

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SONY INTERACTIVE ENTERTAINMENT LLC
Petitioner

v.

MOTIVA PATENTS, LLC
Patent Owner

Case No. IPR2019-01134
U.S. Patent No. 8,159,354

**PETITION FOR *INTER PARTES* REVIEW
OF U.S. PATENT NO. 8,159,354**

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I. INTRODUCTION

Petitioner Sony Interactive Entertainment LLC requests *Inter Partes* Review (“IPR”) of Claims 32-33, 49-50, 56-58, 63 and 72-73 (collectively, the “Challenged Claims”) of U.S. Patent No. 8,159,354 (“’354 Patent”). Ex. 1001. As shown below, video game systems utilizing the motion-tracking and feedback techniques encompassed by the Challenged Claims were well known before the ’354 Patent and thus the Challenged Claims are unpatentable.

II. SUMMARY OF THE ’354 PATENT

A. Description of the alleged invention of the ’354 Patent

The ’354 Patent describes a motion-tracking system “for training the user to manipulate the pose of the transponders through a movement trajectory, while guided by interactive and sensory feedback means, for the purposes of functional movement assessment for exercise, and physical medicine and rehabilitation.” Ex. 1001, 1:16-22. Specifically, the system “measure[s] the position of transponders for testing and ... train[s] the user to manipulate the position of the transponders while being guided by interactive and sensory feedback.” *Id.* Abstract. The ’354 Patent also briefly contemplates applying the invention to “primitive forms of video game challenges” *Id.* 15:18-31.

The system includes one or more active transponders held by or attached to the user that each “radiate or transmit a signal for purposes of absolute position tracking;” *Id.* 2:46-52; *see id.* 14:1-7, Fig. 4B. For example, the transponders

may transmit cycles of ultrasonic pulses that are received by a processing unit “comprised principally of a constellation of five (5) ultrasonic transducers and signal processing circuitry” *Id.* 18:62-64; *see id.* 8:8-12. The processing unit uses the received pulses to determine the “three-dimensional (3D) translations and rotations of the transponders.” *Id.* 8:8-34. The ’354 Patent refers to the position and orientation of a transponder as its “pose.” *Id.* 1:16-18.

As the user moves the transponder(s), the processing unit compares the transponder’s pose to a “reference movement trajectory” and calculates “the conformity error between the actual and reference movement trajectory . . . to determine the characteristics of feedback quality to be elicited by the sensory interfaces for the user’s closed-loop control to correct his/her manipulation strategy.” *Id.* 14:60-15:3. The processing unit also includes a radio-link circuit “comprised of a wireless bi-directional communication interface . . . to provide control messages for the transponders’ sensory interfaces” *Id.* 23:44-51. The transponders’ sensory interfaces provide tactile, aural, or visual feedback to the user based on the control messages received from the processing unit. *Id.*; *see id.* 2:46-55. For example, a vibrator motor embedded in the transponder provides tactile feedback, and a series of LEDs embedded in the handle of the transponder provide visual feedback. *Id.* 11:66-12:5; Figs. 2A-B.

In addition to the sensory interface and ultrasonic transducer, the transponder

also includes a processor, a sensor interface, and a communication interface. *Id.* 32:6-8. The sensor interface includes an accelerometer and a heart rate sensor. *Id.* 32:11-13. The “wireless bi-directional communication interface (with a receiver and transmitter shown generally at 20 and 30)” receives control signals and transmits local sensor data (e.g., accelerometer data) to the processor unit. *Id.* 34:11-19. The transponder’s processor “receives input from the stimuli interface, sensor interface, and the communication interface and provides controlling signals therein.” *Id.* 33:25-27.

B. Summary of the prosecution history of the ’354 Patent

The application that resulted in the ’354 Patent was filed on April 28, 2011. The ’354 Patent is a continuation of several prior applications and also claims priority to a provisional application filed on July 29, 2004. For purposes of this proceeding, Petitioner applies the July 29, 2004 as the priority date of the Challenged Claims.

The ’354 Patent did not face a single prior art rejection during prosecution. Ex. 1002. Instead, all of the claims were rejected on the ground of nonstatutory double patenting over the claims of its parent. *Id.* 116. Applicant filed a terminal disclaimer to overcome the double patenting rejection (*id.* 146), and the Examiner subsequently issued a Notice of Allowance. *Id.* 154. In the reasons for allowance, the Examiner only identified features well-known in the prior art. *Id.* 159.

For example, *Woolston* alone discloses all of the purportedly novel features. As shown below, *Woolston* teaches an interactive game system including a first hand-held communication device and a processing system, remote from the first hand-held communication device. *See* Section IV.A, Claims 32(a), 32(b). *Woolston*'s processing system is also in electrical communication with an array of receiving devices, adapted to wirelessly receive the signals transmitted by the transmitter (*see* Section IV.A, Claim 32(b)(i)), to determine movement information for the first hand-held communication device (*see* Section IV.A, Claim 32(b)(ii)), and to determine position information for the first hand-held device (*see*, Section IV.A, Claim 32(b)(ii)). The processing system also sends data signals to the first hand-held device to provide feedback data to the user. *See* Section IV.A, Claim 50(c)(iii). In *Woolston*'s system, the movement information of the first hand-held communication device controls the movement of at least one object (e.g., a virtual sword) in a computer-generated virtual environment. *See* Section IV.A, Claim 49(c). Additionally, *Woolston*'s first hand-held communication device is adapted to receive and process the received data signals and generate sensory stimuli (i.e., tactile feedback) for the user based on the received data signals and delivered through the output device. *See* Section IV.A, Claims 49(d)(i), 49(d)(ii).

C. Level of skill of a person having ordinary skill in the art

A person having ordinary skill in the art ("PHOSITA") at the time of the '354

Patent would have been a person having at least an undergraduate degree in computer science, computer engineering, electrical engineering, or a similar technical field; a basic understanding of the principles of operation of the technologies commonly used for motion sensing and for communication between electronic peripherals; and one or more years of experience in analysis, design, or development of systems employing some of the sensing and communication principles; with additional education substituting for experience and vice versa. Ex. 1003, ¶55.

III. REQUIREMENTS FOR INTER PARTES REVIEW UNDER 37 C.F.R. § 42.104

A. Grounds for standing under 37 C.F.R. § 42.104(a)

Petitioner certifies that the '354 Patent is available for IPR, and Petitioner is not barred or estopped from requesting IPR challenging the claims of the '354 Patent.

B. Identification of challenge under 37 C.F.R. § 42.104(b) and relief requested

In view of the prior art and evidence presented below, IPR of Claims 32-33, 49-50, 56-58, 63 and 72-73 of the '354 Patent should be granted, and the Challenged Claims should be cancelled. 37 C.F.R. § 42.104(b)(1)-(2).

Proposed Grounds of Unpatentability	Exhibits
<u>Ground 1:</u> Claims 32, 49, 50 and 58 are obvious under § 103(a) over U.S. Patent No. 6,162,123 to Woolston (“ <i>Woolston</i> ”) in view	1005, 1006

Proposed Grounds of Unpatentability	Exhibits
of U.S. Patent Application Publication No. 2001/0034257A1 to Weston et al. (“ <i>Weston</i> ”).	
<u>Ground 2</u> : Claim 33 is obvious under § 103(a) over <i>Woolston</i> in view of <i>Weston</i> in further view of U.S. Patent No. 6,456,977 to Wang (“ <i>Wang</i> ”).	1005, 1006, 1007
<u>Ground 3</u> : Claims 56 and 57 are obvious under § 103(a) over <i>Woolston</i> in view of <i>Weston</i> in further view of U.S. Patent No. 5,181,181 to Glynn (“ <i>Glynn</i> ”).	1005, 1006, 1008
<u>Ground 4</u> : Claims 63, 72 and 73 are obvious under § 103(a) over <i>Woolston</i> in view of U.S. Patent Application Publication No. 2004/0012557A1 to Daniel (“ <i>Daniel</i> ”) in further view of Glynn.	1005, 1009

Section IV identifies where each element of the Challenged Claims is found in the prior art. The exhibit numbers of the supporting evidence relied upon to support the challenges are provided above and the relevance of the evidence to the challenges raised are provided in Section IV. Exhibits 1001–1026 are attached.

C. Claim construction under 37 C.F.R. § 42.104(b)(3)

“In an *inter partes* review proceeding, a claim of a patent . . . shall be construed using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. 282(b), including construing the claim in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.” 37 C.F.R. §42.100(b) (as amended, effective Nov. 13, 2018); *see Phillips*

v. AWH Corp., 415 F.3d 1303, 1312 (Fed. Cir. 2005); *Thorner v. Sony Comput. Entm't Am. LLC*, 669 F.3d 1362, 1365–66 (Fed. Cir. 2012). For all of the claim terms not expressly construed below, Petitioner applies the ordinary and customary meaning of the claim terms as understood by a PHOSITA.¹

At this time, Petitioner proposes construing the limitation “modulate an activity” of Claim 33. Claim 33 recites the limitation “wherein the system . . . responds to verbal command input from the user to modulate an activity.” The ’354 Patent specification does not include the phrase “modulate an activity.” Per the specification, activities are performed by the user and defined by attributes such as “Reps/Sets, Duration, Pause, Heart Rate Limits, intra-activity delay, level, point scalars, energy expenditure, task-oriented triggers, etc., and other parametric data that controls intensity, execution rate and scoring criteria for the activity.” Ex. 1001, 7:14-18. The specification also discusses modulation of feedback stimuli, such as visual and tactile feedback. *Id.* 6:4-7. For example, the specification describes “**a means for modulating** an embedded luminescent display organized and oriented

¹ Petitioner’s constructions and/or application of prior art to the Challenged Claims are not a waiver of any argument in any litigation that claim terms in the ’354 Patent are indefinite or otherwise invalid. Nor does Petitioner waive its rights to raise additional issues of claim construction in co-pending district court litigation.

into a directional-aiding pattern, by **varying its degree of intensity and color, or other physical characteristics . . .**” *Id.* 4:48-51 (emphasis added).² However, the specification is completely devoid of any disclosure regarding “respond[ing] to verbal command input from the user to modulate an activity.”

Based on the specification’s descriptions of “modulating” and “activity,” Petitioner submits the limitation “to modulate an activity” must at least include “to vary any attribute of an activity.” *In re Smith Int’l.*, 871 F.3d 1375, 1382-83 (Fed. Cir. 2017) (“The correct inquiry . . . is an interpretation that corresponds with what and how the inventor describes his invention in the specification, i.e., an interpretation that is ‘consistent with the specification.’”); *Retractable Techs., Inc. v. Becton, Dickinson & Co.*, 653 F.3d 1296, 1305 (Fed. Cir. 2011) (“In reviewing the intrinsic record to construe the claims, we strive to capture the scope of the actual invention, rather than strictly limit the scope of claims to disclosed embodiments or allow the claim language to become divorced from what the specification conveys is the invention.”).

² Unless otherwise indicated, all emphasis in quoted language in this Petition was added by Petitioner.

**IV. THERE IS A REASONABLE LIKELIHOOD THAT THE
CHALLENGED CLAIMS OF THE '354 PATENT ARE
UNPATENTABLE**

**A. Ground 1: Woolston and Weston Render Claims 32, 49, 50 and 58
Obvious**

Woolston issued on December 19, 2000 and therefore qualifies as prior art with regard to the '354 Patent under 35 U.S.C. § 102(b) (pre-AIA). Ex. 1005. *Woolston* was not considered during prosecution of the '354 Patent and discloses a video game system including “an apparatus in which a participant may input velocity and position information into an electronic game and receive physical feedback through the apparatus from the electronic game.” *Id.* 1:5-9. *Woolston*’s system includes a game controller 240, which is a processing system that “track[s] the position and attitude of sword apparatus 200.” *Id.* 15:65-66. As explained by Dr. Welch, *Woolston*’s “game controller 240” refers to a game console or other computing device executing game software – not a peripheral user input device commonly referred to as a “game controller.” Ex. 1003, ¶60.

Woolston’s game controller 240 is coupled to an array of IR receivers 210, 220, 230. Ex. 1005, Fig. 3, 9:39-46. “Infrared . . . receivers 210, 220 and 230 may work in conjunction with . . . blasters 300, 302 and 304 [on sword apparatus 200] to determine the position of the sword in real coordinates.” *Id.* 9:13-17. In particular, the IR transmitters “output a pulse and/or timed emission of infrared light which may then be received at the remote sensors . . . whereupon the timing and/or phase

differential of the received signals may be used to triangulate and determine the spatial position of the sword apparatus.” *Id.* 3:62-4:1. Sword apparatus 200 also includes an inertial positioning system used to “keep the computer game apprised of the spatial attitude and/or location of the sword apparatus” *Id.* 3:51-52.

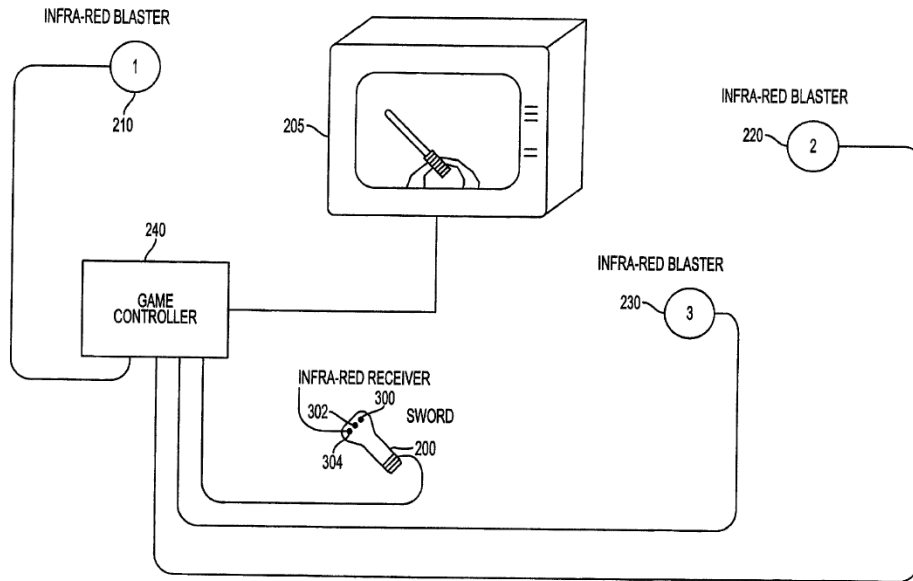


FIG. 3

Id. Fig. 3; 9:39-41.

The '354 Patent specification describes the field of invention as “a system and methods for setup and measuring the position and orientation (pose) of transponders” and to enable “biomechanical tracking and analysis of functional movement.” Ex. 1001, 1:16-18, 2:11-12. However, the Challenged Claims are instead directed to “[a] system for a user to play a video game.” *See, e.g., id.* 36:45. Therefore, the '354 Patent’s field of endeavor must at least include motion tracking and/or video game systems. For the reasons discussed above, *Woolston* describes

an interactive video game system that tracks the user's movement of a hand-held apparatus. Therefore, *Woolston* is in the same field of endeavor and is analogous to the '354 Patent.

Weston published on October 25, 2001 and therefore qualifies as prior art with regard to the '354 Patent under 35 U.S.C. § 102(b) (pre-AIA). Ex. 1006. *Weston* was not considered during prosecution of the '354 Patent. *Weston* describes an interactive game system including “an interactive ‘wand’ and/or other tracking/actuation device to allow play participants to electronically and ‘magically’ interact with their surrounding play environment(s).” *Id.* [0007]. “The play environment may either be real or imaginary (i.e. computer/TV-generated), and either local or remote, as desired.” *Id.* “Multiple play participants, each provided with a suitable ‘wand’ and/or tracking device, may play and interact together, either within or outside the play environment, to achieve desired goals or produce desired effects within the play environment.” *Id.* Each wand wirelessly communicates with other wands and a master control system and includes “position sensors . . . to allow the ‘magic wand’ 200 to be operated by waiving, shaking, stroking and/or tapping it in a particular manner.” *Id.* [0050]; Abstract. The master control system tracks each user's location. *Id.* [0068]. Since *Weston* is directed to a video game system that tracks the user's movement, it is in the same field of endeavor and is analogous to the '354 Patent.

i. Claim 32

32. A system for a user to play a video game, comprising:

Woolston discloses a system for a user to play a video game. Ex. 1005, 1:4-5 (“The present invention relates to interactive electronic games.”); 5:38-41 (“FIG. 3 shows a configuration of the present invention showing the game controller remote infrared blasters, television display, game controller and the sword device 200 of the present invention.”); Fig. 3. According to *Woolston*, “[t]he present invention is an **electronic game with interactive input and output**,” which includes a hand held apparatus that “may be used in conjunction with software to create **an electronic interactive sword game**.” *Id.* 2:36-44.

[32(a)] a first hand-held communication device comprising:

Woolston’s system includes a first “hand held apparatus.” *Id.* 2:38-39. According to *Woolston*, “the hand held apparatus ... is adapted to be held by either one and/or two hands.” *Id.* 2:45-48. In one embodiment, the hand-held interface apparatus includes a housing shaped like the hilt of a sword 200. *Id.* 2:44-50; 5:25-27; Fig. 1. *Woolston*’s apparatus 200 is also a communication device. *Id.* 6:47-62 (“[C]ircuits 499 may contain a suitable protocol communications device or procedure to establish communications between the sword device [200] and game controller 240”).

[32(a)(i)] a transmitter for transmitting signals;

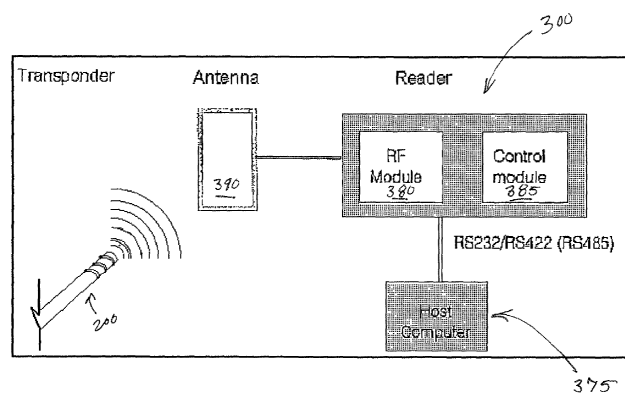
Apparatus 200 includes IR transmitters 300, 302, 304 that “output a pulse and/or timed emission of infrared light” that is received by remote IR receivers and “used to triangulate and determine the spatial position of the sword apparatus.” *Id.* 3:60-4:1; *see id.* 5:25-35; 9:2-25; 9:39-46; Figs. 1, 3.

Alternatively and to the extent the Board finds Woolston’s IR pulses are not “signals” within the meaning of the ’354 Patent, it would have been obvious to a PHOSITA to include in *Woolston*’s apparatus 200 a wireless transmitter for transmitting signals as taught by *Weston*.³ Ex. 1003, ¶95, ¶¶98-104. *Woolston* teaches that the apparatus 200 communicates with the game controller 240 using “a suitable communication means such as a USART and/or ethernet and/or universal serial bus interface” or using “wireless analog and/or digital control signal to provide an interface between the sword apparatus and the game controller 240.” Ex. 1005, 6:47-54. However, *Woolston* does not expressly disclose that the wireless interface includes a transmitter.

Weston teaches a wand 200, which is a wireless hand-held communication device used in an interactive game system. Ex. 1006, [0078] (“The toy or wand 200

³ Given the additional claim requirement that the remote processing system “wirelessly receiv[e] the signals transmitted by the transmitter” (Ex. 1001, 36:50-52), Petitioner is interpreting “a transmitter for transmitting signals” as requiring a wireless transmitter.

also preferably enables the user to interact with either a Master system located within a Magic entertainment facility and/or a home-based system using common consumer electronic devices such as a personal computer, VCR or **video game system.**”). *Weston*’s wand wirelessly communicates with other wands or a master/host system 375 using a transponder, which is a “RF **transmitter**/receiver chip 340 and an antenna 345 provided within an hermetically sealed vial 350.” *Id.* [0046]. In one embodiment, the transponder is a “battery powered RF transponder” enabling bi-directional, long-range communications between the wand and other wireless components. *Id.* [0049]; *see id.* Abstract (“[A] seemingly magical wand toy is provided for enabling a trained user to electronically **send** and receive information to and from other wand toys, a master system”); [0072] (“The SRRF module supports two-way communications with a small home transceiver, as well as with other SRRF objects. For example, a Magic wand 200 can communicate with another Magic wand 200.”); Fig. 2.

**Fig. 3**

Id. Fig. 3; *see id.* [0010], [0044], [0047], [0064]-[0065], [0072], [0078].

Given *Woolston*'s express suggestion to utilize a "wireless . . . control signal to provide an interface between the sword apparatus and the game controller 240," a PHOSITA would have been motivated to modify *Woolston*'s apparatus 200 to include a transmitter for wirelessly transmitting signals as taught by *Weston*. Ex. 1003, ¶99. For example, a PHOSITA would have appreciated that attitude signals output by the sword's positional device element 600 would be transmitted to the game controller running the game software tracking the sword's movements. *Id.* ¶98. (citing Ex. 1005, 3:49-54, 15:65-16:2). Transmitting the attitude information wirelessly via *Weston*'s transmitter would have been a reliable and predictable way to communicate this information to *Woolston*'s game controller 240. *Id.* ¶99.

Moreover, the benefits of not hindering the user's movements with wires were well-known in the field of motion tracking systems well before the '354 Patent. *Id.* ¶100 (citing Exhs. 1013, 1023). For example, *Weston*'s wireless communication device enables the user to move freely about a game environment to provide "a complex, interactive play and entertainment system that creates a seamless magical interactive play experience that transcends conventional physical and temporal boundaries." Ex. 1006, [0064]; *see id.* [0067]-[0068]. The '354 Patent specification also references prior art motion tracking systems utilizing "wireless communication means to remotely transmit and process the information and allow for greater

mobility and range of movement.” Ex. 1001, 1:33-37; *see* Ex. 1003, ¶100. A PHOSITA would have understood that wirelessly transmitting information via a transmitter would have been an advantageous way to avoid the need for a wire connecting the apparatus 200 to the game controller 240 thereby allowing the user more freedom of movement. Ex. 1003, ¶102. A PHOSITA would have understood that allowing the user to freely move *Woolston’s* apparatus 200 would have predictably enhanced the user’s ability to participate in a virtual sword battle thereby increasing user satisfaction. *Id.* ¶103. Therefore, a PHOSITA would have also been motivated to include a transmitter for transmitting signals in *Woolston’s* sword as taught by *Weston* to improve similar communication devices in the same way. *Id.*

As opined by Dr. Welch, wireless communication devices including transmitters transmitting signals were well known in both motion tracking and video game systems prior to the ’354 Patent. *Id.* ¶46, ¶53, ¶99. Moreover, *Woolston’s* apparatus 200 may be powered via batteries instead of relying on power received from the game controller via a wired interface. Ex. 1005, 6:38-39 (“it is within the scope of the present invention to draw power from batteries”). Therefore, a PHOSITA would have understood that relying on a purely wireless connection between the sword and game controller would not have impacted the sword’s power supply or otherwise rendered it inoperable for its intended purpose. Ex. 1003, ¶104.

And there would have been a reasonable expectation of success when modifying *Woolston*'s sword to include Weston's transmitter. *Id.*

[32(a)(ii)] a receiver for receiving signals; and

Woolston's apparatus 200 "receive[s] data signals from the game controller 240." Ex. 1005, 6:47-50. As discussed above, *Woolston* expressly suggests utilizing a "wireless . . . control signal to provide an interface between the sword apparatus and the game controller 240," but does not expressly disclose that the wireless interface includes a receiver. *Id.* 6:58-62. As also discussed above, *Weston* teaches a wand device that receives information signals via a transponder including a "RF transmitter/receiver chip 340" enabling the wand to wirelessly receive information from a master system. *See* Claim 32(a)(i). Based on *Woolston*'s express suggestion to enable wireless communications between the apparatus 200 and game controller 240, a PHOSITA would have been motivated to include a receiver in *Woolston*'s apparatus 200 to wirelessly receive the data signals from game controller 240 as taught by *Weston*. Ex. 1003, ¶106.

A PHOSITA would have understood that enabling *Woolston*'s apparatus 200 to receive data signals wirelessly via a receiver would have been an advantageous way to avoid the need for a wire connecting it to the game controller thereby allowing the user more freedom of movement. *Id.* ¶107. A PHOSITA would have understood that allowing the user to freely move apparatus 200 would have

predictably enhanced the user's ability to participate in a virtual sword battle thereby increasing user satisfaction. *Id.* Therefore, a PHOSITA would have been motivated to include a receiver for receiving signals in *Woolston's* apparatus 200 as taught by *Weston* to improve similar communication devices in the same way. *Id.*

As opined by Dr. Welch, wireless communication devices including receivers receiving signals were well known in both motion tracking and video game systems before the priority date of the '354 Patent. *Id.* ¶46, ¶53. Moreover, *Woolston* discloses that apparatus 200 may be powered via batteries instead of relying on power received from the game controller via a wired interface. Ex. 1005, 6:38-39. Therefore, a PHOSITA would have understood that relying on a wireless connection between the apparatus 200 and game controller 240 would not have impacted the power supply of apparatus 200 or otherwise rendered it inoperable for its intended purpose. Ex. 1003, ¶108. And there would have been a reasonable expectation of success when modifying apparatus 200 to include a wireless receiver. *Id.*

[32(a)(iii)] an output device; and

Woolston's apparatus 200 includes a propulsion gyrostat 500 and a speaker 203, which are each an output device. The propulsion gyrostat 500 is “utilized to create a torque and/or the feel of sword blows on the sword handle and, thus, on the player holding the sword apparatus [200].” Ex. 1005, 2:50-54; *see id.* 2:38-41, 2:55-3:8, 4:20-29, 5:66-6:7, 7:32-8:64, Figs. 1-2. Propulsion gyrostat 500 is “‘spun’ at

sufficiently high speed in order to convey to the player, through the gyrostatic toppling effect, the desired tactile game effect and/or torque on the player.” *Id.* 4:23-26. Additionally, *Woolston* teaches “a **speaker 203 [used] to provide an audio output for game sounds.**” *Id.* 6:41-43.

[32(b)] a processing system, remote from the first hand-held communication device

Woolston’s system includes a game controller 240, which is a processing system “embodied in personal computer software and/or a personal computer hardware apparatus and/or dedicated hardware.” *Id.* 9:11-13; *see id.* 8:65-9:2. As shown in Figure 3 below, the game controller 240 is remote from the apparatus 200 (i.e., “first handheld communication device”):

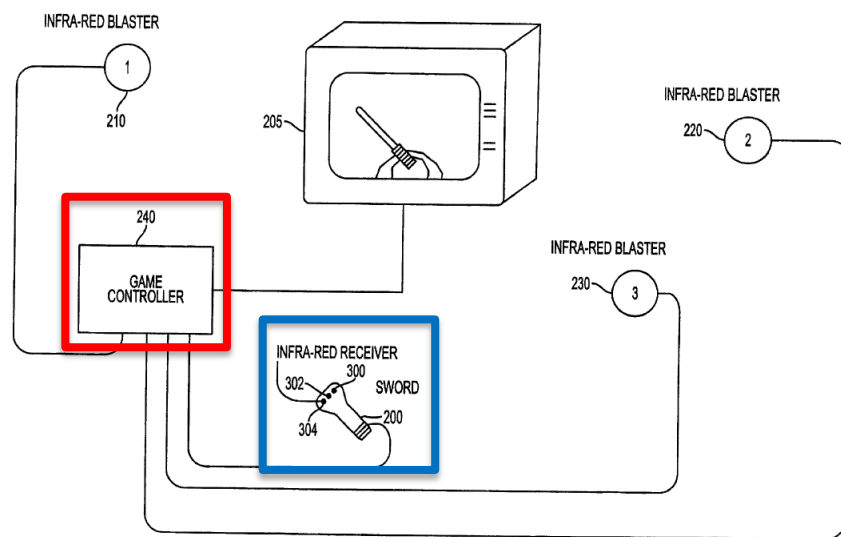


FIG. 3

Id. Fig. 3 (annotated).

To the extent Motiva alleges that the limitation “remote from the first hand-held communication device” prohibits wired connections between the processing system and first hand-held communication device, it would have been obvious to a PHOSITA to include wireless transceivers as taught by *Weston* on both the game controller 240 and apparatus 200 to remove the need for the wire coupling apparatus 200 to game controller 240 shown in Figure 3 above. *See* Claims 32(a)(i) and 32(a)(ii), 32(b)(i).

[32(b)(i)] for wirelessly receiving the signals transmitted by the transmitter,

Woolston's game controller 240 is coupled to IR receivers 210, 220 and 230, which wirelessly receive the IR emissions transmitted by the IR transmitters 300, 302, 304 of apparatus 200:

Yet another feature of the present invention is to use sensors, e.g., a receiver and/or a transmitter, on the sword apparatus and **an array of sensors, e.g., receivers** and/or transmitters, **external** and/or internal to the sword apparatus to determine the spatial attitude and/or location of the sword apparatus. In the preferred embodiment of the present invention the **sword apparatus uses infrared blasters, e.g., high output infrared transmitters** such as those found on modern universal remote television controls, **to output a pulse and/or timed emission of infrared light which may then be received at the remote sensors**, which in the preferred embodiment are infrared receivers, whereupon the timing and/or phase differential of the received signals may be used to triangulate and determine the spatial position of the sword apparatus.

Id. 3:55-4:1.

Infrared blasters, shown at 210, 220 and 230 may be reversed, that is they may be infrared receivers and the infrared blaster may be located at 300, 302 and 304. In such a configuration a single and/or multiple **infrared burst(s) may be output from 300, 302 and 304** and the timing of **receiving** or reception could be determined **at 210, 220 and 230** in order to triangulate the real position of the sword 200.

Id. 9:39-46; *see id.* 9:2-25; 9:39-46.

As discussed above, it would have been obvious to enable *Woolston's* apparatus 200 to wirelessly transmit information signals, such as attitude information, to game controller 240. *See* Claim 32(a)(i). Based on the teachings of *Weston*, it would have similarly been obvious to a PHOSITA to include a corresponding wireless receiver in *Woolston's* game controller to receive the signals transmitted by the transmitter of apparatus 200. Ex. 1003, ¶110, ¶¶113-116. *Weston* teaches a hand-held wand device wirelessly transmitting signals to a master control system 375, which is a processing system receiving the signals using a wireless transceiver 300 (i.e., transmitter and receiver):

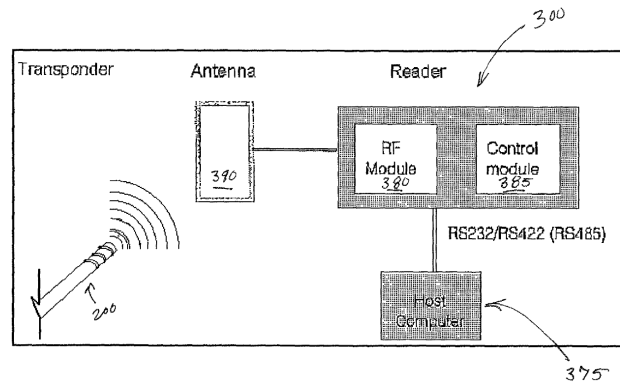


Fig. 3

Ex. 1006, Fig. 3.

If a master system is utilized, preferably **each wand 200 and/or RFID card 400, 600 is configured to electronically send and receive information to and from various receivers or transceivers 300** distributed throughout the play facility 100 **using a send receive radio frequency (“SRRF”) communication protocol. . . .** In its most refined embodiments, a **user may electronically send and receive information to and from other wands and/or to and from a master control system** located within and/or associated with any of a number of play environments, such as a family entertainment facility, restaurant play structure, television/video/radio programs, computer software program, game console, web site, etc.

Id. [0064].

Preferably, the **SRRF transceiver 300 is capable of supporting medium-to-long range (10-40 feet) two-way communications between SRRF objects and a host system, such as a PC running SRRF-compatible software.** This transceiver 300 has an integral antenna and interfaces to the host computer through a dedicated

communication port using industry standard RS232 serial communications.

Id. [0074]; *see id.* [0047].

As discussed above, *Woolston* expressly suggests enabling wireless communications between apparatus 200 and game controller 240. Therefore, a PHOSITA would have been motivated to include in *Woolston's* game controller 240 a wireless transceiver as taught by *Weston* to enable game controller 240 to wirelessly receive information signals (e.g., attitude signals) transmitted by apparatus 200. Ex. 1003, ¶¶113-114.

As with *Weston's* system, a PHOSITA would have understood that enabling *Woolston's* game controller 240 to receive data signals wirelessly via a receiver would have advantageously avoided the need for a wire connecting apparatus 200 to game controller 240, and thereby allow the user more freedom of movement. *Id.* ¶115. As discussed above, a PHOSITA would have understood that allowing the user to freely move *Woolston's* apparatus 200 would have predictably enhanced the user's ability to participate in a virtual sword battle and thereby increase user satisfaction. *Id.* Therefore, a PHOSITA would have also been motivated to include in *Woolston's* game controller 240 a receiver for receiving signals as taught by *Weston* to improve similar interactive game systems in the same way. *Id.*

As opined by Dr. Welch, wireless motion tracking and video game systems were known well before the '354 Patent. *Id.* ¶46, ¶53. A PHOSITA would have

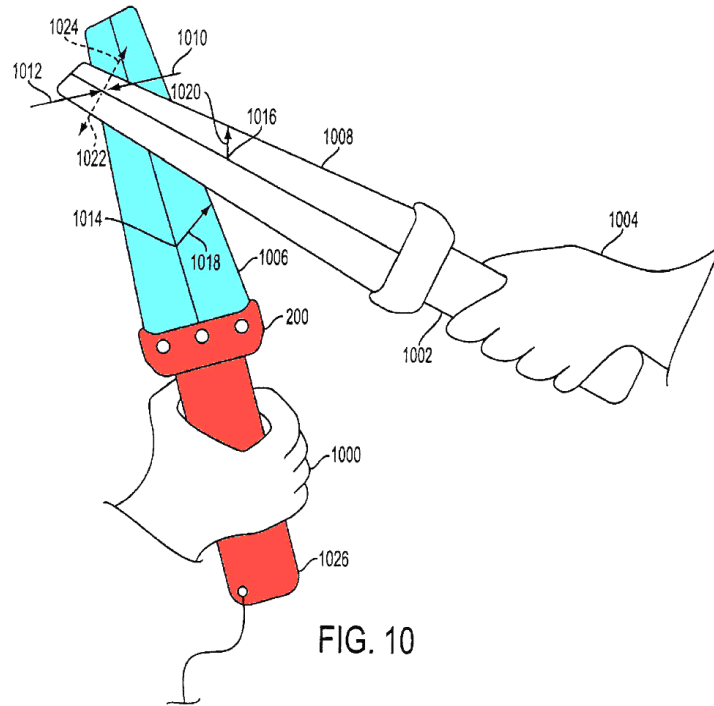
further appreciated that such a simple modification to *Woolston's* game controller 240 would not have changed the principle of operation or rendered it inoperable for its intended purposed. *Id.* ¶116. Therefore, there would have been a reasonable expectation of success when modifying *Woolston's* game controller 240 to include a wireless receiver. *Id.*

[32(b)(ii)] determining movement information for first hand-held communication device;

Woolston's game controller 240 (i.e., "processing system") determines the movement information, including position, attitude, change in position and velocity information, for first apparatus 200. Specifically, game controller 240 "track[s] the position and attitude of sword apparatus 200." Ex. 1005, 15:65-66. The position and attitude are determined via a gyroscopic inertial positioning system in apparatus 200 used to "keep the computer game apprised of the spatial attitude and/or location of the sword apparatus" (*id.* 3:49-53) and via IR transmitters on apparatus 200 that "output a pulse and/or timed emission of infrared light which may then be received at the remote sensors, which in the preferred embodiment are infrared receivers, whereupon the timing and/or phase differential of the received signals may be used to triangulate and determine the spatial position of the sword apparatus." *Id.* 3:60-4:1; *see id.* 9:13-46.

Woolston's game controller 240 uses the determined position and attitude information "to project and track the virtual blade 1006." *Id.* 15:66-16:2. As shown

in Figure 10 below, virtual blade 1006 (highlighted in blue) is a virtual sword blade that extends from the first apparatus 200 (highlighted in red) in the virtual reality game space:



Id. Fig. 10 (annotated); *see id.* 16:4-6 (“The game controller 240 software may also create and track the position of blade 1006 in the game space coordinate system.”).

Woolston’s game controller 240 also “determine[s] and track[s] the velocity of the blade 1006 by using the differential positioning method.” *Id.* 16:2-4. The differential positioning method calculates a velocity vector specifying the “speed and direction” of apparatus 200 “by successively determining the position of the player’s sword and then determin[ing] from the change in position the velocity of the sword apparatus 200.” *Id.* 10:51-56; *see id.* 10:66-11:6. Thus, game controller

240 maps the position and attitude of apparatus 200 to game space coordinates to determine the position of the virtual blade 1006 and then tracks the change in position of apparatus 200 to determine the velocity of apparatus 200 and the corresponding velocity of virtual blade 1006. Ex. 1003, ¶70.

[32(c)] a second hand-held communication device,

For the reasons discussed above, *Woolston's* apparatus 200 is a hand-held communication device. *See* Claim 32(a). Additionally, *Woolston* teaches multi-player modes, including a two-player mode with “respective sword devices” participating in virtual sword fights:

Another aspect of the present invention is the ability to **network multiple game play stations to allow virtual sword fights between multiple players** and/or the coordinated efforts of multiple participants. **In a two player mode**, conventional modem means may be used to **connect game stations in a back-to-back configuration**. Telemetry between the game stations may be used to convey positional, attitudinal and inertial mass, explained further below, of the **respective sword devices between game stations**.

Ex. 1005), 5:8-16.

A PHOSITA would understand that in *Woolston's* multi-player mode, each player holds a respective apparatus 200 (i.e., a first player holding the first apparatus 200 and a second player holding a second apparatus 200). Ex. 1003, ¶119.

[32(c)(i)] in wireless communication with the processing system

Woolston teaches a networked, multiplayer embodiment where each apparatus 200 communicates with a corresponding local game processing system, which in turn communicates with other game processing systems remotely over “a TCP/IP network such as the Internet.” Ex. 1005, 15:29-37; Fig. 9A. *Woolston* is silent with regard to a local multiplayer embodiment where each apparatus 200 communicates directly with the same game controller 240 (i.e., “the processing system”).

Weston teaches an interactive game system where multiple wand devices wirelessly transmit and receive information from the same master control system. In particular, *Weston* teaches that “multiple play participants, each provided with a suitable ‘wand’ and/or tracking device, may play and interact together, . . . within . . . the play environment” Ex. 1006 [0007]. The play environment may be a local, computer/TV generated environment. *Id.* Each wand “enabl[es] a trained user to electronically send and receive information to and from other wand toys and/or to and from . . . a master control system.” *Id.* [0008]; *see id.* [0067] (“A typical entertainment facility provided with SRRF technology may allow 300-400 or more users to more-or-less simultaneously send and receive electronic transmissions to and from the master control system using a magic wand or other SRRF-compatible tracking device.”).

Based on the teachings of *Weston*, it would have been obvious to a PHOSITA to modify *Woolston*'s system to enable a local multiplayer embodiment where both the first and second sword apparatuses wirelessly transmit and receive signals to/from the same game controller 240. Ex. 1003, ¶124. A PHOSITA would have understood that most video game systems at the time of the '354 Patent included a local multiplayer feature, and users would have expected this feature to be available on *Woolston*'s system. *Id.* Moreover, a PHOSITA would have understood that the local multiplayer implementation would not suffer from the same network latency problems as the networked multiplayer implementation. *Id.* ¶125. As explained by Dr. Welch, networked games – especially real-time “twitch” games – were sensitive to high network latency due to the rapid occurrence of events in the game. *Id.* (citing Ex. 1024). It was understood that high network latency would severely impact the game's performance and frustrate players. *Id.* ¶126. Enabling *Woolston*'s game controller 240 to wirelessly communicate directly with two local apparatuses would have completely alleviated these problems and predictably made the system more responsive and less prone to failures. *Id.* ¶127. For these reasons, a PHOSITA would have been motivated to enable the game controller 240 to wirelessly communicate directly with both the first and second apparatuses in the multiplayer embodiment in order to improve similar game systems in the same way. *Id.*

A PHOSITA would have understood that enabling *Woolston's* game controller 240 to wirelessly communicate with both the first and second apparatuses would not have changed the principle of operation of *Woolston's* interactive game system. *Id.* ¶128. Namely, this modification would have still resulted in an interactive game system enabling the player to input velocity and position information into an electronic game and receive physical feedback. *Id.* (citing Ex. 1005, 1:5-9)). Thus, there would have been a reasonable expectation of success when modifying *Woolston's* system in this way. *Id.*

[32(c)(ii)] said second hand-held communication device, comprising a transmitter for transmitting signals;

As discussed above, *Woolston* teaches a two-player mode where each player holds a respective apparatus 200. *See* Claim 32(c). The second apparatus 200 includes an IR transmitter for transmitting IR signals for the same reasons as discussed above with regard to the first apparatus 200. *See* Claim 32(a)(i). Alternatively, it would have been obvious to a PHOSITA to include a transmitter in *Woolston's* wireless interface to enable the second apparatus 200 to wirelessly transmit signals as taught by *Weston* for the same reasons as discussed above. *Id.*; Ex. 1003, ¶121.

[32(d)(i)] wherein the processing system is adapted to determine movement information of the second hand-held communication device and

When in networked, multi-player mode, *Woolston's* game controller 240 determines the second apparatus's movement information by periodically receiving a packet including its position, attitude, and velocity information (Fig. 9B) and uses this information "to generate a virtual opponent having a virtual sword representation that is mapped into the game space." Ex. 1005, 15:37-49.

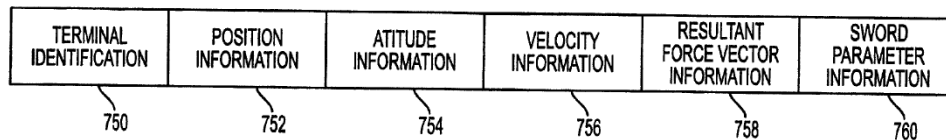


FIG. 9B

Id. Fig. 9B; *see id.*16:6-17; Fig. 10.

For the reasons discussed above, it would have been obvious to a PHOSITA to modify *Woolston's* game controller 240 to wirelessly communicate directly with both the first and second apparatuses 200 in order to enable local, multiplayer gameplay. *See* Claim 32(c)(i). Moreover, a PHOSITA would understand that game controller 240 would need to determine the movement information of second apparatus 200 in order "to generate a virtual opponent having a virtual sword representation." Ex. 1003, ¶130. A PHOSITA expects game controller 240 to perform the same routines for both the first and second apparatuses 200 to ensure that each player has a consistent gameplay experience. *Id.* Thus, a PHOSITA would have been motivated to enable game controller 240 to determine the position,

attitude, change in position, and velocity of the second apparatus 200 in the same way as this information is determined for the first apparatus 200. *See* Claim 32(b)(ii); Ex. 1003, ¶130.

This modification would have predictably resulted in game controller 240 determining the movement information of both the first and second apparatuses 200, and thereby enable two local players to participate in a virtual sword battle game. *Id.* ¶131. Therefore, there would have been no change to *Woolston's* principle of operation and there would have been a reasonable expectation of success. *Id.*

[32(d)(ii)] send feedback data to the user based on the movement information of the first and second hand-held communication devices;

Woolston's game controller 240 “determine[s] when the position information of blade 1006 [first apparatus] and the position information of blade 1008 [second apparatus] indicates a collision of the blades by tracking the area from line 1014 which has a radius 1018 and the area from line 1016 which has a radius 1020 and logically comparing the points to determine whether there is an intersection.” Ex. 1005, 16:8-14, Fig. 10. If an intersection is detected, the game controller 240 software passes the intersection point to the procedures described in Figs. 5, 6 and 7. *Id.* 16:14-17; *see id.* 5:44-46 (Fig. 5 depicts “a routine called from game software”); 6:62-63 (“The control functions and/or parts of the control function may be moved to game controller 240”); 15:19-28.

The routine of Fig. 5 uses the first and second apparatuses' movement information "to calculate a simulated sword blow." *Id.* 13:21-22; *see, id.* Fig. 5. Specifically, the routine receives the intersection/impact point and the attacking (i.e., second) sword's velocity as input (step 520). *Id.* 10:28-31. After determining the position of the first apparatus in step 524, the velocity vector of the first apparatus 200 is calculated in step 526 "by successively determining the position of the player's sword and then determine from the change in position the velocity of the [first] sword apparatus 200." *Id.* 10:51-56. In step 530, the same position and velocity vector calculations are performed for the "attacking" (i.e., second) sword apparatus. *Id.* 11:3-6. This information is used to calculate a "blow torque vector" as follows:

"[C]alculated blow/return blow torque vector" is a product of the two vectors, that is, the vector providing the [first] player's sword direction and force at the impact point and the [second] attacking sword vector providing the direction and force of the impact point idealized at right after impact. The product of the two vectors may provide the resulting direction and speed of the two swords by the calculation between two idealized objects when the equation for the conservation of momentum and/or energy is applied. That is $m_1 v_1 + m_2 v_2 = m_1 v_1(t+1) + m_2 v_2(t+1)$. *Id.* 11:22-32.

The torque vector output by the procedure of Fig. 5 is used by the procedure of Fig. 6 "to calculate the actual values of the torque outputs for the pitch and yaw

gyrostat toppling motors that provides the simulated impact of the sword at the player's [first] sword apparatus 200." *Id.* 11:41-45, *see id.* Fig. 6. In step 548, the value of the torque for output to controllers 404 and 406 is calculated, and in step 550, the calculated torque values are output (i.e., sent) "to a predetermined memory location in controller 401...." *Id.* 12:17-32. Feedback controller 401 is in apparatus 200 and is "used in conjunction with drive circuits at 402, 404 and 406 to provide the voltages and currents necessary to provide the energy for rotation of the propulsion gyrostat motor 20 and/or 22 (not shown) and toppling motors 30, 35, 40 and 50." *Id.* 9:49-54; Fig. 4. The torque values are later used "to determine a tracking voltage and/or voltages to create the toppling torque for the propulsion gyrostat 10" in order to provide tactile feedback to the user. *Id.* 13:55-57. Thus, game controller 240 calculates torque output values (i.e., feedback data) based on the movement information of the first and second apparatuses and sends the torque values to the feedback controller 401 of first apparatus 200 in order to provide tactile feedback to the user.

[32(e)(i)] wherein the first hand-held communication device is adapted to receive and process the feedback data and

Woolston's apparatus 200 includes a communication interface allowing it to "receive data signals from the game controller 240." *Id.* 6:50. As discussed above with regard to the previous limitation, the first apparatus 200 receives data signals such as the torque output values (i.e., feedback data) calculated by game controller

240, which are then stored in the memory of the apparatus's local feedback controller 401. *See* Claim 32(d)(ii). The apparatus's control circuits 499, which include feedback controller 401, "contain the processing elements necessary for control and/or execution of software and/or software elements to effect control of the sword apparatus of the present invention." *Id.* 6:59-62. For instance, the torque output values are combined with other variables to generate "torque voltages 1 and torque voltages 2," which are output by feedback controller 401 to "torque motor controllers 404 and 406." *Id.* 13:58; Figs. 4, 7.

[32(e)(ii)] generates sensory stimuli for the user based on the received data and delivered through the output device; and

Woolston's apparatus 200 generates sensory stimuli in the form of tactile feedback, which is delivered through the propulsion gyrostad based on the received torque output values. As discussed with regard to the limitations above, "torque voltages 1 and torque voltages 2" are calculated based on the torque output values received from the game controller (i.e., the received data). *See* Claims 32(e)(i). Once torque motor controllers 404 and 406 receive "torque voltages 1 and torque voltages 2 . . . [t]hese torque voltages are used to topple the propulsion gyrostad 10 of the present invention to provide the gyrostatic effect of the sword apparatus 200." *Id.* 13:57-61.

[32(f)] wherein the movement information of the first and second hand-held communication devices are used to control a graphical object on a display screen.

Woolston's game controller 240 projects a “a virtual reality and/or the game reality space” on “a television and/or display 205” *Id.* 8:65-9:2.

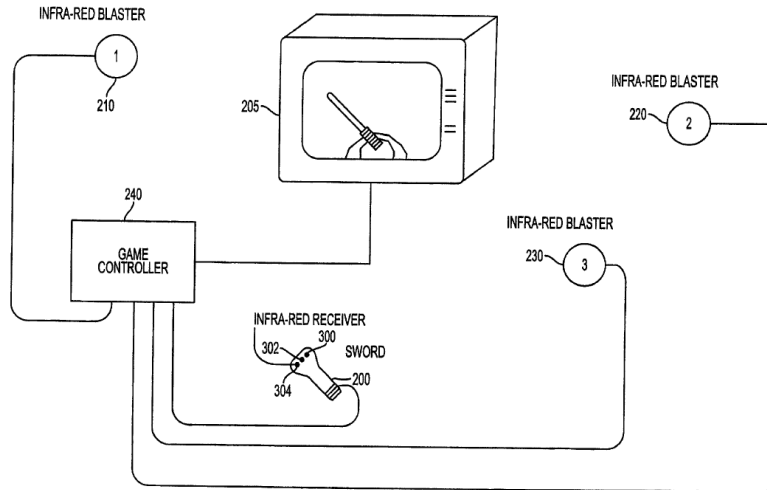
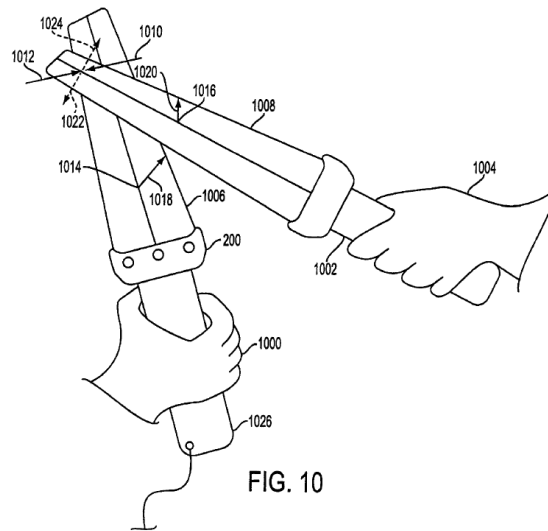


FIG. 3

Id. Fig. 3.

Woolston's game controller 240 uses the movement information of the first and second apparatuses to control a virtual sword battle displayed on screen 205. For example, *Woolston's* Fig. 10 below depicts a virtual representation generated by game controller 240 of a sword battle between player 1000 holding the first sword with a virtual blade 1006 (i.e., “a graphical object”) and an opponent 1004 holding the second sword with a second virtual blade 1008 (i.e., a graphical object”). *Id.* 15:58-65.



Id. Fig. 10.

To generate the representation in Fig. 10, game controller 240 “track[s] the position and attitude of [first] sword apparatus 200” and uses this information “to project and track the virtual blade 1006” and “track the velocity of the blade 1006.”

Id. 15:66-16:4. Game controller 240 similarly “create[s] and track[s] the position of blade 1008” of the second apparatus by using the second apparatus’s position, attitude, and velocity information. *Id.* 16:6-8, 15:47-49. Thus, movement of the first apparatus controls virtual blade 1006 and movement of the second apparatus controls virtual blade 1008 displayed on screen 205 in Fig. 3 above.

ii. Claim 49

49. A system for a user to play a video game, comprising:

See Claim 32 preamble.

[49(a)] a first hand-held communication device comprising:

See Claim 32(a).

[49(a)(i)] a transmitter for transmitting signals;

See Claim 32(a)(i).

[49(a)(ii)] a receiver for receiving signals; and

See Claim 32(a)(ii).

[49(a)(iii)] an output device; and

See Claim 32(a)(iii).

[49(b)] a processing system, remote from the first hand-held communication device,

See Claim 32(b).

[49(b)(i)] adapted to wirelessly receive the signals transmitted by the transmitter,

See Claim 32(b)(i).

[49(b)(ii)] to determine movement information for the first hand-held communication device;

See Claim 32(b)(ii).

[49(c)] wherein the movement information of the first hand-held communication device controls the movement of at least one object in a computer generated virtual environment;

As discussed above, *Woolston's* game controller 240 uses the movement information of the first apparatus 200 to control the movement of a virtual sword blade 1006 in a computer-generated virtual environment. *See Claim 32(f).*

[49(d)(i)] wherein the first hand-held communication device is adapted to receive and process the received data signals and

As discussed above, *Woolston*'s first apparatus 200 receives data signals such as the torque output values calculated by game controller 240, which are then stored in the memory of the apparatus's local feedback controller 401. *See* Claim 32(d)(ii). The first apparatus's control circuits 499 process the received torque output values to generate "torque voltages 1 and torque voltages 2." *See* Claim 32(e)(i).

[49(d)(ii)] generate sensory stimuli for the user, based on the received data signals and delivered through the output device; and

See Claim 32(e)(ii).

[49(e)(i)] wherein the processing system is adapted to determine the three-dimensional position of the first hand-held communication device and

As discussed previously, *Woolston*'s apparatus 200 includes IR transmitters 300, 302, 304 that "output a pulse and/or timed emission of infrared light" that is received by an array of remote IR receivers coupled to game controller 240 (i.e., the processing system) "whereupon the timing and/or phase differential of the received signals may be used to triangulate and determine the spatial position of the sword apparatus." Ex. 1005, 3:60-4:1; *see id.* 5:25-35, 9:2-25, 9:39-46, Figs. 1, 3. The game controller is able to "detect the position of a sword and/or **the spatial coordinates of X, Y and Z**" (i.e., three-dimensional position) using the aforementioned positional tracking. *Id.* 7:29-30.

[49(e)(ii)] wherein the object is controlled in a virtual three-dimensional environment.

As discussed above, *Woolston*'s virtual sword blade 1006 (i.e., "the object") is controlled in a virtual environment. See Claim 49(c). *Woolston*'s virtual environment may be "a **three dimensional representation** of the virtual playing field" presented to the user via "virtual reality glasses and/or helmet . . . us[ing] two displays stereoscopically disposed in front of a player's eyes" *Id.* 9:25-36

iii. Claim 50

50. A system for a user to play a video game, comprising:

See Claim 32 preamble.

[50(a)] a first hand-held communication device comprising:

See Claim 32(a).

[50(a)(i)] a transmitter for transmitting signals;

See Claim 32(a)(i).

[50(a)(ii)] a receiver for receiving signals; and

See Claim 32(a)(ii).

[50(a)(iii)] an output device; and

See Claim 32(a)(iii).

[50(b)] a second hand-held communication device,

See Claim 32(c).

[50(b)(i)] the second hand-held communication device comprising a transmitter for transmitting signals; and

See Claim 32(c)(ii).

[50(c)] a processing system, remote from the first hand-held communication device,

See Claim 32(b).

[50(c)(i)] adapted to wirelessly receive the signals transmitted by the transmitters of the respective communication devices,

For the reasons discussed above, *Woolston* and/or *Woolston* in view of *Weston* teach a processing system adapted to wirelessly receive the signals transmitted by the transmitter of the first apparatus 200. *See Claim 32(b)(i).* For the reasons discussed above, it would have also been obvious to enable *Woolston's* game controller 240 to wirelessly receive signals transmitted by the transmitter of the second apparatus 200. *See Claim 32(c)(i).*

[50(c)(ii)] to determine movement information for each of the respective communication devices, and

See Claims 32(b)(ii) (processing system determines movement information for the first apparatus 200) and 32(d)(i) (processing system determines movement information for the second apparatus 200).

[50(c)(iii)] to send data signals to the receiver to provide feedback data to the user;

As discussed above, *Woolston's* game controller 240 sends data signals, such as the torque output values, which are received and stored in the memory of the

apparatus's local feedback controller 401. *See* Claims 32(d)(ii), 32(e)(i). The torque output values are used to provide feedback data to the user. *Id.*

[50(d)(i)] wherein the first hand-held communication device is adapted to receive and process the received data signals and

See Claim 32(e)(i).

[50(d)(ii)] generate sensory stimuli for the user, based on the received data signals and delivered through the output device;

See, Claim 32(e)(ii).

[50(e)] wherein the movement information of the first and second hand-held devices are used to control a graphical object on a display screen; and

See Claim 32(f).

[50(f)] wherein the system is interactive and responds to verbal command input from the user.

Woolston discloses “an electronic interactive sword game.” Ex. 1005, 2:44. However, *Woolston* is silent with regard to responding to verbal command input from the user. *Weston* teaches a similar interactive game system including a hand-held wand device “configured to respond to other signals such as . . . voice commands as will be readily apparent to those skilled in the art.” Ex. 1006, [0050].

It would have been obvious to a PHOSITA to similarly enable *Woolston*'s interactive game system to respond to voice/verbal command input from the user as taught by *Weston*. Ex. 1003, ¶133. Interactive systems responding to verbal command input from the user were well known prior to the '354 Patent. *Id.*, ¶45,

¶133. Moreover, the benefits of enabling the user to interact with game systems via verbal commands were well established as a way to reduce player frustrations and increase user friendliness. *Id.* ¶¶86-88, ¶¶133-134. A PHOSTA would have understood that in a physical game such as *Woolston's* sword fighting game where the user is rapidly moving apparatus 200 around, allowing the user to input verbal commands instead of requiring the user to press buttons or actuate other input devices would have been a more convenient way to enable the user to interact with the game. *Id.* ¶135. This is because allowing the user to verbally control the system without taking their fingers, hands, or eyes off the apparatus 200/screen 205 would have predictably reduced or eliminated the cognitive load associated with remembering and accurately affecting button combinations. *Id.* This enhancement would have further increased the interactivity of *Woolston's* interactive game system and created a more immersive experience for the user. *Id.* ¶136. For these reasons, a PHOSITA would have been motivated to modify *Woolston's* interactive game system to respond to verbal command input from the user as taught by *Weston*. *Id.* ¶137.

Modifying *Woolston's* system to respond to verbal command input from the user would not have changed the system's principal of operation or rendered it inoperable for its intended purpose. *Id.* ¶138. Therefore, there would have been a

reasonable expectation of success when modifying Woolston's system to respond to verbal command input from the user as taught by Weston. *Id.*

iv. Claim 58

58. A system according to claim 50, wherein: the processing system is adapted to determine position information for each of the respective communication devices.

As discussed above, *Woolston's* processing system determines the movement information, including position information, of the first apparatus. *See* Claims 32(b)(ii), 49(e)(i). For the reasons discussed above, it would have been obvious to a PHOSITA to enable *Woolston's* game controller 240 to also determine the movement information, including the position, of the second apparatus in the same manner as it determines the position of the first apparatus. *See* Claim 32(d)(i).

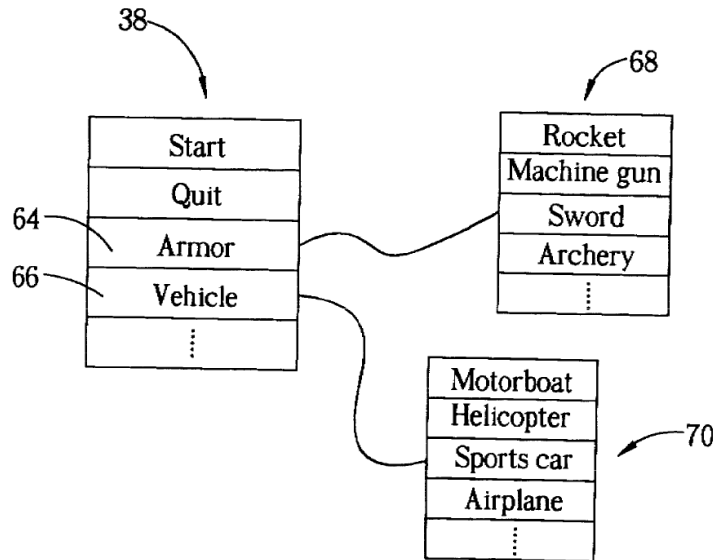
B. Ground 2: Woolston, Weston, and Wang Render Claim 33 Obvious

Wang issued on September 24, 2002 and therefore qualifies as prior art with regard to the '354 Patent under 35 U.S.C. § 102(b) (pre-AIA). Ex. 1007. *Wang* was not considered during prosecution of the '354 Patent and discloses a video game system including "a voice control module for controlling a game controller" *Id.* Abstract. Since *Wang* is directed to a video game system, it is in the same field of endeavor and is analogous to the '354 Patent.

i. Claim 33

33. The video game system of claim 32, wherein the system is interactive and responds to verbal command input from the user to modulate an activity.

For the reasons discussed above, *Woolston* and *Weston* render Claim 32 obvious. *Wang* teaches a video game system that enables the user to control aspects of a game using voice commands. Specifically, the user of *Wang* speaks into a microphone and “the input voice signals are compared with pre-existent commands stored in the memory.” Ex. 1007, 1:31-35. If the input voice signal matches a stored command, “the corresponding command will be executed.” *Id.* 1:35-37. Examples of commands include “switch command 64 ‘**change weapon**’ [that] corresponds to the game command file 68 which contains game commands such as ‘rocket’ and ‘machine gun’, and the switch command 66 ‘**change vehicle**’ [that] corresponds to a game command file 70 which contains game commands such as ‘motorboat’ and ‘helicopter’.” *Id.* 4:24-30.



Id. Fig. 5.

For the reasons discussed above, the limitation “responds to verbal command input from the user to modulate an activity” must at least include responding to verbal command input from the user to “vary any attribute of an activity.” *See* Section III.C. As shown above, *Wang’s* voice control module responds to verbal commands input from the user to vary attributes of the game (i.e., “activity”), such as changing a selected weapon or vehicle. Therefore, *Wang* teaches this limitation.

For the reasons discussed above, it would have been obvious to enable *Woolston’s* interactive game system to respond to verbal commands input by the user as taught by *Weston*. *See*, Claim 50(f). It would have been obvious to a PHOSITA to further modify *Woolston’s* system to respond to verbal commands input from the user to vary game attributes as taught by *Wang*. Ex. 1003, ¶¶140-141. *Wang* acknowledges that “while engrossed in game play, a user may

inadvertently press the wrong button as he is unable to watch the keypad and the screen at the same time . . . [which] disrupts game play and causes user frustration.”

Ex. 1007, 1:19-22. A PHOSITA would have understood that a user of *Woolston*’s game system would similarly be engrossed in the virtual battle and would benefit from verbal input of commands to vary attributes of the game, such as changing a selected weapon. Ex. 1003, ¶141. Therefore, enabling the user of *Woolston*’s game system to vary attributes of the game (e.g., change the weapon used) via verbal commands, as taught by Wang, would predictably reduce user frustrations and improve similar video game systems in the same way. *Id.* Again, this modification would not have changed the principle of operation of *Woolston*’s system in any way or rendered it inoperable for its intended purpose. *Id.* ¶142. Therefore, there would have been a reasonable expectation of success when modifying *Woolston*’s system to vary attributes of the game based on verbal input from the user. *Id.*

C. Ground 3: *Woolston, Weston, and Glynn* Render Claims 56 and 57 Obvious

Glynn issued on January 19, 1993 and therefore qualifies as prior art with regard to the ’354 Patent under 35 U.S.C. § 102(b) (pre-AIA). Ex. 1008. *Glynn* was not considered during prosecution of the ’354 Patent. *Glynn* discloses a motion tracking system where the user provides inputs to a computer via the movement of a wireless, handheld mouse. *Id.* Abstract; 2:62-68. The mouse includes accelerometers and rotational rate sensors that “simultaneously senses all six degrees

of motion of the translation along, and rotation about, three mutually perpendicular axes of a Cartesian coordinate system.” *Id.* 6:13-18. “Information regarding the sensor signals is then provided to mouse transceivers 7-12 for communication to the computer transceiver 22.” *Id.* 6:40-43. The computer uses position, motion, and attitude of the mouse to control “movement of a cursor, represented on a computer display in terms of three-dimensional spatial coordinates.” *Id.* 2:50-60. Since *Glynn* describes a motion tracking system, it is in the same field of endeavor and is analogous to the ’354 Patent. Since the inventors of the ’354 Patent sought an untethered motion tracking system (Ex. 1001, 1:33-37), *Glynn*’s disclosures of a wireless motion tracking system would have “logically commend itself” to an inventor’s attention in considering his problem and is therefore reasonably pertinent and analogous to the ’354 Patent for this reason as well.

i. Claim 56

56. A system according to claim 50, wherein: the first hand-held communication device comprises a user input device adapted for communication with the processing system through the transmitter.

For the reasons discussed above, *Woolston* and *Weston* render Claim 50 obvious. *See* Section IV.A at Claim 50. *Woolston*’s apparatus 200 includes a switch 201, which is depressed by “the user . . . in order for power to be imparted to the torque propulsion unit.” Ex. 1005, 7:20-21. However, *Woolston* does not expressly

disclose whether the switch 201 inputs are adapted for communication with game controller 240.

As discussed above, *Glynn* teaches a motion tracking system where the user provides inputs to a computer via the movement of a wireless, handheld mouse. Ex. 1008, Abstract; 2:62-68. *Glynn*'s mouse includes "a plurality of push-buttons 4, 5 and 6 for additional interaction of the operator with the host computer system." *Id.* 5:26-28. "The push-buttons may be used, for example, to provide special command signals to the computer . . . [that] are **transmitted through the interface ports 7-12** . . . to the computer." *Id.* at 5:28-32. Interface ports 7-12 are wireless transceivers used to transmit data to "transceiver 22 associated with a computer 23." *Id.* 6:32-37; Fig. 3. Thus, *Glynn* teaches push-buttons 4, 5 and 6 (i.e., user input devices) adapted for communication with the computer (i.e., processing system) through transceivers 7-12.

It would have been obvious to a PHOSITA to modify *Woolston*'s apparatus 200 to include pushbuttons used to provide command signals to game controller 240 through the transmitter, as taught by *Glynn*. Ex. 1003, ¶145. As acknowledged by *Glynn*, a PHOSITA would understand that a user would need to interact with *Woolston*'s game controller 240 in more ways than just via the movements of apparatus 200. *Id.* For example, the user would need a way to communicate game menu selections, to pause or end the game, etc., and input mechanisms such as

pushbuttons and voice input (discussed above) would offer complementary mechanisms for communicating with game controller 240. *Id.* Therefore, a PHOSITA would have been motivated to modify *Woolston's* apparatus 200 to include pushbuttons adapted to communicate with game controller 240 through the transmitter (*supra* at Claim 32(a)(i)). *Id.* Pushbuttons, such as taught by *Glynn*, were a common and predictable way of providing inputs to computer systems for many years prior to the '354 Patent. *Id.* ¶146. Therefore, there would have been a reasonable expectation of success when modifying *Woolston's* apparatus 200 in this way. *Id.*

ii. Claim 57

57. A system according to claim 56, wherein: the user input device is adapted for calibrating the first communication device to establish a reference position.

Glynn teaches using pushbuttons to provide special command signals to the computer. *See* Claim 56. One such pushbutton command causes “the system to reset the **zero reference point** from which the relative **position and attitude** of the mouse 1 is measured.” Ex. 1008, 5:47-50. Since *Glynn's* “zero reference point” includes both a position and attitude, it encompasses a “reference position.” Ex. 1003, ¶148.

Woolston discloses: “It is understood that the game has a suitable calibration mode for configuring the sensor array.” Ex. 1005, 9:46-47. *Woolston* also discusses “encourag[ing] the player to re-center the sword 200 and/or to keep the sword 200

in a predetermined playing field of the game.” *Id.* 9:36-39. However, *Woolston* does not provide specific details for the calibration or re-centering processes.

It would have been obvious to a PHOSITA to include a pushbutton on *Woolston*’s sword apparatus 200 adapted for calibrating the apparatus to establish a zero-reference point as taught by *Glynn*. Ex. 1003, ¶149. A PHOSITA would understand that since the sensing components (e.g., IR receivers) are external to apparatus 200 (e.g., fixed in the environment), the attitude and/or location of apparatus 200 will always be estimated with respect to the environment. *Id.*

Without a calibration to establish a zero-reference point as taught by *Glynn*, the game in *Woolston* could start with the virtual opponent appearing behind the user, for example. *Id.* In contrast, a calibration of *Woolston*’s system to establish a zero-reference point (with respect to the external environment) would allow the system to “re-center the sword” as described by *Woolston*—to always place the virtual opponent in front of the user, no matter which way the user is actually facing when they start the game. *Id.* Allowing the user to press a button to re-calibrate the reference position ensures that the user is able to easily recalibrate the system as needed. *Id.* ¶150. For these reasons, a PHOSITA would have been motivated to modify *Woolston*’s apparatus 200 to include a pushbutton adapted for calibrating the apparatus to establish a zero-reference point to enable the user to easily calibrate the position tracking system and ensure proper operation. *Id.*

A PHOSITA would have appreciated that this modification would not have changed *Woolston*'s principle of operation or rendered it inoperable. *Id.* ¶151. Since *Woolston* expressly discloses the need to calibrate the position tracking system and re-center the sword, there would have been a reasonable expectation of success when implementing *Glynn*'s reference point calibration process in *Woolston*'s interactive game system. *Id.*

D. Ground 4: *Woolston, Daniel, and Glynn* Render Claims 63, 72, and 73 Obvious

Daniel was filed on November 7, 2002 claiming priority to U.S. Provisional Application No. 60/397,092 (“*Daniel Provisional*”), which was filed on July 18, 2002. Ex. 1009. With an effective filing date of July 18, 2002 and a publication date of January 22, 2004, *Daniel* qualifies as prior art with regard to the '354 Patent under 35 U.S.C. §§ 102(a) and (e) (pre-AIA). In the event that Motiva attempts to show that the '354 Patent is entitled to a priority date prior to November 7, 2002, but subsequent to July 18, 2002, Petitioner will show that the *Daniel Provisional* provides support for *Daniel* under 35 U.S.C. §112(1). Petitioner has no burden to establish that *Daniel* is entitled to the earlier July 18, 2002 priority date unless and until Motiva makes an argument that the '354 Patent is entitled to a priority date preceding November 7, 2002. *See Dynamic Drinkware, LLC v. National Graphics, Inc.*, 800 F.3d 1375, 1381 (Fed. Cir. 2015) (“[Petitioner] did not have the burden of

producing evidence relating to the [prior art] provisional application until after [Patent Owner] made its argument regarding reduction to practice.”).

Daniel describes “an input device that is held by a user and provides tactile feedback to a user to simulate a hand-based activity.” *Id.* [0031]. The system “capture[s] data regarding a user’s hand movements,” such as “finger movements, e.g., bending of fingers and thumbs, flexing of fingers and thumbs, etc.” and “the movement of the whole hand by the arm.” *Id.* [0032]. “These movements are translated and then transferred to a computing system to initiate a command, respond to a query, provide a command, maneuver objects in an interactive video game, etc.” *Id.*; *see id* [0043] (“The game detects the user gripping the controls by a combination of fingertip pressure and finger flex information and then **tracks the motion and/or orientation of the hand** to interpret the manipulation of the physical controls.”). The computing system is “a computer, or a game console [such as] a PLAYSTATION™ game console.” *Id.*[0033]. Since *Daniel* is directed to a video game system that tracks the user’s movement, it is in the same field of endeavor and is analogous to the ’354 Patent.

i. Claim 63

63. A system for a user to play a video game, comprising:

See Claim 32 preamble.

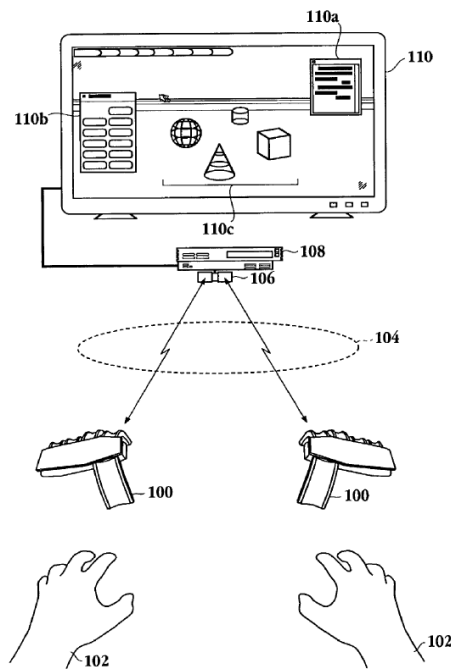
[63(a)] a first hand-held communication device comprising:

See Claim 32(a).

[63(a)(i)] a transmitter for transmitting signals;

As discussed above, *Woolston's* apparatus 200 includes IR transmitters that “output a pulse and/or timed emission of infrared light” and qualify as “a transmitter for transmitting signals.” See Claim 32(a)(i).

Alternatively and to the extent the Board finds *Woolston's* IR pulses are not “signals” within the meaning of the '354 Patent, *Daniel* teaches a hand-held communication device 100 including a transmitter/receiver 118 that transmits signals from sensors 114 to a computing device 108:



Id. Fig. 2; [0038] (“Line extensions 114a-114e are configured to sense the flex or degree of bend of a finger or thumb. The flex or degree of bend is communicated to **transmitter/receiver 118** where the signal is translated into a command that is

subsequently **transmitted to a computing device** in one embodiment. Of course, the signal can be communicated directly to transmitter/receiver 118 without being translated.”); *see id.* Fig. 3, [0045].

Given *Woolston’s* suggestion to utilize a “wireless . . . control signal to provide an interface between the sword apparatus and the game controller 240,” a PHOSITA would have been motivated to modify *Woolston’s* apparatus 200 to include a transmitter for transmitting signals as taught by *Daniel*. Ex. 1003, ¶153, ¶¶156-160. For example, a PHOSITA would have appreciated that attitude signals output by the device’s positional device element 600 would be transmitted to the game controller running the game software tracking the device’s movements. *Id.* ¶156. Transmitting the attitude signals wirelessly via *Daniel’s* transmitter would have been a reliable and predictable way to communicate this information to the game controller. *Id.* ¶157.

Moreover, the benefits of not hindering the user’s movements with wires were well-known in the field of motion tracking systems well before the ’354 Patent. *Id.* ¶158. For example, *Daniel* teaches that the input device’s “short range radio technology” permits “unrestricted placement of the input device during operation.” Ex. 1009, [0039]. Additionally, the ’354 Patent specification references prior art motion tracking systems utilizing “wireless communication means to remotely transmit and process the information and allow for greater mobility and range of

movement.” Ex. 1001, 1:33-37; *see* Ex. 1003, ¶158. A PHOSITA would have understood that wirelessly transmitting signals via a transmitter would have been an advantageous way to avoid the need for a wire connecting the apparatus 200 to the game controller 240 thereby allowing the user more freedom of movement. Ex. 1003, ¶159. A PHOSITA would have understood that allowing the user to freely move *Woolston’s* apparatus 200 would have predictably enhanced the user’s ability to participate in a virtual sword battle and increased user satisfaction. *Id.* ¶160. Therefore, a PHOSITA would have also been motivated to include a transmitter for transmitting signals in *Woolston’s* apparatus 200 as taught by *Daniel* to improve similar hand-held communication devices in the same way. *Id.* For the reasons discussed above, there would have been a reasonable expectation of success when modifying *Woolston’s* apparatus 200 to include a wireless transmitter. *See* Claim 32(a)(i); Ex. 1003, ¶161.

[63(a)(ii)] a receiver for receiving signals; and

Woolston’s sword “receive[s] data signals from the game controller 240” Ex. 1005, 6:47-50. As discussed above, *Woolston* suggests utilizing a “wireless . . . control signal to provide an interface between the sword apparatus and the game controller 240,” but does not expressly disclose that the wireless interface is used to receive data signals from game controller 240. *Id.* 6:58-62. Based on *Woolston’s* express suggestion to enable wireless communications between the apparatus 200

and game controller 240, a PHOSITA would have been motivated to include a receiver in *Woolston's* apparatus 200 to wirelessly receive the data signals from game controller 240 as taught by *Daniel*. Ex. 1003, ¶163.

As discussed above, *Daniel* teaches a similar hand-held communication device 100 including a “transmitter/receiver 118.” See Claim 63(a)(i). The receiver 118 is used “**for receiving signals** from an external device, such as computing device 108 of FIG. 2.” Ex. 1009, [0036]; [0033] (“For exemplary purposes, communication of the radio signals can be done using standards such as BLUETOOTH, or other suitable wireless technology (e.g., such as IEEE 802.11).”); Figs. 2-3, [0045].

A PHOSITA would have understood that enabling *Woolston's* apparatus 200 to receive data signals wirelessly via a receiver would have been an advantageous way to avoid the need for a wire connecting the sword to game controller 240 and thereby allow the user more freedom of movement. Ex. 1003, ¶164. As discussed above, a PHOSITA would have understood that allowing the user to freely move *Woolston's* sword would have predictably enhanced the user's ability to participate in a virtual sword battle thereby increasing user satisfaction. *Id.*; see Claim 63(a)(ii). Therefore, a PHOSITA would have been motivated to include in *Woolston's* apparatus 200 a receiver for receiving signals as taught by *Daniel* to improve similar communication devices in the same way. Ex. 1003, ¶164. For the reasons discussed

above, there would have been a reasonable expectation of success when modifying *Woolston's* apparatus 200 to include a wireless receiver. *Id.* ¶165; *see* Claim 32(a)(ii)

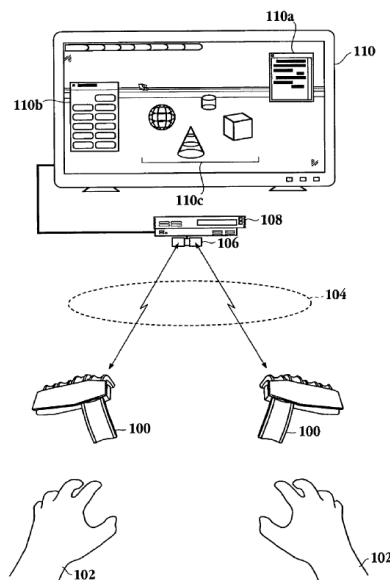
[63(a)(iii)] an output device; and

See Claim 32(a)(iii).

[63(b)] a second hand-held communication device

As discussed above, *Woolston* teaches a two-player mode where each player holds a respective sword device (i.e., a first player holding the first sword and a second player holding a second sword). *See* Claim 32(c).

Alternatively, *Daniel* teaches a video game system where the user holds both a first and a second input device 100:



Ex. 1009, Fig. 2; [0033] (“External input device 100 is configured to be held within the palm of a user's hand 102. . . . In one embodiment[,] device 108 can be a computer, or a game console which can be manufactured by any company.”)

Each input device 100 is a communication device including transmitter/receiver 118. *Id.* [0038]; Fig. 3. *Daniel* teaches a single user playing a game using both a first and second input device:

For instance, for a game where the user is a pilot, a folded sheet of plastic can be used to simulate the cockpit controls (e.g., the instrument panel can be printed on the plastic or other material), and **the user can be wearing the input devices on each hand** to enable piloting of the airplane or other vehicle or device. A display monitor connected to a computer, or game unit, allows the user to view the interactions. . . . A combination of fingertip pressure, positional tracking, and tactile feedback can be used to interact with the game. . . . The game detects the user gripping the controls by a combination of fingertip pressure and finger flex information and then tracks the motion and/or orientation of the hand to interpret the manipulation of the physical controls.

Id. [0043].

It would have been obvious to a PHOSITA to modify *Woolston's* game system to allow the user to hold a first apparatus 200 in his/her first hand and a second apparatus 200 in his/her second hand as taught by *Daniel*. Ex. 1003, ¶169. A PHOSITA would have appreciated the usefulness of two-handed computer

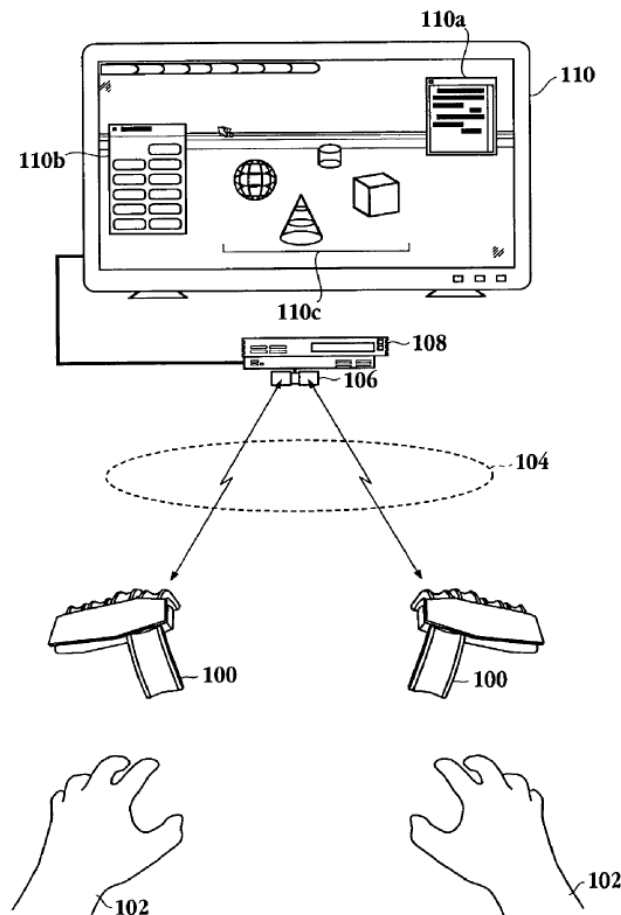
interaction techniques, which have been studied and employed at least since the early 1980s. *Id.* (citing Ex. 1025). In addition to a sword configuration, *Woolston* also teaches configuring apparatus 200 to be a “a gun, bazooka, knife, hammer, axe and the like.” Ex. 1005, 3:35-41. A PHOSITA would have appreciated that giving the user the ability to interact with the game using multiple weapons would have predictably made the game more versatile and interesting for the user, thereby increasing user satisfaction. Ex. 1003, ¶169. Moreover, a PHOSITA would have appreciated that allowing the user to play other types of games, such as the airplane/vehicle piloting game taught by *Daniel*, would have further improved *Woolston*’s game system. *Id.* ¶170. Therefore, a PHOSTA would have been motivated to modify *Woolston*’s game system to enable the user to interact with the game using both a first and second hand-held communication device as taught by *Daniel*. *Id.*

[63(b)(i)] adapted to electrically communicate with the first communication device, and

In co-pending district court litigation, Motiva contends this limitation should be construed to mean “[a]ble to transmit or receive information electrically, including wirelessly.” Ex. 1026, 2. Moreover, Motiva’s infringement allegations imply that this limitation is satisfied when game inputs from one hand-held device are used by the software on the game console to generate haptic response commands

sent to the other hand-held device. If this limitation is as broad as alleged by Motiva, then it is taught by *Daniel*.

Per *Daniel*, “each of input devices 100 is enabled to communicate with computing device 108 through receiver 106.” Ex. 1009, [0034]. In particular, “[e]ach of input devices 100, of FIG. 2, is configured to generate commands 104 in response to a user’s hand movements.” *Id.* [0035].



Id. Fig. 2.

The commands are received by the receiver 106 of the computing device 108 and used “to initiate a command, respond to a query, maneuver objects in an interactive video game, etc.” *Id.* [0035]. The computing device 108 also generates tactile feedback responses that are sent to the user input devices 100. *Id.* [0048]-[0049].

Based on the teachings of *Daniel*, it would have been obvious to a PHOSITA to enable *Woolston*’s game controller 240 to generate tactile feedback responses for the first hand-held device based on the inputs received from the second handheld device. Ex. 1003, ¶173. When implementing *Daniel*’s airplane/piloting game on *Woolston*’s game system, for example, if an input provided by the second hand-held device results in a game event such as a crash or explosion, it would have been obvious to enable the game controller software to generate a tactile feedback response sent to both the first and second handheld apparatuses in order to simulate such a game event, thereby enabling the second apparatus to electrically communicate with the first apparatus via the game controller per Motiva’s interpretation of the claim. *Id.* And a PHOSITA would have been motivated to modify *Woolston*’s system in this way in order to improve similar interactive game systems in the same way. *Id.* ¶¶173-174. Since *Woolston* already discloses providing tactile feedback to the first apparatus based on movements of the second

apparatus, there would have been a reasonable expectation of success when implementing this feature in *Woolston's* system. *Id.* ¶175.

[63(b)(ii)] adapted for being attached to, in contact with, or held by the user,

For the reasons discussed above, it would have been obvious to a PHOSITA to modify *Woolston's* game system to allow the user to hold a first apparatus 200 in his/her first hand and a second apparatus 200 in his/her second hand as taught by *Daniel*. See Claim 63(b).

[63(b)(iii)] the second hand-held communication device comprising a transmitter for transmitting signals;

As discussed above, *Woolston's* apparatus 200, including the second apparatus 200, includes IR transmitters 300, 302, 304 that each “output a pulse and/or timed emission of infrared light” for purposes of position tracking. See Claim 32(a)(i).

Alternatively, *Daniel* teaches a second hand-held communication device including a transmitter/receiver 118 that transmits signals to a computing device 108. Ex. 1009, [0034]-[0035], [0038], Figs. 2, 3. It would have been obvious to a PHOSITA to modify *Woolston's* second apparatus 200 to include a transmitter for transmitting signals as taught by *Daniel* for the same reasons as discussed above with regard to the first apparatus 200. See Claim 63(a)(i).

[63(c)] an array of receiving devices remote from the first hand-held communication device for tracking the movement of the first hand-held communication device;

Woolston's game controller 240 is coupled to an array of IR receivers 210, 220, 230 remote from the first apparatus 200. Ex. 1005, 3:55-60 (“Yet another feature of the present invention is to use sensors, e.g., a receiver and/or a transmitter, on the sword apparatus and an **array of sensors, e.g., receivers** and/or transmitters, external . . . to the sword apparatus to determine the spatial attitude and/or location of the sword apparatus.”), Fig. 3. “Infrared . . . receivers 210, 220 and 230 may work in conjunction with . . . blasters 300, 302 and 304 [on apparatus 200] to determine the position of the sword in real coordinates.” *Id.* 9:13-17; *see id.* 3:63-4:1.

The position information is used for tracking the movement of the first apparatus 200. For example, a “get sword velocity vector” routine is used to “determine the sword velocity vector, e.g., the direction and speed of the sword, by successively determining the position of the player’s sword and then determine from the change in position the velocity of the sword apparatus 200.” *Id.* 10:51-56; Fig. 5 (Step 526).

[63(d)] a processing system, remote from the first hand-held communication device,

For the reasons discussed above, *Woolston's* game controller 240 is a processing system remote from the first apparatus 200. *See* Claim 32(b). To the extent Motiva alleges that the limitation “remote from the first hand-held

communication device” prohibits wired connections between the processing system and first hand-held communication device, it would have been obvious to a PHOSITA to include wireless transceivers on both game controller 240 and first apparatus 200 as taught by *Daniel* to remove the need for the wire coupling the two components. *See* Claims 63(a)(i), 63(a)(ii), 63(d)(i).

[63(d)(i)] adapted to wirelessly receive the signals transmitted by the transmitter of the first hand-held communication device,

As shown above, *Woolston*’s game controller 240 is coupled to IR receivers 210, 220 and 230, which wirelessly receive the IR emissions transmitted by the IR transmitters 300, 302, 304 of first apparatus 200. *See* Claim 32(b)(i).

Alternatively, it would have been obvious to enable *Woolston*’s apparatus 200 to wirelessly transmit information signals, such as attitude information, to game controller 240. *See* Claim 63(a)(i). Based on the teachings of *Daniel*, it would have also been obvious to a PHOSITA to include a corresponding wireless receiver in *Woolston*’s game controller 240 to receive the signals transmitted by the apparatus 200’s transmitter. *Ex.* 1003, ¶177, ¶¶180-182. *Daniel* teaches a computing device 108 that receives wireless transmissions from first and second input devices 100 using receiver 106. *Ex.* 1009, [0034] (“As shown, each of input devices 100 is enabled to communicate with computing device 108 through receiver 106.”); [0035] (“Each of input devices 100, of FIG. 2, is configured to generate commands 104 in

response to a user's hand movements. Commands 104 are captured by computing device 108 through receiver 106.”); Fig. 2.

As discussed above, *Woolston* suggests enabling wireless communications between apparatus 200 and game controller 240. Therefore, a PHOSITA would have been motivated to include in *Woolston*'s game controller 240 a wireless receiver as taught by *Daniel* to enable the game controller to wirelessly receive signals (e.g., attitude signals) transmitted by apparatus 200. Ex. 1003, ¶¶180-181. As discussed above, a PHOSITA would have understood that enabling *Woolston*'s game controller 240 to receive data signals wirelessly via a receiver would have advantageously avoided the need for a wire connecting the sword to the game controller, and thereby would allow the user more freedom of movement. *See* Claim 32(b). Therefore, a PHOSITA would have also been motivated to include in *Woolston*'s game controller 240 a receiver for receiving signals as taught by *Daniel* to improve similar interactive game systems in the same way. Ex. 1003, ¶182. For the reasons discussed above, there would have been a reasonable expectation of success when modifying *Woolston*'s game controller 240 to include a wireless receiver. *See* Claim 32(b); Ex. 1003, ¶183.

[63(d)(ii)] to determine movement information for each of the respective communication devices, and

See Claim 50(c)(ii).

[63(d)(iii)] to send data signals to the receiver to provide feedback data to the user;

See Claim 50(c)(iii).

[63(e)(i)] wherein the first hand-held communication device is adapted to receive and process the received data signals and

See Claim 32(e)(i).

[63(e)(ii)] generate sensory stimuli for the user, based on the received data signals, the sensory stimuli delivered through the output device;

See Claim 32(e)(ii).

[63(f)] wherein the first hand-held communication device is further comprised of a user input device adapted for communication with the processing system through the transmitter; and

See Claim 56.

[63(g)] wherein the user input device is adapted for calibrating the first communication device to establish a reference position.

See, Claim 57.

ii. Claim 72

72. A system for a user to play a video game, comprising:

See Claim 32 preamble.

[72(a)] a first hand-held communication device comprising:

See Claim 32(a).

[72(a)(i)] a transmitter for transmitting signals;

See Claim 63(a)(i).

[72(a)(ii)] a receiver for receiving signals; and

See Claim 63(a)(ii).

[72(a)(iii)] an output device; and

See Claim 32(a)(iii).

[72(b)] a second hand-held communication device

See Claim 63(b).

[72(b)(i)] adapted to electrically communicate with the first communication device, and

See Claim 63(b)(i).

[72(b)(ii)] adapted for being attached to, in contact with, or held by the user,

See Claim 63(b)(ii).

[72(b)(iii)] the second hand-held communication device comprising a transmitter for transmitting signals; and

See Claim 63(b)(iii).

[72(c)] a processing system, remote from the first hand-held communication device,

See Claim 32(b).

[72(c)(i)] adapted to wirelessly receive the signals transmitted by the transmitter of the first hand-held communication device, and

See Claim 32(b)(i).

[72(c)(ii)] to send data signals to the receiver to provide feedback data to the user;

See Claim 50(c)(iii).

[72(d)(i)] wherein the first hand-held communication device receives and processes the received data signals and

See Claim 32(e)(i).

[72(d)(ii)] generates sensory stimuli for the user, based on the received data signals and delivered through the output device;

See Claim 32(e)(ii).

[72(e)] wherein the first hand-held communication device is further comprised of a user input device adapted for communication with the processing system through the transmitter; and

See Claim 56

[72(f)] wherein the user input device is adapted for calibrating the first communication device.

See Claim 57.

iii. Claim 73

73. A system according to claim 72, wherein: the processing system is adapted to determine movement information for each of the respective communication devices.

For the reasons discussed above, *Woolston's* game controller 240 processing system determines movement information for each of the respective communication devices. *See* Claims 32(b)(ii) (processing system determines movement information for the first hand-held communication device) and 32(d)(i) (processing system determines movement information for the second hand-held communication device).

V. CONCLUSION

For the forgoing reasons, Petitioner respectfully requests *inter partes* review of Claims 32-33, 49-50, 56-58, 63, and 72-73 of the '354 Patent.

Respectfully submitted,

BY: /s/ Abran J. Kean
Abran J. Kean, Reg. No. 58,540
Callie A. Pendergrass, Reg. No. 63,949

COUNSEL FOR PETITIONER

VI. MANDATORY NOTICES UNDER 37 C.F.R. § 42.8(A)(1)

A. Real Party-In-Interest

Petitioner is a real party-in-interest. 37 C.F.R. § 42.8(b)(1). Additional real parties-in-interest include Sony Interactive Entertainment Inc., a Japanese corporation; Sony Corporation, a Japanese corporation; and Sony Corporation of America, a New York corporation.

B. Related Matters

The '354 Patent is asserted in the following pending patent infringement lawsuits filed by Motiva Patents, LLC:

- *Motiva Patents, LLC v. Sony Corporation et al.*, Case No. 9:18-cv-00180 (EDTX);
- *Motiva Patents, LLC v. HTC Corporation*, Case No. 9:18-cv-00179 (EDTX); and
- *Motiva Patents, LLC v. Facebook Technologies, LLC*, Case No. 9:18-cv-00178 (EDTX).

C. Lead and Back-Up Counsel

Petitioner provides the following designation and service information for lead and back-up counsel. 37 C.F.R. § 42.8(b)(3) and (b)(4).

Lead Counsel	Back-Up Counsel
Abran J. Kean (Reg. No. 58,540) Abran.Kean@eriseip.com <u>Postal and Hand-Delivery Address:</u> ERISE IP, P.A. 5600 Greenwood Plaza Blvd., Suite 200 Greenwood Village, CO 80111 Telephone: (913) 777-5600 Fax: (913) 777-5601	Callie A. Pendergrass (Reg. No. 63,949) Callie.Pendergrass@eriseip.com Eric A. Buresh (Reg. No. 50,394) Eric.Buresh@eriseip.com <u>Postal and Hand-Delivery Address:</u> ERISE IP, P.A. 7015 College Blvd., Suite 700 Overland Park, Kansas 66211 Telephone: (913) 777-5600 Fax: (913) 777-5601

APPENDIX OF EXHIBITS

Exhibit 1001	U.S. Patent No. 8,159,354
Exhibit 1002	File History of U.S. Patent No. 8,159,354
Exhibit 1003	Declaration of Dr. Gregory Welch
Exhibit 1004	Curriculum Vitae of Dr. Gregory Welch
Exhibit 1005	U.S. Patent No. 6,162,123 to Woolston
Exhibit 1006	U.S. Patent Application Publication No. 2001/0034257A1 to Weston et al.
Exhibit 1007	U.S. Patent No. 6,456,977 to Wang
Exhibit 1008	U.S. Patent No. 5,181,181 to Glynn
Exhibit 1009	U.S. Patent Application Publication No. 2004/0012557A1 to Daniel
Exhibit 1010	F. J. Ferrin. Survey of helmet tracking technologies. Proceedings of SPIE, 1456:86–94, April 1991 (“Ferrin”).
Exhibit 1011	Greg Welch and Eric Foxlin (2002). Motion Tracking: No Silver Bullet, but a Respectable Arsenal, IEEE Computer Graphics and Applications, special issue on Tracking, November/December 2002, 22(6): 24–38.
Exhibit 1012	I. E. Sutherland. A head-mounted three dimensional display. In Proceedings of the 1968 Fall Joint Computer Conference, AFIPS Conference Proceedings, volume 33, part 1, pages 757–764. Thompson Books, Washington, D.C., 1968.
Exhibit 1013	Christopher G. Atkeson and John M. Hollerbach. Kinematic Features of Unrestrained Vertical Arm Movements. The Journal of Neuroscience, Vol. 5, No. 9, pages 2318-2330, September 1985. Society for Neuroscience.
Exhibit 1014	U.S. Patent No. 3,898,445 to Macleod et al.
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Exhibit 1017	A. Wilson and S. Shafer. Xwand: Ui for intelligent spaces. In CHI '03: Proceedings of the SIGCHI conference on Human factors in

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Exhibit 1018	Jun Rekimoto. GestureWrist and GesturePad: Unobtrusive Wearable Interaction Devices. In ISWC '01 Proceedings of the 5th IEEE International Symposium on Wearable Computers, pages 21-27, Washington, DC, USA, 2001. IEEE.
Exhibit 1019	Grigore C. Burdea and Philippe Coiffet. Virtual Reality Technology, 2 nd Edition. 2003. John Wiley & Sons, Inc.
Exhibit 1020	Mark J.P. Wolf. Before the Crash Early Video Game History. Wayne State University Press, 2012.
Exhibit 1021	Richard Marks. EyeToy, Innovation and Beyond, retrieved from https://blog.us.playstation.com/2010/11/03/eyetoy-innovation-and-beyond/ on May 23, 2019
Exhibit 1022	M. Wiley. Nintendo WaveBird Review – IGN, retrieved from https://www.ign.com/articles/2002/06/11/nintendo-wavebird-review on May 23, 2019
Exhibit 1023	Ehud Sharlin, Pablo Figueroa, Mark Green, Benjamin Watson. A Wireless, Inexpensive Optical Tracker for the CAVE™. In Proceedings IEEE Virtual Reality 2000, New Brunswick, NJ, USA, 2000. IEEE.
Exhibit 1024	U.S. Patent No. 6,475,090 to Roelofs
Exhibit 1025	W. Buxton and B. Myers. A study in two-handed input. In CHI '86: Proceedings of the SIGCHI conference on Human factors in computing systems, pages 321–326, New York, NY, USA, 1986. ACM Press
Exhibit 1026	Motiva Patents, LLC's Proposed Claim Terms for Construction

CERTIFICATION OF WORD COUNT

The undersigned certifies pursuant to 37 C.F.R. §42.24 that the foregoing Petition for *Inter Partes* Review, excluding any table of contents, mandatory notices under 37 C.F.R. §42.8, certificates of service or word count, or appendix of exhibits, contains 13,904 words according to the word-processing program used to prepare this document (Microsoft Word).

Dated: May 31, 2019

BY: /s/ Abran J. Kean
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COUNSEL FOR PETITIONER

CERTIFICATE OF SERVICE ON PATENT OWNER
UNDER 37 C.F.R. § 42.105

Pursuant to 37 C.F.R. §§ 42.6(e) and 42.105, the undersigned certifies that on May 31, 2019, a complete and entire copy of this Petition for *Inter Partes* Review including exhibits was provided via Federal Express to the Patent Owner by serving the correspondence address of record for the '354 Patent as listed on PAIR:

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