UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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SONY COMPUTER ENTERTAINMENT LLC
Petitioner

v.

GAME CONTROLLER TECHNOLOGY LLC
Patent Owner

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Case No. TBD
Patent 8,094,885

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PETITION FOR *INTER PARTES* REVIEW

OF U.S. PATENT NO. 8,094,885

Table of Contents

I. INTRODUCTION

Petitioner Sony Computer Entertainment LLC ("SCEA" or "Petitioner") requests an *Inter Partes* Review ("IPR") of claims 1-11 (collectively, the "Challenged Claims") of U.S. Patent No. 8,094,885 (the "'885 Patent") issued on January 10, 2012 to Yaron Tanne ("Applicant") and that claims priority to U.S. provisional application No. 60/907,353 that was filed on March 27, 2007. **Exhibit 1001**, *'885 Patent*.

II. 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 '885 Patent is available for IPR and that the Petitioner is not barred or estopped from requesting IPR to challenge the claims of the '885 Patent. Specifically, Petitioner states: (1) Petitioner is not the owner of the '885 Patent; (2) Petitioner has not filed a civil action challenging the validity of any claim of the '885 Patent; (3) this Petition is filed less than one year after the Petitioner was served with a complaint alleging infringement of the '885 Patent; and (4) this Petition is filed more than nine months after the '885 Patent issued and the '885 Patent was not the subject of a post-grant review.

B. Identification of Challenge Under 37 C.F.R. § 42.104(b) and Relief Requested

In view of the prior art, evidence, and claims charts discussed in this Petition, claims 1-11 of the '885 Patent are unpatentable and should be cancelled. 37 C.F.R. § 42.104(b)(1). Based on the prior art references identified below, IPR of the

Challenged Claims should be instituted. 37 C.F.R. § 42.104(b)(2). The proposed statutory rejections for claims 1-11 of the '885 Patent are as follows:

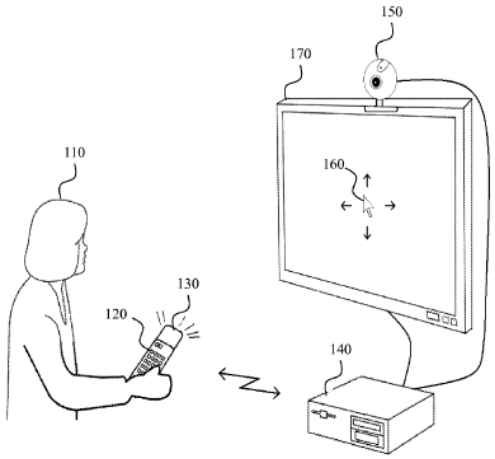
- Claims **1, 3, 4, 6, 7, 10,** and **11** are **anticipated** under § 102(b) by Japanese Unexamined Publication No. H07-244557 to Hashimoto, which published on September 19, 1995 ("Hashimoto") and qualifies as prior art with regard to the '885 Patent under § 102(b) (**Exhibit Nos. 1002** and **1003**);
- Claims **2** and **9** are **obvious** under § 103(a) by Hashimoto in view of U.S. Patent No. 7,965,859 to Marks, which was filed on January 19, 2007, claiming priority to U.S. Provisional Application No. 60/798,112, which was filed on May 4, 2006 ("Marks '859") and qualifies as prior art with regard to the '885 Patent under § 102(e) (**Exhibit Nos. 1002, 1003, 1004,** and **1005**);
- Claims **1, 3, 4, 6, 7**, **10**, and **11** are **obvious** under § 103(a) by EP1402929A1 to Wang, which published on March 31, 2004 ("Wang") and qualifies as prior art with regard to the '885 Patent under § 102(b), in view of Hashimoto (**Exhibit Nos. 1002, 1003,** and **1006**);
- Claims **5** and **8** are **obvious** under § 103(a) by Hashimoto in view of U.S. Patent No. 8,062,126 to Marks et al., which was filed on October 26, 2006, claiming priority to U.S. Provisional Application No. 60/730,659, which was filed on October 26, 2005 ("Marks '126") and qualifies as prior art with regard to the '885 Patent under § 102(e) (**Exhibit Nos. 1002, 1003, 1007,** and **1008**).

Section V identifies where each element of the Challenged Claims is found in the prior art. 37 C.F.R. § 42.104(b)(4). 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 is provided in Section V. 37 C.F.R. § 42.104(b)(5). **Exhibits 1001 – 1022** are also attached.

III. SUMMARY OF THE '885 PATENT

A. Description of the Alleged Invention of the '885 Patent

The '885 Patent describes an optical tracking system that enables a computer to accept user inputs corresponding to movements of a remote control object manipulated by the user. *See* **Ex. 1001**, *'885 Patent*, at Abstract. As shown in the figure below, a camera 150 captures images of the user 110 holding controller 120:



Id. at Fig. 1. The controller includes a Light Emitting Diode (LED) 130 that is picked up by the camera. *Id.* at 2:67-3:2 ("The remote control is provided with a light emitting area 130 (such as light emitting diodes). The light is picked up by a camera

150."). The camera is connected to a computer 140, which analyzes the video frames captured by the camera and tracks the position of the LED in the image in order to translate the movement into input for controlling the computer (e.g., controlling the position of a cursor 160 on a display 170). *Id.* at 3:3-6 ("Camera 150 is connected to a computer 140 that analyzes the incoming video frames and tracks light emitting area 130. By moving the remote control, the user can control the on-screen cursor 160, on a screen 170."). Specifically, the computer extracts pixels corresponding to the color of the controller's LED in the image and uses the pixel data to track the movement of the controller. *Id.* at 3:47-51 ("[A] Tracking module 206 is responsible of [sic] extracting the pixels corresponding to the color light emitter 201 from the images acquired by the camera 204, and establishing its location in respect to the scene captured by the camera.").

In one embodiment, the controller includes multicolored LEDs. *Id.* at 3:30-35 ("According to certain embodiments, the color light emitter 201 may contain LED lights of different colors, preferably red, green and blue, and can light them with different intensities . . . to create colorful combinations spanning the full spectrum of visible light."). During an initial calibration process, the computer 140 analyzes an image of the background scene to determine and select the least common color in the background surrounding the controller. *Id.* at 3:61-64 ("According to some embodiments of the invention, in operation, the processor 205 is arranged to initially

process the colorimetric data of an image containing the controlling object and determine the least common color in the image."). The computer then transmits the selected color to the controller, which causes the LEDs to emit the selected color. *Id.* at 3:65-67 ("Thus, the processor selects the most distinguishable color in the image, and transmits it to the controller which is arranged to light the color light emitter in that color."). During operation, the computer continuously samples the colors in the background image and retransmits the most distinguishable color to the controller. *Id.* at 3:67-4:3 ("From that point onwards, a constant update process takes place and at each sampling time, the most distinguishable color is transmitted from the processor to the controlling object."); Fig. 3.

B. Summary of the Prosecution History of the '885 Patent

The international application that resulted in the '885 Patent was filed on March 26, 2008. *Id.* at PCT filing date. On September 14, 2009, Applicant filed a U.S. National Stage application including 18 claims concurrently with a preliminary amendment cancelling 6 claims and amending others. *See* **Exhibit 1009**, *'885 Patent File History* at As-Filed Application and September 14, 2009 Preliminary Amendment. In the September 2009 Preliminary Amendment, Applicant also attempted to amend the specification to claim priority to U.S. Provisional Application No. 60/907,353, which was filed on March 27, 2007. *Id*. at September 14, 2009 Preliminary Amendment at p. 2. On February 3, 2011, Applicant filed another

preliminary amendment amending as-filed independent claims 4 and 7. *Id*. at February 3, 2011 Preliminary Amendment. On September 9, 2011, the USPTO mailed a first action Notice of Allowance citing the following purportedly "inventive features" in the reasons for allowance:

- "wherein the selected color of the emitted light is a least represented color in the scene, out of said at least two alternative colors" (issued claim 1);
- "wherein the processor is configured to reselect and track light of a new color as a result of a change in color representation in a scene" (issued claim 2);
- "configuring the controlling object to emit a light with specific color, wherein the specific color is selected from a plurality of alternative colors, and wherein the selection complies with data received by the controlling object and pertaining to the optical characteristics of the background surrounding the controlling object" (issued claim 3).

Id. at September 9, 2011 Notice of Allowance at p. 2. These reasons for allowance follow the rationale of the written opinion issued by the International Searching Authority on October 8, 2009. *Id.* at Written Opinion of the International Searching Authority dated October 9, 2009 (p. 53-58). However, the above three purportedly novel features are clearly described in the prior art references discussed below. The '885 Patent issued on January 10, 2012, with 11 claims.

C. Level of a Person Having Ordinary Skill in the Art

A person having ordinary skill in the art at the time of the '885 Patent would be a person with (1) an undergraduate degree in applied mathematics, computer science, computer engineering, electrical engineering, physics, or similar technical fields; (2) a working knowledge of computers and their processing, storage, hardware, and software; and (3) two to four years of experience (or, with a graduate degree in the above-stated fields, one to two years of experience) in software and hardware analysis, design, and/or development related to motion tracking and pointing devices, including a working familiarity with sources, sensors, and signals, such as in the context of consumer electronics, gaming, or other related fields. **Exhibit 1010**, *Declaration of Dr. Gregory F. Welch* at ¶¶ [09]-[16].

IV. CLAIM CONSTRUCTION UNDER 37 C.F.R. § 42.104(B)(3)

A claim subject to IPR receives the "broadest reasonable construction in light of the specification of the patent in which it appears." 37 C.F.R. § 42.100(b). "Under a broadest reasonable interpretation, words of the claim must be given their plain meaning, unless such meaning is inconsistent with the specification." MPEP 2111.01. For purposes of this IPR only, Petitioner proposes that the claim terms of the '885 Patent are presumed to take on their ordinary and customary meaning that the term would have to one of ordinary skill in the art in view of the Specification

of the '885 Patent and the intrinsic record.[1] In Petitioner's view, for purposes of this IPR only, there are no terms in independent claims 1 and 2, or dependent claims 4-11, of the '885 Patent that need to be defined with additional, or alternative, words to assess the broadest reasonable interpretation of the claims.

However, Petitioner does note that the otherwise plain and ordinary terms in the following language from independent claim 3 of the '885 Patent are drafted in a manner that, on the face of the claim, make no sense in the context of the specification: "wherein the selection complies with data received by the controlling object and pertaining to the optical characteristics of the background surrounding the controlling object." This language, as drafted, requires that the controlling object receive data pertaining to the optical characteristics of the background and that the selection complies with that data. In every embodiment described in the specification, either a camera or processor receives the background information on which the color of light selection is based. *See*, *e.g.*, **Exhibit No. 1001** at 3:62-67; 4:14-25. Accordingly, the claim as drafted would require that the controlling object include either a camera or processor. There is no support in the '885 specification for a controlling object that includes a camera or color selection processor, and

[1] Petitioner is applying the "broadest reasonable construction" of the claims for purposes of this IPR only, and the analysis is not, and should not be viewed as, a concession by Petitioner as to the proper scope of any claim term in any litigation.

thus claim 3 as drafted violates 35 U.S.C. § 112 due to indefiniteness, lack of written description, and/or lack of enablement. *See*, *e.g.*, IPR2013-00076, Order Instituting IPR at 8 (noting that "[t]he specification provides no description of the structure of the verification mechanism," but declining to explicitly address 35 U.S.C. § 112 issues).

For purposes of this IPR only, Petitioner assumes that this confusing claim language, under the broadest reasonable interpretation, must be sufficiently broad to encompass the embodiments expressly described in the written description of the '885 Patent. In these embodiments, a processor assesses the optical characteristics of the background surrounding the controlling object that the processor receives from a camera that is operationally coupled with the processor; the processor selects a specific color that complies with those optical characteristics; the processor transmits that selected "color information" to the controlling object; and the controlling object receives the "color information" and emits the light color selected by the processor. *See*, *e.g.*, **Exhibit No. 1001** at 3:62-67 ("[T]he processor 205 is arranged to initially process the colorimetric data of an image containing the controlling object and determine the least common color in the image. Thus, the processor selects the most distinguishable color in the image, and transmits it to the controller which is arranged to light the color light emitter in that color."); *see also id.* at 4:14-25 ("When the user wishes to start using the

remote controller (301), she sends an indication to the computer through the communications module (302). Then, the Calibration module gets the first frame of data from the camera (303), creates statistics about the color distribution in the scene, and selects the optimal color for tracking these conditions (304). In general, the optimal color will be a color that is most uncommon in the current scene so it can be easily tracked and is not confused with objects in the background. Next, the color information is sent to the remote controller through the communications module (305), and the designated color light emitter is lit in the selected color.").

The term "comply" is subject to several connotations. Specifically, the dictionary definition of "comply" is "conform, submit, or adapt (as to a regulation or to another's wishes) as required or requested." **Ex. 1023, 2006 Merriam-Webster's Dictionary and Thesaurus**. Taking the "submit" or "adapt" connotation first, under one plain meaning, the definition requires a relationship where the color selection must submit to, or adapt to, data received by the controlling object. This connotation would require the controlling object to include a camera or processor, which would not align with the '885 Patent specification, as discussed above. However, if the "conform" connotation of "comply" is used for the construction of the term "complies with" in claim 3, the result aligns with the specification. The word "conform" means "to be in agreement or harmony." *Id.* This connotes a relationship where the selection is simply in agreement with the

data, and where the data is in agreement with the selection. *See id.* Applying this meaning in the context of claim 3, the selection must be in agreement with the data received by the controlling object. This interpretation would be satisfied when the controlling object receives data identifying a color that is in agreement with the selection. In other words, the limitation would be satisfied when the controlling object receives data identifying the color selection. For purposes of IPR, the broadest interpretation should encompass all interpretations that align with the specification, including where "complies with" means "in agreement with."

V. THERE IS A REASONABLE LIKELIHOOD THAT THE CHALLENGED CLAIMS OF THE '885 PATENT ARE UNPATENTABLE

Optical object tracking systems were prevalent decades before the application for '885 Patent was filed. **Ex. 1010**, *Welch Declaration*, at ¶¶ [10]-[16]. The following prior art references disclose each limitation of the Challenged Claims.

1. Hashimoto Anticipates Claims 1, 3, 4, 6, 7, 10, and 11 Under 35 U.S.C. § 102(b)

Hashimoto, which published in 1995, describes the same optical tracking system contemplated by the '885 Patent over a decade before the application for the '885 Patent was filed. Like the '885 Patent, Hashimoto discloses an imaging device 104 (i.e., "camera") that captures images of the user holding an input device 101 having a light-emitting element such as an LED. **Exhibit 1003**, *Certified Translation of Hashimoto* at ¶¶ [0024] – [0025]; Fig. 1. A position detecting part 105 (i.e., "processor") analyzes

the image data including the brightness and color of the pixels in the image in order to track changes in the position of the LED of the input device 101. *Id.* at ¶¶ [0027] – [0029]; Fig. 1. The detected movement is translated into input for a computer. *Id.* at Abstract; ¶ [0001]. The input device includes one or more LEDs of a plurality of alternative colors, including red, green blue, and yellow. *Id.* at ¶¶ [0038] – [0039]; ¶¶ [0044] – [0050]; Figs. 1 and 2; Tables 1, 2 and 3.

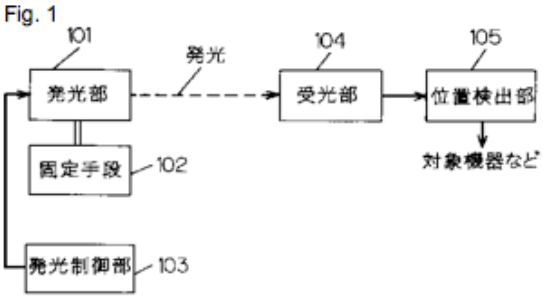
Hashimoto also discloses the purportedly patentable feature in claims 1 and 6 of the '885 Patent of selecting "a least represented color in the scene." Specifically, Hashimoto describes a color-of-light control part 103 (*i.e.*, a processor) that performs a color spectrum analysis of the image of the background scene surrounding the controlling object to determine and select a color that either "does not exist" or is "very rare" in the background. *Id.* at ¶ [0053]. Hashimoto's color spectrum analysis is the same as the process described in the '885 Patent where "the processor 205 is arranged to initially process the colorimetric data of an image containing the controlling object and determine the least common color in the image." **Ex. 1001**, *'885 Patent*, at 3:61-67. The '885 Patent Specification discloses that the selected color will optimally "be a color that is most uncommon in the current scene, so it can be easily tracked and is not confused with objects in the background." *Id.* at 4:19-22. Thus, by disclosing the selection of a color that "does not exist" or "is very rare" in the background scene, the disclosure in Hashimoto teaches the broadest reasonable

interpretation of selecting "a least represented color in the scene." **Ex. 1003**, *Hashimoto Translation,* at ¶ 53.

After the color-of-light control part 103 selects a color that is either not present or is very rare in the background scene surrounding the input device, the input device of Hashimoto receives the color selection and is configured to emit a light color that complies with the color selected during the color spectrum analysis. **Ex. 1003**, *Hashimoto Translation,* at ¶¶ [0028], [0053] – [0054], [0063]. This disclosure in Hashimoto regarding the configuration of the input device to emit the specific selected color is the same as an embodiment of the configuration of the input device described in the '885 Patent. *See e.g.*, **Ex. 1001**, *'885 Patent*, at 2:65-67; 4:14-25. Therefore, Hashimoto must fall within the broadest reasonable interpretation of the claim, and as such, also discloses the purportedly patentable feature in claim 3 of the '885 Patent of selecting a color for the controlling object "pertaining to the optical characteristics of the background surrounding the controlling object." For at least these reasons, there is a reasonable likelihood that Petitioner will prevail in its patentability challenge to claims 1, 3, 4, 6, 7, 10, and 11.

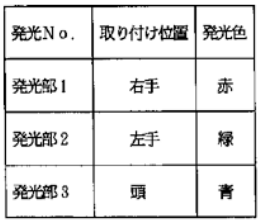
While Hashimoto is cited on the '885 Patent, a translation of the entire disclosure of Hashimoto was not available to the USPTO during prosecution of the '885 Patent. Thus, the Examiner was only able to review the English abstract of Hashimoto, which abstract did not provide the salient teachings. **Ex. 1009**, *File History*, at p. 34. As shown below,

Hashimoto discloses every limitation of claims 1, 3, 4, 6, 7, 10, and 11 and thus these claims should be rejected under § 102(b) as being anticipated by Hashimoto and cancelled.

Claim 1	***Anticipated By Hashimoto (Exs. 1002 and 1003)***
1. A data processing system for tracking a spatially manipulated controlling object, said system comprising:	*Hashimoto discloses a data processing system for tracking the position of a spatially manipulated input device.* "Fig. 1, (101) is lighting part with light emitting element such as a LED, (102) is fix in place device for fixing in place lighting part (101) to the body, (103) is light control part that controls lighting part (101) with a control signal . . . , (104) is light receiver imaging device that receives the light from lighting part (101), (105) is position detection part with communication means to communicate information from light receiver (104) and detects position of lighting part (101) based on information from light receiver (104). Also, it has communication means with the applicable input device such as a host." **Ex. 1003**, *Hashimoto Translation*, at ¶ [0024] (emphasis added)  Fig. 1 101 発光 104 105 発光部 受光部 位置検出部 固定手段 102 対象機器など 発光制御部 103 101. Lighting part Light generation 104. Light receiver 105. Position detection part Target device or the like 102. Fix in place device 103. Light control part *Id.* at Fig. 1.
[1(a)] a camera;	*Hashimoto discloses a "light receiver (104)" which is an imaging device (i.e., "a camera") that captures image data.* "Fig. 1, (101) is lighting part with light emitting element such as a LED, . . . (104) is light receiver imaging device that receives the light from lighting part (101) . . . ." *Id.* at ¶ [0024]. "In Fig. 3, (301) imaging device takes a picture of body

	movement with detection part (302) where detection part (302) is provided with communication means to obtain information from imaging device (301) . . . ." *Id*. at ¶ [0004] (emphasis added). First, position detection part (105) detects the position of lighting part (101) from the image captured by light receiver (104). . . . In other words, through detection of surrounding images (picture), brightness, color (pixel value) that differ greatly with the image captured, detection of lighting part (101) is feasible." *Id*. at ¶¶ [0027] – [0028] (emphasis added). *See also, id.* at ¶¶ [0006], [0025] – [0026]; Figs. 1, 3.
[1(b)] a processor operatively coupled to said camera;	*Hashimoto discloses a position detecting part 105 (i.e., "processor") that is coupled to the imaging device 104.* "Fig. 1, (101) is lighting part with light emitting element such as a LED, . . . (104) is light receiver imaging device that receives the light from lighting part (101), (105) is position detection part with communication means to communicate information from light receiver (104) and detects position of lighting part (101) based on information from light receiver (104)." *Id*. at ¶ [0024] (emphasis added). "Next, the information captured as an image by light receiver (104) is transferred via communication means provided in position detection part (105). The position of the lighting part, in other words, movement of the operator is detected by position detection part (105)." *Id*. at ¶ [0026].
[1(c)] a controlling object designated as an object to be tracked by said processor and arranged to emit light at a specific color such that the specific color is selected from a plurality of alternative colors;	*Hashimoto discloses an input device 101 (i.e., "controlling object") with one or more light emitting elements such as an LED. The position detecting part 105 tracks the position of the input device 101 by analyzing the image data received from the imaging device 104.* "Fig. 1, (101) is lighting part with light emitting element such as a LED, (102) is fix in place device for fixing in place lighting part (101) to the body, (103) is light control part that controls lighting part (101) with a control signal . . . , (104) is light receiver imaging device that receives the light from lighting part (101), (105) is position detection part with communication means to communicate information from light receiver (104) and detects

	position of lighting part (101) based on information from light receiver (104). Also, it has communication means with the applicable input device such as a host." *Id*. at ¶ [0024]. "The operator attaches lighting part (101) using the fix in place device (102) to a part of the body such as the hand, and performs input operation. In the case that the operator moves the body, movement of lighting part (101) in conjunction with this movement is captured as an image by light receiver (104). Next, the information captured as an image by light receiver (104) is transferred via communication means provided in position detection part (105). The position of the lighting part, in other words, movement of the operator is detected by position detection part (105). The process performed in position detection part (105) is as follows. First, position detection part (105) detects the position of lighting part (101) from the image captured by light receiver (104). Position detection part (105) performs detection of lighting part (101) without performing image recognition as a conventional method. In other words, through detection of surrounding images (picture), brightness, color (pixel value) that differ greatly with the image captured, detection of lighting part (101) is feasible." *Id*. at ¶¶ [0025] – [0028]. *Each LED on the input device is arranged to emit a specific color selected from a plurality of alternative colors, including red, green, blue, and yellow.* "However, through <u>using different colors of light</u> generated by the lighting parts, providing a correspondence table of the respective color of light generated and attaching positions enables restriction of the respective lighting parts and implementation of the method of simply looking up in the table. Therefore, in the case of providing multiple lighting parts indicated in the present embodiment, <u>different colors of light are used</u>. By providing the correspondence table tying attached position of the lighting part and color of light generated by the respective lighting parts, detection of detailed movement of the operator and input can be performed easily." *Id*. at ¶¶ [0050] – [0051] (emphasis added).

	 発光No. 取り付け位置 発光色 発光部1 右手 赤 発光部2 左手 緑 発光部3 頭 青 Light No. | Attachment position | Color of light generated Lighting part 1 | Right hand | Red Lighting part 2 | Left hand | Green Lighting part 3 | Head | Blue *Id.* at ¶ [0039] Table 1. *See also, id.* at ¶¶[0045]–[0046] at Tables 2, 3; ¶[0040]; Figs. 1, 2.
[1(d)] wherein said camera is arranged to receive said colored light and to further transfer the respective data to the processor,	*The imaging device 104 receives the colored light emitted from the input device 101 and transfers the image data to the position detecting part 105 for processing.* "Next, the information captured as an image by light receiver (104) is transferred via communication means provided in position detection part (105). The position of the lighting part, in other words, movement of the operator is detected by position detection part (105). The process performed in position detection part (105) is as follows. First, position detection part (105) detects the position of lighting part (101) from the image captured by light receiver (104). Position detection part (105) performs detection of lighting part (101) without performing image recognition as a conventional method. In other words, through detection of surrounding images (picture), brightness, color (pixel value) that differ greatly with the image captured, detection of lighting part (101) is feasible." *Id.* at ¶¶ [0026] – [0028] (emphasis added).
[1(e)] wherein said processor is arranged to receive said data from the camera, and	*The position detecting part 105 receives the image data from the imaging device 104.* "Fig. 1, (101) is lighting part with light emitting element such as a LED, . . . (104) is light receiver imaging device that receives the light from lighting part (101), (105) is position detection part with communication means to communicate information from light receiver (104) and detects position of lighting part (101) based on information from light receiver (104)." *Id.* at ¶ [0024] (emphasis added).

	"Next, the information captured as an image by light receiver (104) is transferred via communication means provided in position detection part (105). The position of the lighting part, in other words, movement of the operator is detected by position detection part (105)." *Id*. at ¶ [0026] (emphasis added).
[1(e)(i)] wherein the selected color of the emitted light is a least represented color in the scene, out of said at least two alternative colors.	*Hashimoto discloses an embodiment where, in order to improve tracking performance, the system analyzes the color spectrum present in the image and selects a color for the LED of the input device that either "does not exist" or is "very rare" in the background surrounding the input device.* "However, as in the present embodiment, providing a color-of-light control part that controls the color of light generated enables analysis of the color spectrum, which exists in the background. A color-of-light control part makes a selection of a color, which does not exist in the background, and even if the color exists in the background, the color is very rare. The color-of-light control part communicates this color to the lighting parts. The lighting parts emit this color, which eliminates the influence from the background. In other words, the lighting part can be uniquely detected. It goes without saying that unique detection and restriction of the lighting part improves the position detection performance of the lighting part." *Id*. at ¶¶ [0053]-[0054] (emphasis added).
Claim 3	
3. A method of tracking a controlling object, said method comprising:	*Hashimoto embodies a method for tracking the position of an input device (i.e., "controlling object").* "The operator attaches lighting part (101) using the fix in place device (102) to a part of the body such as the hand, and performs input operation. In the case that the operator moves the body, movement of lighting part (101) in conjunction with this movement is captured as an image by light receiver (104). Next, the information captured as an image by light receiver (104) is transferred via communication means provided in position detection part (105). The position of the lighting part, in other words, movement of the operator is detected by position detection part (105). The process performed in position detection part (105) is as

	follows. First, position detection part (105) detects the position of lighting part (101) from the image captured by light receiver (104). Position detection part (105) performs detection of lighting part (101) without performing image recognition as a conventional method. In other words, through detection of surrounding images (picture), brightness, color (pixel value) that differ greatly with the image captured, detection of lighting part (101) is feasible." *Id*. at ¶¶ [0025] – [0028] (emphasis added).
[3(a)] receiving a colored light indicative of the spatial location of the controlling object;	*Hashimoto discloses an imaging device coupled to a position detecting device that receives colored light emitted by an LED on an input device. The position detecting part analyzes the received image data to determine the spatial location of the input device.* "The operator attaches lighting part (101) using the fix in place device (102) to a part of the body such as the hand, and performs input operation. In the case that the operator moves the body, movement of lighting part (101) in conjunction with this movement is captured as an image by light receiver (104). Next, the information captured as an image by light receiver (104) is transferred via communication means provided in position detection part (105). The position of the lighting part, in other words, movement of the operator is detected by position detection part (105). The process performed in position detection part (105) is as follows. First, position detection part (105) detects the position of lighting part (101) from the image captured by light receiver (104). Position detection part (105) performs detection of lighting part (101) without performing image recognition as a conventional method. In other words, through detection of surrounding images (picture), brightness, color (pixel value) that differ greatly with the image captured, detection of lighting part (101) is feasible." *Id*. at ¶¶ [0025] – [0028] (emphasis added). "However, through using different colors of light generated by the lighting parts, providing a correspondence table of the respective color of light generated and attaching positions enables restriction of the respective lighting parts and implementation of the method of simply looking up in the table.

	Therefore, in the case of providing multiple lighting parts indicated in the present embodiment, different colors of light are used. By providing the correspondence table tying attached position of the lighting part and color of light generated by the respective lighting parts, detection of detailed movement of the operator and input can be performed easily." *Id*. at ¶¶ [0050] – [0051] (emphasis added).
[3(b)] configuring the controlling object to emit a light with specific color, wherein the specific color is selected from a plurality of alternative colors, and wherein the selection complies with data received by the controlling object and pertaining to the optical characteristics of the background surrounding the controlling object;	*As discussed above in Section II, this claim language, as drafted, makes no sense in the context of the written description. Under any interpretation that construes this language to encompass the embodiments described in the specification, the prior art teaches this limitation.* *Specifically, Hashimoto discloses a processor receiving an image of the input device and the background surrounding the input device from an imaging device (i.e., "camera"), which receives light. The processor of Hashimoto selects a specific color, selected from a plurlaity of alternative colors (e.g., red, blue, green, and yellow), in response to an analysis of the color spectrum (i.e., "optical characteristics") present in the background surrounding the input device. The selected color is communicated to the input device, which is configured to emit light of the specific selected color. Thus, the controlling object receives data identifying a color that is in agreement with the selection. Stated differently, the selection complies with the data received by the controlling object.* "However, as in the present embodiment, providing a color-of-light control part that controls the color of light generated enables analysis of the color spectrum, which exists in the background. A color-of-light control part makes a selection of a color, which does not exist in the background, and even if the color exists in the background, the color is very rare. The color-of-light control part communicates this color to the lighting parts. The lighting parts emit this color, which eliminates the influence from the background. In other words, the lighting part can be uniquely detected. It goes without saying that unique detection and restriction of the lighting part improves the position detection performance of the lighting part." *Id*. at ¶¶ [0053]-[0054] (emphasis added).

	"However, through using different colors of light generated by the lighting parts, providing a correspondence table of the respective color of light generated and attaching positions enables restriction of the respective lighting parts and implementation of the method of simply looking up in the table. Therefore, in the case of providing multiple lighting parts indicated in the present embodiment, different colors of light are used. By providing the correspondence table tying attached position of the lighting part and color of light generated by the respective lighting parts, detection of detailed movement of the operator and input can be performed easily." *Id*. at ¶¶ [0050] – [0051] (emphasis added). *See also, id.* at ¶¶ [0025] – [0028]; [0039]–[0046] at Tables 1, 2, 3; ¶[0040]; Figs. 1, 2.
[3(c)] tracking the controlling object, based upon the selected specific color.	*Hashimoto discloses a position detecting device 105 that tracks the input device 101 based upon the selected color emitted by the input device LED.* "The operator attaches lighting part (101) using the fix in place device (102) to a part of the body such as the hand, and performs input operation. In the case that the operator moves the body, movement of lighting part (101) in conjunction with this movement is captured as an image by light receiver (104). Next, the information captured as an image by light receiver (104) is transferred via communication means provided in position detection part (105). The position of the lighting part, in other words, movement of the operator is detected by position detection part (105). The process performed in position detection part (105) is as follows. First, position detection part (105) detects the position of lighting part (101) from the image captured by light receiver (104). Position detection part (105) performs detection of lighting part (101) without performing image recognition as a conventional method. In other words, through detection of surrounding images (picture), brightness, color (pixel value) that differ greatly with the image captured, detection of lighting part (101) is feasible." *Id*. at ¶¶ [0025] – [0028] (emphasis added). "However, through using different colors of light generated by

	the lighting parts, providing a correspondence table of the respective color of light generated and attaching positions enables restriction of the respective lighting parts and implementation of the method of simply looking up in the table. Therefore, in the case of providing multiple lighting parts indicated in the present embodiment, different colors of light are used. By providing the correspondence table tying attached position of the lighting part and color of light generated by the respective lighting parts, detection of detailed movement of the operator and input can be performed easily." *Id*. at ¶¶ [0050] – [0051] (emphasis added). *See also, id.* at ¶¶ [0039] –[0046] at Tables 1, 2, 3; ¶[0040]; Fig. 2.
Claim 4	
4. The method according to claim 3, wherein the color of the light emitted by the controlling object is automatically selected.	*Hashimoto discloses automatically selecting the color of light to be emitted by the LEDs of the input device.* "However, as in the present embodiment, providing a color-of-light control part that controls the color of light generated enables analysis of the color spectrum, which exists in the background. A color-of-light control part makes a selection of a color, which does not exist in the background, and even if the color exists in the background, the color is very rare. The color-of-light control part communicates this color to the lighting parts. The lighting parts emit this color, which eliminates the influence from the background." *Id.* at ¶ [0053] (emphasis added). *See also, id.* at ¶ [0020], [0044].
Claim 6	
6. The method according to claim 3, wherein the selected color of the emitted light is a least represented color in the scene, out of said at least two alternative colors.	*Hashimoto discloses this limitation*. *See* V.1 Claim 1(e)(i).
Claim 7	
7. The method according to claim 4, wherein said controlling object is automatically	*Hashimoto discloses that the input device is automatically configured to emit light of a selected color.* "However, as in the present embodiment, providing a color-of-light control part that controls the color of light generated enables analysis of the color spectrum, which exists in the background. A color-of-light control part makes a selection of a color, which

configured to emit light of a selected color.	does not exist in the background, and even if the color exists in the background, the color is very rare. The color-of-light control part communicates this color to the lighting parts. The lighting parts emit this color, which eliminates the influence from the background." *Id.* at ¶ [0053] (emphasis added). *See also, id.* at ¶¶ [0020], [0044].
Claim 10	
10. The method according to claim 3, wherein the controlling object is configured to provide input commands.	*Hashimoto discloses that the input device is used to provide input commands to a computer corresponding to movements of an input device manipulated by a user.* "The present invention is related to an input device used for the input of body movement into a computer for operation of equipment etc." *Id*. at ¶ [0001]. "Therefore, an input device with high detection performance, a good interactive user interface, high position detection performance, enables practical input of body movement." *Id*. at ¶ [0022]. *See also, id.* at Abstract, ¶¶ [0030], [0061].
Claim 11	
11. The method according to claim 3, wherein a plurality of controlling objects are tracked concurrently, such that each controlling object emits light in a different color.	*Hashimoto discloses concurrently tracking a plurality of input devices where each input device emits a different color of light. For instance, Hashimoto discloses an embodiment where three input devices are tracked, one in the user's right hand emitting red light, one in the user's left hand emitting green light, and one in on the user's head emitting blue light.* "Fig. 2 shows an input device, describing embodiment 2 of the present invention. In Fig. 2, (201), (202), and (203) are multiple fix in place devices for fixing in place lighting parts (207), (208), and (209). (204) is light control part that controls multiple lighting parts respectively with a control signal. (205) is light receiver, which is an imaging device that receives the light from the multiple lighting parts. (206) is position detection part with communication means for communicating information from light receiver (205) that detects position of the multiple lighting parts based on information from lighting receiver (205). (206) also transfers the results to a target device, and this is the same

	configuration as Fig. 1. The differences from the configuration of Fig. 1 are as follows. Lighting part (207), lighting part (208), and lighting part (209) of which the color of the generated light changes, the light generation part with communication means for communication information from light control part (204) and position detection part (206) and correspondence table (210) that can store a correspondence table of the mounting position and color of generated light such as Table 1. The content of Table 1 is stored in the correspondence table." *Id.* at ¶¶ [0037] – [0038]. 発光No. | 取り付け位置 | 発光色 発光部1 | 右手 | 赤 発光部2 | 左手 | 緑 発光部3 | 頭 | 青 Light No. | Attachment position | Color of light generated Lighting part 1 | Right hand | Red Lighting part 2 | Left hand | Green Lighting part 3 | Head | Blue *Id.* at Table 1. *See id.* at Tables 2, 3; ¶¶ [0040] – [0051].

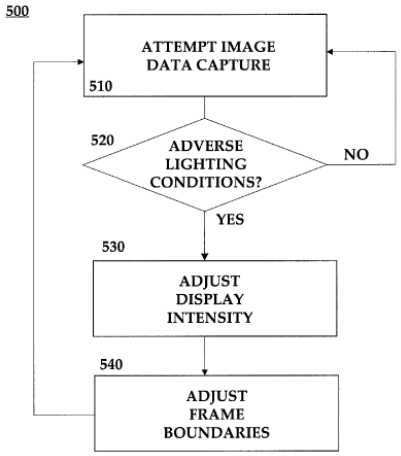
2. Hashimoto in view of Marks '859 Renders Claims 2 and 9 Obvious Under 35 U.S.C. § 103(a)

Like Hashimoto and the '885 Patent, Marks '859 also describes an optical tracking system where user movement is translated into input to "allow user control of or interaction with objects on a graphical display." **Exhibit 1004**, *Marks '859* at 1:26-35. As shown in the figure below, the Marks '859 system includes a camera coupled to a client-computing device. *Id.* at Fig. 1; 3:57-63. As with Hashimoto and the '885 Patent, Marks '859 also teaches tracking the position of specific objects in the field of view of the camera using color data extracted for each pixel in the image of the

background environment. *Compare id.* at 4:8-23 *with* **Ex. 1003**, *Hashimoto Translation,* at ¶¶ [0025] – [0028] and **Ex. 1001**, *'885 Patent*, at 3:47-51.

Marks '859 acknowledges the same problem as Hashimoto and the '885 Patent. Specifically, Marks '859 recognizes that conditions in the background environment can affect object-tracking performance. *Id.* at 1:49-51 ("The output of the devices on graphical displays can be significantly affected by a variety of factors, especially lighting conditions in the user environment."). Marks '859 further recognizes that the conditions of a user's environment can change over time and negatively impact object-tracking performance. *Id.* at 1:51-64; 7:60-8:1; 8:27-35. To solve this problem, Marks '859 suggests "an image capture device whereby the lighting conditions of various user environments can be automatically and dynamically controlled . . . . for lessening the computational burdens of an image processing system coupled to such a device . . . ." *Id.* at 1:65-2:8 (emphasis added). For example, Marks '859 describes an embodiment where the sunlight coming in through a window changes over time (i.e., the sun sets), and the image capture device periodically "re-samples" the scene to detect the change. *Id.* at 9:45-10:10; 11:47-50. Marks '859 teaches that lighting changes can adversely affect the ability of the image capture device to differentiate between colors in the scene. *Id.* at 7:60-8:1. The image capture device uses lighting controls to dynamically adjust the luminescence (i.e., brightness) and/or colors of the lights on the display device to offset background condition changes that negatively

impact the optical tracking processing. *Id.* at 8:32-58; 9:62-10:51; 11:8-24; 11:35-50. A figure illustrating the dynamic adjustment control loop is as follows:



Id. at Fig. 5; *see also, id.* at 13:24-56.

Hashimoto similarly seeks to reduce the amount of processing required to accurately track an object using image recognition techniques for the purpose of providing input to a computer. **Ex. 1003** at Abstract, ¶¶ [0001] – [0013]; [0017]; [0032] – [0033]. Hashimoto also recognizes the affect of the background on position tracking performance and seeks to implement a general-purpose system that will work regardless of the background of the input device. *Id.* at ¶¶ [0014]; [0018]; [0048]; [0052]. As discussed above, Hashimoto discloses configuring the color of the LED on the input device based on an observation of the background scene and a least represented color therein. *Id.* at ¶ [0053]. Marks '859 teaches periodically sampling the background scene for lighting/color changes and making dynamic lighting/color adjustments to improve object tracking when the conditions adversely change. As

such, a person having ordinary skill in the art at the time of the '885 Patent would have recognized that the calibration process described by Hashimoto for selecting the color of the LED on the input device could be combined with the "re-sampling" process described by Marks '859 to arrive at the purported invention of claim 2 wherein the Hashimoto system would "re-sample" the background image and dynamically adjust the LED input light in response to color changes in the background scene.

Upon reading the disclosure of Marks '859, a skilled artisan would have recognized that such a dynamic re-sampling and adjustment would similarly benefit the system described by Hashimoto and result in a further reduction in processing requirements and an increase in position tracking performance. **Ex. 1010** at ¶¶ [13], [16], [17]. A skilled artisan would have also appreciated that this improvement to the Hashimoto system could be achieved by simply configuring the system to perform the already disclosed background color spectrum analysis and LED color update process when environmental lighting/color conditions change as taught by Marks '859. Thus, such a modification would have yielded predictable results without requiring undue experimentation. As is evident from the descriptions above, both Hashimoto and Marks '859 are in the same field of endeavor as the '885 patent and are each therefore analogous to the '885 Patent. *See* **Ex. 1001** at 1:14-17. As such, claims 2 and 9 of the

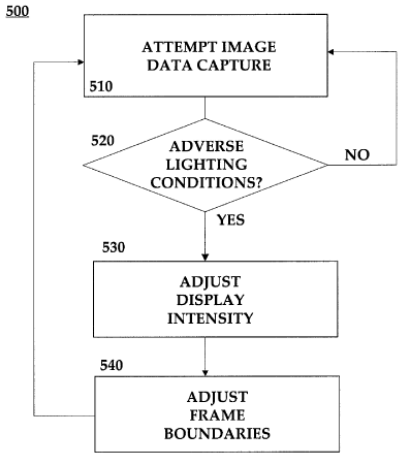
'885 Patent should be rejected and cancelled under § 103(a) as being obvious over Hashimoto in view of Marks '859.

Claim 2	***Obvious over Hashimoto (Exs. 1002 and 1003) in view of Marks '859 (Ex. 1004)***
2. A data processing system for tracking a spatially manipulated controlling object, said system comprising:	*Hashimoto teaches this limitation. See* V.1 Claim 1 Preamble.
[2(a)] a camera;	*Hashimoto teaches this limitation. See* V.1 Claim [1(a)].
[2(b)] a processor operatively coupled to said camera;	*Hashimoto teaches this limitation. See* V.1 Claim [1(b)].
[2(c)] a controlling object designated as an object to be tracked by said processor and arranged to emit light at a specific color such that the specific color is selected from a plurality of alternative colors;	*Hashimoto teaches this limitation. See* V.1 Claim [1(c)].
[2(d)] wherein said camera is arranged to receive said colored light and to further transfer the respective data to the processor,	*Hashimoto teaches this limitation. See* V.1 Claim [1(d)].
[2(e)] wherein said processor is arranged to receive said data from the camera and to track said controlling object in accordance with the selected specific color,	*Hashimoto teaches a position detecting part 105 (i.e. "processor") that receives the image data from the imaging device 104 (i.e., "camera").* "Fig. 1, (101) is lighting part with light emitting element such as a LED, (102) is fix in place device for fixing in place lighting part (101) to the body, (103) is light control part that controls lighting part (101) with a control signal[.] , (104) is light receiver imaging device that receives the light from lighting part (101), (105) is position detection part with communication means to communicate information from light receiver (104) and detects position of lighting part (101) based on information from light receiver (104)." **Ex. 1003** at ¶ [0024] (emphasis added). *The position detecting part 105 tracks the colored light emitted by the input device by analyzing the pixel data corresponding to the colored light captured in the image.*

	"The operator attaches lighting part (101) using the fix in place device (102) to a part of the body such as the hand, and performs input operation. In the case that the operator moves the body, movement of lighting part (101) in conjunction with this movement is captured as an image by light receiver (104). Next, the information captured as an image by light receiver (104) is transferred via communication means provided in position detection part (105). The position of the lighting part, in other words, movement of the operator is detected by position detection part (105). The process performed in position detection part (105) is as follows. First, position detection part (105) detects the position of lighting part (101) from the image captured by light receiver (104). Position detection part (105) performs detection of lighting part (101) without performing image recognition as a conventional method. In other words, through detection of surrounding images (picture), brightness, color (pixel value) that differ greatly with the image captured, detection of lighting part (101) is feasible." *Id*. at ¶¶ [0025] – [0028] (emphasis added).
[2(f)] wherein the processor is configured to automatically select said certain color in accordance with the data received from the camera, and	*Hashimoto teaches an embodiment where, in order to improve tracking performance, the processor performs a calibration process where it automatically analyzes the color spectrum present in the background of the image and selects a color for the LED of the input device that either "does not exist" or "is very rare" in the background image.* "However, as in the present embodiment, providing a color-of-light control part [103] that controls the color of light generated enables analysis of the color spectrum, which exists in the background. A color-of-light control part [103] makes a selection of a color, which does not exist in the background, and even if the color exists in the background, the color is very rare. The color-of-light control part [103] communicates this color to the lighting parts [101]. The lighting parts [101] emit this color, which eliminates the influence from the background. In other words, the lighting part can be uniquely detected. It goes without saying that unique detection and restriction of the lighting part improves the position detection performance of the lighting part." *Id*. at ¶¶ [0053]-[0054] (emphasis added).

[2(g)] wherein the processor is configured to reselect and track light of a new color as a result of a change in color representation in a scene.	*Hashimoto is silent with regard to reselecting a new color for the LED of the input device based on a change in color representation in the background scene. As discussed above, a person having ordinary skill in the art at the time of the '885 Patent would have recognized that the calibration process described by Hashimoto (i.e., id. at ¶¶ [0053]-[0054]) could be combined with the process of dynamically adjusting to changes in environmental lighting/color conditions described by Marks '859 to arrive at the invention of claim 2.* **Ex. 1010** at ¶¶ [13], [16], [17]. *Specifically, Marks '859 teaches a continuous resampling process where every frame of video image data is used to determine if a dynamic lighting adjustment is needed to offset environmental lighting/color conditions negatively impacting the optical tracking processing.* "FIG. 5 illustrates an exemplary method 500 for implementing lighting control of a user environment through varying illumination intensity in a video display device in accordance with one embodiment of the present invention. In step 510 an image capture device may attempt to capture image data from a user environment. In step 520, a determination may be made whether adverse lighting conditions are inhibiting the processing of the image capture data or the actual capture of the data. If there are no adverse conditions present and the image data is captured and processed without incident, image data capture proceeds as necessary followed by subsequent processing of the data. If it is determined in step 520 that adverse lighting conditions do exist, an attempt may be made to adjust display intensity in step 530. This may occur through various adjustments whereby the outer frame area may be 'filled' with a particular color and intensity of light as discussed in the context of FIGS. 3A and 3B and 4A and 4B above. If the adjustment as to display intensity is not sufficient, then (in step 540), frame image boundaries may be enlarged (or reduced as is appropriate) in order to increase or decrease the total amount of artificial light projected into the user environment. While step 540 and the adjustment of frame boundaries is recited as following step 530 and the adjustment of light intensity, this is not to suggest the necessity of a step-by-step

process. Both adjustments may occur concurrently or frame adjustment may occur prior to intensity adjustment in that FIG. 5 is an exemplary embodiment only. Regardless of the order, following the adjustment of image intensity and/or frame boundaries, further attempts at image capture and/or image data processing occur as the method repeats or continues (as is appropriate) in step 510." **Ex. 1004** at 13:24-56 (emphasis added).



Id. at Fig. 5.

"For example, the image capture device 110 and related client device 130 may be in a room with a window in the late afternoon. While there may be sufficient natural light to support image data capture at the time game play commences, as the afternoon continues and the natural light source begins to disappear (i.e., the sun sets), there may be insufficient light for the image capture device 110 to properly continue to capture image data. The outer frame area 320 may, at that point, be illuminated as a white halo to provide the additional light necessary to allow for game play to continue. The intensity of the light, as noted, may be controlled by the client computing device 130 that may be running game software that has been calibrated with the image capture device 110 to determine when the proper amount of light is present to allow for the game to function as intended. In that regard, requisite light settings may be predetermined or calibrated based on the particular game and/or user environment.

As natural light continues to disappear throughout the course of the day, the intensity of the artificial light source emitted from

	the display device 300 may be gradually increased. For example, a dull gray light source in the outer frame area 320 may provide sufficient light at 4.00 PM but a flat white emission may be required from the outer frame area 320 at 6.00 PM. The intensity of the light may also be increased (e.g., the brightness of the light). At some point, the limitations of the video display device 300 may be such that even the most intense white available does not provide sufficient 'artificial light' to allow game play to continue. At that point, the GPU 210 may cause for the size of the inner frame area 310 to decrease and the outer frame area 320 to increase thereby providing additional artificial light (i.e., additional individual pixels in the screen display utilized for illumination purposes versus the display of game data). . . . Particular portions of the outer frame area 320 (or other frame areas in the case of multiple frames surrounding the inner frame area 310) may be subdivided into various sub-sections. Each of those sub-sections may be subject to various lighting controls. For example, the outer frame area 320 may be sub-divided into four quadrants: an upper right, upper left, lower right, and lower left quadrant. Each of those individual quadrants may be subject to various lighting controls (e.g., the upper right and lower left corner of the frame may be illuminated while the upper left and lower right are not). <u>These various controls include color, luminance, and any other condition that may be controlled by the various systems and methods disclosed herein</u>." *Id.* at 9:45-10:51 (emphasis added). "The image capture device, in conjunction with the various lighting controls discussed herein as implemented by various hardware and/or software operations, may then adjust certain user environment lighting conditions through inner frame area 310 and outer frame area 320 lighting manipulations (e.g., size, brightness, orientation, <u>color</u>). During the course of these adjustments, <u>the image capture device 110 may 're-sample' the environment to determine what environmental control condition will allow for a particular operation of a game or chat session in light of the particular environment</u>." *Id*. at 11:14-24 (emphasis added).

	"These calibrations or adjustments may occur at start-up of a game or chat session or may occur dynamically during the session. For example, adjustments may occur automatically during game play or at breaks such as between levels. Adjustments may further occur in response to a user action wherein a query may be made such as during a pause. In some embodiments, a particular frame of data (e.g., an I-frame) may indicate the propriety and need to readjust lighting conditions in the user environment." *Id*. at 11:47-55. *See also, id.* at 7:60-8:58.
Claim 9	
9. The method according to claim 4, wherein the color of the light emitted by the controlling object is reselected in response to the changes in color representation in a scene.	*Hashimoto discloses claim 4. See* V.1 Claim 4. *Additionally, Hashimoto in view of Marks '859 teaches this limitation. See* V.2 Claim [2(g)].

3. Wang in view of Hashimoto Renders Claims 1, 3, 4, 6, 7, 10, and 11 Obvious Under 35 U.S.C. § 103(a)

Wang teaches an optical tracking system used to provide input corresponding to user movements into a video game. *See e.g.*, **Exhibit 1006**, *Wang* at Abstract. Like Hashimoto and the '885 Patent, Wang also teaches a system including a camera coupled to a computing device configured to track the movements of a marking device having at least one colored light source. *Id.* at ¶¶ [0008], [0018]-[0024], [0045]; Figs. 1, 6. As such, Wang is also in the same field of endeavor as the claimed invention and is therefore analogous to the '885 Patent. *See* **Ex. 1001** at 1:14-17.

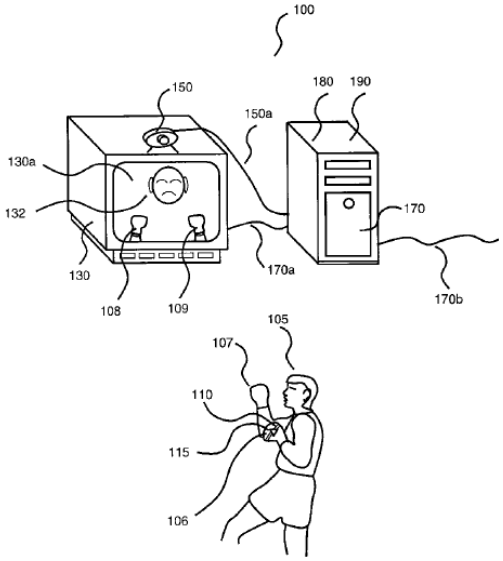
Wang also discloses the same problem as Hashimoto and the '885 Patent. Specifically, Wang recognizes that conditions in the background environment can affect color representation in the scene and negatively impact object-tracking

performance. **Ex. 1006** at ¶[0004], 2:40-48 ("The disadvantage of a passive marker is the fact that they normally require some special high-powered external lighting, and a reasonably controlled lighting environment, which may not be available or suitable to home game players. In addition, the commonly used markers are not selectively reflective. They reflect the color of the light source. That means they usually take the same color as the external lighting.") (emphasis added). Also like Hashimoto, Wang endeavors to create a general-purpose object tracking system that is immune to adverse conditions in the user's home environment and further result in increased object tracking performance. *Id.* at ¶[0025], 9:28-10:3 ("The object and background separation problem in general is regarded as a difficult computer vision problem that is not always easily solvable. However, if the lighting device 115 has been turned on, the light sources, such as light sources 116a, 116b, and 116c in Fig. 3C, will be imaged as bright blobs in video images. Bright blobs are in general very easily detectable and hence quickly separable from a background if the background does not contain any additional bright light sources in similar color, shape and brightness. This assumption is usually not difficult to be satisfied in a home environment. . . . In general, these image feature points take longer to compute than the detection of simple bright blobs generated by a lighting device with several point or area light sources. That means that the object pose estimation using an active marking device with a lighting device, such as lighting device 115, turned on can be performed in

general much faster. This is very important to practical use of this technology.") (emphasis added).

As discussed previously, Hashimoto similarly seeks to reduce the amount of processing required to accurately track an object using image recognition techniques for the purpose of providing input to a computer. **Ex. 1003** at Abstract, ¶¶ [0001] – [0013]; [0017]; [0032] – [0033]. Hashimoto also recognizes the affect of the background on position tracking performance and seeks to implement a general-purpose system that will work regardless of the background of the user. *Id.* at ¶¶ [0014]; [0018]; [0048]; [0052]. As discussed above, Hashimoto discloses configuring the color of the LED on the input device based on an observation of the background scene and a least represented color therein. *Id.* at ¶ [0053]. Upon reading the disclosure of Hashimoto, a skilled artisan would have recognized that the system taught by Wang would further benefit from the color configuration process taught by Hashimoto and result in increased object tracking performance and reduced processing requirements. **Ex. 1010** at ¶¶ [15], [16], [18]. Additionally, a skilled artisan would have enjoyed a reasonable expectation of success in using a known technique to improve a similar device in the same way. As such, claims 1, 3, 4, 6, 7, 10, and 11 of the '885 Patent should be rejected and cancelled under § 103(a) as being obvious over Wang in view of Hashimoto.

Claim 1	***Obvious over Wang (Ex. 1006) in view of Hashimoto (Exs. 1002 and 1003)***

1. A data processing system for tracking a spatially manipulated controlling object, said system comprising:	*Wang teaches a system for tracking the movements of a marking device (i.e., "controlling object") that is spatially manipulated by a user.* "For embodiments of the present invention, such as for the boxing game or the enhanced dancing pad game, the markers with different colors can help quickly distinguish the movement from the left or the right hand. In addition, only a few markers are needed in targeted applications of the present invention, such as the boxing or an enhanced dancing pad game. Therefore, it is preferable for embodiments of the present invention to use active markers with different colors or shapes for tracking the movements of different body parts, such as a person's left or right fist or hand." **Ex. 1006** at ¶ [0008], 3:26-36 (emphasis added).  *Id.* at Fig. 1. *See also, id.* at ¶ [0005], Fig, 6.
[1(a)] a camera;	*Wang teaches a camera 150.* "Fig. 1 shows an apparatus 100 comprised of a marking device 110 that is attached to a human body part, such as a fist 106, in this case the left fist, of a live human boxing video game player 105, a screen device 130, a video camera 150, and a computing device 170. The computing device 170 may be a personal computer or a game console machine. The screen device 130 is electrically connected to the computing device 170 by communications line 170a. The video camera 150 is electrically

	connected to the computing device 170 by communications line 150a." *Id.* at ¶ [0021] (emphasis added). *See also, id.* at Figs. 1, 6; ¶¶ [0020], [0045].
[1(b)] a processor operatively coupled to said camera;	*Wang teaches a computing device 170 with a processor operatively coupled to the camera 150 via a wired or wireless interface 150a.* "The present invention in one or more embodiments provides a solution that can make boxing, dancing video games, or other action or movement video games, much more realistic on computers or similar devices, such as the PLAYSTATION (trademarked) from SONY (trademarked), that contain at least one processor, a memory device and/or a storage device, a monitor or a display screen, such as a television set, a low cost video camera, and some input devices, such as a game pad, and/or joysticks." *Id.* at ¶ [0018], 7:2-12 (emphasis added). "Fig. 1 shows an apparatus 100 comprised of a marking device 110 that is attached to a human body part, such as a fist 106, in this case the left fist, of a live human boxing video game player 105, a screen device 130, a video camera 150, and a computing device 170. The computing device 170 may be a personal computer or a game console machine. The screen device 130 is electrically connected to the computing device 170 by communications line 170a. The video camera 150 is electrically connected to the computing device 170 by communications line 150a. The communications lines 150a and 170a may be comprised of wireless connections, hardwired connections, optical connections, software connections, or any other known communication connections." *Id.* at ¶ [0021], 7:2-16 (emphasis added). *See also, id.* at Figs. 1, 6; ¶¶ [0024], [0045].
[1(c)] a controlling object designated as an object to be tracked by said processor and arranged to emit	*Wang teaches that the computing device designates at least one marking device 110 as the object to be tracked. The marking device includes at least one lighting device 115, such as an LED, arranged to emit a specific color of light.* "The marking device 110 includes a lighting device 115. The lighting device 115 may be comprised of one or multiple light

light at a specific color such that the specific color is selected from a plurality of alternative colors;	sources. . . . The video camera 150 may be used to capture video images from the marking device 110 with the lighting device 115 turned on. The video camera 150 may be mounted onto the screen device 130. The computing device 170 may be comprised of a pose determination device 180, which may be comprised of computer software, which is part of and is running on the computing device 170. The pose determination device 180 may determine the pose of the fist 106 of the boxing game player 105 via the marking device 110. The pose information of the real fist 106 of the game player 105 is then passed to computer game software 190 running on computing device 170 that controls the pose of a virtual fist in the boxing video game. . . . The light from the lighting device 115 is usually non-directional so that the light can be observed from a large range of directions. For this reason, the light source which makes us the lighting device 115 may be typically comprised of a plurality small light bulbs or small LEDs (Light Emitting Diodes). . . . The computing device 170 is also responsible for running the boxing video game computer software program 190, which may be comprised of computer software, that displays visual target objects to be hit at on the screen 130a and reacts accordingly depending on whether a visual target object has been hit or not by a virtual fist, such as fist 108, of a virtual boxer representing a real live boxing game player such as player 105." *Id.* at ¶¶ [0022] – [0023], 7:2-8:5 (emphasis added). "For embodiments of the present invention, . . . the markers with different colors can help quickly distinguish the movement from the left or the right hand. In addition, only a few markers are needed in targeted applications of the present invention, such as the boxing or an enhanced dancing pad game. Therefore, it is preferable for embodiments of the present invention to use active markers with different colors or shapes for tracking the movements of different body parts, such as a person's left or right fist or hand. Active markers are defined as markers which have their own internal light sources so that no external lighting is necessary to make them shine." *Id.* at ¶ [0008], 3:26-39 (emphasis added). "In at least one embodiment of the present invention the

	apparatus is comprised of at least two marking devices. Each of the light sources of the first marking device may emit light of a first color and each of the light sources of the second marking device may emit light of a second color, wherein the first color and the second color are different." *Id.* at ¶ [0010], 3:55-4:3 (emphasis added). "After the pose (position and orientation) of the lighting device, such as one of lighting devices 115, 115a, 115b, or 115c of a marking device, such as marking devices 110, 110a, 110b, or 110c, respectively, is determined by the computing device 170 at step 550, the computing device 170 takes the pose information of the marking device from step 550 and passes the pose information to the video game software 190, also running on the computing device 170." *Id.* at ¶ [0039], 14:44-52. *See also, id.* at ¶¶ [0016], [0019], [0024]-[0025], [0027]-[0034], [0038], [0041]; Figs. 3A-3H, 4, 5, 7A, 9A, 10. *The color of light may be selected from a plurality of colors, including red, yellow, and green.* "A lighting device may in general also contain both area and point light sources in a mixed way. One lighting device may for example be comprised of a polygonal shaped area light source in one color but with an additional one point light source in another color located in the center of a polygonal shaped area light source. Such a lighting device may in general be localized more robustly, because such a color combination is more easily to be seen and is also more unique in space. This is especially useful when the background in which the game player is playing contains other light sources. For example, if only one area light source in red color is used by the lighting device, and there are some other light sources in the background having similar red colors, then a detection algorithm may be confused by those additional light sources in the background. Now if a combination of red area light source and a yellow point light source is used by a lighting device, the detection algorithm will not be confused by the same red light sources in background because it can check if a localized red blob contains actually a small yellow blob. By doing so, the background light sources can easily be

	distinguished from the light of an actual lighting device the system is looking for. Similarly, unique color combinations can also help if more than one lighting device are used. For example, one may use a lighting device with a red area light source and a green area light source for his/her left and right fist, respectively. Both lighting devices may contain in addition also a yellow point light source at the center of the area light sources. These two unique color combinations, namely red with yellow and green with yellow, can easily be distinguished by the system for separating signals from both fists and at the same time not easily be confused by additional red and green light sources in the background." *Id.* at ¶ [0035], 12:23-57 (emphasis added). *See also*, *id.* at ¶ [0040].
[1(d)] wherein said camera is arranged to receive said colored light and to further transfer the respective data to the processor,	*The camera receives the colored light and transfers the image data to the computing device.* "The game player 105 uses his/her fist, such as fist 106, with the marking device 110 to control the movement of the virtual fist 108 to hit at the displayed target objects, such as target object 132 provided by the video boxing game 190 on the screen 130a. The lighting device 115 on the marking device 110 has to be turned on, before the game player 105 starts a game. The lighting device 115 is rigidly mounted on or integrated within the marking device 110. The video camera 150 placed on top of the screen device 130 captures video images from the lighting device 115 and sends the video images through communications line 150a to the computing device 170. The video camera 150 may also be placed elsewhere as long as the video camera 150 is facing the game player 105 and it is near the screen device 130. Typical and common examples of the communications line 150a are the Universal Serial Bus (USB) cable version 1.1 and 2.0, or cables made according to the IEEE (Institute of Electrical and Electronics Engineers) 1394 standard, such as the FIREWIRE (Trademarked) and the ILINK (Trademarked and copyrighted). A pose determination device 180 running on the computing device 170 then processes the captured video images." *Id.* at ¶ [0024], 8:41-9:5 (emphasis added). *See also, id.* at ¶¶ [0020], [0022], [0038]; Figs. 4-5.
[1(e)] wherein	*Wang teaches that the computing device receives the video image*

said processor is arranged to receive said data from the camera, and	*data from the camera.* "The game player 105 uses his/her fist, such as fist 106, with the marking device 110 to control the movement of the virtual fist 108 to hit at the displayed target objects, such as target object 132 provided by the video boxing game 190 on the screen 130a. The lighting device 115 on the marking device 110 has to be turned on, before the game player 105 starts a game. The lighting device 115 is rigidly mounted on or integrated within the marking device 110. The video camera 150 placed on top of the screen device 130 captures video images from the lighting device 115 and sends the video images through communications line 150a to the computing device 170. The video camera 150 may also be placed elsewhere as long as the video camera 150 is facing the game player 105 and it is near the screen device 130. Typical and common examples of the communications line 150a are the Universal Serial Bus (USB) cable version 1.1 and 2.0, or cables made according to the IEEE (Institute of Electrical and Electronics Engineers) 1394 standard, such as the FIREWIRE (Trademarked) and the ILINK (Trademarked and copyrighted). A pose determination device 180 running on the computing device 170 then processes the captured video images." *Id.* at ¶ [0024] , 8:41-9:5 (emphasis added). *See also, id.* at ¶¶ [0020], [0022].
[1(e)(i)] wherein the selected color of the emitted light is a least represented color in the scene, out of said at least two alternative colors.	*Wang teaches using unique combinations of colored lights to distinguish the marking device from the background scene and reduce optical tracking processing.* "A lighting device may in general also contain both area and point light sources in a mixed way. One lighting device may for example be comprised of a polygonal shaped area light source in one color but with an additional one point light source in another color located in the center of a polygonal shaped area light source. Such a lighting device may in general be localized more robustly, because such a color combination is more easily to be seen and is also more unique in space. This is especially useful when the background in which the game player is playing contains other light sources. For example, if only one area light source in red color is used by the lighting device, and there are some other light sources in the background having similar red colors, then a detection algorithm may be confused by those additional light

	sources in the background. Now if a combination of red area light source and a yellow point light source is used by a lighting device, the detection algorithm will not be confused by the same red light sources in background because it can check if a localized red blob contains actually a small yellow blob. By doing so, the background light sources can easily be distinguished from the light of an actual lighting device the system is looking for." *Id.* at ¶ [0035], 12:23-45. *Hashimoto teaches an embodiment where, in order to improve tracking performance, the system analyzes the color spectrum present in the background of an image and selects a color for the LED of an input device that either "does not exist" or "is very rare" in the background surrounding an input device. As discussed above, it would have been obvious to a person having ordinary skill in the art at the time of the '885 Patent to modify the system described by Wang to perform the background color spectrum analysis and color selection process taught by Hashimoto in order to achieve increased position detection performance and reduced processing.* "However, as in the present embodiment, providing a color-of-light control part that controls the color of light generated enables analysis of the color spectrum, which exists in the background. A color-of-light control part makes a selection of a color, which does not exist in the background, and even if the color exists in the background, the color is very rare. The color-of-light control part communicates this color to the lighting parts. The lighting parts emit this color, which eliminates the influence from the background. In other words, the lighting part can be uniquely detected. It goes without saying that unique detection and restriction of the lighting part improves the position detection performance of the lighting part." **Ex. 1003** at ¶¶ [0053]-[0054] (emphasis added).
Claim 3	
3. A method of tracking a controlling object, said method	*Wang teaches a method of tracking the position and orientation of a marking device (i.e., "controlling object").* "After the pose (position and orientation) of the lighting device, such as one of lighting devices 115, 115a, 115b, or 115c of a

comprising:	marking device, such as marking devices 110, 110a, 110b, or 110c, respectively, is determined by the computing device 170 at step 550, the computing device 170 takes the pose information of the marking device from step 550 and passes the pose information to the video game software 190, also running on the computing device 170." **Ex. 1006** at ¶ [0039], 14:44-52. *See also, id.* at Abstract.
[3(a)] receiving a colored light indicative of the spatial location of the controlling object;	*Wang teaches a camera 150 coupled to a computing device 170 for receiving colored light indicative of position and orientation (i.e., "spatial location") of the marking device.* "For embodiments of the present invention, . . . the markers with different colors can help quickly distinguish the movement from the left or the right hand. In addition, only a few markers are needed in targeted applications of the present invention, such as the boxing or an enhanced dancing pad game. Therefore, it is preferable for embodiments of the present invention to use active markers with different colors or shapes for tracking the movements of different body parts, such as a person's left or right fist or hand. Active markers are defined as markers which have their own internal light sources so that no external lighting is necessary to make them shine." *Id.* at ¶ [0008], 3:26-39 (emphasis added). "The game player 105 uses his/her fist, such as fist 106, with the marking device 110 to control the movement of the virtual fist 108 to hit at the displayed target objects, such as target object 132 provided by the video boxing game 190 on the screen 130a. The lighting device 115 on the marking device 110 has to be turned on, before the game player 105 starts a game. The lighting device 115 is rigidly mounted on or integrated within the marking device 110. The video camera 150 placed on top of the screen device 130 captures video images from the lighting device 115 and sends the video images through communications line 150a to the computing device 170. The video camera 150 may also be placed elsewhere as long as the video camera 150 is facing the game player 105 and it is near the screen device 130. Typical and common examples of the communications line 150a are the Universal Serial Bus (USB) cable version 1.1 and 2.0, or cables made according to the IEEE (Institute of Electrical and Electronics Engineers) 1394 standard,

	such as the FIREWIRE (Trademarked) and the ILINK (Trademarked and copyrighted). A pose determination device 180 running on the computing device 170 then processes the captured video images." *Id.* at ¶ [0024], 8:41-9:5 (emphasis added). *See also, id.* at ¶¶ [0010], [0035], [0039].
[3(b)] configuring the controlling object to emit a light with specific color, wherein the specific color is selected from a plurality of alternative colors, and wherein the selection complies with data received by the controlling object and pertaining to the optical characteristics of the background surrounding the controlling object;	*Hashimoto discloses a processor receiving an image of the input device and the background surrounding the input device from an imaging device (i.e., "camera"), which receives light. The processor of Hashimoto selects a specific color, selected from a plurlaity of alternative colors (e.g., red, blue, green, and yellow), in response to an analysis of the color spectrum (i.e., "optical characteristics") present in the background surrounding the input device. The selected color is communicated to the input device, which is configured to emit light of the specific selected color. Thus, the controlling object receives data identifying a color that is in agreement with the selection. Stated differently, the selection complies with the data received by the controlling object. See* V.1 Claim [3(b)]. *As described above, it would have been obvious to a person having ordinary skill in the art at the time of the '885 Patent to modify the method embodied in Wang to include the background color spectrum analysis taught by Hashimoto to arrive at the purported invention of claim 3.*
[3(c)] tracking the controlling object, based upon the selected specific color.	*Wang teaches tracking the position and orientation of the marking device based on at least one selected color.* "In at least one embodiment of the present invention the apparatus is comprised of at least two marking devices. Each of the light sources of the first marking device may emit light of a first color and each of the light sources of the second marking device may emit light of a second color, wherein the first color and the second color are different." **Ex. 1006** at ¶ [0010], 3:55-4:3 (emphasis added). "A lighting device may in general also contain both area and point light sources in a mixed way. One lighting device may for example be comprised of a polygonal shaped area light source in one color but with an additional one point light source in another

	color located in the center of a polygonal shaped area light source. Such a lighting device may in general be localized more robustly, because such a color combination is more easily to be seen and is also more unique in space. This is especially useful when the background in which the game player is playing contains other light sources. For example, if only one area light source in red color is used by the lighting device, and there are some other light sources in the background having similar red colors, then a detection algorithm may be confused by those additional light sources in the background. Now if a combination of red area light source and a yellow point light source is used by a lighting device, the detection algorithm will not be confused by the same red light sources in background because it can check if a localized red blob contains actually a small yellow blob. By doing so, the background light sources can easily be distinguished from the light of an actual lighting device the system is looking for." *Id.* at ¶ [0035], 12:22-45. "After the pose (position and orientation) of the lighting device, such as one of lighting devices 115, 115a, 115b, or 115c of a marking device, such as marking devices 110, 110a, 110b, or 110c, respectively, is determined by the computing device 170 at step 550, the computing device 170 takes the pose information of the marking device from step 550 and passes the pose information to the video game software 190, also running on the computing device 170." *Id.* at ¶ [0039], 14:44-52.
Claim 4	
4. The method according to claim 3, wherein the color of the light emitted by the controlling object is automatically selected.	*Wang in view of Hashimoto renders claim 3 obvious. Additionally, Hashimoto teaches this limitation. See* V.1 at Claim 4.
Claim 6	
6. The method according to claim 3, wherein the selected color of the emitted light is a least represented color in the scene, out of said at least two alternative colors.	*Wang in view of Hashimoto renders claim 3 obvious. Additionally, Hashimoto teaches this limitation. See* V.1 at Claim 6.
Claim 7	
7. The method according to claim 4, wherein said controlling object is automatically configured to emit light of a	*Wang in view of Hashimoto renders claim 4 obvious. Additionally, Hashimoto teaches this limitation. See*

selected color.	V.1 at Claim 7.
Claim 10	
10. The method according to claim 3, wherein the controlling object is configured to provide input commands.	*Wang in view of Hashimoto renders claim 3 obvious. Additionally, Hashimoto teaches this limitation. See* V.1 at Claim 10.
Claim 11	
11. The method according to claim 3, wherein a plurality of controlling objects are tracked concurrently, such that each controlling object emits light in a different color.	*Wang in view of Hashimoto renders claim 3 obvious. Additionally, Hashimoto teaches this limitation. See* V.1 at Claim 11.

4. Hashimoto in view of Marks '126 Renders Claims 5 and 8 Obvious Under 35 U.S.C. § 103(a)

Marks '126 describes an optical controller tracking system where user movement and manual manipulations of the controller are translated into input "allowing user 108 to manipulate objects 114 (e.g., cursors, drawings, windows, menus, etc.) of [a] program." **Exhibit 1007**, *Marks '126* at 5:45-49. Like the '885 Patent and Hashimoto, the Marks '126 system also includes a camera coupled to a client-computing device tracking the controller's location using color data in the image of the environment. *See e.g., id.* at 4:61-5:22; 7:15-65; Figs. 4, 13A. As such, Marks '126 is in the same field of endeavor as the claimed invention and is therefore analogous to the '885 Patent. *See* **Ex. 1001** at 1:14-17.

Marks '126 discloses the same problem as Hashimoto and the '885 Patent. Specifically, Marks '126 states that the problem being addressed is that of "extracting precisely only those pixels of a video image that correspond unambiguously" to the tracked controller. **Ex. 1007** at 1:49-53. Also like the '885 Patent and Hashimoto,

Marks '129 teaches solving this problem by using a controller including at least one light-emitting portion emitting colored light. *Id.* at 10:13-18; 12:4-18; 15:37-45.

As discussed previously, Hashimoto teaches a system where the color of the LED light on the input device is automatically selected, and the input device is then automatically configured to emit the selected color of light. *See* V.1. Unlike Hashimoto, the controller taught by Marks '129 must be manually configured by the user to emit a selected color of light. *See e.g.*, **Ex. 1007** at 10:13-18; 12:4-18; 15:37-45. A person having ordinary skill in the art at the time of the '885 Patent would have recognized two distinct design choices for selecting and configuring the a controller in optical tracking systems as described by Hashimoto and Marks '129 – namely, automatic as taught by Hashimoto and manual as taught by Marks '129. **Ex. 1010** at ¶¶ [16], [19]. As such, it would have been obvious to try to implement a manual controller configuration for the system taught by Hashimoto to predictably reduce system complexity and costs. *Id*. A skilled artisan would have enjoyed a reasonable expectation of success since such a modification would have reduced the complexity of the Hashimoto system. As such, claims 5 and 8 of the '885 Patent should be rejected under § 103(a) as being obvious over Hashimoto in view of Marks '126.

Claim 5	***Obvious over Hashimoto (Exs. 1002 and 1003) in view of Marks '126 (Ex. 1007)***
5. The method according to claim 3, wherein the color of light	*Hashimoto discloses claim 3. See V.1 Claim 3. Additionally, Marks '0126 teaches that the color of light emitted by the controlling object can be manually selected by a user. For instance, the user can manually select a color for the controller*

emitted by the controlling object is manually selected by a user.	*corresponding to a command to select an item displayed on a screen.* "For instance, as shown in FIG. 8A, object 704 has a particular color. However, as shown in FIG. 8B, when button 710 is pressed, the button triggers object 704 to change to a different color. In one embodiment, color changes may be facilitated by the inclusion of a colored light source (e.g., light-emitting diode (LED) light) within object 704. The color of object 704 changes when the colored light source is triggered to emit a colored light within the object." **Ex. 1007** at 10:13-20 (emphasis added). "In one embodiment, object 1112 may be a spheroid of translucent plastic material allowing an illuminating means within object 1112 to illuminate object 1112. Using multi-color and/or modulating LED devices, object 1112 can be illuminated to varying degrees of brightness and to different colors depending on data received from game controller 1102 or associated computing device (wired or wireless). A circuit (FIG. 15) may be positioned within object 1112, connector 1114, post 1110, or along different sections of the controller 1102, connector 1114 or post 1110. In one embodiment, the circuit interprets received data and powers the illuminators with appropriate voltages to generate the desired color and brightness." *Id.* at 12:4-16 (emphasis added). "That is, interface object 112 may have a distinct color and distinct shape capable of being detected when in the field of view of image capture device 104. A hand holding interface object 112 may move the interface object along any X, Y, and Z direction relative to image capture device 104. Additionally, the color of interface object 112 may be changed. Image capture device 104 can detect these changes in position and color, and these detected changes are communicated to computing system 102, which in turn result in interfacing commands being triggered on programs executed on the computing system and displayed on display 106. For example, interface object 112 can be used similar to a mouse such that an object such as image 604 or point 602 displayed on display 106 can be selected, accessed, and moved around. In one embodiment, the change in color of interface object 112 triggers an interfacing command

	comparable to a mouse click which causes objects, such as image 604 and point 602, displayed on display 106 to be selected." *Id.* at 15:63-16:13 (emphasis added). *See also, id.* at 15:37-45; Fig. 8B.
Claim 8	
8. The method according to claim 4, wherein the controlling object is manually configures [sic] to emit light of a selected color.	*Hashimoto discloses claim 4. See* V.1 Claim 4. *Additionally, Marks '126 teaches that the controlling object can be manually configured to emit light of a selected color.* "For instance, as shown in FIG. 8A, object 704 has a particular color. However, as shown in FIG. 8B, when button 710 is pressed, the button triggers object 704 to change to a different color. In one embodiment, color changes may be facilitated by the inclusion of a colored light source (e.g., light-emitting diode (LED) light) within object 704. The color of object 704 changes when the colored light source is triggered to emit a colored light within the object." **Ex. 1007** at 10:13-20 (emphasis added). "In one embodiment, object 1112 may be a spheroid of translucent plastic material allowing an illuminating means within object 1112 to illuminate object 1112. Using multi-color and/or modulating LED devices, object 1112 can be illuminated to varying degrees of brightness and to different colors depending on data received from game controller 1102 or associated computing device (wired or wireless). A circuit (FIG. 15) may be positioned within object 1112, connector 1114, post 1110, or along different sections of the controller 1102, connector 1114 or post 1110. In one embodiment, the circuit interprets received data and powers the illuminators with appropriate voltages to generate the desired color and brightness." *Id.* at 12:4-16 (emphasis added). "Additionally, the color of interface object 112 may be changed. Image capture device 104 can detect these changes in position and color, and these detected changes are communicated to computing system 102, which in turn result in interfacing commands being triggered on programs executed on the computing system and displayed on display 106. For example, interface object 112 can be used similar to a mouse such that an object such as image 604 or point 602 displayed on

	display 106 can be selected, accessed, and moved around. In one embodiment, the change in color of interface object 112 triggers an interfacing command comparable to a mouse click which causes objects, such as image 604 and point 602, displayed on display 106 to be selected." *Id.* at 16:1-13 (emphasis added). *See also, id.* at 15:37-45; Fig. 8B.

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

A. Real Party-In-Interest and Related Matters

Petitioner is the real party-in-interest. 37 C.F.R. § 42.8(b)(1). In addition to Petitioner, another Sony entity—Sony Corporation of America—is also a real party-in-interest. The '885 Patent is presently the subject of a patent infringement lawsuit filed on August 5, 2013 by Game Controller Technology LLC against Petitioner and Sony Corporation of America in the United States District Court for the Southern District of Florida Case No. 1:13-cv-22795-CMA, entitled *Game Controller Technology LLC v. Sony Computer Entertainment America LLC, et al*. 37 C.F.R. § 42.8(b)(2).

B. Lead and Back-Up Counsel Under 37 C.F.R. § 42.8(b)(3)

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). Service of any documents via hand-delivery may be made at the postal mailing address of the lead or back-up counsel. 37 C.F.R. § 42.8(b)(4).

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C. Payment of Fees Under 37 C.F.R. § 42.103

The undersigned submitted payment by deposit account with the filing of this Petition authorizing the Office to charge $23,000.00. 37 C.F.R. § 42.103.

VII. CONCLUSION

For the forgoing reasons, Petitioner respectfully requests *inter partes* review of claims 1-11 of U.S. Patent No. 8,094,885.

Respectfully submitted,
ERISE IP, P.A.

BY: /*Eric A. Buresh*/_____
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ATTORNEYS FOR PETITIONER

APPENDIX OF EXHIBITS

Exhibit 1001	U.S. Patent No. 8,094,885 to Tanne
Exhibit 1002	Japanese Unexamined Patent Application Publication No. H07-244557 to Hashimoto
Exhibit 1003	Certified English Translation of JP H07-244557 to Hashimoto
Exhibit 1004	U.S. Patent No. 7,965,859 to Marks
Exhibit 1005	U.S. Provisional Patent Application No. 60/798,112
Exhibit 1006	European Patent Application No. EP 1 402 929 A1 to Wang
Exhibit 1007	U.S. Patent No. 8,062,126 to Marks et al.
Exhibit 1008	U.S. Provisional Patent Application No. 60/730,659
Exhibit 1009	File History of U.S. Patent No. 8,094,885
Exhibit 1010	Declaration of Dr. Gregory F. Welch
Exhibit 1011	Curriculum Vitae of Dr. Gregory F. Welch
Exhibit 1012	G. F. Welch, SCAAT: Incremental Tracking with Incomplete Information. PhD thesis, University of North Carolina at Chapel Hill, Chapel Hill, NC, 1996.
Exhibit 1013	G. Welch and G. Bishop, "SCAAT: Incremental tracking with incomplete information in places," in Computer Graphics (T. Whitted, ed.), Annual Conference on Computer Graphics & Interactive Techniques, pp. 333–344, Los Angeles, CA, USA (August 3-8): ACM Press, SIGGRAPH 97 conference proceedings ed., 1997.
Exhibit 1014	G. Welch, G. Bishop, L. Vicci, S. Brumback, K. Keller, and D. Colucci, "The HiBall tracker: High- performance wide-area tracking for virtual and augmented environments," in Proceedings of the ACM Symposium on Virtual Reality Software and Technology (VRST), pp. 1–11, Association of Computing Machinery, ACM Press, Addison-Wesley Publishing Company, December 1999.
Exhibit 1015	G. Welch, G. Bishop, L. Vicci, S. Brumback, K. Keller, and D. Colucci, "High-performance wide-area optical tracking: The HiBall Tracking System," Presence: Teleoperators and Virtual Environments, vol. 10, no. 1, pp. 1–21, 2001.
Exhibit 1016	B. D. Allen, G. Bishop, and G. Welch, "Tracking: Beyond 15 minutes of thought: SIGGRAPH 2001 course 11," in Computer Graphics, Annual Conference on Computer Graphics & Interactive Techniques, Los Angeles, CA, USA (August 12-17): ACM Press, Addison-Wesley, SIGGRAPH 2001 course pack ed., 2001.

Exhibit 1017	G. Welch, "History: The use of the Kalman filter for human motion tracking in virtual reality," Presence: Teleoperators and Virtual Environments, vol. 18, no. 1, 2009.
Exhibit 1018	G. Welch and E. Foxlin, "Motion tracking: No silver bullet, but a respectable arsenal," IEEE Computer Graphics Applications, vol. 22, no. 6, pp. 24–38, 2002.
Exhibit 1019	G. Welch and G. Bishop, "An introduction to the Kalman filter," Tech. Rep. TR95-041, University of North Carolina at Chapel Hill, Department of Computer Science, 1995.
Exhibit 1020	H. J. Woltring, "New possibilities for human motion studies by real-time light spot position measurement," Biotelemetry, vol. 1, pp. 132–146, 1974.
Exhibit 1021	D. Caspi, N. Kiryati, and J. Shamir, "Range imaging with adaptive color structured light," Pattern Analysis and Machine Intelligence, IEEE Transactions on, vol. 20, no. 5, pp. 470–480, 1998.
Exhibit 1022	Y. Kishino, M. Tsukamoto, Y. Sakane, and S. Nishio, "Realizing a visual marker using leds for wearable computing environment," in Distributed Computing Systems Workshops, 2003. Proceedings. 23rd International Conference on, pp. 314–319, IEEE, 2003.
Exhibit 1023	Excerpts from Merriam-Webster's Dictionary and Thesaurus, 2006.

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

Pursuant to 37 C.F.R. §§ 42.6(e) and 42.105(b), the undersigned certifies that on October 22, 2013, a complete and entire copy of this Petition for *Inter Partes* Review including exhibits was provided via US Express Mail to the Patent Owner by serving the correspondence address of record for the '885 Patent and Patent Owner's litigation counsel:

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