one or more non-volatile memories, one or more storage devices, or one or more storage systems, and 59
 - d. [17.4] and [17.5] wherein the first [new] one or more digital pictures include: one or more still digital pictures, or one or more motion digital pictures, and.....59
 - e. [17.6] and [17.7] wherein the first [second] application program includes: a video game, a

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f.	[17.8] wherein an instruction set of the first one or more instruction sets for operating the first object of the first application program includes at least one of: only one instruction, a plurality of instructions, one or more inputs, one or more commands[...]or one or more information.	60
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b.	[16.2] wherein the determining the first one or more instruction sets for operating the first object of the	

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PETITIONER’S EXHIBIT LIST

Exhibit No.	Description
Ex. 1001	U.S. Patent No. 11,113,585
Ex. 1002	Prosecution File History for U.S. Patent No. 11,113,585
Ex. 1003	Declaration of Jason Janet, Ph.D.
Ex. 1004	Curriculum Vitae of Jason Janet, Ph.D.
Ex. 1005	U.S. Patent No. 8,142,268 (“Thomas”)
Ex. 1006	U.S. Patent No. 9,434,072 (“Buehler”)
Ex. 1007	U.S. Patent No. 9,008,840 (“Ponulak”)
Ex. 1008	U.S. Patent App. Pub. No. 2003/0171146 A1
Ex. 1009	U.S. Patent App. Pub. No. 2003/0032467 A1
Ex. 1010	U.S. Patent No. 9,195,934
Ex. 1011	Silva, Marty, <i>A Visual History of American Football Games</i> , IGN, July 8, 2013, available at, https://www.ign.com/articles/2013/07/08/a-visual-history-of-football-video-games
Ex. 1012	Macy, Seth G., <i>A Visual History of Racing Games</i> , IGN, updated Sept. 6, 2017, available at, https://www.ign.com/articles/2015/03/27/a-visual-history-of-racing-games
Ex. 1013	<i>Final Fantasy XI Released</i> , IGN, updated June 16, 2012, available at, https://www.ign.com/articles/2003/10/29/final-fantasy-xi-released
Ex. 1014	Ellis, Tim, et al., <i>Ellipse Detection and Matching with Uncertainty</i> , pp. 137-144
Ex. 1015	Pomerleau, Dean A., <i>Neural Network Perception for Mobile Robot Guidance</i> , Feb. 16, 1992
Ex. 1016	Lee, Ten-min, et al., <i>Computer Simulation of Learning Experiments with Autonomous Mobile Robots</i> (Univ. of Manchester, March 26, 1999)
Ex. 1017	Durrant-Whyte, Hugh, et al., <i>Simultaneous Localisation and Mapping (SLAM): Part I The Essential Algorithms</i>
Ex. 1018	Smith, Randall, et al., <i>Estimating Uncertain Spatial Relationships in Robotics</i> , pp. 167-193

Ex. 1019	Zimmer, Kyle, <i>Evolution of the Game Console</i> , available at citadel.sjfc.edu/students-virtual/k/knz03095/public_html/imd/museum/index.html
Ex. 1020	Stuart, Keith, <i>PS4 and Xbox One: so why aren't they backwards compatible?</i> , The Guardian, December 12, 2013, available at https://www.theguardian.com/technology/2013/dec/12/ps4-and-xbox-one-so-why-arent-they-backwards-compatible
Ex. 1021	Christian, Mark, <i>Saved Game History: Battery Backups, Memory Cards, and the Cloud</i> , Mailchimp, Feb. 21, 2019, available at https://tedium.co/2019/02/21/video-game-save-state-history/

I. MANDATORY NOTICES

A. Real Party-in-Interest

Tesla, Inc. is the sole real party-in-interest.

B. Related Matters

U.S. Patent No. 11,113,585 (“the ’585 Patent”) is the subject of a civil action, *Autonomous Devices LLC v. Tesla, Inc.*, No. 22-cv-1466 (MN) (D. Del.), filed November 7, 2022. Petitioner has also concurrently filed requests for *inter partes* review of the other asserted patents in the same civil action, including U.S. Patent Nos. 10,452,974, 11,238,344, 10,607,134, 11,055,583, and 10,102,449.

C. Lead and Back-up Counsel and Service Information

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II. GROUNDS FOR STANDING

Petitioner certifies that the '585 Patent is available for *inter partes* review and that Petitioner is not barred or estopped from requesting *inter partes* review challenging the patent claims on the grounds identified in this Petition.

III. INTRODUCTION

The '585 Patent is directed to a system/method of storing digital pictures correlated with instruction sets for operating an object in an application (*e.g.*, an avatar in a video game), and executing the instruction set to operate the object in response to at least a partial match between the stored picture and new digital pictures that are generated or received. Ex. 1001, claim 1. The '585 Patent claims are anticipated and/or rendered obvious by prior art patents that were not before the examiner during prosecution, including U.S. 8,142,268 ("Thomas") and U.S. 9,434,072 ("Buehler").

Thomas discloses the same approach to simulating an avatar in a video game. Specifically, Thomas describes storing instruction sets provided by a user during a learning mode that are correlated with situations and/or events, including the spatial position of the avatars as displayed in digital pictures on the interface screen:

During the learning mode, the simulator is configured to monitor the user's interaction with the computer program The simulator is

further configured to *record one or more user inputs in response to the occurrence of the one or more events*¹

Ex. 1005, 2:26-34; *id.*, 4:29-33 (“One common parameter that defines a situation may be ... *spatial position of avatars controlled by the user 665 on the interface screen.*”). Thomas further describes simulating the operation of the avatar after matching stored situations/events with new situations/events generated in digital pictures during simulation mode:

[T]he simulator is configured to *monitor the computer program for the one or more particular events...and invoke one or more simulated inputs...in response to the occurrence of the one or more events.*

Ex. 1005, 2:35-41.

This Petition demonstrates that there is a reasonable likelihood that at least one of the challenged claims is unpatentable. Petitioner respectfully requests that the Board institute review.

IV. STATUTORY GROUNDS FOR THE CHALLENGES

Ground 1	Anticipation of claims 1-7 and 10-20 based on Thomas
Ground 2	Obviousness of claims 3-4, 6-7 and 10-12 based on Thomas in view of the Knowledge of a POSITA
Ground 3	Anticipation of claims 1, 8-9, 12, and 16-20 based on Buehler

¹ Emphasis added unless otherwise noted.

Ground 4	Obviousness of claim 17 based on Buehler in view of the Knowledge of a POSITA
Ground 5	Obviousness of claim 16 based on Buehler in view of U.S. 9,008,840 (“Ponulak”)

V. LEVEL OF ORDINARY SKILL

A person having ordinary skill in the art (“POSITA”) would have at least: (1) a bachelor’s degree in electrical engineering, computer engineering, computer science, systems engineering, or equivalent course work with two to three years of work experience in computer vision, image/video processing, and/or machine learning; or (2) a master’s degree in any of those fields with a focus in computer vision, image/video processing, and/or machine learning. Ex. 1003, ¶ 37-39.

VI. CLAIM CONSTRUCTION

The Petition applies the ordinary and customary meaning of the claim terms as described in the analysis of how the prior art invalidates. The following sections address the constructions of terms under 35 U.S.C. § 112(f).

A. “means for processing” (claim 20)

Claim 20 requires a “means for processing” that performs the following functions: “accessing one or more memories ...,” “receiving or generating a new one or more digital pictures ...,” “determining the first one or more instruction sets ...,” and “executing the first one or more instruction sets” The Specification describes

that the corresponding structure for the claimed functions comprises a processor or processor circuit. Ex. 1001, 28:8-37 (describing a “processor circuit” that accesses memory, receives new digital pictures, anticipates instruction sets, and executes instruction sets), 79:29-34 (using processor and processor circuit interchangeably); *id.*, claim 1 (requiring a processor that performs receiving, determining, and executing steps); Ex. 1003, ¶ 58-60.

B. “means for storing” (claim 20)

Claim 20 requires a “means for storing machine readable code.” The Specification describes that the function of “storing machine readable code” is performed by a storage or memory. Ex. 1001, 73:24-27 (describing that “code” is referred to as “Application Program 18” and is executed by processor 11), Figure 1 (illustrating Application Program 18 in Storage 27), 71:41-42 (describing that Storage 27 includes “memory”); Ex. 1003, ¶ 61-63.

VII. OVERVIEW OF THE ’585 PATENT

The ’585 Patent claims priority back to August 23, 2016 (App. No. 15/245,046).²

² The references set forth herein are prior art even if the ’585 Patent was effectively filed on August 23, 2016.

The '585 Patent describes a system/method for autonomously operating an object (*e.g.*, an avatar) in an application (*e.g.*, a video game) comprising “learning one or more digital pictures of an object’s surrounding along with correlated instruction sets for operating the object, storing this knowledge..., and autonomously operating an object.” Ex. 1001, 70:52-60. Figure 31 illustrates the disclosed method, including the steps of storing a first digital picture correlated with one or more instruction sets, and executing the instruction set upon detecting at least a partial match between a new digital picture and the first digital picture:

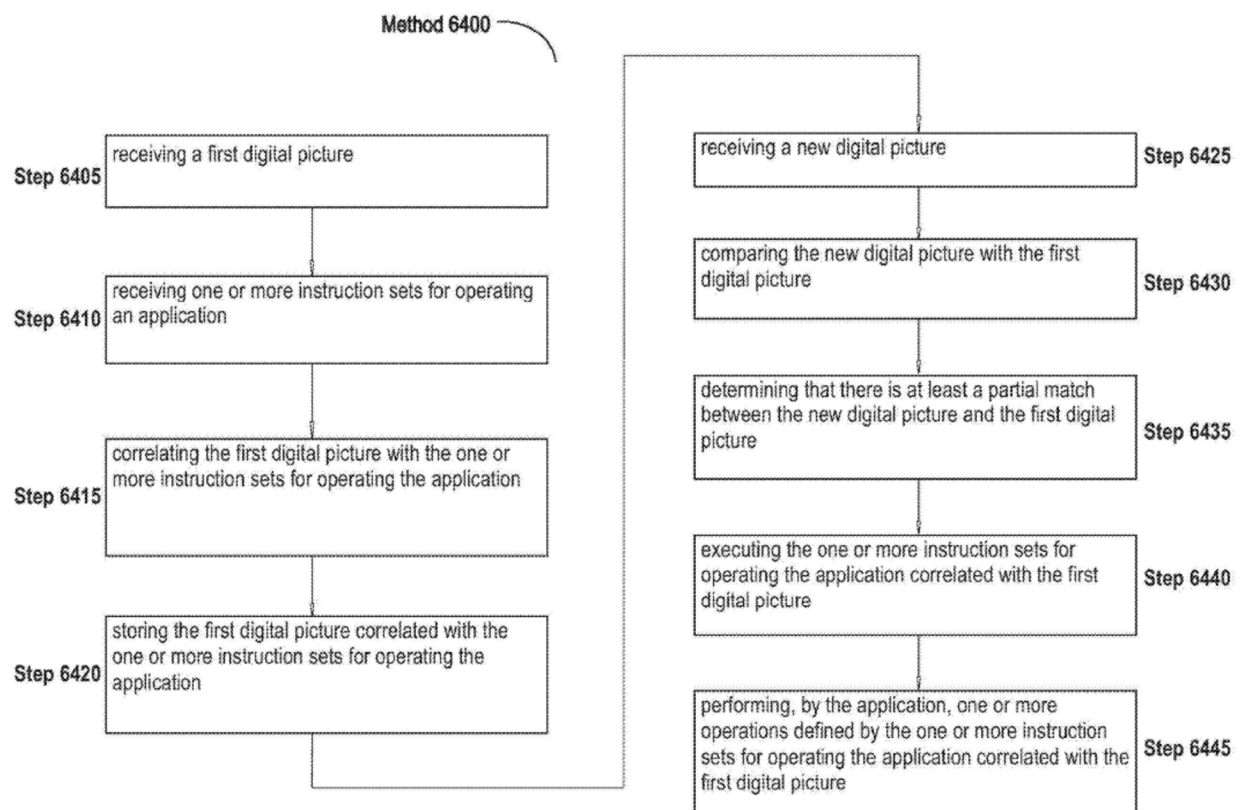


FIG. 31
Ex. 1001, Fig. 31

The '585 Patent describes that this method “enables learning of a particular User’s 50 (i.e. player’s, etc.) knowledge, methodology, or style of operating [an] Avatar,” including in video games and simulations. *See* Ex. 1001, 165:52-54; *id.*, claim 17.

VIII. OVERVIEW OF THE PRIOR ART

A summary of each reference is provided below.

A. U.S. 8,142,268 (“Thomas”)

Thomas issued on March 27, 2012 and is prior art under 35 U.S.C. § 102(a)(1).

Thomas discloses a system/method for “simulating a particular user’s behavior in an interactive computer system.”. Ex. 1005, Abstract. Thomas describes that its system operates in: (1) learning mode; or (2) simulation/playback mode. *Id.* During learning mode, “the simulator 120 will record the user’s decision/input, such as a pressed button, combination of buttons...in response to the particular situation and/or event,” Ex. 1005, 4:64-5:5, where the situation can include “the spatial position of avatars...on the interface screen.” *Id.*, 4:29-39.

Thomas describes that during simulation/playback mode, the system “monitors...the computer program in search of particular events and/or situations.” *Id.*, 5:34-36. Thomas further explains that if “a particular event and/or situation occurs” that corresponds to one stored during learning mode, “the simulator 120 can

invoke a corresponding reaction based on the stored data, thereby simulating the user.” *Id.*, 5:25-29.

B. U.S. 9,434,072 (“Buehler”)

Buehler was filed on September 17, 2012 and issued on September 6, 2016. Buehler is prior art under 35 U.S.C. § 102(a)(2).

Buehler discloses systems/methods “for robot learning and robot training.” Ex. 1006, 1:64-67. Buehler describes that the system compares stored templates of digital pictures to digital pictures captured by a camera, and executes instructions causing a robot to perform actions when the template and captured digital pictures sufficiently match. Ex. 1006, 18:50-54 (“The detection algorithm 508 *compares real-time camera images against the template* and determines ... whether the real-time image contains the object of interest.”), 22:42-44 (“If the robot detects, for instance, a conveyor belt, it may select an action for picking up objects”).

Buehler further describes a training mode, whereby the robot creates a virtual representation of its end effector to simulate performance of a task upon detecting a particular object. Ex. 1006, 19:34-36 (“[T]he robot may test its performance by simulating detection of the object using the model”), 21:47-50 (“[T]he robot may overlay virtual grippers on the image...to indicate where the grasp point would be....”).

C. U.S. 9,008,840 (“Ponulak”)

Ponulak issued on April 14, 2015 and is prior art under 35 U.S.C. § 102(a)(1). Ponulak discloses a neural network that uses digital pictures as an input to generate output instructions for autonomously operating a robot. Ex. 1007, 8:31-34 (“The disclosure can best be understood in the context of robotic adaptive control system comprising a spiking *neural network*....”), 9:1-21 (“The output 108 may comprise one or more motor commands [T]he signal 106 may comprise an array of *pixel values in the input image*”).

IX. IDENTIFICATION OF HOW THE CHALLENGED CLAIMS ARE UNPATENTABLE

A. Grounds 1 and 2: Anticipation of Claims 1-7 and 10-20 Based on Thomas; Obviousness of Claims 3-4, 6-7, and 10-12 Based on Thomas in View of the Knowledge of a POSITA

1. Claim 1

Thomas anticipates claim 1. Ex. 1003, ¶ 79-95.

a. [1.1] A system comprising: one or more processors; and

Thomas discloses a system comprising one or more processors. Ex. 1005, Abstract (“The field...relates to...systems and methods for simulating a particular user's behavior in an interactive *computer system*.”), claim 1 (“A computer program product ... having a sequence of instructions stored thereon, which, when *executed by a processor*”); Ex. 1003, ¶ 80.

- b. **[1.2] one or more memories that store at least a first one or more digital pictures correlated with a first one or more instruction sets for operating a first object of a first application program,**

Thomas discloses limitation [1.2]. Ex. 1003, ¶ 81-86.

The '585 Patent describes objects of the application may include “an avatar” and/or “user-controllable object.” Ex. 1001, 81:14-19; Ex. 1003, ¶ 81.

Thomas describes that during learning mode, “the simulator 120 collects and evaluates data about the first user’s input when interacting with the computer program 110 ... [and] [t]he collected data is then stored....” Ex. 1005, 3:53-61. The stored data includes the user’s input for controlling an avatar of the computer program (*i.e.*, an instruction set for operating a first object of an application program) in association with the surrounding circumstances/situation. Ex. 1005, 5:7-13 (“[T]he data recorded can be associated with both an event and a situation [T]he user’s response, when recorded, is not only associated with the occurrence of that event, but also with the situation during the occurrence of that event, which is defined by one or more current circumstances.”), 4:67-5:5 (“[S]imulator 120 will record the user’s decision/input, such as a pressed button...and store the user’s input ... associated with the particular situation....”); Ex. 1003, ¶ 82.

Thomas further discloses that the recorded situation that is associated with the user’s input “may include spatial position of avatars controlled by the user 665 on the interface screen” such as in football, basketball, or first person shooter games, or

“virtual weather in games such as golf, or road conditions of racing games.” Ex. 1005, 4:16-54; *see also* 7:65-8:1 (“record[ing], as a current circumstance, the location of the user’s avatar that catches and shoots [in a basketball video game]”), 8:66-9:9 (discussing Fig. 5, “a diagram representing a video game interface” that “includes a graphical representation of a football field 310, and two sets of avatars 320, each representing a football team”), 9:43-53 (“[T]he user’s input is logically linked to an event and/or situation that initiated the user’s input.... Current circumstances can also include the spatial location of individual avatars, such as the linebacker....”); Ex. 1003, ¶ 83.

The current circumstance that is stored, such as the spatial position of avatars and the virtual weather or road conditions on the interface screen, is a “digital picture” as used in the ’585 Patent. The ’585 Patent explicitly states that the stored “first one or more digital pictures” are a representation of one or more portions of a digital picture, one or more features, and/or one or more collections of values. Ex. 1001, claim 18 (claiming that “the first one or more digital pictures *are*: one or more whole digital pictures, ... *one or more representations of one or more portions of at least one digital picture, one or more features, ... or one or more collections of values.*”); *see also id.*, 114:31-35 (describing that “Digital Pictures 525 or portions thereof” can be “regions, features, pixels, etc.”); Ex. 1003, ¶ 84. As Dr. Janet explains, Thomas’s video game interface screen is a stream of digital pictures, and

the spatial position of an avatar, virtual weather, and/or road conditions on the interface screen that the system stores are each a representation of a portion of a digital picture (*i.e.*, the interface screen at a given moment), one or more features, and one or more collections of values. Ex. 1003, ¶ 85.

Accordingly, Thomas discloses a memory that stores a first one or more digital pictures (*e.g.*, spatial position of avatars, virtual weather or road conditions on the interface screen) in association with a first one or more instruction sets (*e.g.*, pressed button, combination of buttons, joystick move) for operating a first object (*e.g.*, football or basketball player, first person shooter, car) of a first application program (*e.g.*, video game). Ex. 1003, ¶ 86. For example, Thomas describes that the memory stores digital pictures in association with instruction sets for pump faking in a basketball game:

[D]uring the learning mode 550, the simulator 120 *records how often a user pump fakes*. For current circumstances, the simulator 120 *records how covered the user was and user's location*.

Ex. 1005, 8:8-11; Ex. 1003, ¶ 86. The system accesses the stored information in simulation mode, as described for Limitations [1.3] and [1.4] below.

- c. **[1.3] wherein the one or more processors are configured to perform at least: receiving or generating a new one or more digital pictures that depict at least a portion of a surrounding of: the first object of the first application program, a second object of the first application program, or a first object of a second application program;**

Thomas discloses limitation [1.3]. Ex. 1003, ¶ 87-91.

Thomas describes that during simulation/playback mode, the system generates new digital pictures on the interface screen, which depict the surroundings of the simulated avatar in the video game (*i.e.*, first object of the first application program), including at least portions of the field/court and avatars of players on the opposing team. Ex. 1005, 3:49-51 (“*The simulator 120 generally operates in two modes: (1) learn, or record, mode and (2) simulation, or playback, mode.*”), 8:67-9:3 (“*The interface 300 generally includes a graphical representation of a football field 310, and two sets of avatars 320, each representing a football team*”), 8:11-14 (“*During playback mode 600, the simulator 120 will monitor for a shoot event and analyze the location of the simulated user and the defensive coverage*”); Ex. 1003, ¶ 87-88. In the pump fake example, Thomas describes generating new digital pictures during simulation/playback mode comprising the spatial position of defensive players, which are in the surroundings of the simulated user’s avatar (*i.e.*, the first object):

During *playback mode* 600, the simulator 120 will...*analyze the location of the simulated user and the defensive coverage*. If criteria is met, then simulator 120 will invoke a pump fake.

Ex. 1005, 8:11-15; Ex. 1003, ¶ 90.

As explained below for limitation [1.4], a POSITA would understand that Thomas's system includes at least a feature, a collection of values, or a representation of a portion of the digital picture generated and displayed on the interface screen (*e.g.*, spatial position of other avatars, virtual weather, road conditions), which is received by Thomas's processor to compare the situation/event generated during simulation mode to the situation/event stored during learning mode. Ex. 1003, ¶ 89; *see* Section IX.A.1.d *infra*.

- d. **[1.4] determining the first one or more instruction sets for operating the first object of the first application program based on at least partial match between the new one or more digital pictures and the first one or more digital pictures; and**

Thomas discloses limitation [1.4]. Ex. 1003, ¶ 92-93.

Thomas discloses that, “[t]he stored data enables the analysis of a user’s behavior, tendencies, and inclinations for a given event [and,] [t]hus ... when the simulator 120 is in simulation mode, and a particular event and/or situation occurs,” *i.e.*, receiving or generating new one or more digital pictures, “the simulator 120 can invoke a corresponding reaction based on the stored data,” *i.e.*, determining and executing (*see* Section IX.A.1.e *infra*) the first one or more instruction sets, “thereby

simulating the user.” Ex. 1005, 5:24-29. Thomas further discloses that simulation mode involves matching first digital pictures recorded during learning mode (*e.g.*, stored spatial position of defenders) to new digital pictures generated and received during simulation mode (*e.g.*, spatial position of defenders), and determining instructions for operating the avatar (*e.g.*, pump faking) of a simulated user (*i.e.*, the first object) in response to a match:

[T]he simulator 120 will...*analyze the location of the simulated user and the defensive coverage. If criteria is met, then simulator 120 will invoke a pump fake.*

Ex. 1005, 8:8-15; *see also id.*, 7:39-44, 7:65-8:7, 10:56-11:3, 11:11-22, 12:63-13:1;

Ex. 1003, ¶ 93.

- e. **[1.5] at least in response to the determining, executing the first one or more instruction sets for operating the first object of the first application program, wherein the first object of the first application program, the second object of the first application program, or the first object of the second application program autonomously performs one or more operations defined by the first one or more instruction sets for operating the first object of the first application program.**

Thomas discloses limitation [1.5]. Ex. 1003, ¶ 94-95.

As explained for limitation [1.4], Thomas discloses a simulation/playback mode whereby the simulator invokes actions for an object in the application program based on stored data. Ex. 1005, 5:24-29; *see* Section IX.A.1.d *supra*; Ex. 1003, ¶

94. Thomas describes that upon determining a match of a situation/event, the instruction set is applied to the simulated avatar, which autonomously performs the operation defined by the instruction set (*e.g.*, pump faking). Ex. 1005, 8:14-15 (“*If criteria is met, then simulator 120 will invoke a pump fake.*”); *id.* 7:55-64 (causing avatar of the simulated user to pass upon detecting a match of the defensive coverage); Ex. 1003, ¶ 95.

2. Claim 2

As described below, Thomas anticipates claim 2 at least via its pump fake and pass example. Ex. 1003, ¶ 96-101.

- a. **[2.1] The system of claim 1, wherein the memory further stores at least a second one or more digital pictures correlated with a second one or more instruction sets for operating the first object of the first application program,**

Thomas discloses limitation [2.1]. Ex. 1003, ¶ 96.

Thomas describes a memory for storing instruction sets correlated with digital pictures (*e.g.*, the spatial position of defensive players) for various situations/events during a video game, such as when an avatar pump fakes (a first digital picture correlated with a first instruction set) or passes the ball (a second digital picture correlated with a second instruction set). *See* limitation [1.4] *supra* (describing pump fake event); Ex. 1005, 7:55-64 (“[T]he simulator 120, during learn mode 550, records...which avatar passed, and which avatar was passed to.... [T]he simulator

120 records how open the receiving avatar was and how covered the passing avatar was.”).

- b. **[2.2] and wherein at least a portion of the first one or more digital pictures or at least a portion of the first one or more instruction sets for operating the first object of the first application program is learned in a first learning process that includes operating the first object of the first application program at least partially by a first user,**

Thomas discloses limitation [2.2]. Ex. 1003, ¶ 97-98.

Thomas describes that the spatial position of the avatars (*i.e.*, digital pictures) and corresponding instruction sets are learned when the user operates the avatar (*i.e.*, first object) at a specific time during learning mode (*i.e.*, a first learning process). Ex. 1005, 8:8-11 (“*[D]uring the learning mode 550, the simulator 120 records how often a user pump fakes.*”); Ex. 1003, ¶ 97.

- c. **[2.3] and wherein at least a portion of the second one or more digital pictures or at least a portion of the second one or more instruction sets for operating the first object of the first application program is learned in a second learning process that includes operating the first object of the first application program at least partially by the first user,**

Thomas discloses limitation [2.3]. Ex. 1003, ¶ 99-100.

Thomas describes recording digital pictures and instruction sets when the user operates the avatar (*i.e.*, the first object) during different situations in the same game (*i.e.*, a pump fake event and pass event occur during different situations), each of

which is a different learning process. Ex. 1005, 7:55-61 (“For a *pass out of shot event*, the simulator 120, *during learn mode 550*, records a shot type, which avatar passed, and which avatar was passed to”); *see also id.* at 5:5-7 (“A user’s *response to the occurrence of an event can differ depending upon the surrounding circumstances or situation.*”); Ex. 1003, ¶ 99.

Thomas also describes recording digital pictures and instruction sets when the user operates the avatar during different games, wherein each game comprises different learning process (*i.e.*, first and second learning processes):

During learning mode, the simulator 120 retrieves the user profile 400 of the user to be simulated.... *Preferably, data should evolve as the user's interaction evolves. In other words, data recorded thirty games ago may have a lesser impact....*

Ex. 1005, 10:19-32; Ex. 1003, ¶ 100.

d. **[2.4] and wherein the first user is: a human user, or a non-human user.**

Thomas discloses limitation [2.4]. Ex. 1003, ¶ 101.

Thomas discloses that the first user is a human user (*i.e.*, the human playing the video game) or non-human user. Ex. 1005, 7:28-34 (“If the *user is controlling the team* ... the simulator 120 records ... whether the user ran an avatar around”); Ex. 1003, ¶ 101.

3. Claim 3

As described below, Thomas anticipates and/or renders obvious claim 3 at least via its pump fake and pass out of shot examples and storage of multiple user profiles. Ex. 1003, ¶ 102-106.

- a. **[3.1] The system of claim 1, wherein the memory further stores at least a second one or more digital pictures correlated with a second one or more instruction sets for operating the first object of the first application program, and**

Thomas discloses limitation [3.1]. *See* Section IX.A.2.a *supra*; Ex. 1003, ¶ 102.

- b. **[3.2] wherein at least a portion of the first one or more digital pictures or at least a portion of the first one or more instruction sets for operating the first object of the first application program is learned in a first learning process that includes operating the first object of the first application program at least partially by a first user, and**

Thomas discloses limitation [3.2]. *See* Section IX.A.2.b *supra*; Ex. 1003, ¶ 103.

- c. **[3.3] wherein at least a portion of the second one or more digital pictures or at least a portion of the second one or more instruction sets for operating the first object of the first application program is learned in a second learning process that includes operating the first object of the first application program at least partially by a second user, and**

Thomas discloses and/or renders obvious limitation [3.3]. Ex. 1003, ¶ 104-105.

Thomas describes that the system stores multiple user profiles including situations/events correlated with instruction sets. Ex. 1005, 19:49-62 (“*[A]ny participating user can upload its own user profile for access by any other participating user, and further any participating users can download or access any user profile available....*”); Ex. 1003, ¶ 104. A POSITA would have understood and it would have been obvious that when a second user plays with the same team and avatars as a first user (*e.g.*, different users playing with the Los Angeles Lakers), the digital pictures and instruction sets (*i.e.*, first and second digital pictures correlated with first and second instruction sets, respectively) for operating the same avatar on the Lakers (*i.e.*, the first object) would be learned in a second learning process that includes operating that avatar by a second user. Ex. 1003, ¶ 105.

d. **[3.4] wherein the first user is: a human user, or a non-human user, and wherein the second user is: a human user, or a non-human user.**

Thomas discloses limitation [3.4]. Ex. 1003, ¶ 106.

As explained above for limitation [2.4], Thomas discloses that both the first user and second user are human or non-human users. Ex. 1005, 19:49-50 (“Multiple users can compete against each other”); Ex. 1003, ¶ 106; *see* Section IX.A.2.d *supra*.

4. Claim 4

As described below, Thomas anticipates and/or renders obvious claim 4 at least via its pump fake and pass out of shot examples and storage of multiple user profiles. Ex. 1003, ¶ 107-112.

- a. **[4.1] The system of claim 1, wherein the memory further stores at least a second one or more digital pictures correlated with a second one or more instruction sets for operating a third object of the first application program or a second object of the second application program, and**

Thomas discloses and/or renders obvious limitation [4.1]. Ex. 1003, ¶ 107-108.

First, Thomas describes, and a POSITA would have understood, that the system stores instruction sets correlated with digital pictures for simulating multiple avatars in a sports video game on a user's console (*i.e.*, the first application program), such as different players on the same basketball team:

Another type of parameter, in the case of a computer game involving one or more avatars, is the archetype [A]rchetypes can include true point guard, slasher, shooter, pure shooter, low post scorer, midrange scorer, and role player.

Ex. 1005, 4:45-51; *id.*, 8:38-40 (“[T]he simulator 120 records the archetype of the avatar that initiated a monitored event.”); *see also* Section IX.A.2.a. Thus, Thomas discloses and/or renders obvious storing multiple (*i.e.*, first and second) digital pictures correlated with instruction sets for operating a third object of the first

program (*i.e.*, any of three players on a basketball team that the user controls). Ex. 1003, ¶ 107.

Second, Thomas discloses and/or renders obvious storing digital pictures correlated with instruction sets for operating a second object of a second application program. Specifically, Thomas describes that a user's profile can be accessed by other users on their game consoles. Ex. 1005, 19:60-62 (“[A]ny participating users can download or access any user profile available in the database ...”). Thus, when a second user downloads a particular profile for use on his or her console, the digital pictures and instruction sets from the profile would be used to operate first and second objects in a second application program (*i.e.*, the video game on a different user's console). Ex. 1003, ¶ 108.

- b. **[4.2] wherein at least a portion of the first one or more digital pictures or at least a portion of the first one or more instruction sets for operating the first object of the first application program is learned in a first learning process that includes operating the first object of the first application program at least partially by a first user, and**

Thomas discloses limitation [4.2]. See Section IX.A.2.b. *supra*; Ex. 1003, ¶ 109.

- c. **[4.3] wherein at least a portion of the second one or more digital pictures or at least a portion of the second one or more instruction sets for operating the third object of the first application program or the second object of the second application program is learned in a second learning process that includes operating the third object of the first application program or the second object of the second application program at least partially by: the first user, or a second user, and**

Thomas discloses and/or renders obvious limitation [4.3]. Ex. 1003, ¶ 110-111.

Thomas describes that the digital pictures and/or instruction sets are recorded throughout a single game and during each subsequent instance of the game during learning mode (*i.e.*, during different learning processes). *See* Section IX.A.2.c. *supra*. Each of the recordings associated with a third object of the first application program (*i.e.*, a third basketball player avatar) or the second object of the second application program (*i.e.*, a second basketball player avatar on a second user's console) when a user operates the objects during a particular game comprises a separate learning process, as are the recordings in each subsequent game (*i.e.*, first and second learning processes). Ex. 1003, ¶ 110-111.

- d. **[4.4] wherein the first user is: a human user, or a non-human user, and wherein the second user is: a human user, or a non-human user.**

Thomas discloses that the first and second users are human or non-human users. *See* Section IX.A.3.d *supra*. Ex. 1003, ¶ 112.

5. Claim 5

Thomas anticipates claim 5 at least via its pump fake example. Ex. 1003, ¶ 113-114.

- a. **[5.1] The system of claim 1, wherein the new one or more digital pictures depict the at least the portion of the surrounding of the first object of the first application program, and**

Thomas discloses limitation [5.1] because it describes that the new digital pictures generated during simulation mode depict at least the defensive players surrounding the first object (i.e., the simulated avatar). *See* Section IX.A.1.c *supra*; Ex. 1003, ¶ 113.

- b. **[5.2] wherein the first one or more instruction sets for operating the first object of the first application program are applied to the first object of the first application program, and wherein the first object of the first application program autonomously performs the one or more operations defined by the first one or more instruction sets for operating the first object of the first application program.**

Thomas discloses limitation [5.2]. *See* Section IX.A.1.e *supra*; Ex. 1003, ¶ 114.

6. Claim 6

As explained below, Thomas anticipates and/or renders obvious claim 6 at least via its pump fake example and default instruction sets. Ex. 1003, ¶ 115-118.

- a. **[6.1] The system of claim 1, wherein the new one or more digital pictures depict the at least the portion of the surrounding of the second object of the first application program, and**

Thomas discloses limitation [6.1]. Ex. 1003, ¶ 115.

In particular, Thomas discloses the digital picture generated and displayed during simulation mode depict the surroundings of multiple basketball players on the simulator user's team (*i.e.*, a second player, which is a second object of the first application program), such as the court and defensive players. Ex. 1005, 4:45-51 (“Another type of parameter, in the case of a computer game *involving one or more avatars*”), 8:11-14 (“For a pump fake event... the simulator 120 will ... *analyze the location of the simulated user and the defensive coverage.*”); Ex. 1003, ¶ 115.

- b. **[6.2] wherein the first one or more instruction sets for operating the first object of the first application program are applied to the second object of the first application program, and**

[6.3] wherein the second object of the first application program autonomously performs the one or more operations defined by the first one or more instruction sets for operating the first object of the first application program.

Thomas anticipates and/or renders obvious limitations [6.2] and [6.3]. Ex. 1003, ¶ 116-118. Thomas teaches using a default instruction set for a simulated avatar if no previously recorded response is stored, which a POSITA would understand is correlated with a situation/event:

If there is no value, i.e., stored user input, recorded for the given the event and/or situation, then the simulator 120 will generate a random or default response representing the second user's simulated input

Ex. 1005, 5:54-58; Ex. 1003, ¶ 116. Thomas further describes that each avatar can be classified by archetype, such as a shooter. Ex.1005, 4:49-51 (“[A]rchetypes can include true point guard, slasher, shooter... and role player.”). A POSITA would have understood, and it would have been obvious, that the default instruction set would be the same for two different avatars with the same archetype (e.g., “shooter”). Ex. 1003, ¶ 116. Accordingly, the second object would autonomously perform the operation defined by the first instruction set for operating the first object (i.e., the default instruction set) when there is no stored instruction set for those objects for a particular situation. *Id.*, ¶ 118.

It also would have been obvious that a learned instruction set for a first avatar would be applied to a second avatar of the same archetype if there is no stored correlation for the second avatar, such as multiple avatars that are shooters. Ex. 1003, ¶ 117-118. A POSITA would understand that learned instruction sets can be applied to different avatars, because for example, Thomas discloses that the system can invoked a stored instruction set in response to a situation based on time, score, and the spatial position of the defense without requiring that the simulated avatar be the same avatar used during learning mode. Ex. 1005, 7:39-44 (“During playback mode 600...the simulator 120 will...analyze the current situation, such as time,

score, and spatial positions of defensive avatars, to determine which action to invoke that represents the simulated user.”); see also id. 7:50-54, 8:2-7, 8:11-15; Ex. 1003, ¶ 117.

7. Claim 7

As explained below, Thomas anticipates and/or renders obvious claim 7 at least via its pump fake example and accessibility of profiles to multiple other users. Ex. 1003, ¶ 119-122.

- a. **[7.1] The system of claim 1, wherein the new one or more digital pictures depict the at least the portion of the surrounding of the first object of the second application program, and**

Thomas discloses and/or renders obvious limitation [7.1]. Ex. 1003, ¶ 119-120.

Thomas describes that any user can download the profile for any other user. Thus, when two different users play in simulation mode with the same stored profile, the new digital pictures generated when the second user plays would depict at least a portion of the surroundings of the first object (*e.g.*, a simulated basketball player avatar) in a second application program (*i.e.*, the video game played on the same or different console). Ex. 1005, 19:60-62 (“[A]ny *participating users can download or access any user profile available in the database*”); Ex. 1003, ¶ 119-120; *see* Section IX.A.1.c. *supra* (describing pump fake situation in simulation mode).

- b. [7.2] wherein the first one or more instruction sets for operating the first object of the first application program are applied to the first object of the second application program, and
[7.3] wherein the first object of the second application program autonomously performs the one or more operations defined by the first one or more instruction sets for operating the first object of the first application program.

Thomas discloses and/or renders obvious limitations [7.2] and [7.3]. Ex. 1003, ¶ 121-122.

When multiple users on the same or different game console download the same profile for use in simulation mode, that will result in the instruction set for operating the first object of the first application program being applied to the first object in a second application program (*i.e.*, simulation of the same avatar in a video game played by different users on the same or different consoles) such that the first object of the second application program autonomously performs the one or more operations defined by the first one or more instruction sets for operating the first object of the first application program:

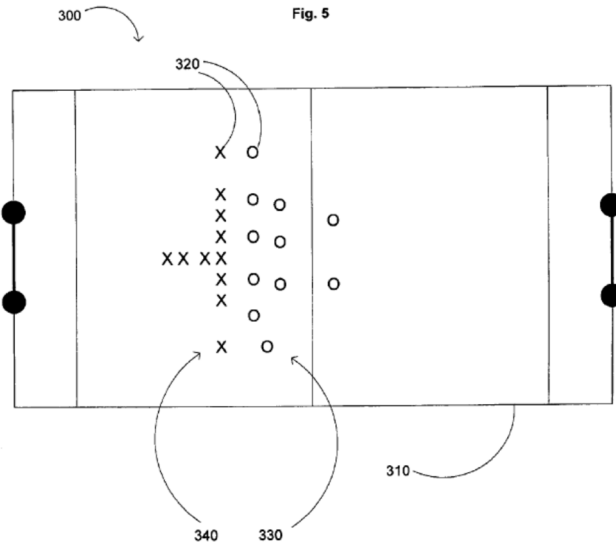
[T]he simulator 120 will then retrieve input data from the first user, i.e., the first user's profile, from the database 130 (action block 220) and simulate the first user's behavior based on the retrieved data

Ex. 1005, 3:62-4:2; *see also* 19:60-62 (“[A]ny participating users can download or access any user profile available in the database 130.”); Ex. 1003, ¶ 121-122.

8. Claim 10

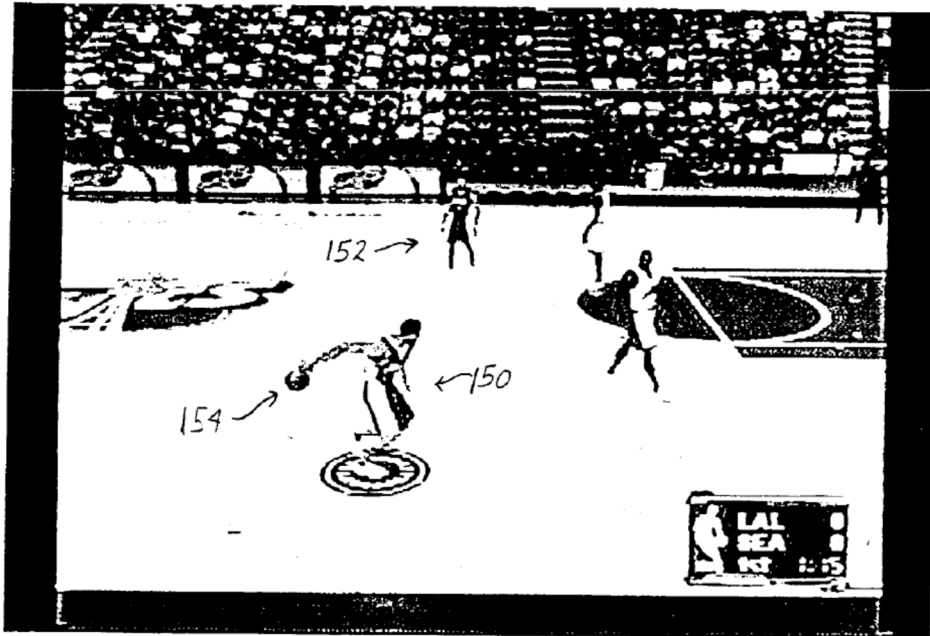
- a. [10.1] The system of claim 1, wherein the new one or more digital pictures depict a third-person view of the at least the portion of the surrounding of: the first object of the first application program, the second object of the first application program, or the first object of the second application program, and
[10.2] wherein the third-person view includes a view from a perspective of an observer of: the first object of the first application program, the second object of the first application program, or the first object of the second application program.

Thomas anticipates and/or renders obvious claim 10. Ex. 1003, ¶ 123-128. Thomas describes applying its system to basketball, football, and racing video games. Ex. 1005, 5:13-18; *see also* 4:19-54; Ex. 1003, ¶ 123. Figure 5 depicts a third-person aerial view from the perspective of an observer of the surroundings of the avatars, including the first object, in a football video game. Ex. 1005, Fig. 5, 8:66-9:9; Ex. 1003, ¶ 124. A POSITA would understand that basketball video games, likewise, include a third-person view of the court. Ex. 1003, ¶ 125.



Ex. 1005, Fig. 5

It also would have been obvious to generate digital pictures that provide a third-person view from the perspective of an observer of the first object (*e.g.*, someone watching the game), such as from behind a quarterback in a football game, from the stands in a basketball game, or behind a vehicle in a racing game, which depict the first object (*i.e.*, simulated player or vehicle) and its surroundings (*i.e.*, the court or racetrack, and other players thereon). Ex. 1003, ¶ 125-127. An exemplary prior art basketball video game is shown, which includes a third person view of the simulated avatar and its surroundings from the perspective of an observer of the avatars:



Ex. 1008, Fig. 4

Ex. 1003, ¶ 125; *see infra* limitations [18.1] and [18.2].

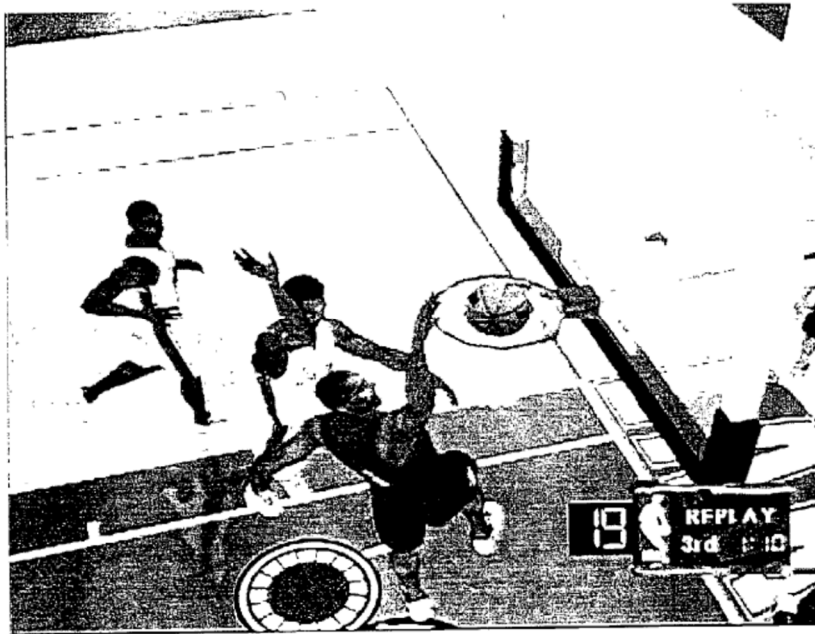
9. Claim 11

- a. **[11.1] The system of claim 1, wherein the new one or more digital pictures depict a top-down view of the at least the portion of the surrounding of: the first object of the first application program, the second object of the first application program, or the first object of the second application program, and wherein the top-down view includes a view from above of: the first object of the first application program, the second object of the first application program, or the first object of the second application program.**

Thomas anticipates and/or renders obvious claim 11. Ex. 1003, ¶ 129-131.

Thomas discloses a football video game interface screen with a top-down aerial view of the field and players. Ex. 1005, Fig. 5, 8:66-9:9 (“Turning to FIG. 5, a diagram representing a video game interface...generally includes a graphical representation

of a football field 310”); Ex. 1003, ¶ 129; *see* Section IX.A.8 *supra*. A POSITA would understand that basketball video games, likewise, include a top-down view of the court from the above the avatars, which depicts the surroundings of the avatars (*i.e.*, first object). Ex. 1003, ¶ 130. It also would have been obvious because prior art sport video games commonly generated digital pictures that provide a top-down view of the game, which would include a view of the first object (*i.e.*, the simulated avatar) and its surroundings (*i.e.*, the court and other players), as shown below. *Id.*, ¶ 130-131.



Ex. 1009, Fig. 6

10. Claim 12

- a. **[12.1] The system of claim 1, wherein the one or more processors are further configured to perform at least: modifying: the first one or more instruction sets for operating the first object of the first application program, or a copy of the first one or more instruction sets for operating the first object of the first application program, and**

Thomas discloses and/or renders obvious limitation [12.1]. Ex. 1003, ¶ 132-135.

Thomas describes modifying the stored user data based on how the user interacts with the video game over time (*i.e.*, over a number of different games):

[T]he simulator 120 will evaluate *whether the data is up to date....*
Preferably, *data should evolve as the user's interaction evolves.* In other words, *data recorded thirty games ago may have a lesser impact....*

Ex. 1005, 10:27-32; Ex. 1003, ¶ 132. A POSITA would have understood, and it would have been obvious that updating the data associated with the user's interaction during learning mode would include modifying the instruction set for operating the avatar based on how the user modifies commands over time in response to a particular situation (*e.g.*, spatial position of defense). Ex. 1003, ¶ 132
In one example, Thomas discloses modifying the instruction set associated with how a particular user kicks a football during a game, such as the power range:

[A] kick profile 420 stores... *how many times a user has kicked the ball, the minimum and maximum distances that a user has kicked the*

ball, and the total power used. There is a kick profile for when a user kicks off, punts, and kicks field goals.

When recording data for a kick profile 420, the simulator 120 may check to see if the user's power has exceeded the minimum or maximum, *increment the kick count, and add the power to the total power accumulated.*

Thomas, 12:42-57; Ex. 1003, ¶ 133-135.

- b. **[12.2] wherein the executing the first one or more instruction sets for operating the first object of the first application program includes executing: the modified the first one or more instruction sets for operating the first object of the first application program, or the modified the copy of the first one or more instruction sets for operating the first object of the first application program, and**

Thomas discloses and/or renders obvious limitation [12.2]. Ex. 1003, ¶ 136.

When the stored user data (*i.e.*, the instruction set) is modified over time, subsequent execution of the instruction set during simulation mode would include executing the modified instruction set for operating the first object (*i.e.*, simulated operation of the avatar). *Id.* For example, Thomas discloses kicking a football in simulation mode using the modified kick profile. Ex. 1005, 12:51-54 (“*[I]n simulation mode...the simulator 120 may determine the power for kick based on the corresponding kick profile*”).

- c. [12.3] wherein the first object of the first application program[...]autonomously performing the one or more operations defined by the first one or more instruction sets for operating the first object of the first application program includes the first object of the first application program[...]autonomously performing one or more operations defined by: the modified the first one or more instruction sets for operating the first object of the first application program[...].³

Thomas discloses and/or renders obvious limitation [12.3]. Ex. 1003, ¶ 137.

As described above for limitations [5.2], [12.1] and [12.2], the first object of the first application program would autonomously perform the one or more operations defined by the modified and updated instruction set, such as kicking a football. Ex. 1003, ¶ 137; *see* Section IX.A.5.b & IX.A.10.a-b.

11. Claim 13

The system of claim 1, wherein the new one or more digital pictures are generated at least by: generating one or more representations of one or more objects in the at least the portion of the surrounding of: the first object of the first application program[...]; and generating the new one or more digital pictures using the generated one or more representations of the one or more objects, and wherein the new one or more digital pictures depict: the generated one or more representations of the one or more objects[....]

Thomas discloses claim 13. Ex. 1003, ¶ 138-139.

³ Elipses are used herein to omit language that is unnecessary to satisfy a particular claim limitation.

Thomas discloses a simulation/playback mode during which an interface screen is displayed, which depicts a simulated player and other players surrounding the simulated player on the field. *See* Section IX.A.1.c *supra*. Thus, Thomas discloses generating one or more representations of objects in the surroundings of the first object (*i.e.*, the simulated avatar), such as the defensive players and the basketball. *See* Ex. 1005, 8:11-14 (“[T]he simulator 120 will monitor for a *shoot event* and analyze the location of *the simulated user and the defensive coverage*.”); Ex. 1003, ¶ 138.

Thomas further discloses generating the new one or more digital pictures using the generated representations of one or more objects in the surroundings of the first object, and depicting the generated representations in digital pictures on the interface screen. *See* Ex. 1005, 4:31-33 (“Another may include *spatial position of avatars* controlled by the user 665 *on the interface screen*.”), 8:66-9:9 (“The interface 300 generally includes a graphical *representation of a football field 310, and two sets of avatars 320...*”); *id.*, 8:11-14; Ex. 1003, ¶ 139.

12. Claim 14

The system of claim 1, wherein the first one or more instruction sets for operating the first object of the first application program include one or more information about one or more states of: the first object of the first application program, or a portion of the first object of the first application program.

Thomas discloses claim 14. Ex. 1003, ¶ 140.

Thomas describes that the instruction sets can include information about the state of the first object (*i.e.*, the simulated avatar), such as the object's archetype, its ability to perform a certain task (*e.g.*, kicking power), whether the object possesses the ball (*e.g.*, for a pump fake), or the game situation that the first object is currently in. Ex. 1005, 4:45-51 (“[A]n archetype can be defined by relative size, strength, and speed....”), 4:29-31 (“One common parameter...may be...time left in a...game....”), 8:8-11 (“[T]he simulator 120 records how often a user pump fakes.”), 12:42-54 (“[T]he simulator 120 may *determine the power for kick based on the corresponding kick profile....*”).

13. Claim 15

The system of claim 1, wherein the first one or more digital pictures correlated with the first one or more instruction sets for operating the first object of the first application program include the first one or more digital pictures connected with the first one or more instruction sets for operating the first object of the first application program using at least one or more connections.

Thomas discloses claim 15. Ex. 1003, ¶ 141-143.

The '585 Patent describes that a “connection” “may include...a value *such as a symbolic label or numeric attribute* (*i.e. weight, cost,... etc.*).” Ex. 1001, 107:42-45; Ex. 1003, ¶ 142; *see also id.*, 109:57-59. Thomas discloses that correlated instruction sets and digital pictures are connected using numerical occurrence value (*i.e.*, a numerical attribute or weight) connections, which correspond to the

frequency with which an instruction set may be called by the simulator in response to detecting a particular situation/event:

In one hundred (100) occurrences of the event, if the user spun left twenty (20) times, right thirty (30) times, and juked fifty (50) times, the simulator 120 *will assign values of twenty (20), thirty (30), and fifty (50) to the respective responses....*

If the number 53 is selected, then the avatar will juke (51-100 are associated with juke).

Ex. 1005, 6:19-41; Ex. 1003, ¶ 143.

14. Claim 16

- a. **[16.1] The system of claim 1, wherein the system further comprising: a neural network that includes the first one or more digital pictures connected with the first one or more instruction sets for operating the first object of the first application program using at least one of: one or more connections, or one or more nodes, and**

Thomas discloses limitation [16.1]. Ex. 1003, ¶ 144-148.

The '585 Patent describes that a “neural network” encompasses a data structure configured to compute an output from an input. Ex. 1001, 98:24-27 (“The features of known persons, objects, and/or their activities can *be stored in any data structure or repository (i.e. neural network....)*”), 107:45-49 (“A computational model can be utilized to *compute values from inputs* based on a pre-programmed or learned function or method. *For example, a neural network* may include one or more input neurons that can be activated by inputs.”); Ex. 1003, ¶ 144.

First, Thomas describes that its system includes a data structure that stores digital pictures correlated/connected with instruction sets (*see* claim 15 above), each of which is stored in a node⁴ (*i.e.*, a field or sub-profile). Ex. 1005, 4:67-5:5 (“[T]he simulator 120 will... *store the user’s input in the field or sub-profile associated with the particular situation....*”); Ex. 1003, ¶ 146; *see* Section IX.A.13 *supra*.

Second, Thomas describes that its data structure converts digital picture inputs into instruction set outputs (*i.e.*, invoking an action). *Id.*, 5:25-29 (“[W]hen... *a particular event and/or situation occurs, the simulator 120 can invoke a corresponding reaction* based on the stored data....”); Ex. 1003, ¶ 147.

Third, Thomas describes that its neural network uses connections because stored instruction sets correlated with digital pictures are connected using numerical occurrence value (*i.e.*, a numerical attribute or weight) connections. *See* Section IX.A.13 *supra*; Ex. 1003, ¶ 148.

⁴ A “node” is synonymous with a “knowledge cell,” and can “include any data structure or arrangement.” Ex. 1001, 102:21-22, 111:61-63; Ex. 1003, ¶ 145.

- b. **[16.2] wherein the determining the first one or more instruction sets for operating the first object of the first application program based on the at least partial match between the new one or more digital pictures and the first one or more digital pictures includes applying the new one or more digital pictures to the neural network.**

Thomas discloses limitation [16.2]. Ex. 1003, ¶ 149.

Thomas describes determining instruction sets by matching new digital pictures generated during simulation mode with first digital pictures stored during learning mode. *See* section IX.A.1.d *supra*. Thomas further describes applying the new digital pictures to the neural network because Thomas describes matching situations/events generated in simulation mode (including a new digital picture) to situations/events stored in learning mode by applying new digital pictures to the data repository (*i.e.*, the neural network) to determine a match and the corresponding instruction set. Ex. 1005, 6:19-41 (“[W]hen the simulated opponent's avatar is running down the *sideline and encounters an opposing player's avatar...* [i]f the number 53 is selected, then the *avatar will juke...*”); Ex. 1003, ¶ 149.

15. Claim 17

- a. **[17.1] The system of claim 1, wherein at least some elements of the system are included in: a single device, or multiple devices, and**

Thomas discloses that some elements of the system can be included in a single device (*e.g.*, console) or multiple devices (*e.g.*, console and server). Ex. 1005, 19:35-

42 (“[C]omputer program 110, simulator 120, and database 130... *can reside on a single client console.... [or] a server 710 accessible by... consoles....*”); Ex. 1003, ¶ 150.

b. [17.2] wherein the one or more processors include: one or more microcontrollers, one or more computing devices, or one or more electronic devices, and

Thomas discloses that the one or more processors include one or more computing devices or electronic devices (*e.g.*, a game console). *See* Limitation [17.1] above; Ex. 1003, ¶ 151.

c. [17.3] wherein the one or more memories include: one or more non-transitory machine readable media, one or more volatile memories, one or more non-volatile memories, one or more storage devices, or one or more storage systems, and

Thomas discloses one or more storage devices or storage systems (*e.g.*, server and/or memory). Ex. 1005, 19:39-42 (“[T]he computer program 110, the simulator 120, and database 130 can reside on a server....”), claim 19 (requiring a portable memory device); Ex. 1003, ¶ 152.

d. [17.4] and [17.5] wherein the first [new] one or more digital pictures include: one or more still digital pictures, or one or more motion digital pictures, and

Thomas discloses that the system generates motion digital pictures on the interface screen during learning and simulation mode. *See* Section IX.A.1.b-c *supra*; Ex. 1003, ¶ 153-154 Thomas further describes that the system stores features, values, and/or representations of portions of the motion digital pictures generated

during learning mode (*i.e.*, the first digital pictures), including the spatial position of the defensive players in the motion digital pictures at a particular time. Ex. 1005, 5:13-18 (“[T]he user may choose to shoot a jump shot or split the defenders-responses that may be *recorded in the profile 650 and linked with opponent's avatar's position.*”); Ex. 1003, ¶ 153 Thomas further describes that the system compares the features, values, and/or representations of portions of the motion digital pictures generated during learning mode with the motion digital pictures generated during simulation mode (*i.e.*, new digital pictures). 8:11-14 (“During playback... simulator 120 will... *analyze the location of the simulated user and the defensive coverage.*”); Ex. 1003, ¶ 154.

- e. **[17.6] and [17.7] wherein the first [second] application program includes: a video game, a computer game, a simulation program, a program including text processing, a program including number processing, a program including picture processing, a program including object processing, or a program, and**

Thomas discloses that the first and second application program include a video game. Ex. 1005, 7:2-3 (“[C]omputer program 110 can be a... video game....”); Ex. 1003, ¶ 155-156.

- f. [17.8] wherein an instruction set of the first one or more instruction sets for operating the first object of the first application program includes at least one of: only one instruction, a plurality of instructions, one or more inputs, one or more commands[...]or one or more information.

This limitation is satisfied by an instruction set that includes one or more instructions, inputs, or commands. Thomas discloses that the instruction set for operating the first object of the first application program can include one or more instructions, inputs, and/or commands, such as an instruction, input, or command to shoot a basketball. *Id.*, 4:67-5:1 (“[S]imulator 120 will record the user’s decision/input, such as a pressed button, combination of pressed buttons....”); *id.*, 5:13-18, 5:25-29; Ex. 1003, ¶ 157.

16. Claim 18

- a. [18.1] and [18.2] The system of claim 1, wherein the first [new] one or more digital pictures are: one or more whole digital pictures, one or more representations of one or more whole digital pictures, one or more portions of at least one digital picture, one or more representations of one or more portions of at least one digital picture, one or more features, one or more representations of one or more features, one or more collections of pixels, or one or more collections of values, and

Thomas discloses that the first digital pictures are at least representations of a portion of a digital picture, one or more features, or one or more collections of values. *See* Section IX.A.1.b *supra* (limitation [1.2]); Ex. 1003, ¶ 158.

A POSITA would understand that the new digital pictures generated during simulation mode are whole digital pictures as depicted on the visual interface. *See e.g.*, Ex. 1005, Fig. 5; Ex. 1003, ¶ 159. Thomas further describes that at least a representation of a portion of the new digital pictures, one or more features, and/or one or more collections of values of the new digital pictures are received by the processor to match the stored first digital picture information. *See* Section IX.A.1.c-d *supra*; Ex. 1003, ¶ 159.

17. Claim 19

Independent claim 19 is a method claim that corresponds to system claim 1. The analysis above for claim 1 applies to claim 19, as set forth below. Ex. 1003, ¶ 160.

Claim 19	Disclosure of Thomas
A method implemented using a computing system that includes one or more processors, the method comprising: accessing one or more memories that store at least a first one or more digital pictures correlated with a first one or more instruction sets for operating a first object of a first application program;	Section IX.A.1.a-b <i>supra</i> .

Claim 19	Disclosure of Thomas
receiving or generating a new one or more digital pictures that depict at least a portion of a surrounding of: the first object of the first application program, a second object of the first application program, or a first object of a second application program;	Section IX.A.1.c <i>supra</i> .
determining the first one or more instruction sets for operating the first object of the first application program based on at least partial match between the new one or more digital pictures and the first one or more digital pictures; and	Section IX.A.1.d <i>supra</i> .
at least in response to the determining, executing the first one or more instruction sets for operating the first object of the first application program, wherein the first object of the first application program, the second object of the first application program, or the first object of the second application program autonomously performs one or more operations defined by the first one or more instruction sets for operating the first object of the first application program.	Section IX.A.1.e <i>supra</i> .

18. Claim 20

- a. **[20.1] A system comprising: means for processing; and**

The corresponding structure for this limitation is a processor, which Thomas discloses. *See* Section IX.A.1.a *supra*; Ex. 1005, claims 17-19 (requiring a local

processor). Thomas also discloses that its system can operate on a video game console, which a POSITA would understand includes a processor. Ex. 1003, ¶ 161.

- b. **[20.2] means for storing machine readable code that, when executed by the means for processing, causes the means for processing to perform at least:**

The corresponding structure for this limitation is storage or a memory, which Thomas discloses. *See* Section IX.A.15.c *supra*; Ex. 1005, claim 1 (“a computer-usable medium having a sequence of instructions stored...”), claim 19 (requiring a “memory device”); Ex. 1003, ¶ 230-231. Thomas also discloses that its system can operate on a video game console and/or on a server, which includes storage and/or a memory for storing code. Ex. 1003, ¶ 162, 230-231.

- c. **[20.3] accessing one or more memories that store at least a first one or more digital pictures correlated with a first one or more instruction sets for operating a first object of a first application program;**

Thomas discloses this limitation. *See* Section IX.A.1.b-d *supra*; Ex. 1003, ¶ 163 (explaining that claims 1-2 of Thomas describe that the processor performs the accessing function).

- d. **[20.4] receiving or generating a new one or more digital pictures that depict at least a portion of a surrounding of: the first object of the first application program, a second object of the first application program, or a first object of a second application program;**

Thomas discloses this limitation. *See* Section IX.A.1.c *supra*; Ex. 1003, ¶ 164 (explaining that claims 1-2 of Thomas describe that the processor performs the receiving or generating functions).

- e. **[20.5] determining the first one or more instruction sets for operating the first object of the first application program based on at least partial match between the new one or more digital pictures and the first one or more digital pictures; and**

Thomas discloses this limitation. *See* Section IX.A.1.c-d *supra*; Ex. 1003, ¶ 165 (explaining that claims 1-2 of Thomas describe that the processor performs the determining function).

- f. **[20.6] at least in response to the determining, executing the first one or more instruction sets for operating the first object of the first application program, wherein the first object of the first application program [...] autonomously performs one or more operations defined by the first one or more instruction sets for operating the first object of the first application program.**

Thomas discloses this limitation. *See* Section IX.A.1.c & IX.A.1.e *supra*; Ex. 1003, ¶ 166 (explaining that claims 1-2 of Thomas describe that the processor performs the executing function).

B. Grounds 3 and 4: Anticipation of Claims 1, 8, 9, 12, and 16-20 Based on Buehler; Obviousness of Claim 17 Based on Buehler in View of the Knowledge of a POSITA

1. Claim 1

a. [1.1] A system comprising: one or more processors; and

Buehler discloses a robot system comprising one or more processors.Ex. 1006, 4:51-56 (“The image processing module and the control system comprise sets of instructions stored in memory and executable by *a processor*.”); 8:10-15 (describing a robot system); Ex. 1003, ¶ 168.

b. [1.2] one or more memories that store at least a first one or more digital pictures correlated with a first one or more instruction sets for operating a first object of a first application program,

Buehler discloses a memory that stores template digital pictures (*e.g.*, an image of an object) correlated with instruction sets (*e.g.*, a routine for picking up the object) for operating a robotic end effector:

The system memory 224 contains partitions and/or buffers to store, in digital (pixel) form, images obtained by the cameras, as well as portions of one or more databases for representing task and object representations....

Id., 10:22-26.

[R]elevant information about the accomplished task...may be stored along with the visual model of the object. When the robot later...detects

an object of the same type, it may utilize the stored information to execute an object-specific pick-up routine.

Id., 3:36-42; Ex. 1003, ¶ 169-171. Buehler further describes creating a virtual representation of the robot and its end effector (*i.e.*, a first object of a first application program) to simulate performance of the stored instruction set:

[T]he robot may *overlay virtual grippers on the image* (or video stream) of the object to indicate where the grasp point would be.... Thus,... the robot can *give the user a sense of the likelihood of a successful pick-up.*

Ex. 1006, 21:46-54; *id.*, 6:31-48 (“[T]he robot...*overlays a representation of an end-effector onto the camera view, and displays performance of an action on the object by the end-effector....*”); Ex. 1003, ¶ 172.

- c. **[1.3] wherein the one or more processors are configured to perform at least: receiving or generating a new one or more digital pictures that depict at least a portion of a surrounding of: the first object of the first application program, a second object of the first application program, or a first object of a second application program;**

Buehler discloses limitation [1.3]. Ex. 1003, ¶ 173. Buehler describes receiving and generating new digital pictures from the robot camera, and generating a new digital picture comprising at least the virtual grippers or the robot (*i.e.*, the first object) and an object near the robot (*i.e.*, a portion of the surroundings of the virtual grippers):

[T]he robot may use a camera to acquire images of its environment (constituting real-world data), and overlay computer graphics onto the image (such as, e.g., an object outline...and/or a representation of the robot's end-effector....).

Ex. 1006, 2:6-12; *id.*, 21:46-50.

- d. **[1.4] determining the first one or more instruction sets for operating the first object of the first application program based on at least partial match between the new one or more digital pictures and the first one or more digital pictures; and**

Buehler discloses limitation [1.4]. Ex. 1003, ¶ 174-175. Specifically, Buehler describes determining a routine (*i.e.*, an instruction set) upon detecting at least a partial match between captured images and previously stored images:

The method includes...*using a visual model to computationally identify the object based on a stored representation thereof..., determining whether an object-specific manipulation routine is stored in association with the stored representation, and, if so, executing the object-specific manipulation routine....*

Ex. 1006., 7:6-15; *id.*, 18:50-54; Ex. 1003, ¶ 174.

Buehler further describes that the instruction set is used to operate the visual representation of the robot (*i.e.*, the first object of the application) to simulate the robot's performance of a task:

[T]he robot may overlay *virtual grippers on the image... to indicate where the grasp point would be.... [T]he robot can give the user a sense of the likelihood of a successful pick-up.*

Id., 21:46-54; Ex. 1003, ¶ 175.

- e. **[1.5] at least in response to the determining, executing the first one or more instruction sets for operating the first object of the first application program, wherein the first object of the first application program, the second object of the first application program, or the first object of the second application program autonomously performs one or more operations defined by the first one or more instruction sets for operating the first object of the first application program.**

Buehler discloses limitation [1.5]. Ex. 1003, ¶ 176. As explained above, Buehler describes that when the system detects a match of digital pictures, the system executes an instruction set causing the virtual robot and its end effector (*i.e.*, the first object of the application) to autonomously performs the operation defined by the instruction set (*e.g.*, grasping an object):

[T]he robot selects an object in the field of view..., overlays a representation of an end-effector onto the camera view, and displays performance of an action on the object by the end-effector.

Ex. 1006, 6:31-37; *id.*, 21:33-50; *see also id.* 7:6-15; *see* Section IX.B.1.d *supra*.

2. Claim 8

- a. **[8.1] The system of claim 1, wherein the one or more processors are further configured to perform at least: modifying at least one of: the first one or more digital pictures, [...] and**

Buehler discloses limitation [8.1]. Ex. 1003, ¶ 177-179. Buehler describes that the system overlays computer-generated graphics onto a digital picture of an object, such as an outline the user modifies:

[T]he robot may show an image...and indicate selection of an object in the field of view by drawing an outline of the object in the image....

[T]he user may have the opportunity to provide feedback by manipulating the computer-generated graphics. For example...the user may drag vertices of the outline to a desired position....

Ex. 1006, 12:43-55. As explained below in limitation [8.2], the modified digital pictures correspond to first digital pictures because they are stored for later matching with new digital pictures. *See* Section IX.B.2.b *infra*.

- b. [8.2] wherein the at least partial match between the new one or more digital pictures and the first one or more digital pictures is determined at least by...(iii) determining at least partial match between the new one or more digital pictures and the modified the first one or more digital pictures, or....⁵

Buehler discloses limitation [8.2]. Ex. 1003, ¶ 180-181. Buehler describes that the modified images are stored and matched with new digital pictures obtained by the robot's cameras:

The contextual information 502 relevant to object recognition *includes a previously acquired image or video stream annotated with labeled pixels (e.g., contour outlines, highlights, etc.)....*

Ex. 1006, 17:28-37; *id.*, 18:50-54 (“The detection algorithm 508 *compares real-time camera images against the template* and determines...whether the realtime image contains the object of interest”).

⁵ Claim 8 requires that the partial match is determined by one of eight options. Ex. 1003, ¶ 180-181. Buehler discloses at least option (iii).

3. Claim 9

- a. **[9.1] The system of claim 1, wherein the new one or more digital pictures depict a first-person view of the at least the portion of the surrounding of: the first object of the first application program, the second object of the first application program, or the first object of the second application program,**

Buehler discloses that the new digital pictures depict a first-person view of the at least the portion of the surrounding of the first object of the first application program. Ex. 1003, ¶ 182-184. Buehler describes that the robot includes cameras that capture digital pictures of the robot's surroundings, including objects nearby:

It has one camera 109 in each of its two wrists so that the robot 100 can "see" objects it is about to pick up [I]t has two cameras... in its chest that...allow the robot 100 to visually detect equipment or objects.....

Id., 8:57-63. A POSITA would understand that the wrist and chest cameras provide a first person view of at least the surroundings of the first object of the application program (*i.e.*, the virtual robot and its end effector), such as objects the end effector simulates grasping in the augmented reality display. Ex. 1003, ¶ 183-184.

- b. **[9.2] and wherein the first-person view includes a view from a perspective of: the first object of the first application program, the second object of the first application program, or the first object of the second application program.**

A POSITA would understand that the first-person view disclosed in Buehler is a view from the perspective of the first object of the first application program. In

particular, when the new digital picture depicts the object of interest and the virtual end effector, the new digital picture is providing a first person view from the perspective of the robot's chest or wrist (*i.e.*, the first object of the application). Ex. 1003, ¶ 185.

4. Claim 12

- a. **[12.1] The system of claim 1, wherein the one or more processors are further configured to perform at least: modifying: the first one or more instruction sets for operating the first object of the first application program [...], and**

Buehler discloses limitation [12.1]. Ex. 1003, ¶ 186. Buehler describes that during training mode, the user and/or system modify instruction sets for operating the virtual robot:

If the virtual gripper is not positioned around the proper part...the user may adjust the arm to roughly establish the proper grasp point.... This process of coarse and fine adjustments of the gripper by the human trainer and the robot, respectively, may be iterated

Ex. 1006, 21:54-64; *id.*, 22:26-32 (“[T]he routines may be...altered, as necessary, during training.”).

- b. [12.2] wherein the executing the first one or more instruction sets for operating the first object of the first application program includes executing: the modified the first one or more instruction sets for operating the first object of the first application program, [...] and

[12.3] wherein the first object of the first application program [...] autonomously performing the one or more operations defined by the first one or more instruction sets for operating the first object of the first application program includes the first object of the first application program [...] autonomously performing one or more operations defined by: the modified the first one or more instruction sets for operating the first object of the first application program [....]

Buehler discloses that after modifying the instruction set during training, the system executes the modified instruction set and the virtual end effector autonomously performs the modified instruction set to demonstrate performance of the action. *Id.*, 6:37-43 (“The *display of the robot's performance of the action...* and *feedback are repeated until the action is performed correctly on the display.*”); Ex. 1003, ¶ 187-189.

5. Claim 16

- a. [16.1] The system of claim 1, wherein the system further comprising: a neural network that includes the first one or more digital pictures connected with the first one or more instruction sets for operating the first object of the first application program using at least one of: one or more connections, or one or more nodes, and

Buehler discloses limitation [16.1]. Ex. 1003, ¶ 190-192. First, Buehler describes that its system comprises a data structure that stores template digital pictures in nodes⁶ that are correlated and connected with instruction sets. Ex. 1006, 7:6-15 (“The method includes... determining whether *an object specific manipulation routine is stored in association with the stored representation*, and...executing the... routine....”); Ex. 1003, ¶ 190. Second, Buehler describes inputting new digital pictures to the data structure, which are converted into instruction outputs for operating the virtual robot.⁷ See Section IX.B.1.d *supra*; Ex. 1003, ¶ 191.

⁶ The specification describes that a node can comprise “any data structure.” See Section IX.A.14.a *supra*; Ex. 1003, ¶ 190.

⁷ A “neural network” includes a data structure configured to compute an output from an input. See Section IX.A.14.a *supra*; Ex. 1003, ¶ 190.

- b. **[16.2] wherein the determining the first one or more instruction sets for operating the first object of the first application program based on the at least partial match between the new one or more digital pictures and the first one or more digital pictures includes applying the new one or more digital pictures to the neural network.**

As explained above in limitation [16.1], Buehler discloses applying the new digital pictures to the neural network to determine the instruction set for operating the first object based on at least a partial match. *See* Section IX.B.5.a; *see* also Section IX.B.1.d *supra*; Ex. 1003, ¶ 193.

6. Claim 17

- a. **[17.1] The system of claim 1, wherein at least some elements of the system are included in: a single device, or multiple devices, and**

Buehler discloses that at least some elements are included on one or multiple devices. Ex. 1006, 11:25-27 (“[C]ontrol system 200 and its various components may be integrated *into the robot*, or kept (at least in part) in a *separate control facility in communication with the robot*.”); Ex. 1003, ¶ 194.

- b. **[17.2] wherein the one or more processors include: one or more microcontrollers, one or more computing devices, or one or more electronic devices, and**

Buehler discloses that the processor includes one or more computing or electronic devices. Ex. 1006, 10:5-12 (“[Controller [is] implemented on a general-purpose *computer* . . . [that] includes a central processing unit... (*e.g.*, a quad-core Intel *processor*)”); Ex. 1003, ¶ 195.

- c. **[17.3] wherein the one or more memories include: one or more non-transitory machine readable media, one or more volatile memories, one or more non-volatile memories, one or more storage devices, or one or more storage systems, and**

Buehler discloses that the one or more memories includes one or more storage devices, storage systems, and/or non-volatile memories. Ex. 1006, 4:51-56 (“The image-processing module and the control system comprise *sets of instructions stored in memory....*”), 10:10-14 (“The general-purpose computer 210 includes a...*system memory 224, and non-volatile mass storage devices (such as one or more hard disks and/or optical storage units)....*”); Ex. 1003, ¶ 196.

- d. **[17.4] and [17.5] wherein the first [new] one or more digital pictures include: one or more still digital pictures, or one or more motion digital pictures, and**

Buehler discloses that the first (template pictures) and new digital pictures (those captured by the robot) are still digital pictures (*e.g.*, images) or motion digital pictures (*e.g.*, video streams). *Id.*, 17:34-36 (“The contextual information 502 relevant to object recognition includes a *previously acquired image or video stream....*”), 21:46-50 (“[T]he robot may overlay virtual grippers on the *image (or video stream)....*”); Ex. 1003, ¶ 197-198.

- e. **[17.6] and [17.7] wherein the first [second] application program includes: a video game, a computer game, a simulation program, a program including text processing, a program including number processing, a program including picture processing, a program including object processing, or a program, and**

Buehler discloses that the first application program includes a training mode comprising a simulation program. Ex. 1006, 2:43-45 (“As *part of the training process*, the robot may repeatedly *simulate performance*”); Ex. 1003, ¶ 199.

Buehler also discloses and/or renders obvious that the second application program includes a simulation program because it describes that its system is intended to train multiple industrial robots. *Id.*, 1:25-26 (“*Industrial robots* perform a variety of tasks....”); Ex. 1003, ¶ 200. A POSITA would understand that Buehler’s system and method operated on a second robot would be a second application program comprising a simulation program. Ex. 1003, ¶ 200.

- f. **[17.8] wherein an instruction set of the first one or more instruction sets for operating the first object of the first application program includes at least one of: only one instruction, a plurality of instructions, one or more inputs, one or more commands[...], or one or more information.**

Buehler discloses that the instruction sets include one or more instructions, inputs, and/or commands provided by the user and/or control system. *Id.*, 22:26-32 (“[T]he *routines may be* programmed into the robot at the outset and *altered, as necessary, during training*....”); *id.*, 21:54-64; Ex. 1003, ¶ 201.

7. Claim 18

- a. [18.1] and [18.2] The system of claim 1, wherein the first [new] one or more digital pictures are: one or more whole digital pictures, [...]one or more portions of at least one digital picture, [...]or one or more collections of values, and

Buehler discloses that the first and new one or more digital pictures are whole digital pictures and/or portions of at least one digital picture. Section IX.B.1.b-c *supra*; Ex. 1003, ¶ 202-203.

8. Claim 19

Independent claim 19 is a method claim that corresponds to system claim 1. The analysis above explaining how Buehler anticipates claim 1 applies to claim 19, as set forth below. Ex. 1003, ¶ 204.

Claim 19	Disclosure of Buehler
A method implemented using a computing system that includes one or more processors, the method comprising: accessing one or more memories that store at least a first one or more digital pictures correlated with a first one or more instruction sets for operating a first object of a first application program;	Section IX.B.1.a-b <i>supra</i> .

Claim 19	Disclosure of Buehler
receiving or generating a new one or more digital pictures that depict at least a portion of a surrounding of: the first object of the first application program, a second object of the first application program, or a first object of a second application program;	Section IX.B.1.c <i>supra</i> .
determining the first one or more instruction sets for operating the first object of the first application program based on at least partial match between the new one or more digital pictures and the first one or more digital pictures; and	Section IX.B.1.d <i>supra</i> .
at least in response to the determining, executing the first one or more instruction sets for operating the first object of the first application program, wherein the first object of the first application program, the second object of the first application program, or the first object of the second application program autonomously performs one or more operations defined by the first one or more instruction sets for operating the first object of the first application program.	Section IX.B.1.e <i>supra</i> .

9. Claim 20

Claim 20	Disclosure of Buehler
A system comprising: means for processing; and	The corresponding structure for this limitation is a processor, which Buehler discloses. Section IX.B.1.a <i>supra</i> ; Ex. 1003, ¶ 205.
means for storing machine readable code that, when executed by the means for processing, causes the means for processing to perform at least:	The corresponding structure for this limitation is storage or a memory, which Buehler discloses. Section IX.B.6.c <i>supra</i> ; Ex. 1003, ¶ 206, 333-334.
accessing one or more memories that store at least a first one or more digital pictures correlated with a first one or more instruction sets for operating a first object of a first application program;	Buehler discloses this limitation. Section IX.B.1.b-d. <i>supra</i> ; Ex. 1003, ¶ 207.
receiving or generating a new one or more digital pictures that depict at least a portion of a surrounding of: the first object of the first application program, a second object of the first application program, or a first object of a second application program;	Buehler discloses this limitation. Section IX.B.1.c <i>supra</i> ; Ex. 1003, ¶ 208.
determining the first one or more instruction sets for operating the first object of the first application program based on at least partial match between the new one or more digital pictures and the first one or more digital pictures; and	Buehler discloses this limitation. Section IX.B.1.c-d <i>supra</i> ; Ex. 1003, ¶ 209.

Claim 20	Disclosure of Buehler
at least in response to the determining, executing the first one or more instruction sets for operating the first object of the first application program, wherein the first object of the first application program [...] autonomously performs one or more operations defined by the first one or more instruction sets for operating the first object of the first application program.	Buehler discloses this limitation. Section IX.B.1.c & IX.B.1.e <i>supra</i> ; Ex. 1003, ¶ 210.

C. Ground 5: Obviousness of Claim 16 Based on Buehler in View of Ponulak

Buehler in view of Ponulak renders claim 16 obvious. Ex. 1003, ¶ 211-223.

A POSITA would have been motivated to combine Buehler with Ponulak’s neural network for several reasons. First, both references describe using digital picture inputs to detect objects and provide instructions for operating a robot, including for industrial applications. Ex. 1007, 1:41-45, Ex. 1006, 1:25-26. This would have suggested to a POSITA that Ponulak’s neural network for detecting objects and providing instructions to autonomously operate a robot would have been applicable to Buehler. Ex. 1003, ¶ 211. Given these similarities, the combination would have been obvious as the application of Ponulak’s technique (*i.e.*, using a neural network for robot object detection and instruction selection) to improve a similar device (Buehler’s robot). *Id.*

Second, a POSITA would have been motivated to utilize Ponulak’s neural network for image detection in Buehler given the advantages described therein.

Ponulak describes that use of its neural network and adaptive predictor apparatus may allow “for faster and smoother anticipatory avoidance behavior” and “may speed-up and/or improve reliability of object detection....” Ex. 1007, 38:34-41. A These advantages of Ponulak’s system would have been desirable for Buehler’s robotic system for use in industrial applications. Ex. 1003, ¶ 212.

A POSITA also would have readily expected to succeed in combining the teachings of both references given their overlapping and complimentary techniques (*e.g.*, techniques for autonomous operation of robots). *Id.*, ¶ 213-217. For example, Buehler describes that “some objects may be best recognized based on features extracted from the images....” Ex. 1006, 3:7-13. Similarly, Ponulak describes that its neural network can identify objects by detecting features within images. Ex. 1007, 33:12-16; Ex. 1003, ¶ 213. Indeed, techniques for incorporating a neural network into a robot system for object detection and instruction set determination were well-known in the art before the ’585 Patent. Ex. 1003, ¶ 217.

1. Claim 16

- a. **[16.1] The system of claim 1, wherein the system further comprising: a neural network that includes the first one or more digital pictures connected with the first one or more instruction sets for operating the first object of the first application program using at least one of: one or more connections, or one or more nodes, and**

Buehler in view of Ponulak renders obvious limitation [16.1]. Ex. 1003, ¶ 219-221. Buehler discloses storing digital pictures correlated with instruction sets for operating the first object of the first application program. *See* Section IX.B.1.b *supra*, Ex. 1003, ¶ 219. Ponulak, in turn, discloses a neural network that recognizes objects and determines instruction sets (*e.g.*, motor commands) based on digital picture inputs. Ex. 1007, 9:1-20 (“The output 108 may comprise one or more motor commands.... [T]he signal 106 may comprise an array of pixel values in the input image....”) *Id.*, 36:42-43 (“The neuromorphic apparatus 1150 may receive input (*e.g.*, visual input) via the interface 1160”); Ex. 1003, ¶ 219. In an exemplary embodiment, Ponulak describes connected cells of the neural network perform different functions, such as object detection and motor command determination. *Id.*, 36:20-21 (“A number of *cell blocks*... may *communicate with one another via local interconnects*”), 36:36-41 (“[C]ells may perform different aspects of operating a robot with one or more L2/L3 *cells processing visual data from a camera*, and other L2/L3 *cells operating motor control block*....”); Ex. 1003, ¶ 220.

It would have been obvious to a POSITA to include Buehler's first digital picture and corresponding algorithm for object detection in one or more cells, which are connected to others cell(s) including the instruction set (*e.g.*, a motor command) correlated to the first digital picture, such that each cell would perform the functions described in Ponulak and output the detected object and correlated instruction set. *Id.*, 36:49-52 ("The output may include...indication of recognized object or a feature, a motor command"); Ex. 1003, ¶ 221. This is illustrated in an annotated version of Fig. 11D of Ponulak below:

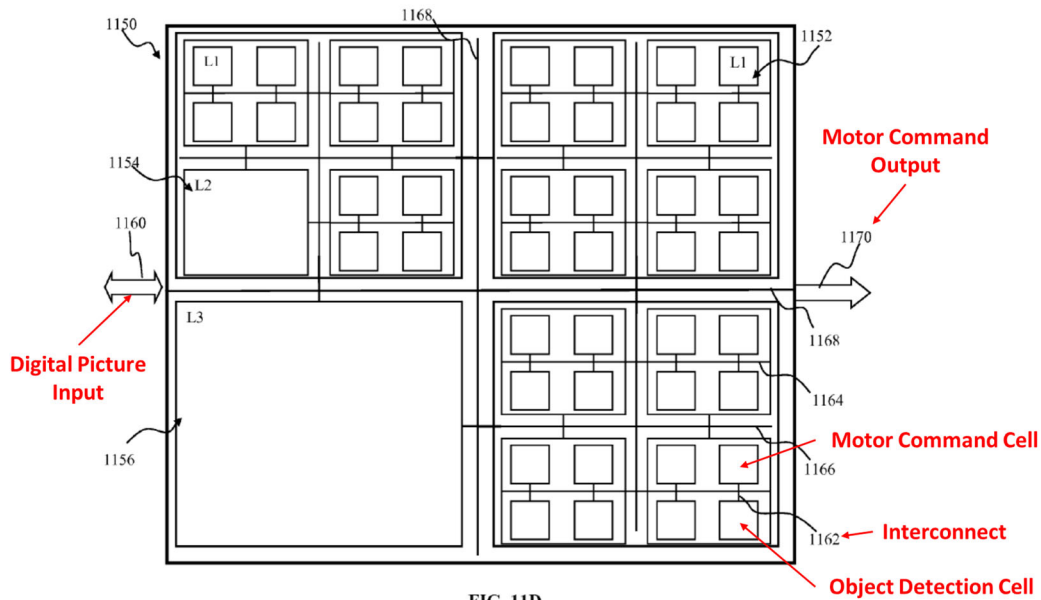


FIG. 11D

Ex. 1007, Figure 11D (Annotated)

- b. [16.2] wherein the determining the first one or more instruction sets for operating the first object of the first application program based on the at least partial match between the new one or more digital pictures and the first one or more digital pictures includes applying the new one or more digital pictures to the neural network.

Buehler in view of Ponulak renders obvious limitation [16.2]. Ex. 1003, ¶ 222. Ponulak describes applying new digital pictures to a neural network to determine an instruction set (*e.g.*, motor command) when a particular object is detected. Ex. 1007, 36:42-52 (“The neuromorphic apparatus 1150 may receive input (*e.g.*, visual input)... The output may include...a motor command....”). It would have been obvious that the instruction set output from Ponulak’s neural network would result from at least a partial match between the new digital picture input and the first digital pictures stored in Ponulak’s neural network (*e.g.*, features of a digital picture), which would operate the first object of the first application program in Buehler. *Id.*, 33:12-16 (“[I]ndividual subsequent layers of detectors may...*detect more complex features and objects....*”); Section IX.B.1.d *supra* (Buehler describing matching digital pictures to determine instruction sets for operating virtual end effector).

X. CONCLUSION

Review should be instituted and claims 1-20 of the ’585 Patent should be cancelled as unpatentable.

Petition for Inter Partes Review of U.S. Patent No. 11,113,585

Dated: June 30, 2023

Respectfully submitted,

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CERTIFICATE OF COMPLIANCE

1. The undersigned certifies that this brief complies with the type volume limitations of 37 CFR § 42.24(a)(1)(i). This brief contains 13,991 words (excluding the table of contents, the table of authorities, mandatory notices under 37 CFR § 42.8, the certificate of service, certificate of compliance, and appendix of exhibits), as calculated by the “Word Count” feature of Microsoft Word 2016, the word processing program used to create it.

2. The undersigned further certifies that this brief complies with the typeface requirements of 37 CFR § 42.6(a)(2)(ii) and typestyle requirements of 37 CFR § 42.6(a)(2)(iii). This brief has been prepared in a proportionally spaced typeface using Microsoft Word 2016 in Times New Roman 14 point font.

Dated: June 30, 2023

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CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.105 and § 42.6(e), the undersigned certifies that on June 30, 2023, a complete and entire copy of this **PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,113,585, PETITIONER TESLA, INC.'S POWER OF ATTORNEY, and all supporting exhibits** were sent via FedEx next business day delivery to the following:

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